DRAFT EIA

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLAN

PROPOSAL FOR ENHANCEMENT THE PRODUCTION CAPACITY OF BILLET FROM 24000 TPA TO 84,000 TPA BY ADDITIONAL INSTALLATION OF 2X10 T CAPACITY IF AND 280 TPD ROLLING MILL WITHIN ITS EXISTING PLANT

AT VILL: SARPI, P.O. & P.S.- FARIDPUR, DIST: PASCHIM BARDHAMAN, WEST BENGAL

CATEGORY OF PROJECT: B

PROPOSAL NO: SW/101529/2019

BASELINE MONITORING PERIOD: OCTOBER TO DECEMBER 2021

LABORATORY USED: KALYANI LABORATORIES PRIVATE LIMITED, BHUBANESWAR

PROJECT PROPOSED BY

M/s. NEPTUNE ISPAT PVT. LIMITED

ENVIRONMENT CONSULTANT:

KALYANI LABORATORIES PVT.LTD.

PLOT NO. 78/944, MILLENIUM CITY, NEAR NISSAN SHOW ROOM, PAHALA, BHUBANESWAR - 752101

e-mail: kalyanilab@yahoo.co.in

NABET CERT. NO: NABET/EIA /2023/SA 0149, DT. 02.03.2023

Document No. :KLPL-EIA(IND)A-2022-07		Document Name: EIA/EMP REPORT FOR PROPOSED EXPANSION PROJECT OF M/S NEPTUNE ISPAT PVT. LTD.	
Issue. No.: 02	Date: 05.03.2022	Copy No.: 01	Copy Holders Name: -

AMENDMENT PAGE
(F-0103)

SL	Page No.	Section / Clause / para / Line (as Applicable	Date of Amendment	Amendment Made	Reasons of amendment	Signature of Person Authorizing Amendment
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ACKNOWLEDGEMENT

M/s Kalyani Laboratories Private Limited, Bhubaneswar is very much thankful to M/s Neptune Ispat Private Limited for the confidence and trust placed on the organization for carrying out Environmental Impact Assessment (EIA) study For Enhancement the production of Billet from 24000 TPA to 84,000 TPA by additional installation of 2x10 T capacity IF and installation of rolling mill of 84,000 TPA within its existing plant at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal and formulating the Environmental Management Plan (EMP).

We also gratefully acknowledge the cooperation and assistance provided by concerned government authorities for collection of secondary information for the preparation of EIA/ EMP report.

Our sincere thanks to the local people of Sarpi and Paschim Bardhaman area for their whole hearted cooperation and constant involvement during the entire field study without which the study would not have been possible.

UNDERTAKING

In Line with MoEF OM no. J – 11013/41/2006-IA.II (I) dated 5th October 2011, we hereby give our undertaking for owning the content and information provided in the EIA/EMP report prepared for Environment Clearance of the proposed expansion of M/s Neptune IspatPrivate Limited, Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal.

For M/s Neptune IspatPrivate Limited

UNDERTAKING

In Line with MoEF OM no. J – 11013/41/2006-IA.II (I) dated 4th Aug. 2009, we hereby confirm that all Terms of Reference issued by SEAC, West Bengal vide letter no. 911 -2N-58/2019(E) dated 22.11.2019 preparation of EIA/EMP report for EC of the proposed Enhancement the production capacity of Billet from 24000 TPA to 84,000 TPA by additional installation of 2x10 T capacity IF and installation of rolling mill of 84,000 TPA within its existing plantatVillage - Sarpi, P.O &P.S. - Faridpur, District – Paschim Bardhaman, West Bengal of M/s Neptune Ispat Private Limited as been complied with and data provided in the EIA/EMP report is factually correct.

The EIA/EMP report has been prepared by M/s Kalyani Laboratories Pvt. Ltd. (KLPL), Bhubaneswar. KLPL is a NABET accredited consultant for preparation of EIA/EMP report of Metallurgical industry vide certificate no. NABET/EIA/2023/SA 0149 dated 02.03.2023.

Kalyani Laboratories Pvt. Ltd. BBSR

5/3/22

Name: Dr. D. Biswal

EIA Co-ordinator (Metallurgical Industry)

Kalyani Laboratories Pvt. Ltd.

Declaration by Experts contributing to the EIA EMP reportprepared for Environment Clearance of the proposed expansion of M/s Neptune Ispat Private Limited, Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal.

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator:

Name: Dr.Debasis Biswal

Signature and Date: 5/3/22

Kalyani Laboratories Pvt. Ltd. BBSR

Period of involvement: July 2019 to December 2019 and October 2021 to March 2022

Contact information: Kalyani Laboratories Private Limited, Plot No.: 78/944, Millenium City, Pahala, Bhubaneswar

Functional area experts:

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	Dr. Rekha Nayak	July 2019 to December 2019, October 2021 to March 2022 Assessment of existing air quality, Impact of the project on ambient air, Suggested mitigation measures for air pollution	Rekha Nayak 5/3/2022
2	WP*	Dr. Rekha Nayak	October 2021 to March 2022 Assessment of existing water quality, Impact of the project on surface and ground water quality,	Rekha Nayak 5/3/2022

			Suggested mitigation measures for minimizing the impact	
3	ISW/HW	Dr. Debasis Biswal	July 2019 to December 2019 and October 2021 to March 2022 Assessment of waste generated from the project, Suggested waste management practices. Practice for zero waste discharge.	4/3/22
4	SE*	Mr. JagabandhuBisoi	October 2021 to March 2022 Baseline SE study, Data compilation and assessment. Impact of the project on SE status of the area. Formulation of CER plan,	Jagabandhu Bisoi 5/3/2022
5	EB	Dr. Madhusmita Jena	July 2019 to December 2019, October 2021 to March 2022 Baseline field data collection of related to ecology of the area.	Madhusmita Jena 5/3/2022
6	HG*	Mr. S.C. Nayak	December 2021 Hydrogeological feature of the area. Ground water depth and impact of project on ground water of the area.	5/3/2022
9	AQ*	Dr. Debasis Biswal	July 2019 to December 2019, October 2021 to March 2022 Air quality modeling utilizing the area source model. Prediction of ground level	4/3/22

			concentration of the dust. Suggesting suitable mitigation measure.	
10	Noise*	Mr. S.C. Nayak	December 2021 Ambient noise study of the area. Incremental noise generation due to plant operation and impact of the noise due to the project.	5/3/2022
11	LU*	Mr. Sahil Sood	December 2021 & February 2022 Preparation of land use map based on satellite imagery. Land use classification and analysis. Impact prediction of the project on the surrounding land environment.	5/3/2022
12	RH*	Dr. Debasis Biswal	July 2019 to December 2019, October 2021 to March 2022 Identification of the Risk related to the mining activities. Preparation of emergency disaster management plan. Plan for supply of safety equipment for the worker.	5/3/22

CERTIFICATE OF PLAGIARISM CHECK

Title of EIA Report	Proposed Expansion proposal for M/s Neptune Ispat Private Limited at Village - Sarpi, P.O &P.S. - Faridpur, District – Paschim Bardhaman, West Bengal
Name of Accredited Organization	M/s Kalyani Laboratories Private Limited
Unique Identification Number	KLPL-EIA(IND)A-2022-07
Name of EIA Co-Ordinate (Ec)	Dr. D. Biswal
Name of the Software	https://smallseotools.com/plagiarism-checker/
Date of Check	28.02.2022
Time of Check	11.00 AM to 5.30 PM

Declaration by the head of the accredited consultant organization/ authorized person.

I hereby certify that this EIA report has been evaluated using online/in-house software viz., https://smallseotools.com/plagiarism-checker/. The report produced has been analysed by the system & based on it; I certify that the EIA report produced in accordance with good scientific practice.

Date & Sign of EIA Coordinator:

Name: Dr.Debasis Biswal

Designation: Managing Director

5/3/22

Kalyani Laboratories Pvt. Ltd. BBSR

Date & Sign of Head Accredited Organization:

Name of the EIA consultant organization: M/s Kalyani Laboratories Private Limited

NABET certification. &Issue date: NABET/EIA/2023/SA 0149 valid till March 2023.

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COMPLIANCE TO TERMS OF REFERENCE

Sl. No.	Additional ToR	Reference in EIA Report
1	Details site location with site map satellite image latitude longitude in degree, minute and Second upto2nd Place of decimal after second land related document, Existing site condition, Existing water bodies and vegetation , if any at the proposed site.	Chapter 2, Section 2.4
2	Detail plant layout showing proposed facility, internal roads, storage yards, green belt, RWH storage space etc.	Chapter 2, Section 2.13, Figure 2.7
3	Permission from approve authority for power supply ,water supply ,insufficient & soil waste disposal permission from concerned authority and local body for ground water abstraction, if any and related details.	Water will be extracted from ground water and permission has been obtained. Power will be sourced from DVC and permission obtained. No waste water will be disposed outside the plant premises Chapter 1, Section 1.5
4	Raw materials/fuel with quantity to be used probable local sources.	Chapter 2, Section 2.5.2
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9	Solid waste /Hazardous waste management.	Chapter 4, Section 4.7
10	DG set and noise pollution Control.	Chapter 1, Section 1.5 Chapter 10, Section 10.6.1 Table 10.3
11	Rain water Harvesting plan with detailed calculation and storage area shown in scaled layout plan .	Chapter 4, Section 4.6.2
12	Green belt area Clearly indicated in scale layout plan with detailed plantation list.	Chapter 10, Section 10.7.5
13	Estimated project cost.Corporate Environmental Responsibility (CER Plan with specific	Chapter 8, Section 8.6

	Financialcommitment.)	
14	Impacts Pollution load from proposed unit along with existing unit	Chapter 4, Section 4.4 to 4.7
15	Mitigation measure for controlling fugitive emission.	Chapter 4, Section 4.4.1.7
16	EMP and Disaster management plan if any	Chapter 10 and Chapter 7.5
17	Present status of the existing as well as expansion project compliance report of previous environmental clearance.	This is the first application for environment clearance. Chapter 1, Section 1.1
18	Notification issued by MoEF& CC vice S.O 648(E) dated 03.08.2016 and office memorandum issued by MoEF dated 30.09.2011 and 04.03 2009 are to be followed.	Complied

CHAPTER 1

INTRODUCTION

M/s Neptune Ispat Private Limited is located at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal and its Registered /Correspondance Office: 35, Chittaranjan Avenue , Ground Floor , Room No. 6/4, Kolkata -700012.&A405A, 3rd Floor, Bengal Shristi Complex, City Centre , Durgapur – 713216.With professional and dedicated man-power, the industry has gained a famous status in the Iron & Steel Industry in the State of West Bengal.

1.1 Purpose of the Report:

The proposed project of **M/s Neptune Ispat Private Limited** is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPDSlag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. Present capacity of the Plant is 24000 TPA M.S Ingot/ Billets.After expansion the total plant capacity will be M.S. Ingot / Billets 84000 TPA, Rolled Product 80,000 TPA and Slag Crushing 7500 TPA. As per EIA notification, 2006 and subsequent amendments the proposed enhancement project is listed at Schedule 3(a) under Category-Band require environment clearance from MoEF& CC. Project will be appraised at SEAC, West Bengal. The present EIA/EMP report for the enhancement in production has been prepared based on the approved ToR by SEIAA, Kolkata.

1.2 Identification Of The Project And Project Proponent:

M/s Neptune Ispat Private Limited has obtained CTE vide Ref. No. – 148720, dated 19.03.2018 for Induction Furnace of 1x8 TPH from West Bengal Pollution Control Board. attached as **Annexure 1.** Further CTE has been obtained for 1x80 Ton/ day capacity CCM and 1x25 TPD capacity slag crusher unit vide letter no. 3596-dr-nc-r/16/0082 dated 20.12.2018. Copy attached as **Annexure 2.** The company obtained consent to operate for production of 80 MT/day MS Ingot from West Bengal State pollution control Board vide consent letter no C0110227 dated 31.08.2018 and valid till 31.07.2023**. Copy attached as Annexure 3.**

Table No.1.1 Final Plant Configuration proposed as per approved ToR

Sl. No	Name of the Unit	Configuration			Capacity	Product
		Existing	Proposed	Final		
1	Induction Furnace (Steel Melting)	1x8 TPH	2x10 TPH	1x8 TPH & 2x10 TPH	84,000 TPA (10 heat/day)	Molten Metal

2	Continuous Caster (for Billet making)	****	2x6/11 m Radius	2x6/11 m Radius	84,000 TPA	MS Billet
3	Rolling Mill	****	80,000 TPA	80,000 TPA	80,000 TPA	TMT Bar
4	Slag Grinding Unit	7500 TPA	****	7500 TPA	7500 TPA	Iron recovery

1.2.1 Project Proponent

M/s Neptune Ispat Private Limitedis a leading Steel & Iron Industry in West Bengal and has been considerable presence since 2018.

Director: Mr. Ramdhani Jaiswal, Smt. Radha Jaiswal enthusiastic industrialist, having experience of more than 15 years in the Iron & Steel Industry.

Incorporationtion during:

Registered Office:35, ChittaranjanAvenue , Ground Floor , Room No. 6/4, Kolkata -700012.

CorrespondanceOffice :A405A, 3rd Floor ,Bengal Shristi Complex, City Centre , Durgapur – 713216.

Plant Location: Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal.

1.3 Brief Description of The Nature, Size, Location of The Project and Its Importance to The Country and Region.

The proposed project is for ofExistingInduction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPD Slag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and280 TPD Rolling Mill within its existing plant. Present capacity of the Plant is 24000 TPA M.S Ingot/ Billets.After expansion the total plant capacity will be M.S. Ingot / Billets 84,000 TPA, Rolled Product 80,000 TPA and Slag Crushing 7500 TPA.

Table no.1.2: Salient Features of the existing and proposed expansion project:

Location	At Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal
Type of the project	Category-B, Sl.No.-3(a)
Land Area	Total land area 6.49 Acres. Out of which 1.26 Acre of land will be utilized for proposed expansion. **(Annexure 4)**

Type of Land	Industrial Land/ No forest Land involved
Project Cost(Expansion)	Rs. 25.28 Cr.
Power Requirement	13.5 MVA (Power will be initially sourced from DVC and 0.275 KVA from DG Sets. **(Annexure 5)**
Water Requirement	Existing water requirement: 23KLD; Drinking – 4 KLD (Tanker water); Plantation: 2 KLD; Process requirement – 17 KLD (RWH ponds 1nos (40x40x5m) and from Bore Well. Requirement of water after expansion project will be about 74KLD.However, for the proposed expansion project the water will be sourced from Bore Well. Further additional one RWH pond of same capacity is being proposed for the expansion.
Working Days	300 Days

Plant Location: Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal

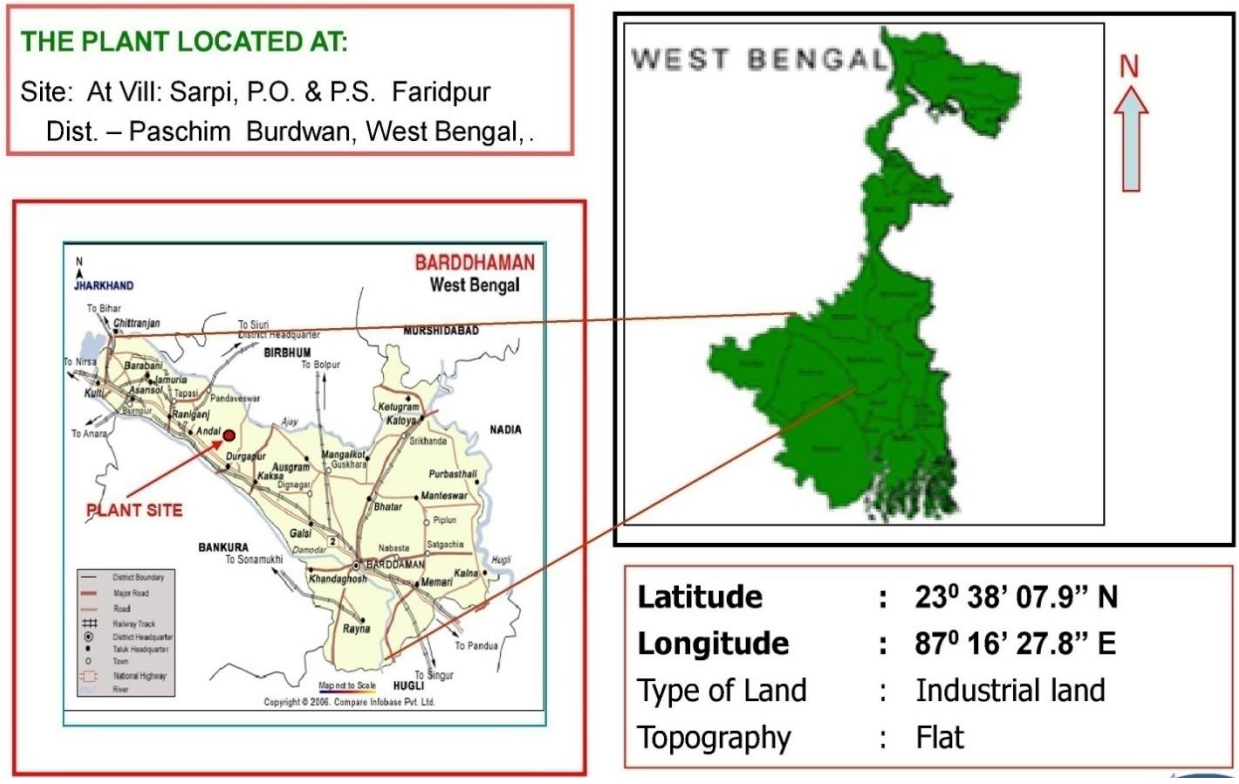


Figure 1.1: Index Map

1.3.1 Importance of the Project to Country and Region:

India was the second largest steel producer in 2019 with crude steel production of 1112 million ton (MT). As per the prediction of Indian Steel Association (ISA) the demand in 2021 isestmated a growth of overall 7%. Hence there is a tremendous potential of growth of steel industry in India in coming years. Out of the total steel production, the production trhough DRI- SMS- Rolling route is approximately 60%. Hence through DRI -SMS- Rolling production of finished good has a tremendous potential for the growth of steel sector in addition to value addition of steel Industry.

1.4 Scope of the Study as Per the Regulatory Scoping Carried Out (Terms of Reference – TOR)

The Environmental impact assessment & Management plan for the proposed expansion project of **M/s Neptune Ispat Private Limited.** is located at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal, has been prepared based on the approved ToR by SEIAA, West Bengal vide letter no. **911-2N-58,2019(E)** dated 19.08.2019. (Copy attached as Annexure **6).**

As per requirement stated in the EIA notification, 14th September 2006 and its subsequent amendment, Environmental Impact Assessment (EIA) study has been undertaken to assess the environmental impacts of the proposed enhancement in production and to develop a site-specific environment management plan.

The EIA/EMP report has been prepared based on the Approved ToR.

1.5 Status of Other Clearances

i. Raw material: The raw materials for Billet (Induction Furnace) are Sponge Iron, Pig Iron, Steel Scrap / Alloys will be obtained from existing source (linkage),near by market by road.

ii. Permission for power: 13.5MVA sourced from DVC and 0.275 KVA DG Sets.

iii. Existing water requirement: 23 KLD; Drinking – 4 KLD (Tanker water); Plantation: 2 KLD; Process requirement – 17 KLD (RWH ponds 1 nos (40x40x5m) and from Bore Well. Requirement of water after expansion project will be about 74 KLD.However, for the proposed expansion project the water will be sourced from Bore Well. Further additional one RWH pond of same capacity is being proposed for the expansion. Copy of ground water permission is attached **Annexure 7.**

IV. Land Required: The proposed expansion project will be within the existing unit. Out of total land of 6.49 Acres, the existing operational plant is on 0.86 Acres 1.26 Acres will be utilized for proposed expansion unit.

CHAPTER 2

PROJECT DESCRIPTION

2.1 Introduction

M/s Neptune Ispat Private Limitedproposed for the expansion of the existing sponge Iron unit with additional installation of SMS, Rolling mill, Slag Grinding Unit. CTE vide Ref. No. – 148720, dated 19.03.2018 for Induction Furnace of 1x8 TPH from West Bengal Pollution Control Board (24,000 TPA) at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal. and CTO(CO110227 Memo no. 3023/or – co-17/18/0386) has been obtained from West Bengal State Pollution Control Board

The management of **M/s Neptune Ispat Private Limited**. has made the application for Environment clearance for the proposed expansion unit. The application for environment clearance for the proposed expansion project has been made to SEIAA, West Bengal vide letter no. **911-2N-58,2019(E)** dated 19.08.2019.

2.2 Type of the Project:

The proposed project of **M/s Neptune Ispat Private Limited** is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPD Slag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. Present capacity of the Plant is 24000 TPA M.S Ingot/ Billets.After expansion the total plant capacity will be M.S. Ingot / Billets 84000 TPA, Rolled Product 80000 TPA and Slag Crushing 7500 TPA.

. As per EIA notification 2006 the proposal is coming under category '3(a)' and requires environmental clearance under category B and appraised at SEAC,West Bengal.. The detail profile of the project is as below:

Table No. 2.1: Profile of the Project

Sl. No.	Particulars	Details
1.	Name	**M/s Neptune Ispat Private Limited**
2.	Location	Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal
3.	Location	**Latitude:** 23˚38'07.9"N **Longitude:** 87˚16'27.8"E
3.	Plot Area	6.49 Acres
4.	Type of Land	Industrial Land
5.	Nearest Highway	National highway (NH 19) – 7.5 km from Site

6.	Nearest Railway line	Durgapur Railway Station –16 Km from the site
7.	Nearest Airport	Andal3.4 km from the Site
8.	Nearest Rivers	Ajay river - 9.5Km
9.	Forest	Gangajalghati Forest 27.3 km, Beliator Forest 35.3 Km
10.	Total Water Requirement (Existing & Proposed)	Existing water requirement: 23 KLD; Drinking – 4 KLD (Tanker water); Plantation: 2 KLD; Process requirement – 17 KLD (RWH ponds 1 nos (40x40x5m) and from Bore Well. Requirementof water after expansion project will be about 74 KLD.However, for the proposed expansion project the water will be sourced from Bore Well. Further additional one RWH pond of same capacity is being proposed for the expansion.
11.	Power Requirement (Existing &proposed)	13.5 MVA from DVC and 0.275 MVA from DG Sets

2.3 Need for the Project

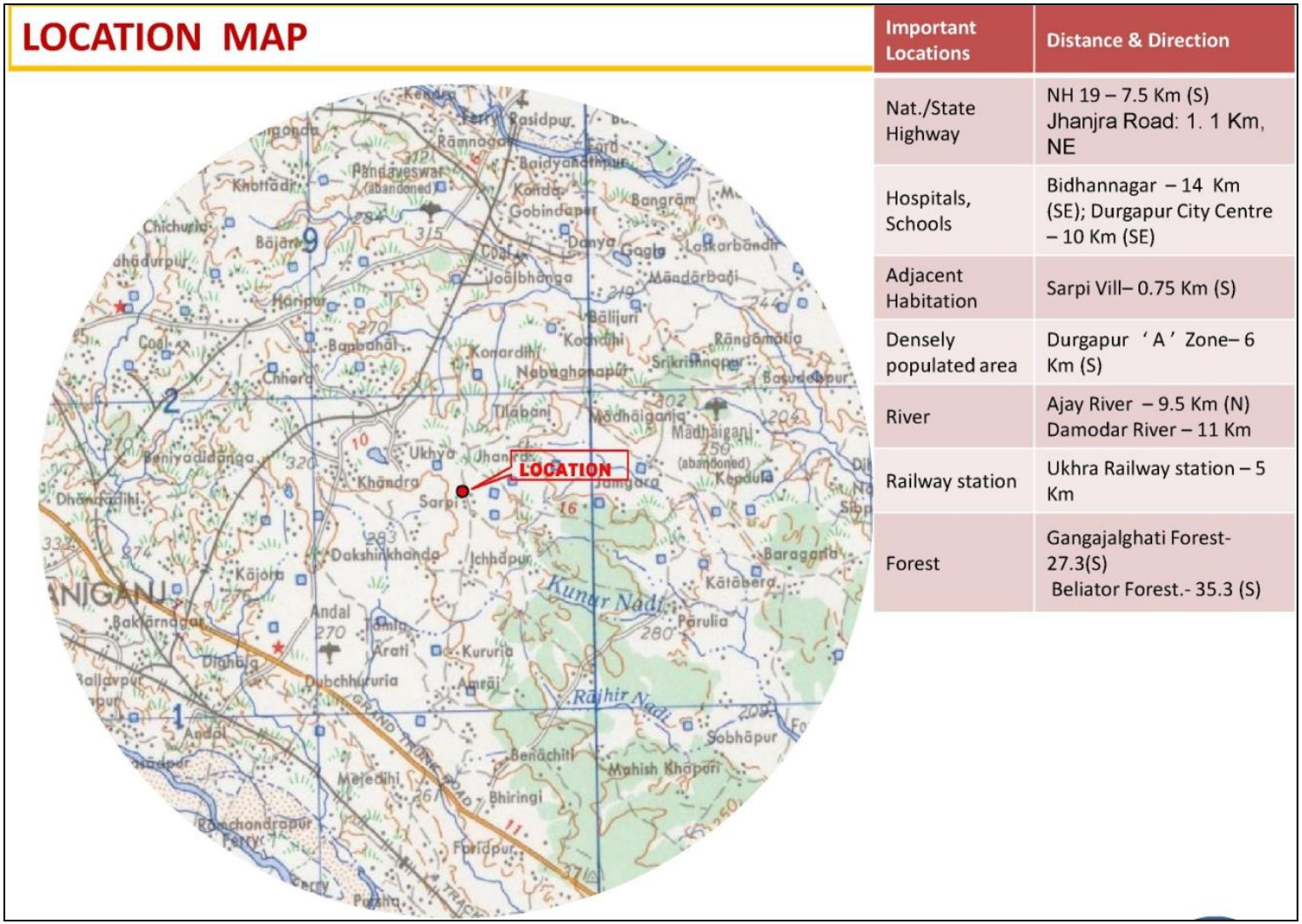
In present scinareoInduction-CCM-Rolling route for Steel making is more convenient use Sponge Iron, Iron Scrap, Ferro allays.This type of Induction has low air as well as water pollution.

2.4 Location and Topography

The proposed site is located at latitude 23˚38’07.9”Nand longitude 87˚16’27.8”E .The project is located in Survey of India Topo Sheet no. 73M/6. The topo map showing the project site has been given in **Figure No.2.1.** The highest altitude of the site lies within102m AMSL and the lowest altitude is 99m AMSLin F**igure No.2.2.**

The nearest airport is Andal Airport around 3.4 Km. from the proposed project site. The proposed plant site is at distance of around 16 km from Durgapur Railway Station. The project site has all necessary infrastructure facilities such as road, telephone facilities and electric power with electric substation and all other basic facilities. Transportation facilities to access various markets are easily available. Both skilled and unskilled labours are available in the area. The nearest highway is National Highway No.19 from the project site which is at 7.5km from the project site. The nearest river is Ajay River is at a distance of 9.5 Km.

The plnat photographs attached as **Figure 2.2.**



Important Locations	Distance & Direction
Nat./State Highway	NH 19 – 7.5 Km (S) Jhanjra Road: 1. 1 Km, NE
Hospitals, Schools	Bidhannagar – 14 Km (SE); Durgapur City Centre – 10 Km (SE)
Adjacent Habitation	Sarpi Vill– 0.75 Km (S)
Densely populated area	Durgapur 'A' Zone– 6 Km (S)
River	Ajay River – 9.5 Km (N) Damodar River – 11 Km
Railway station	Ukhra Railway station – 5 Km
Forest	Gangajalghati Forest- 27.3(S) Beliator Forest.- 35.3 (S)

Figure 2.1 Topo Map Showing the Project Site

Figure 2.2: View of the Plant Premises

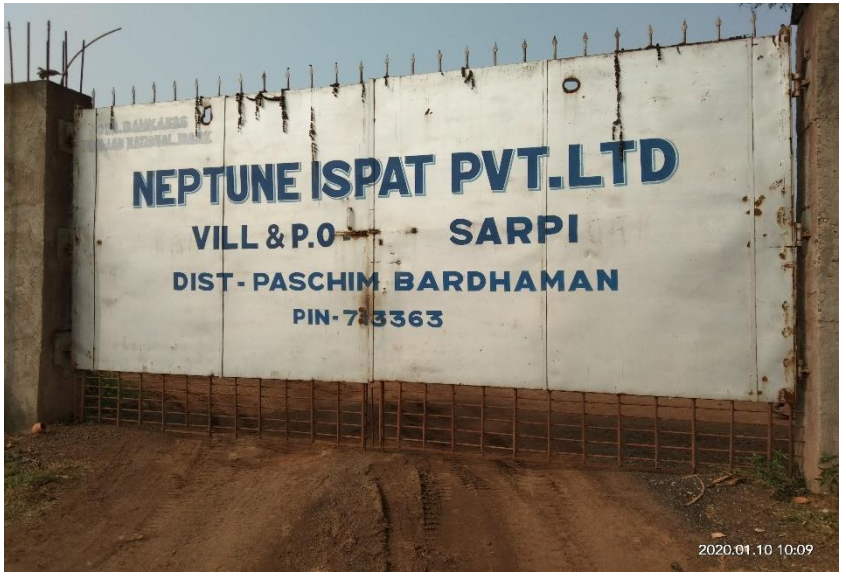


Figure 2.3. Satelite Map Showing the Project Site

2.5 Size or Magnitude of Operation

2.5.1 Production Capacity

The proposed project of **M/s Neptune Ispat Private Limited** is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPD Slag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. Present capacity of the Plant is 24000 TPA M.S Ingot/ Billets.After expansion the total plant capacity will be M.S. Ingot / Billets 84000 TPA, Rolled Product 80000 TPA and Slag Crushing 7500 TPA.

The details of production for both existing unit and proposed expansion are presented in table given below.

Table No.2.2 Existing Unit Details:

Sl.No.	Name of Unit	Configuration	Capacity (TPA)
1.	Induction Furnace (Steel Melting with CCM)	1x 8 TPH	24000
2.	Slag Crusher	-	7500

Table No.2.4 Proposed Unit Details

Sl.No.	Name of Unit	Configuration	Capacity of Each Unit (TPA)
2.	Induction Furnace (Steel Melting with CCM)	2x10 TPH	60,000
3.	Continuous Caster (for Billet making)	2x6/11 m Radius	84,000
4.	Rolling Mill	--	80,000

Table No.2.3 Final Plant Configuration

Sl. No	Name of the Unit	Final Plant Configuration	
		Configuration	Capacity
2	Induction Furnace (Steel Melting with CCM)	1x8 TPH & 2x10 TPH	60,000 TPA
3	Continuous Caster(for Billet making)	2x6/11 m Radius	84,000 TPA
4	Rolling Mill	--	80,000 TPA
5	Slag Grinding Unit	--	7500 TPA

2.5.2 Raw Materials

The overall raw material requirement is given in Table below. The raw materials and finished products will be transported by rail/road.

Table No. 2.4 Requirement of Raw Material for Proposed Expansion Project

Sl. No.	Name Of TheRaw Materials	Quantity (TPA)	Source	Mode Of Transportation
Steel Melting Shop				
	Name of Raw material	**Qty. Required per Ton of production (T)**	**Total qty Required per annum**	**Source**
1	Sponge Iron	221.80	66,540 TPA	Captive production
2	Pig Iron	91.25	27,375 TPA	Open market
3	Steel Scrap/ Alloys	13.15	3945 TPA	Open market
Rolling Mill				
9	Billet	294	84,000	Captive production

2.6 Proposed Schedule for Approval and Implementation

The installation of proposed expansion project and services require co-operation for procurement of equipment, equipment foundations, award of all contracts and supervision of all construction jobs at plant site. The factors which are responsible for timely implementation of the project are:

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

The proposed expansion project is expected to be commissioned within 56 months from the date of obtaining Environment clearance. Time frame for setting up the proposed expansion project is as follows,

Table 2.5: Time frame for Implementation of the Project

Activities	Total Time Period -56 Months, One block equivalent to Four Months													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Go Ahead														
Basic Engineering														
Procurement Activities														
Detail Engineering														
Steel Melting Shop														
Engineering, manufacturing and Delivery														
Enabling Work														
Civil & Structural Work														
Installation of Equipment & Other Facilities														
Testing and Trial Run & Commissioning														
Rolling Mill														
Engineering, manufacturing and Delivery														
Enabling Work														
Civil & Structural Work														
Installation of Equipment & Other Facilities														
Testing and Trial Run & Commissioning														

2.7 Technology and Process Description

2.7.1Steel Melting Shop with matching Induction Furnace and CCM(84,000 TPA)

a) Process Concept and Technology

The electric induction furnace is a type of melting furnace that uses electric currents to melt metal in the proposed project. Induction furnaces are ideal for melting and alloying a wide variety of melt with minimum melt losses, however, little refining of the metal is possible.

b) **Principle of Induction Furnace**

The principle of Induction Furnace is the Induction Heating.

c) **Induction Heating**

Induction heating is a form of non-contact heating for conductive materials. The principle of induction heating is mainly based on two well-known physical phenomena:

- Electromagnetic Induction
- The Joule effect

d) **Electro Magnetic Induction**

The Energy transfer to the object to be heated occurs by means of electromagnetic induction. Any electrically conductive material placed in a variable magnetic field is the site of induced electrical currents, called eddy currents, which will eventually lead to joule heating.

e) **Inductions Furnaces**

In these furnaces, electromagnetic induction is used to heat the metal. An alternating current supplied to a primary coil (inductor) sets up a variable magnetic field around the coil. The variable magnetic flux in turn induces an electromotive force in the secondary circuit (metallic charge), so that the metal is melted by the alternating current formed in it. The coreless Induction Furnace will be used for melting of steel in the proposed expansion.

Coreless Induction Furnace is proposed due following advantages;

1 Since there are no electrodes, it is possible to melt steels very low in carbon
2 The absence of arcs ensures that the metal is very low in gasses.
3 Alloying additions are oxidized only insignificantly and the furnace productivity is high
4 Temperature of the process can be controlled quite accurately
5 Only cooling water is required around 2-3% of evaporation loss is consider which is accomplish by daily make up water

1) Solid State Power Supply Unit

Solid State Power Supply Unit conditions the incoming power suitable to operate induction furnace. The incoming three-phase supply at 50 Hz is converted into a DC using a three phase fully controlled thyristorized rectifier. The DC supply is converted to a single phase AC at required frequency using single phase thyristorized current source (parallel) inverter. The Power Supply Unit consists of fast acting semiconductor grade back up, HRC fuses, thyristorized twelve pulse , DC smoothing choke, single phase thyristorized bridge inverter, controlled electronics with necessary feedback elements and power supply, protection circuits, a set of fault indicating lamps, meters, push buttons, interconnecting bus-bars, flow monitoring switch and conductivity meter for monitoring conductivity of deionised water. All these components are fitted into a dust proof MS cubicle.

2) Capacitor Rack

Medium Frequency water cooled capacitors are used to form a tank circuit with the furnace coil. This presents unity power factor load to the inverter. The capacitors are fitted on

a MS fabricated structure to enable mounting and removal of capacitors can be done easily during maintenance. The electrical connections to the main bus bars are provided by water cooled tubes to ensure proper cooling at the joint. Flow monitoring switches are used to ensure proper flow in the capacitor. Colour coded PVC braided pipes are used for inlet and outlet water connection.

3) D. C. Choke

Electrotherm's large iron core DC choke reduces rate of rise of current to dangerous level and allows front-end thyristorized convertor stop current flow within 6 - 8 milliseconds. This protection is faster than any other circuit breaking device with minimum risk of fuse blowing and thyristor failures.

4) Inter Connecting Busbars& Flexible Water Cooled Cables

Inter connecting bus bars between capacitors and coil carry large reactive currents. Adequately rated EC copper bus bars with tinning at the contact points are used to keep the losses minimum. Flexible cables are used to feed power to the furnace coil. The cables carry the same current as that of the bus bars and are also water cooled. Rubber hoses of the flexible cables are carbon free and are provided with braiding for preventing puncture due to accidental metal splashes.

5) DM Water Circulation System

Components of solid state power supply unit, medium frequency capacitors and interconnecting bus bars are cooled by water. De-ionized water is used for cooling various components in a closed loop. The de-ionized water circulation system consists of water storage tank, non-ferrous pump, plate type heat exchanger, a mixed bed resin cartridge and inter-connecting pipelines. The conductivity of de-ionized water is continuously monitored and stops the Power supply Unit in case exceeds the pre-set level. Occasional make-up of this deionised water is required. A plate type heat exchanger which is much easier to maintain is used to cool de-ionized water. The plates of this heat exchanger are made out of stainless steel grade 316 for better corrosion resistance.

6) Hydraulic System

This system consists of Hydraulic power pack, hydraulic cylinders, interconnecting pipelines and direction control valves. Hydraulic cylinders are used for tilting the furnace. Required pressure and flow for tilting the furnace is generated by this hydraulic power pack which consists of motor, pump, pressure relief valves, filters and adequate capacity oil tank.

Hydraulic power pack is connected to the cylinders by seamless hydraulic pipes through a direction control valve. Furnace tilting is controlled by operator using direction control valve.

7) Furnace Change Over Switch

The furnace changes over switches are used in case more than one furnace is to be fed from the same Power Supply Unit. These switches are of water cooled type and can be operated manually. They are double poled double brake type and suitable for off-circuit/off-load applications. De-ionized water is used for cooling the switches. Auxiliary contacts are provided for inter-locking.

8) Melting Furnace

Steel Frame Furnaces are manufactured with energy efficient coil to perform under typical harsh melt shop environment. The coil is made out of rectangular cross section electrolytic grade copper. The gap between two turns of the coil is maintained using spacers. The coils are electrically insulated by a special resin based coating. The coil is firmly secured to insulating bars equally spaced around the coil periphery. These bars provide mechanical strength against deformation during maintenance and normal operation.

Furnace lamination packet provides a return path to the flux. It also improves the coil efficiency and prevents overheating of the structure. In a steel frame furnace coil, laminations packets, top and bottom ring forms a cage assembly, which is easily removable from the tilting structure in case of maintenance. For tilting the furnace two numbers single acting hydraulic cylinders are provided. For efficient cooling of the furnace coil it is divided into number of sections and connected to inlet and outlet manifold. In each path a flow regulating/control valves are provided at inlet and outlet manifold. Temperature of each path is also indicated by temperature indicator. Preset thermostats are used in each individual path to switch off the furnace in case of insufficient flow of water or excessive temperature.

2.7.2 Continuous Casting Machine (CCM)

Continuous casting, also called strand casting, is the process whereby molten metal is solidified into a "semi-finished" Billet for subsequent rolling in the finishing mills. The molten metal is transferred from induction furnace to caster for casting through mould in different sections. After exiting the spray-chamber, the strand passes through straightening rolls and withdrawal rolls. There may be a hot rolling stand after withdrawal, in order to take advantage of the metal's hot condition to pre-shape the final strand. Finally, the strand is cut into predetermined lengths by mechanical shears or by travelling oxyacetylene torches, is marked for identification and either taken to a stockpile or the next forming process.

i. Equipmentsat Caster

The main equipment of the caster is as mentioned below (**Figure 2.5**).

1. Stopper to control the casting (flow of liquid metal)
2. Tundish (buffer to hold the liquid steel)
3. Mould (for shaping the liquid metal)
4. Roll Support (for guiding material being cast)
5. Turning zone (radius portion to make Billet straight)
6. Shroud – tundish to mould (to cover the liquid metal stream from atmosphere
7. Withdrawal unit - for dragging the Billet downward to facilitate Casting.
8. Shear Machine (for cutting Billet)
9. Cooling bed (Billet will be transferred to cooling bed for cooling purpose)

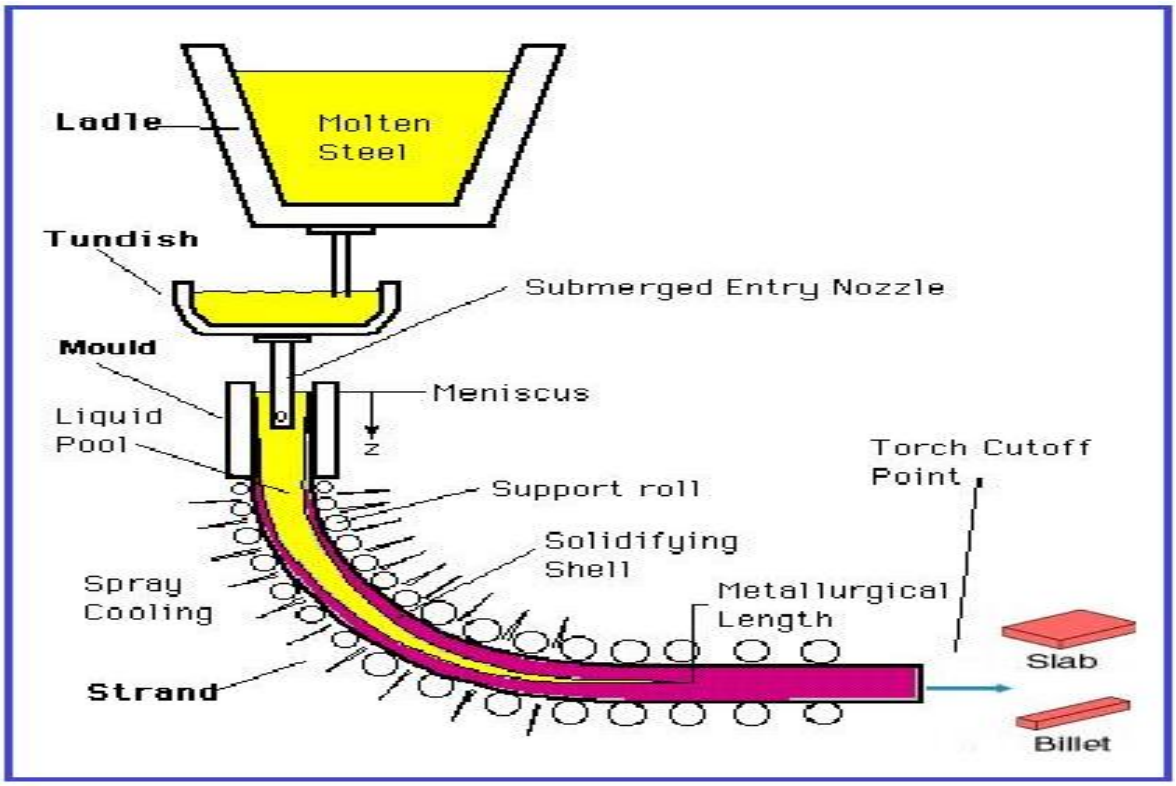


Figure-2.4: Cross Section of CCM

ii. Basic Data of Billet/ Slab Caster

Particular	Description
Caster type	Bow type with tubular mould
Billet/Slab Size	Up to 150 Sq.mm
Strand	02 Nos. 2 x 1 Strand Slab Caster
Strand	02 Nos. 1 x 3 Strand Billet Caster

Mould Lubrication	Rapeseed oil / casting powder
Mould Oscillation	Electro-Mechanical
Withdrawal and straightener	Hydraulic cylinders
Billet/Slab Cutting	Automatic Shear Machine
Casting speed	2.0 to 4.0 m/min
Lubrication system	Centralized grease lubrication system

A. Fume Extraction System

The proposed fume extraction system (Showelling hood type) will be located near to the Induction furnace as much as possible to ensure the effective dust capturing and minimum emission level meeting the pollution norms laid by the government.FES takes out the Fumes / Dust generated during melting of sponge iron in the Induction Furnace.Thefumeswhich are directly being captured passes through Spark arrester & bag filter, where dust cleaning is to be done. After getting cleaned through bag-house the fume enters ID fans and being sent to chimney through which it is released in the atmosphere at adequate height. The system is equipped with different sensors and instruments and PLC to facilitate complete automatic operation of the fume extraction system.

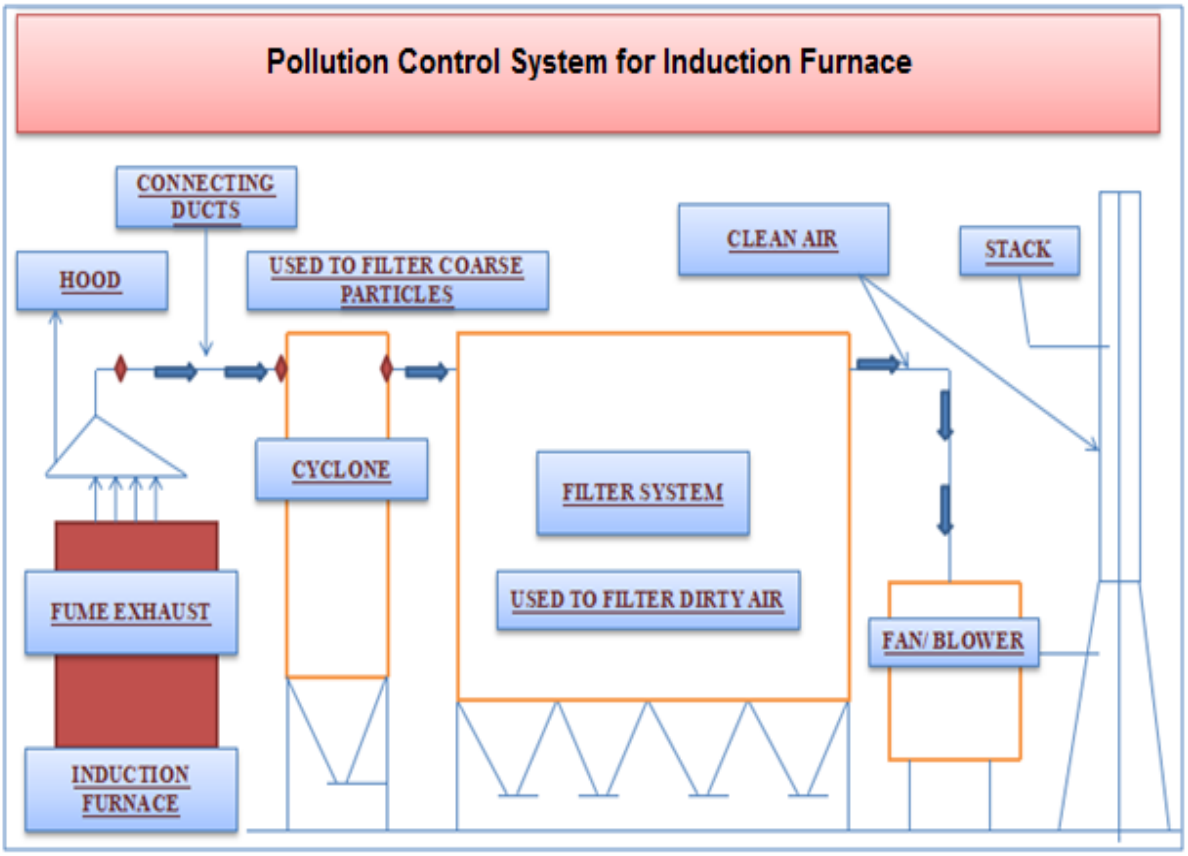


Figure-2.4: Proposed Fume Extraction System

B. Oxygen Charging

Since oxygen is required to assist and also expedite the process, a plant of required capacity shall be installed. Portable Oxygen Cylinder will be used. The Steel Melt Shop shall be consisting of the following facilities.

Table No.2.6 Steel Melt Shop Facilities

S.N	Facilities / Equipment	Capacity	Type/Specs
1	SMS	1x8 TPH 2x10 TPH	--
2	Continuous Casting Machine for Billet/Slab casting	2x6/11m radius	2x 6/11mtr (2strand CCM), suitable up to 200 Sq.mm section (Billet/Slab)
3	Rolling Mill	266.6 TPD	84,000 TPA TMT bar
4	Billet Production	Tons/Year	84,000
5.	Tap-tap time	Min	130-140

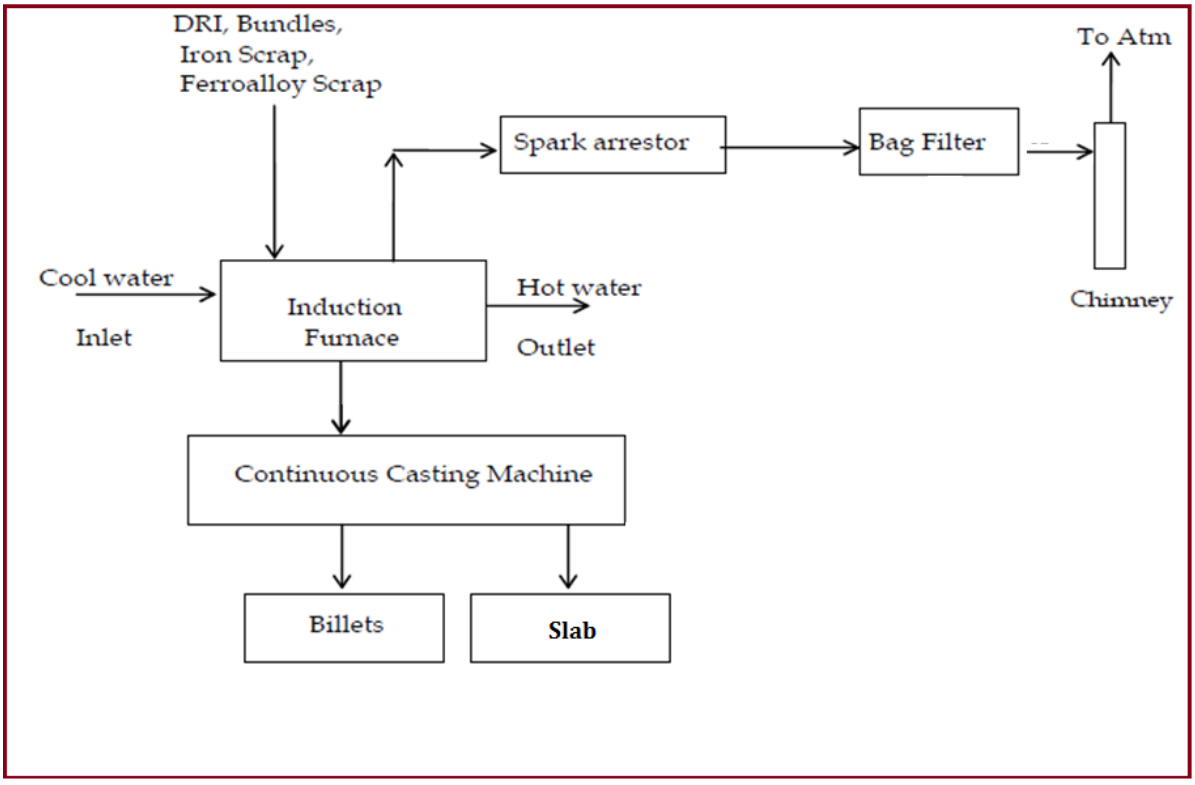


Figure-2.5-Process Flow Chart of SMS Unit

Production Capacity

1x8 TPH& 2x10 TPH capacity Induction Furnace will be installed. 3 nos. of Furnace will be there and 10 nos. heats will be generated from the each furnace and each heat is required around 2 hours.

So, Total 30 Nos. of Heat will be generate in 24 hours or a Day

Daily production will be 8 T x 10 Nos.+ 10T x 20 of Heat i.e. 280 T / Day

Yearly production will be 280 T x 300 days = 84,000 TPA

Actual production on an average after deducting Loss due to Shut down, maintenance etc. will be 84,000 TPA.

Table 2.7-Materials Balance for Steel Melting Shop

Name of the Input Materials	Quantity input in (TPA)	Name of the output Materials	Quantity output in (TPA)
Sponge Iron	66,540	Liquid Steel	88,200
Pig Iron	27,375	Bagfilter Dust	75
Steel Scrap/ Alloys	3945	Slag	7800
		Gases	1785
Total	**97,860**		**97,860**

2.7.3 SMS Slag Crushing Unit (1x8 TPH& 2x10 TPH)

Slag often contains valuable metals that can still be recovered and utilized. Also, when crushed and sized properly, slag can be sold and used as valuable material in many different ways, for example, as aggregates. Instead of dumping the slag and piling it up somewhere, it really is economically beneficial to process such material.The advantage of installing Slag Crushing Unit is to crush received slag from Induction Furnace into fines and then available iron particles in slag will be separated with the help of online magnet & conveying system. Recovered iron fines shall be reused for making sinter/pallets and waste slag shall be used for land filling, cement plant etc. The production capacity of slag crushing unit will be 7500 Tons/ Annam.

2.7.4 Rolling Mill

a) Process Concept and Technology

2.7.5.1 TMT Steel Bars, Wire, Wire Rod/Angel, Channels & Beam/ H.R. Coils & Plate:

The full form of TMT is Thermo Mechanical Treatment; in this the steel bars are passed through a specially designed water-cooling system. After the bars pass, the outer surface of the bars solidifies while the core remains hot. This creates a temperature gradient in the bars.

After the intensive cooling, the bar is exposed to air and the core re-heats the quenched surface layer by conduction, therefore tempering the external marten site. When the bars are taken out of the cooling system, the heat flows from the core to the outer surface, further tempering of the bars, which helps them attain higher yield strength. The resulting heat-treated structure imparts superior strength and toughness to the bars. The pre-determined cooling of the bar periphery transforms the peripheral structure to martensite and then annealed through the heat available at the core. The peripheral and core temperature difference finally equalizes at around 600 degree C and the resultant bar structure is of tempered martensite at the periphery and of fine-grained ferrite pearlite at the core. Generally speaking, the resultant soft core forms about 65-75 per cent of the area (depending upon the desired minimum yield strength) and the rest is the hardened periphery. The equalizing temperature together with the final rolling temperature is the most important parameter to achieve the required mechanical properties. Finally, when the bar is discharged on to the Cooling Beds, the remaining austenite transforms into a very fine-grained pearlite structure. After this process of thermo mechanical treatment, a dark etched peripheral rim of tempered martensite and a grey core of ferrite pearlite get formed. The tempered martensite surface layer is very hard while the microstructure of the core is a very fine-grained ferrite and pearlite which is quite soft. The result is a structure with a high yield strength combined with high ductility.

1. **Heat treatment: -**

Metals can be heat treated to alter the properties of strength, ductility, toughness, hardness or resistance to corrosion. Common heat treatment processes include annealing, precipitation strengthening, quenching, and tempering. The annealing process softens the metal by allowing recovery of cold work and grain growth. Quenching can be used to harden alloy steels, or in precipitation hardenable alloys, to trap dissolved solute atoms in solution. Tempering will cause the dissolved alloying elements to precipitate, or in the case of quenched steels, improve impact strength and ductile properties. In the production of TMT bars/ Steel Wire the carbon is restricted to below 0.20% for imparting better ductility and bend-ability and to ensure better weld-ability. The carbon equivalent of the steel is controlled by the addition of Manganese (from 0.50% to 1.0% depending on the grade of the TMT bar being produced. In case of production of corrosion resistant TMT bars, corrosion resisting elements are suitably added in the steel.

2. Raw Materials

The raw materials used in production of TMT bars/Wire and Wire Rods is Billets. Billets have better finish and there is less chance of blow holes being present inside within. The final product obtained by using billets have better finish when compared to the ingots. Billets are more refined raw material which has less chance of blow holes and smooth surface finish. Billets have no standard colour coding or a standard ratio. They are entirely made as on order. But after manufacturing the billets are supplied with a Heat number (a test certificate) which elaborates the ratios of metals used and order size.

3. Induction Heater

After quality testing, the billets are ready to be fed in the Induction heater. It is necessary for the billets to have a high temperature for the rolling process through the rollers. This is where the Induction Heater comes to play. The billets are fed into the Induction Heater wherein they are constantly heated till desire temperature is obtained. The material, on exit is suitable to undergo Rolling. The Induction Heater generates heat energy by the ELECTRICITY sourced from WBSEDCL/ CPP.

The Induction Heater has three processes:-

i. Feeding
ii. Heating
iii. Ejection

i. Feeding:-

The feeding of the raw material into the Induction Heater is done with the help of conveyer rollers. The billets are placed on the conveyer rollers manually; tongs are used in the positioning onto the conveyor system, which transports the raw material to the feeding bed. Once the billets are stacked one after the other on the feeding bed, they are pushed into the Induction Heater with a mechanism which consists of a worm gear pushing the billets into the Induction Heater. This mechanism is also controlled manually by a person due to discontinuity in feeding. The schematic diagram of the rolling mill has been given in **Figure 2.7.**

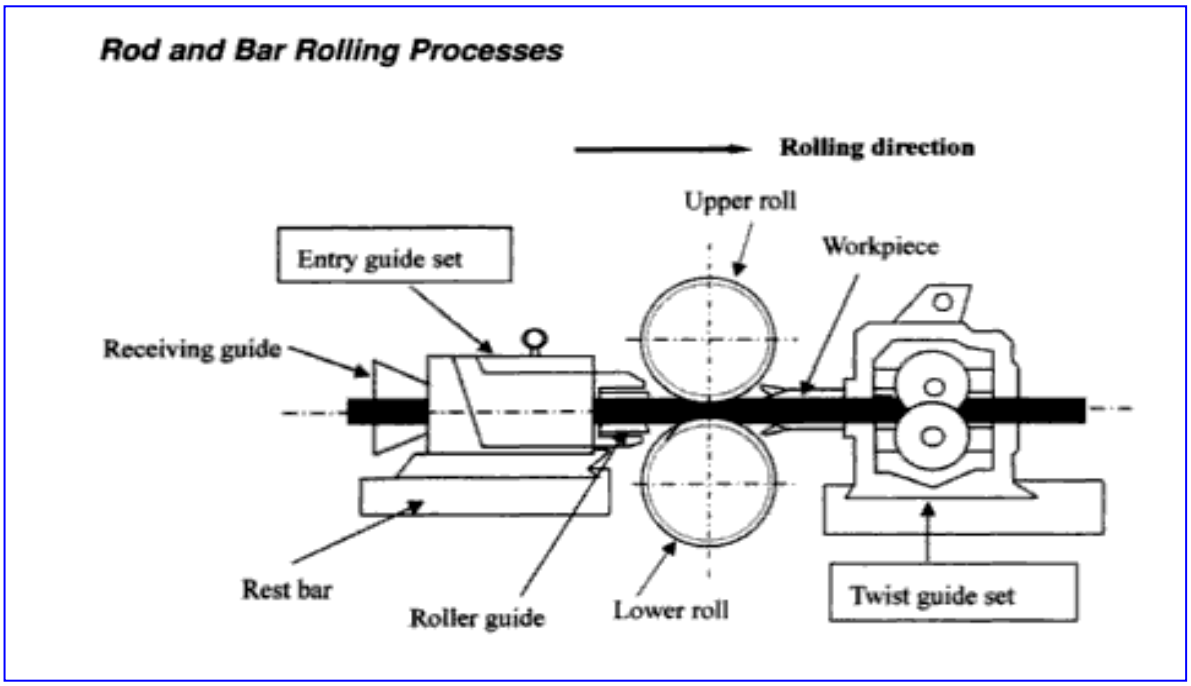


Figure-2.6 Schematic Diagram of Rolling Mill

ii. Heating Chamber:-

The Induction Heater, heating chamber is a place where the billets are made molten, which makes it feasible to pass it through the rollers. The furnace is a fuel consuming chamber which works on electricity. There is a preheating zone, which leads to the intermediate zone ultimately leading to the final zone. The Induction Heater interior is made of refractory bricks to withstand the high temperatures. There are also certain doors at the side for inspection during maintenance. There is another controller near the exit of the Induction Heater to guide the red hot ingots outside of the Induction Heater and position them onto the rollers; leading them to the rolling mill.

iii. Induction Heater Exit: -

After heating, the billets, it is ready for the roughing mill. Authorized personnel are stationed at various nodal points to navigate the heated raw material from the Induction Heater to the Roughing mill. The exit door is opened by the person who removes the billet.

For the present proposal of 2, 50,000 TPA Rolling Mill for production of TMT Bar, Wire and Wire rods instead of conventional preheating furnace technology we are using 02 Nos. Induction Heaters. Billets from proposed SMS plant will be heated into the induction heater which will be operated by electricity for bringing it to desire temperature and then directly transferred to the Rolling Mill.

4. Roughing Mill:

Just after the billet comes out of the furnace it is slowly led to the roughing mill. The mills are operated with a high capacity motor. The roughing mill is where there is very slight elongation and gradually decreases in diameter and this is the main function of the roughing mill. But the billets are still in the molten state and it continuously moves on to the next rollers through the guide ways. After the roughing mill it passes to the next mill that is the intermediate roller and to actuate its movement out of the roughing mill there are some accelerators placed at certain intervals. These are called pinch rolls. When the rollers in a mill get worn out then the same rollers are machined at the machining section of the plant. Heavy lathe machines are used. When the dimensions of the rollers slightly vary they are compensated by the universal joint which is at the shaft attached to the rollers.

5. Cutters:

After the roughing mill it moves through the guide ways which are mostly made of cast iron and these guides also provide an open top just in case the rod expands and comes out of the guide. The guide ways are sometimes placed with a cone which decreases miss alignment. These guide ways helps the tip of the red hot rod to enter into the next roller that is the intermediate mill. This is the automated part of the mill which does not need the manual method of feeding like in the roughing mill.

Hence there are front and back cutters which remove the front and back tip of the hot rod as to allow proper entering into the next mill. Here the cutter blade is visible it moves in a to and fro motion and as the red hot rod is still soft it easily shears it. These shearers are sensory activated and are automated. The sheared waste pieces are put aside as scrap. They usually fall beside the cutter itself and are removed during maintenance. After every roller there is increase in the length of the rod which results in bending or misalignment while entering into the roller. For that reason there are some special cones placed while entering into the roller. These cones help the rod to enter in and align properly and go into the allocated grove in the roller. Without this it may result in the slipping or entering into the wrong grove. These are usually made of cast iron and are long lasting. They are made in such a way so it would be easy while changing or removing the setup.

6. Intermediate Mill:

After passing through the roughing mill, the rod is led into the Intermediate mill. It should be observed that, there is a considerable decrease of the size of the rod after passing through

the Roughing mill. The main function of the Intermediate mill is to prepare the specimen for the finishing mill. After the intermediate mill, pinch rolls are placed

7. Finishing Mill:

The finishing mill is the main roller where the required dimension is obtained. The rollers are made with precision and in such a way that the exact dimension can be obtained. Quality is of great importance, since the manufactured products are graded and approved by the ISI. This gives the company an edge over its competitors. The finishing mill also facilitates for the brand imprint to be put onto the rod. The final dimensions of the TMT steel bar are achieved by finishing rollers. The rods, after passing through the finishing rollers; are still soft due to high temperature. There is a special guide way present after the finishing rollers which leads the rods to the TMT quenching box. The conic shaped guide way helps in the alignment of the rods while movement to prevent torsion.

8. TMT/ Wire Quenching Box:

One of the most important parts of the plant is the TMT box where the hardening takes place. Water is sprayed on the red hot rod to reduce the temperature abruptly which results in the hardening of the outer surface of the rod. The amount of hardening depends on the pressure of the water from the nozzle. The rods are made to fall on the cooling bed after the TMT treatment, but the speed of the rods is too high due to the motor power and various pinch rolls. Hence to reduce the speed before the rod on exit, a breaker is used. It reduces the speed of the incoming rod. The breaker provides safety to the labour and prevents accidents. The finished products are then organized for Dispatch.

9. TMT Process

By adopting thermo mechanically treatment process higher strength of TMT bars is obtained. In this process, steel bars get intensive cooling immediately after rolling. When the temperature is suddenly reduced to make surface layer hard, the internal core is hot at the same time. Due to further cooling in atmosphere and heat from the core, the tempering takes place. This process is expected to improve properties such as yield strength, ductility and toughness of TMT bars. With above properties, TMT steel is highly economical and safe for use. TMT steel bars are more corrosion resistant than Tor steel.

The raw materials used in production of below mentioned products are **Billets or Slab.** It will be obtained from proposed SMS plant.

Table 2.8: Materials Balanced for the Rolling Mill

Sl. No.	Input	Input Quantity (TPA)	Source	Mode of Transportation	Output Qty/Annum
1.	Billets / Slab	84,000	In House	Through Crane/ conveying System	Product- 80,000 TPA TMT Bar

2.8 Utilities

2.8.1 Energy Balance (Power & Fuel)

Total power requirement for project is around 13.5 MW. Power is available from DVC and two DG Sets.

Table 2.9: Power Requirement

Units	Existing Consumption (in MW)	Proposed Consumption (in MW)	Total Consumption (in MW)
Induction Furnace	3.0	8.0	11.0
Rolling Mill	---	1.0	1.0
Slag Crusher	0.5	---	0.5
Auxiliaries	0.5	0.5	1.0
Total	**4.0**	**9.5**	**13.5**
The Company is availing power from DVC.One DG of 100 KVA existing and one more 150 KVA is proposed.			

2.8.2 Water Requirement

Existing water requirement: 23 KLD; Drinking – 4 KLD (Tanker water); Plantation: 2 KLD; Process requirement – 17 KLD (RWH ponds 1 nos (40x40x5m) and from Bore Well.

Requirement of water after expansion project will be about 74 KLD.However, for the proposed expansion project the water will be sourced from Bore Well. Further additional one RWH pond of same capacity is being proposed for the expansion. **Annexure 7.**

Table 2.10: Water Requirement

Units	**Makeup Water requirement Existing m^3/ day**	**Makeup Water requirement Expansion (m^3/day)**	**Total Makeup Water requirement m^3/day**
Induction Furnace	10	30	30
CCM	5	15	15
Rolling Mill	--	15	15
Drinking & Domestic	4	6	6
Plantation	2	4	4
Dust suppression	2	4	4
Total	**23.00**	**74.00**	**74.00**

2.8.3 Transportation Facilities

Road or ship or rail transportation used for the transportation of raw materials. NH-19 is at a distance of nearly 7.5 km from the site. From NH-19, Andal More, a pucca road running through the site.Also well connected through Mobile Phone.Telephone Exchange is located nearby. Buses will be provided for movement of workers of the company. The proposed site is well connected with rail & road transport system. Durgapur Railway station is at a distance of 16 Km from the project site. Hence transportation of finished materials / goods will be smooth.

2.9 Stack Details

There is one existing stacks present attached to the existing furnaces. The details of the stack are as below **Table no.2.10.**

Table No.2.11 Details of stacks

Attributes	**Existing (1x8 Ton IF)**	**Proposed (1x10 T IF)**	**Proposed (1x10 T IF)**
	Stack 1	**Stack 2**	**Stack 3**
Height of stack from ground level(m)	20	30	30
Stack Attached to	IF-1	IF-2	IF-3

Inner dimension of stack(m)	0.9	1.0	1.0
Height of port hole(m)	7.62	7.62	7.62
Atmospheric Pressure(mm of Hg)	755	755	755
Stack Gas Temperature(˚C)	55	60	60
Stack Gas Velocity(m/s)	9.5	9.5	9.5
Volumetric Flow rate (Nm^3/Hr)	20,000	30,000	30,000
Dust Concentration (g/s)	0.1	0.18	0.18

2.10 Project Description (Including Drawing Showing Project Layout, Component of Project Etc.)

The proposed expansion project installed within the existing plant premises over an area of 6.49Acres. The land has been already acquired by the company. The lay out plan showing the existing plant and the proposed modernization has been given in **Figure2.9**

2.11. Fire Protection System:

Fire protection system for the proposed plant comprises portable fire extinguishers of various capacities containing agents such as CO_2, DCP etc. and will be located at strategic points of the plant. The details of fire protection systems and other risk mitigation measures are being discussed in subsequent chapters.

2.12 Communication:

Suitable communication network has been envisaged for quick transmittal of information within the plant. The network shall contain automatic internal telephone system (PBX) and two-way audio communication system.

2.13 Auxiliary Facilities:

Various services facilities like repair and maintenance shop, central stores, administrative building, canteen, guesthouse, time office, laboratory etc. will be provided during installation of the plant.

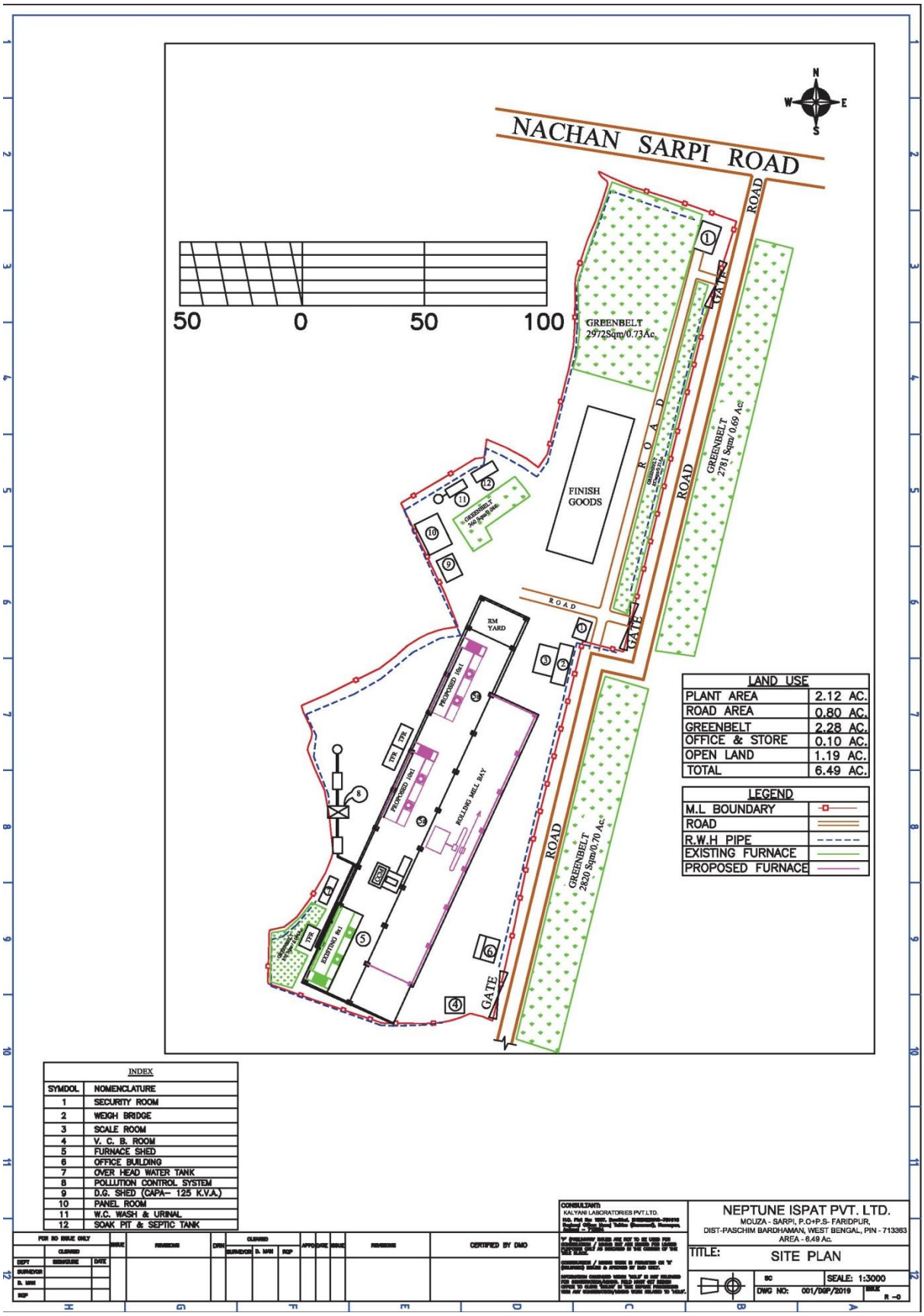


Figure 2.7: Layout Plan

2.14 Solid waste Generation

The Solid waste from Induction Furnacein the form of Slag will be 26 TPD and 0.25 TPD as PCD dust. The Slag will be further processed in house in Slag Crashing Plant for recovery of Scrap Iron.

The Solid Waste after expansion from the Unit will be 23.65 TPD (from Slag Crashing Plant & PCD Dust) which will be used for road making / Low filling and it is also given to out sider who takes it for there low land filling.

Table No. 2.12 Solid Waste Inventory

Waste	**Existing**	**Proposed**	**Total**	**Utilization/ Disposal**
	Quantity in TPA			
Slag	7.2	18.8	26	The Solid Waste after expansion which will be used for road making
PCD Dust	0.09	0.16	0.25	Low filling and it is also given to out sider who takes it for there low land filling.

2.15 Land Use Plan

The company has established its office building, Weigh Bridge, rest shed for workers, canteen, sanitation facility, parking area, drinking water for the workers. Besides the company has established a well-developed garden near the office building.

The proposed expansion project will be within the existing premise of M/s Neptune Ispat Private Limited is located at Village - Sarpi, P.O & P.S. -Faridpur, District – Paschim Bardhaman, West Bengal.Total land required for the installation of proposed expansion unit will be 6.49 Acres which is present within the existing campus of the company. No additional land is required for the above mention expansion project. The detail land use break up for the plant has been given in table below:

Table No. 2.13 Land use Plan of the Project

Sl. No.	**Type of use**	**Existing Area (Acres)**	**Proposed Area (Acres)**	**Total Area (in acres)**
1	Induction Furnace &CCM , Rolling Mill	0.86	1.26	2.12
2	Storage and Solid waste	0.02	0.04	0.06

	handling area			
3	Administrative office	0.04	--	0.04
4	Road and Paved area	0.6	0.2	0.8
5	Green belt	1.3	0.98	2.28
6	Vacant Land	3.67	1.19	1.19
	Total	**6.49**		**6.49**

2.16 Man Power Requirement

The total manpower requirement of the after-expansion project will be 75 persons on direct pay roll of the company during operation & construction phase & 60 indirect employment opportunities will be created in the surrounding areas. The details of existing employment are:

Table No.2.14: Details of Employment

Description	Existing	Additional	Total After proposed expansion
Regular	35	40	75
Contractual	---	60	60
Total	**35**	**100**	**135**

2.17 Cost of the Project

The cost of the project has been estimated to be Rs. 2528 Lacs. The capital cost earmarked for environmental mitigation measures is Rs. 18 Lacs, which includes:

Table No. 2.15: Cost of the Project

Item	Cost (in Lacs)
Total Capital Cost of the Project	Rs. 2528 Lacs
Total Capital Cost for Environmental Pollution Control Measures	Rs.18Lacs
Recurring Cost / annum for Environmental Pollution Control Measures	Rs. 4.5 Lacs
Social development costCost	Rs. 26 Lacs

2.18 Description of mitigative measure incorporated into the project to meet Environmental Standards, Environmental Operating Conditions, Or EIA Requirements

Environmental Parameters	Environmental Standards	Mitigative measures as per DPR	Proposed Additional mitigative measures
Ambient Air Quality	As per NAAQS 2009	In built dust catchers and bag fileter in the material storage and handling area	Water sprinkling, Water fogging system, Dust suppression systems, Maintenance of vehicles with PUC certification, Three-layer plantations along the boundary, Pucca road within the premises, In- built dust catcher and Bag filter.
Stack emission for Inductin Furnace	As per CPCB guidelines	Stack height (30m), I.D Fan, Bag Filters.	The Bag filter should be more than 95% efficiency to arrest the stack emission
Noise Pollution	As per Noise rule, 2000	Noise generating equipment will be provided with proper sound proof enclosures. The air compressor, process air blower, pneumatic valves should be provided with acoustic enclosure	For attenuation of noise thick green belt (3tier) will be developed over an area of 2.28 Acres (33%).
Water Pollution	Zero liquid discharge	Recirculation of waste water in the process. Air cooled condenser will be installed.	Domestic waste water will be treated through STP and utilized for plantation purpose.
Solid waste Management	100% utilization of Solid waste	Proposed quantity of Slag will be sold to brick manufacturer or road making.	The existing Slag has been completely sold to the nearby industries for brick manufacturing.

2.19 Assessment of New & Untested Technology for the Risk of the Technological Failure

There is no alternate technology adopted for the proposed expansion project. Standard and proven technology is adopted.

CHAPTER 3

DESCRIPTION OF ENVIRONMENT

3.1 Study Area

The study area includes the project site (core zone) of the existing plant premises of **M/s Neptune Ispat Private Limited** and its buffer zone comprising of 10 Km radius (Buffer zone) around the project site.

3.2 Study Period

The baseline study was conducted during the period of October to December, 2021 by M/s Kalyani Laboratories Pvt. Ltd. (KLPL). The laboratory is NABL accredited vide letter no TC- 7043 validity till 10.05.2023 and recognised by MoEF&CC vide File No: Q-15018/46/2018-CPW dated 24.10.2019 valid till 23.10.2024.

3.3 Study Components and Methodology

Baseline survey was conducted to evaluate the following environmental component in the study area:

Table 3.1 Study Components and Methodology

Components	Attributes	Study Methodology	Details
Land Environment	Location & Topography	Primary and Secondary data collection	Toposheets**,** GPS reading,
	Geology & Hydrogeology	Secondary data collection	Published literature
	Land use pattern	Primary and Secondary data collection	SateliteImegery, GPS reading, Topsheet
	Soil Quality	Primary data collection	APHA/IS methods
Water Environment	Drainage Network	Secondary data collection	Published literature, Satelite imagery and Toposheet
	Surface Water	Primary data collection	APHA/IS methods

	Ground water	Primary data collection	APHA/IS methods
Air Environment	Meteorological Data (Wind speed and direction, Rainfall, Relative humidity, Temperature, Humidity, Rainfall, Winds)	Primary and Secondary data collection	IS Methods and CPCB Guidelines for Ambient air quality Monitoring
	Ambient Air Quality (AAQ)	Primary data collection	APHA/IS methods
Biological Environment	Terrestrial Flora and Fauna	Primary and Secondary data collection	Quadrat method and Transact Walk
	Aquatic flora and Fauna	Primary and Secondary data collection	Quadrat method and Transact Walk
	Details of ESZ/Protected areas	Secondary data collection	Published literature
Socio-economic Environment	Demographic structure. Infrastructure resource base. Economic resource base. Cultural and aesthetic attributes, Health, Education.	Primary and Secondary data collection	Survey through questionnaire, PRI and Focus group discussion. Secondary information from Census data, Block office data

3.4 Location and Topography

The proposed site is located at latitude 23˚38’07.9”N and longitude 87˚16’27.8”E .The project is located in Survey of India Topo Sheet no. 73M/6. The highest altitude of the site lies within102 m AMSL and the lowest altitude is 99 m AMSL. The nearest airport is Andal

Airport around 3.4 Km. from the proposed project site. The proposed plant site is at distance of around 16 km from Durgapur Railway Station. The project site has all necessary infrastructure facilities such as road, telephone facilities and electric power with electric substation and all other basic facilities. Transportation facilities to access various markets are easily available. The nearest highway is National Highway No.19 from the project site which is at 7.5km from the project site. The nearest river is Ajay River is at a distance of 9.5 Km.

3.5 DRAINAGE

The nearest water body is Damodar River, flows in the South-West part of the project site at a distance of about 11.0 Km and controls the drainage in the immediate vicinity of the site. The Durgapur barrage is at a distance of 17 Km from the site. The major river controlling the drainage of the area is Damodar River. It is spread across Bardhaman, Hooghly districts in West Bengal. There are no streams or rivers passing through the project sites. The Damodar River is also dependent on the flow of water from the barrage of the Damodar Valley Corporation. RriverDamodar originates near Chandwa village, Palamau district, on the Chota Nagpur Plateau in the Jharkhand state in eastern India, and flows through the cities Ramgarh, Bokaro, Dhanbad, Asansol, Durgapur, Burdwan and Howrah, before ultimately joining the lower Ganga (Hooghly estuary) at Shayampur, 55 km downstream of Howrah. Damodar is totally a rain fed river and during the monsoon months about 82% of the total annual rainfall flows through the river.

The Damodar Valley is spread across Hazaribagh, Ramgarh, Koderma, Giridih, Dhanbad, Bokaro and Chatra districts in Jharkhand and Bardhaman and Hooghly districts in West Bengal and partially covers Palamu, Ranchi, Lohardaga and Dumka districts in Jharkhand and Howrah, Bankura and Purulia districts in West Bengal with catchment area of about 23,300 sq.km and has a storage capacity of 1.02 m ac.ft. During monsoon about 2500 mgd of water is estimated to be wasted about 100 days in a year. The water shed system of Damodar River has four storage dams (Tilaiya, KonarMaithon and Panchet) which cansupply 241 mgd only. The rivers remain dry during the summer season.

3.6 GEOLOGY

Major part of the Burdwan district is covered by sedimentary rocks of the Gondwana group. The Gondwana system is represented in the Damodar Valley. The system is divisible into an upper and lower series, characterized by stratigraphical discordances and an utter change in the type of fossil flora, cycads conifers prevailing in the upper and equisetaceous plants in

lower sub-division, ferns being found commonly in both. The geological feature of the district is as **Table No. 3.2** below:

Table No.3.2 Geological feature of the Burdwan district

Age	Formation	Description of rock types
Sub Recent – Recent	Newer Alluvium	Coarse sand with subordinate amount aof silt and clay
Pliocene- Pliestocene	Older alluvium	Clay, silt and sand laterite, basal gravel
Miocene	Durgapur Bed	Felspathoc sand stone and grits with quartz pebble and clay stones
Upper Permian	Raniganj Formation (Lower Gondwana)	Buff, fine to medium grained sand stone and coal seams.

The Talcher group which forms the basis of the Gondwana system consists of silty hales usually of a greenish, grey and olive colour weathering into minute, thin, angular fragments of fine soft sand stones composed chiefly quartz and of undercomposed pink feldspar. The rocks of the Karharbari group consist almost solely of sandstone grit and conglomerates with seams of coal. The Talcher- Karharbari groups are superposed by a great series of beds known as the Damodar series which consists of three divisions known in ascending order as the Barakar group, the Ironstone shales and the Raniganj beds. The Barakars consist of conglomerates sandstone (which are often coarse and felspathic) shales and coal seams of a somewhat irregular character thinning out at short distances. Above the Barakar group in the Raniganj and a few other coal fields of the Damodar Valley, there is found a great thickness of black or grey shales with bands and nodules of clay ironstone.

The study area of M/s Neptune Ispat Private Limited is located in Damodar valley which comprises of two types of geological sediments. One is Holocene sediment which is newer alluvium and Piestocene which is Laterite and lower piestocenes laterite sediment. The geological map of the study area showing the study area has been given in **Figure No.3.1.**

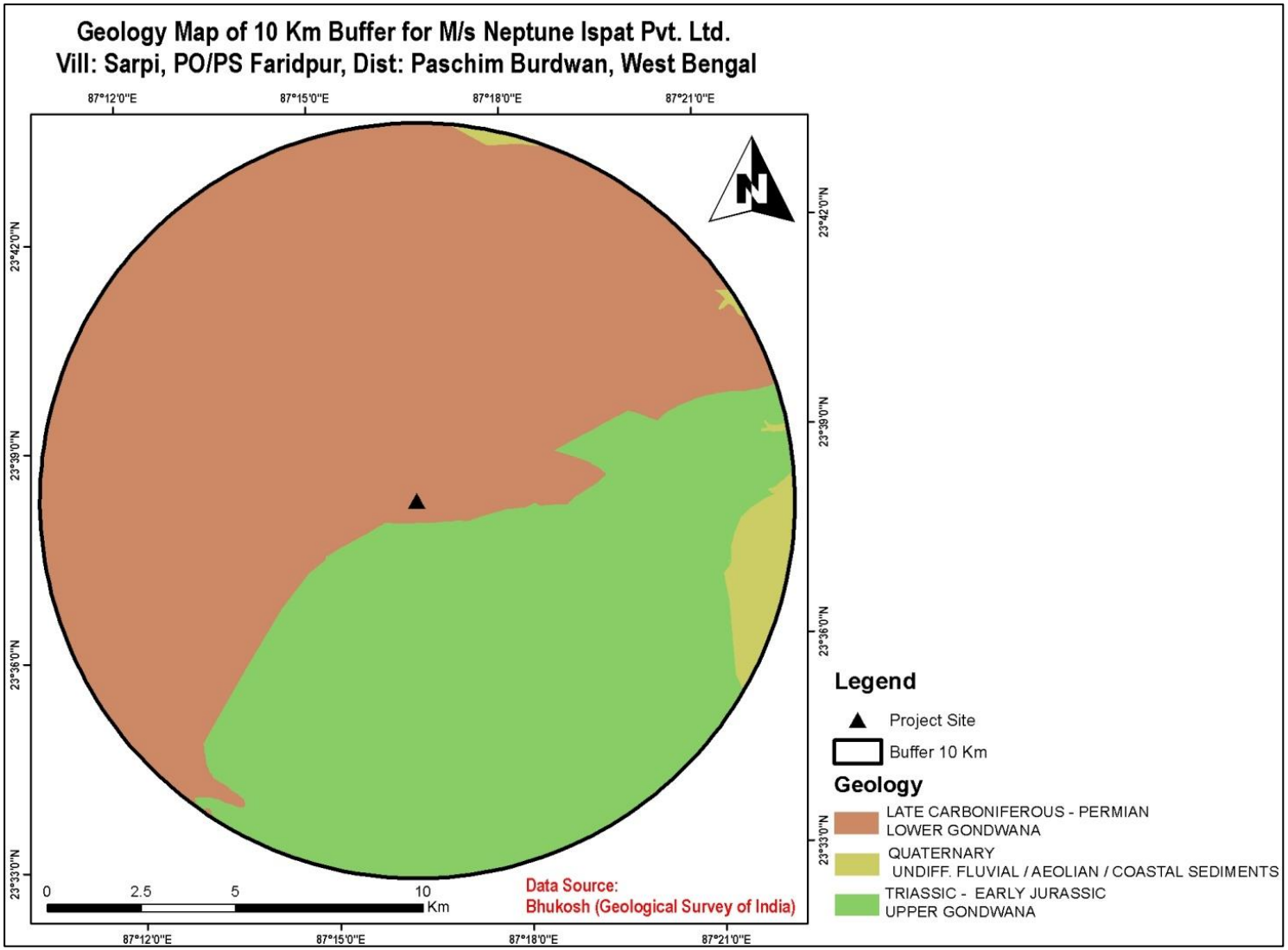


Figure No.3.1 Geological Map

3.7 HYDROGEOLOGY

This part helps in forecast of future behaviour of an aquifer system, based on analysis of past and present observation. It is deals with the flow of water through aquifers or the movement and distribution of ground water in the soil or aquifers.

From hydrological point of view the district can be divide into three groups namely (a) consolidated Archaean metamorphics (b) semi-consolidated Gondwana sedimentaries and (c) unconsolidated Tertiary and Quartenary sediments. Study area encompasses with consolidated Archaean and semi-consolidated Gondwana sedimentaries. Detail hydrological condition of the district has been given in table below: The stratigraphic feature and hydrogeological feature of the district has been given in the **Table No. 3.4 Table No. 3.5** below:

Table 3.3: Statigraphic succession of Burdwan district (Source: Kumar, 1985).

Formation name	Lithological description	Age
Ajoy-Damodar	Sand, ferruginous, silt, clay, greyish-yellow.	Holocene
Unconformity		
Bistupur	Sand, ferruginous, yellow, clay, laterite; calcareous nodules	Pliocene to Pleistocene
Unconformity		
Alinagar	Sand, pebble, greyish white; clay, grey, sticky With occasional carbonaceous matter	Miocene
Unconformity		
Tilokch-Aandrapur (eastern parts) Khatpukur (western parts)	Bluish grey clay stones, siltstones; sandstones, calcareous shales, calcareoussandstones, limestone (in eastern parts) Carbonaceous shales, claystones, grey and greyish black; within bands of lignite and layers of sand. (in western parts)	Oligocene to Miocene
Kuldiha	Sand; red, green and white clays	Middle cretaceous to Oligocene
Unconformity		

Durgapur	Felspathic sandstones, coarse to very coarse grained, gritty and pebbly; occasional red and green shales and sandstones; also lenses of coal	Middle Triassic to lowercretaceous
Panchet	Felspathic sandstones, greyish green, medium to fine grained; shales, green shales	Lower Triassic
Unconformity		
Raniganj	Felspathic sandstones, greyish white coloured, medium to fine grained; carbonaceous shales, grey shales; lenses of coal	Permian
Unconformity		
	Granite gneisses	Pre-cambrian

Table No. 3.4 Details of hydro geological characteristics of Burdwan district (Source: Gupta, 2009).

Age	Hydrogeological Unit/Sub unit	Lithology	Hydrogeological Character
Quaternary	Holocene terrace	Sand, silt and clay	Potential aquifers occur in the depth span of 50 to 110 m bgl. Thickness of aquifers ranges from35 to 60m. Average depth to water level varies from 9 to 16 m bgl during pre monsoonperiod.Groundwater occurs under unconfined to semi-confined condition. Yield of wells varies from 150m3 -250 m3/hour with a draw down of 4 to 7 meter. Average transmissivity value ranges from3000m2/day to 5000m2/day. Storativity values ranges from 1.38x10-3to 3.3x 10-4 The area shown in the coal belt is not a potential water bearing formation.
	Holocene Meander Sediments		
	Holocene Valley fills and Flood plains		
	Pleistocene/ Early Holocene sediments		

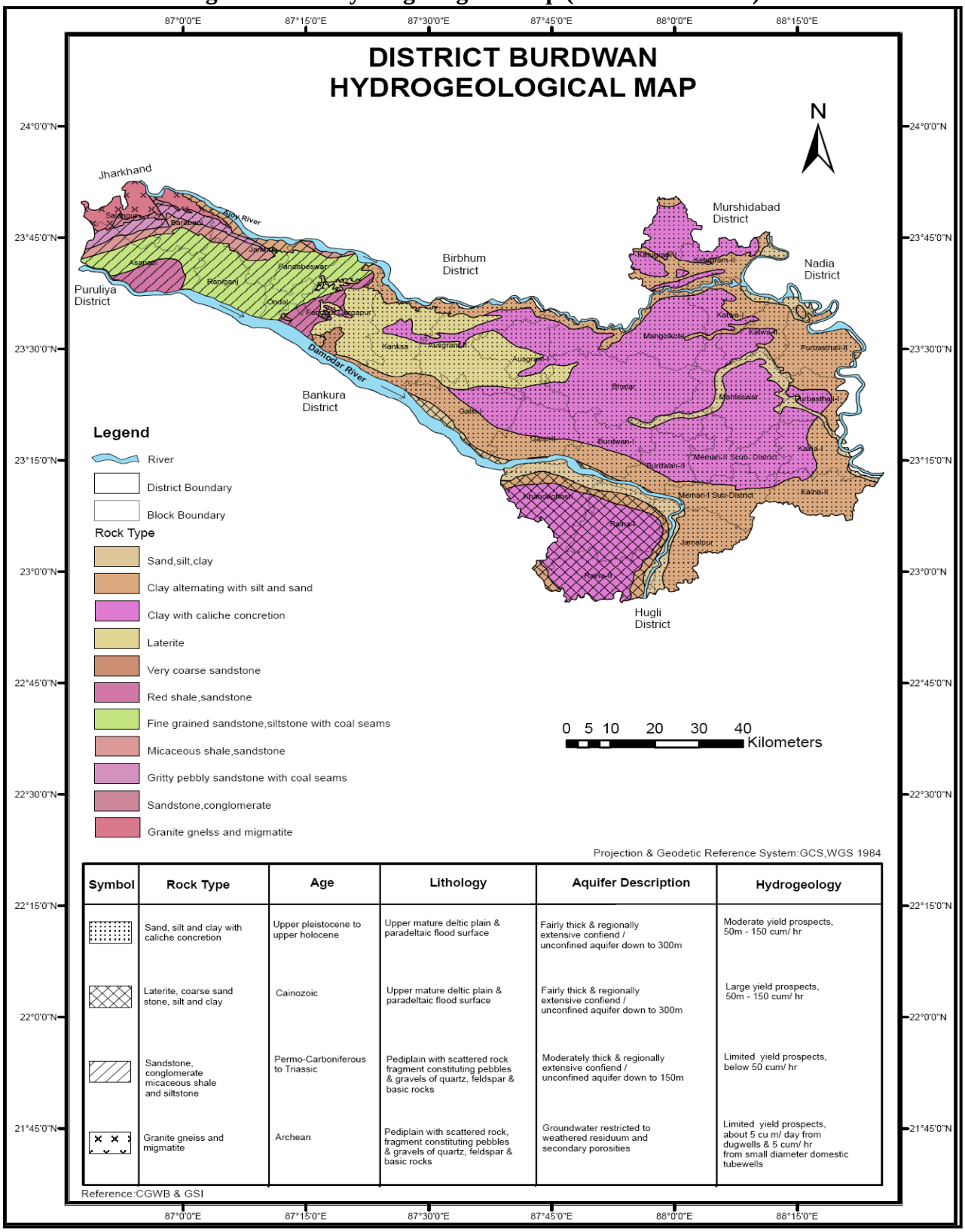
	Neogene -Pleistocene sediments	Older alluvium consists of clay, sand-fine to medium and silt	Potential aquifers occur in the depth span of 45 to 120 m bgl. Thickness of aquifers ranges from25 to 50 m. Average depth to water level from 7 to 16 m bgl. During pre monsoonperiod.Groundwater occurs under unconfined condition and deeper aquifers exhibit semi-confined toconfined condition. Yield of wells variesfrom 100 m3–180 m3/hour with a draw down of 15 to13 meter. Transmissivity value ranges from 300 m2/day to 3000 m2/day. Storativity value rangesfrom 1x10-3to 3.9x10-4
Mio-Pliocene	Tertiary sediment	Sends of various grade, silt and clay	Sediments areoften capped by laterites and older alluvium having, thickness of 20 to 40m.Aquifers occur within the depth of 200 m bgl. Average depth to water level various from 7 to 9 mbgl during pre monsoon period. Yield of wells varies from 63 m3/hour –100 m3/hour. This may goup to 135 m3/hour where overlain by river valley alluvium. Transmissivity value ranges from200m2/day to 700m2/day.
Permo-Carboniferous	Gondwana and indurated sediments	Sediments of arenacreous and argillaceous facies associated with shale,coal seam, and basic intrusive	Ground water occurs in weathered and friable sandstone under unconfined conditions. Aquifersare thin and discontinuous. Average depth to water level various from 10 to 17 m bgl. during premonsoon period. Groundwater occursunder unconfined condition and deeper aquifers exhibitsemi-confined to confined condition. Yield of wells varies from 25 m3/hour under favourablecondition. Transmissivity value of sandstone aquifer ranges from 50m2/day to 200m2/day.
Pre Cambrian	Archacanmetamorphics	Granite, Para and Ortho gneiss	Ground water occurs and circulates in 20 to 25 meter thick weathered and fractured mantleunconfined condition. This extends up to depth of 60m bgl. and some times up to 90 m bgl.Average depth to water levelvaries from 7 to 9 m bgl. During pre monsoon period. Groundwateroccurs phreatic condition. Yield of wells varies from 0.25m3/hour to 4.5 m3/hour.

The study area is mostly comes under gondwana formation. From hydrological point of view, faults and dykes are of significance as the faults provide natural planes of seepage, while dykes have a tendency to impound water along up gradient direction. Groundwater within weathered zone which is limited to around 20m depth occurs under unconfined condition and at deeper levels it occurs under semi-confined and confined condition. Through groundwater exploration it has been established that at most of the places water yielding fractures exist within 100m depth and at few a few places fractures were encountered beyond 100m depth. Generally groundwater exploration is restricted down to a depth of 125mbgl. Panchet formation is one of the important hydro geological units in Asansol block. The NW-SE trending faults appear to have better groundwater potentiality compared to the NE-SW trending faults. The yields of the exploratory bore-wells varies from 0.3m3/hr to 38m3/hr and that of transmissivity values of the aquifers vary from 50m2/day to 200m2/day. As per the CGWB report of Burdwan district, ground water occurs in semi-confined conditions to confined condition. The hydro geological map of the district has been given in **Figure No.3.2 (A).** The hydro geological status of the study area reveals that the ground water yield range varies from 18- 150 cum/ hr. The hydrological feature of the district is as **Table No. 3.6** below:

Table No.3.5 Hydrological feature of the Burdwan district

Hydrology	Statistics
Major water bearing formation	Quaternaries & Tertiaries
Pre monsoon depth to water level	0.74 to 19.95 m bgl in open wells and 2.95 to 19.03 m bgl in tube wells
Post monsoon depth to water level	0.22 to 11.63 m bgl in open wells 1.03 to 31.00 mbgl in tube wells
Long term water level trend	Declining trendof water level to the tune of 0.01 to 1.0 m/yr shown by 64.04% of wells and rising trend of 0.01 to 0.66 m/yr shown by 35.96% of wells.

Figure No.3.2 Hydro geological Map (Burdwan District)



Symbol	Rock Type	Age	Lithology	Aquifer Description	Hydrogeology
	Sand, silt and clay with caliche concretion	Upper pleistocene to upper holocene	Upper mature deltic plain & paradeltaic flood surface	Fairly thick & regionally extensive confiend / unconfined aquifer down to 300m	Moderate yield prospects, 50m - 150 cum/ hr
	Laterite, coarse sand stone, silt and clay	Cainozoic	Upper mature deltic plain & paradeltaic flood surface	Fairly thick & regionally extensive confiend / unconfined aquifer down to 300m	Large yield prospects, 50m - 150 cum/ hr
	Sandstone, conglomerate micaceous shale and siltstone	Permo-Carboniferous to Triassic	Pediplain with scattered rock fragment constituting pebbles & gravels of quartz, feldspar & basic rocks	Moderately thick & regionally extensive confiend / unconfined aquifer down to 150m	Limited yield prospects, below 50 cum/ hr
	Granite gneiss and migmatite	Archean	Pediplain with scattered rock, fragment constituting pebbles & gravels of quartz, feldspar & basic rocks	Groundwater restricted to weathered residuum and secondary porosities	Limited yield prospects, about 5 cu m/ day from dugwells & 5 cum/ hr from small diameter domestic tubewells

3.7.1 Ground water Resource

The ground water recharge source is mainly by rainfall percolation method. Most of the rainfall is lost as runoff from the area and a portion of the rainfall reaches to the zone of saturation through percolation and is a part of ground water resource. The ground water resource of Burdwan district as estimated by Central Ground water board as on 31st March 2013 has been tabulated as **Table No. 3.7** below:

Table No. 3.6 Ground water resource Availability and Stage of Development:

Annual Replenishable Ground water resource (Monsoon)		**Annual Replenishable Ground water resource (Non - Monsoon)**		**Total Ground water Recharge**	**Natural Discharge During Non monsoon Season**	**Net Annual Ground water availability**
Recharge from Rainfall	Recharge from Other sources	Recharge from Rainfall	Recharge from Other sources			
170743	42504	13283	35214	261646	24768	236877.76

Annual Ground water Draft					
Irrigation	Domestic and Industrial Use	Total	Projected demand for Domestic and Industrial Up to 2025	Ground water availability for Future Irrigation	Stage of Ground Water Development
94059	9608	103667	15762	127055	44%

Source: Water Resources Of India (As On 31st March 2013)

3.7.2 Depth of Ground water table in the study area:

The ground water depth in the study area during the pre monsoon season as revealed from the bore well data varies from 2m to 10m bgl however most of the area is having ground water depth 5 to 7m bgl. The map showing the depth of the ground water in pre monsoon season has been given in **Figure No.3.3.**

During the post monsoon season the depth of ground water varied from 1m to 7m bgl. The average ground water depth in most of the sampling points varies from 1m to 3m bgl. The map showing the depth of ground water during post monsoon period has been given in **Figure 3.4.**

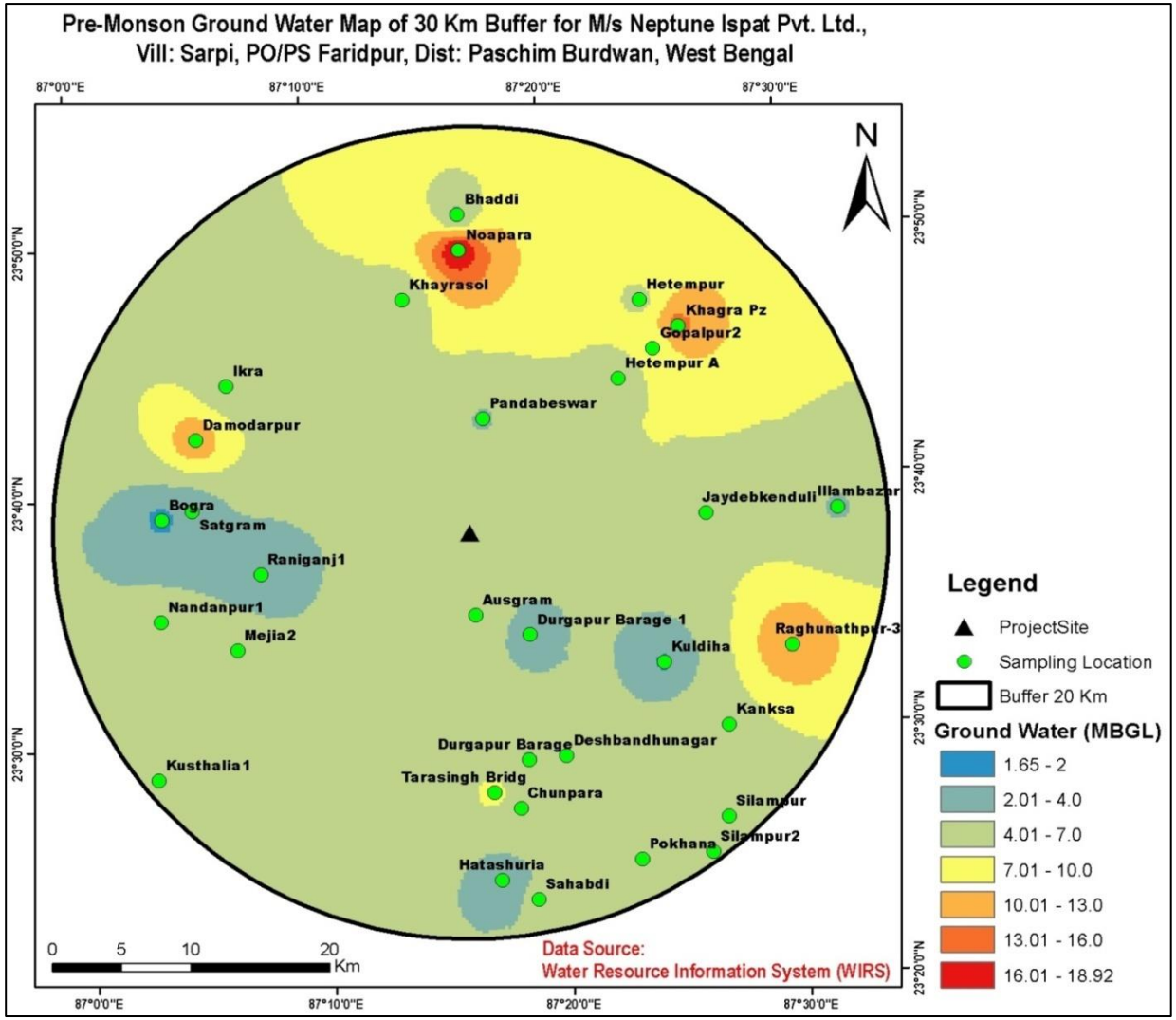


Figure No.3.3 Pre-monsoon Ground water map

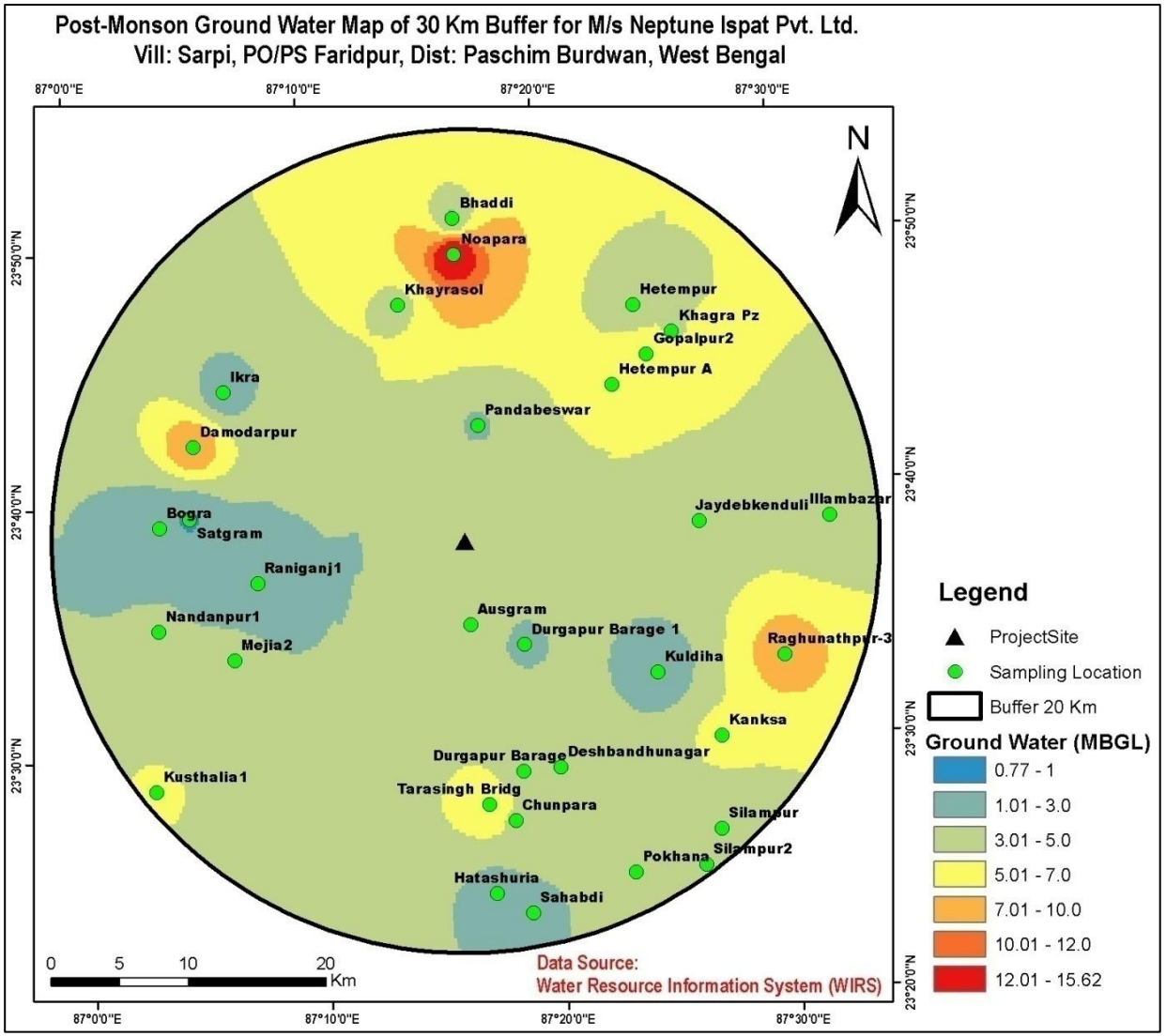


Figure No.3.4 Post-monsoon Ground water map

3.8 Digital Elevation Model-

The highest elevation of the buffer zone is 162m AMSL and lowest elevation is 36m ASML. The project site is at an elevation of 97 m above MSL. The Digital elevation map of the buffer zone has been given in **Figure 3.5**

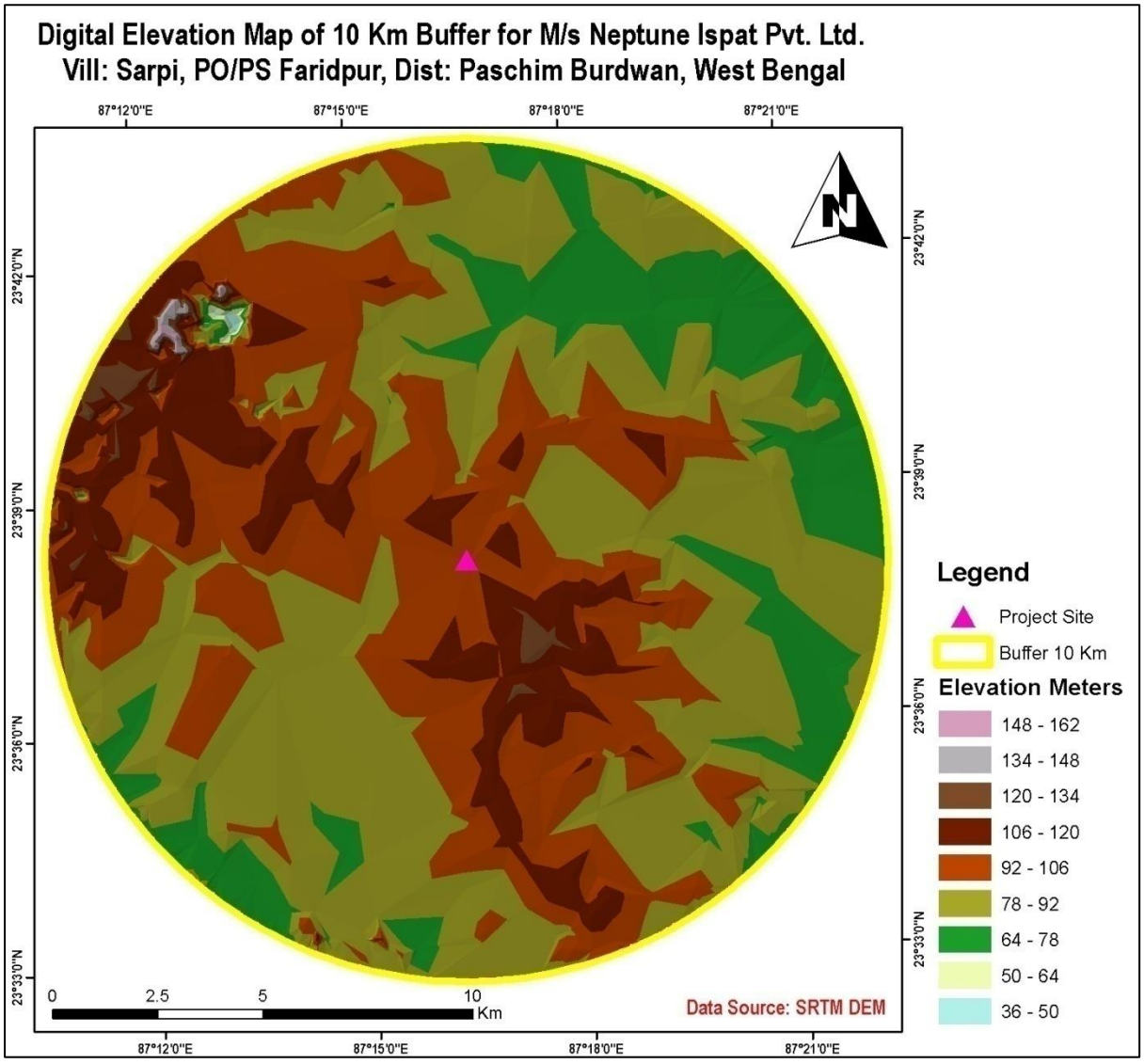


Figure No.3.5 DEM of 10 km Buffer

3.9 LAND ENVIRONMENT

The objective of this section is to define the present baseline status, so that temporal changes due to the industrial activities on the surroundings can be assessed in future.

The objectives of land use studies are:

- To determine the present land use pattern
- To analyze the impacts on land use due to industrialization activities in the study area
- To give recommendations for optimizing the future land use pattern vis-à-vis growth of industrial activities in the study area and its associated impacts.

3.9.1 Land Use & Land Cover of core zone

This part assessing the impact on land use pattern in the study area due to the proposed enhancement in production. Current vintage data of Sentinel-2 FCC (False Colour Composite) downloaded from USGS Earth Explorer has been used for preparation of Land use/Landcover thematic map of study area. The downloaded satellite data is already geo referenced and terrain corrected. A total number of four bands have been stacked and resample at 10 m resolution. Google earth was used as reference for the preparation of base layer data like road, rail network, and plant site.

Table No.3.7 Technical input

Satellite Image	Sentinel-2
Imagery Date	18thFebruary, 2022
Satellite Data Source	USGS Earth Explorer
Software used	ArcGIS 10.1 and e-Cognition 9.2

3.9.2 Methodology

Land use/Land cover map preparation, base map creation; Layer Stacking of satellite image has been processed using ArcGIS 10.1Software. The LULC maps were generated using Sentinel-2 satellite data for the date 18th February, 2022, the bands used were blue, green, red and Near Infra-Red (NIR); these were stacked at10 m of spatial resolution. Object oriented classification method was implemented in e- Cognition 9.2 software. In this classification approach the image is divided into objects by using multi-resolution segmentation. As this is a supervised classification algorithm sample objects are selected for all the classes from the segmented image. The mean of the selected bands are used as object features for differentiating classes from each other. Finally, nearest neighbourhood classification algorithm is applied. Certain anomalies in classified output are removed

using manual editing tool. The results were then exported as ESRI shape files into ArcGIS 10.1 and area calculation for different classes was done. The final map was prepared using ArcGIS layout view by adding all the layers and map information like North arrow, scale bar, legend and the title for the map.

For the accuracy assessment of the Land Use Land Cover classes field work was carried out. A hand-held GPS device was used for the purpose of collecting GPS coordinates. These were used for the identification of certain features on field and some of these were later on used to check the accuracy of the generated LULC map. GPS coordinates were collected for classes such as water body, wate Land River bed, fallow land and also for the man-made features such as road and railway tracks.

3.9.3 Technical input

Satellite Image	Sentinel-2
Imagery Date	18th February, 2022
Satellite Data Source	USGS Earth Explorer
Software used	ArcGIS 10.1 and e-Cognition 9.2

The graph showing the land use distribution of the buffer zone has been given in **figure 3.10.** The Land use map of the buffer zone given in **figure 3.11.**

3.9.4Land Use & Land Cover in Buffer zone

The land use pattern of the area around 10 km radius of study area is presented in table given below.

Table 3.8: Land Use planning of buffer zone

Sl.No.	Class_name	Area Sq Km	% Area
1	Crop Land	71.551	22.78563
2	Fallow Land	163.308	52.00592
3	Forest	11.1041	3.536134
4	Industrial Area	2.32097	0.73912
5	Plantation	6.2374	1.986319
6	Pond/Lake	5.30687	1.689989
7	Quarry Site	10.9576	3.48948
8	River Bed	0.044765	0.014256
9	Scrub Land	5.43382	1.730416
10	Settlement	23.1584	7.374862
11	Waste Land	14.5952	4.647885
Total		**314.0181**	**100**

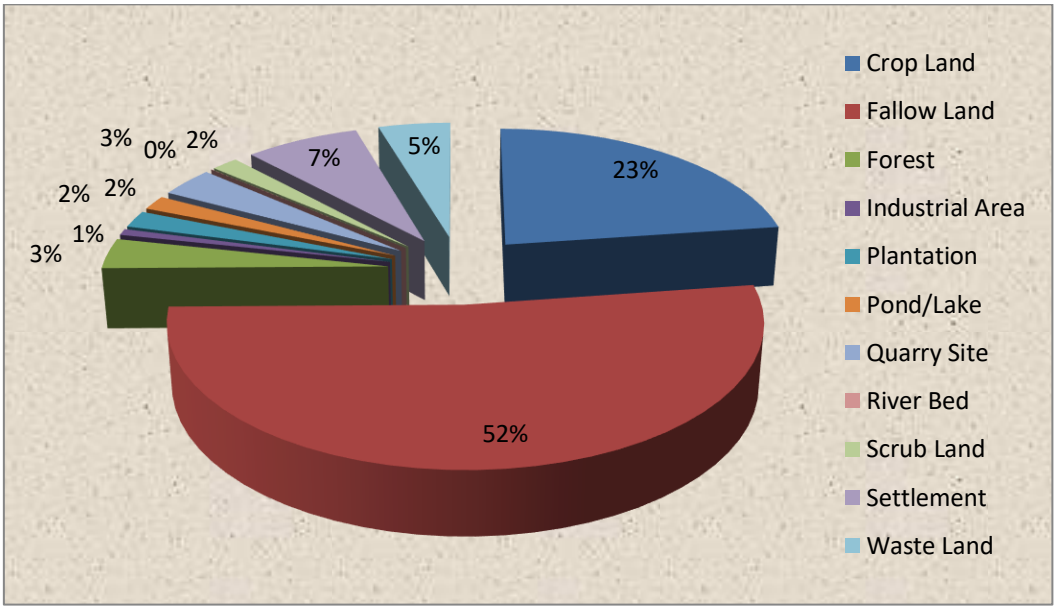


Figure 3.6: Graph showing Land use planning of buffer zone

As per the land use pattern of the buffer zone of the project site it has been observed that about 23% of the land cover is used as crop land, fallow land is covered by52% of the total land area, forest cover of the area is only 4%, scrub land is about 2% and land without scrub is 5%. Other land use pattern of the buffer zone of the project site include river bed 0.01%, water body 2%, settlement 7% and plantation of 2%. Industrial establishment in the study area coversonly1% and quarry site covers 3% of the total land use plan. The Land use map of the buffer zone given in **Figure No.3.7.**

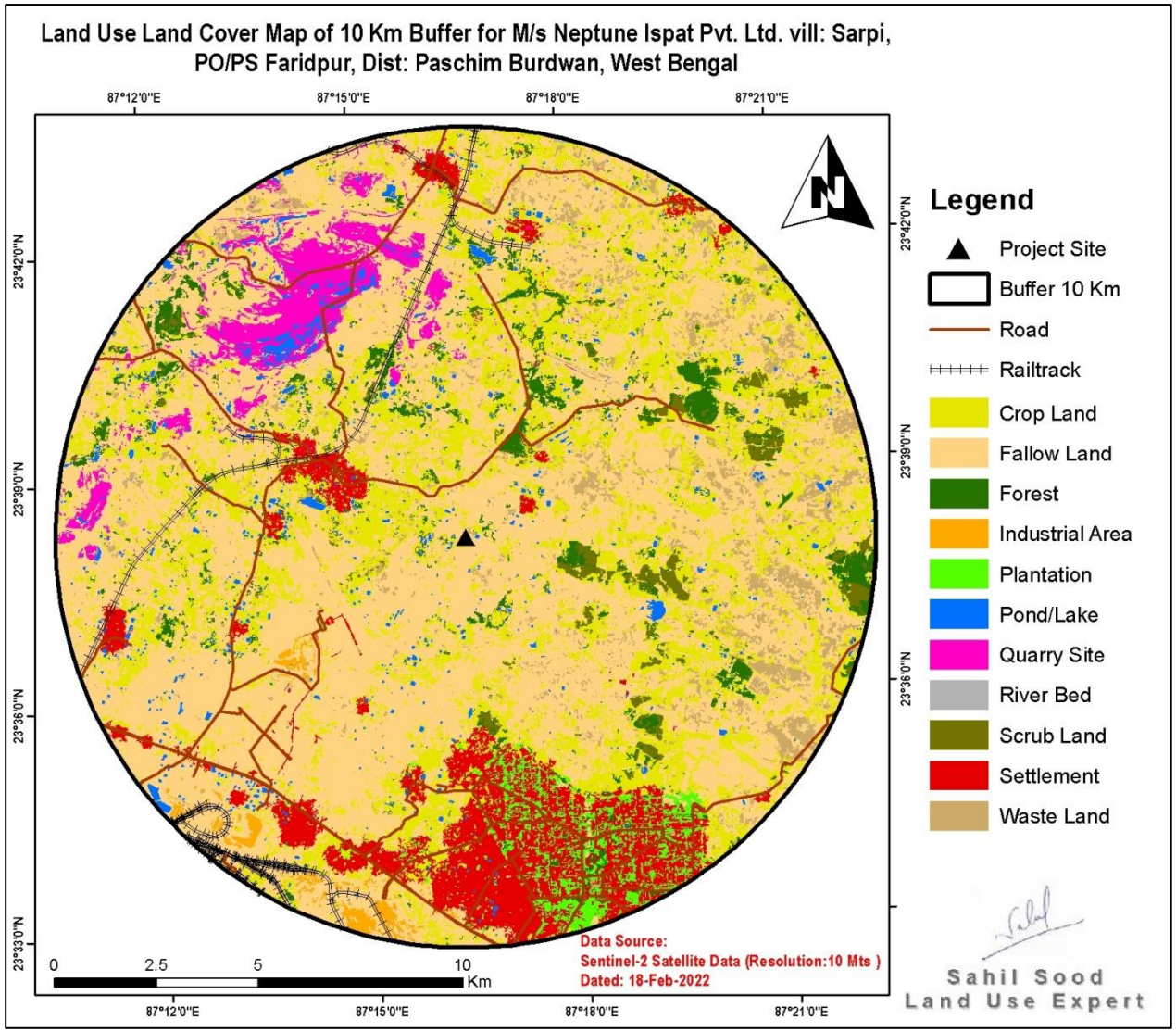


Figure No.3.7 Land Use Map

3.10 Soil Quality

3.10.1 Soil Quality Monitoring

Soil samples were collected from 4 selected locations in the study area to assess the existing soil conditions in and around the project site as given in the sampling location map. The sampling locations are decided based on the following criteria:

1. Land use pattern of the study area
2. Cropping pattern of the area
3. Identification of impact zone of the project
4. Slope of the study area

3.10.2 Methodology

Soil samples were collected mainly from the agricultural fields with the help of core sampler with 6-10 cm depth. The sampling sites are away from fences, roads, and other features that may cause atypical properties and samples are collected from freshly dug pits. The sample was packed in a polyethylene bag, sealed and brought to the laboratory. After drawing sample for moisture content, the remaining samples were air-dried. For chemical characteristics, air-dried samples were ground in an agate mortar and sieved.

The standard soil classification details as per Indian council of agricultural research have been tabulated as below to assess the soil quality of the study area.

Table 3.9: Standard for Soil Quality Parameters

Sl. No	Parameters	Classification
01	pH	<6.0: Acidic 6.0 – 8.5: Normal to Saline 8.9 – 9.0: Tending to become alkaline >9.0: Alkaline
02	Salinity Electrical Conductivity (µmhos/cm) (1ppm = 640 µmho/cm)	Up to 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
03	Organic carbon (%)	<0.5 % : Low 0.5-0.75: Medium >0.75 : High
04	Nitrogen (Kg/Ha)	< 240 Kg/ Ha: low 240-480 Kg/ Ha: Medium >480 High
05	Phosphorus as P2O5 (Kg/ha)	<11.0 Kg/ Ha low 11 – 22 Kg/Ha: Medium >22 Kg/ Ha: High
06	Potassium as K2O (Kg/ha)	<110.0 Kg/ Ha low 110 - 280 Kg/Ha: Medium >280 Kg/ Ha: High

07	SAR	
08	**DTPA Extractable Micronutrient**	
i.	Zinc (Zn)	<0.3 ppm – low 0.3 to 2.3 ppm – Medium > 2.3 ppm - High
ii.	Copper (Cu)	0.2 to 10 PPM
iii.	Active Manganese (Mn)	< 15 ppm – Deficient 15-100 ppm – Normal/ Critical >100 ppm - Toxic
iv.	Iron (Fe)	11.0 to 16.0 PPM

3.10.3 Sampling Locations

A total of 6 sampling locations were selected for soil quality analysis. The sampling location for soil quality has been given in the **Table No.3.5** below and **Figure 3.12**.

Table No. 3.10 Location of soil Sampling Stations

Sl. no	Locations	Distance in km	Direction	Latitude & Longitude	Station No.	Land use Pattern
1.	Project site	---	---	23° 38’ 15.52” N 87° 16’ 31.48” E	S1	Core zone (Inside plant premises)
2.	Sarpi	0.65	W	23° 38’ 8.14” N 87° 16’ 05.05” E	S2	Agricultural Land
3.	Bansgora	2	SE	23° 37’ 31.57” N 87° 17’ 28.64” E	S3	Agricultural Land
4.	Kumardihi	4	NNE	23° 40’ 16.31” N 87° 16’ 04.01” E	S4	Agricultural Land

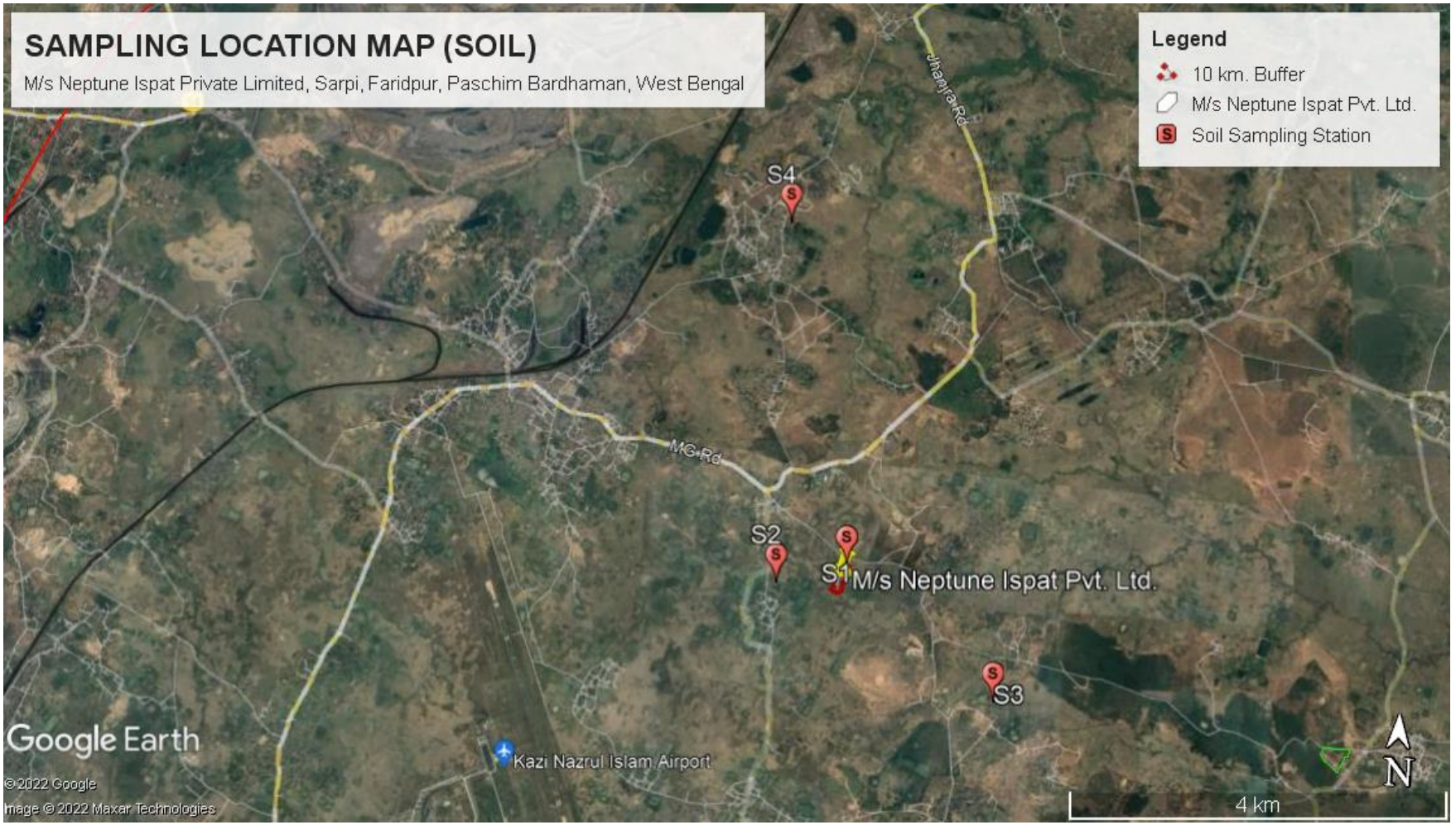


Figure 3.8: Soil Quality Monitoring Stations

The analysis result of soil from 4 nos of sampling stations is given in **Table No.3.6** below.

Table 3.11: Soil Quality Analysis Results

Sample Code	**178**	**178A**	**178B**	**178C**
Location	Project Site	Sarpi	Bansgora	Kumardihi
A: SOIL PHYSICAL PROPERTIES				
Texture	LOAM	LOAM	LOAM	LOAM
Sand (%)	51	52	50	50
Silt (%)	39	38	39	40
Clay (%)	10	10	11	10
Bulk Density (G/Cc)	1.11	1.08	1.05	1.18
Permeability (cm/hr)	1.09	1.08	1.05	1.07
Moisture (%)	13.03			
B: CHEMICAL PROPERTIES				
pH	6.55	6.6	6.65	6.7
Color (Visual)	Grey	Grey	Brown	Brown
Electrical Conductivity (µs/Cm)	205	190	220	235
Total Organic Carbon (%)	0.59	0.56	0.74	0.78
Sodium (Mg/Kg)	245	240	250	260
(i) MACRONUTRIENTS				
Available Nitrogen (Kg/Ha)	163	151	176	188
Available PhosphorusAs P_2O_5 (Kg/Ha)	15	14	16	18
Potassium As K_2O Kg/Ha)	538	524	564	591
(ii) MICRONUTRIENTS				
Iron (%)	0.85	0.88	0.92	0.94
Ca (Mg/Kg)	72	64	80	120
Mg (Mg/Kg)	24	19.2	28.8	24
Cu (Mg/Kg)	12.8	10.6	15.6	17.8
Zn (Mg/Kg)	68	62	72	76
Mn (Mg/Kg)	340	360	380	400
(iii) Toxic Metals				
Lead (Mg/Kg)	5.24	4.85	6.15	7.20
Nickel (Mg/Kg)	10.45	9.82	12.64	15.76

3.10.4 Discussion

The soil has been grouped into major grey and brown loam sedimentary types with loam texture. Soil pH lies in the range of 6.55 – 6.7. Total organic carbon content is moderate to high (0.56 to 0.78%) at most of the places. Macro nutrients like phosphorus (P_2O_5) is moderate (14 to 18 Kg/Ha). Soils are deficient in available nitrogen content (151 to 188 kg/Ha) at most of the sites. Available potassium in soils of this area is high (524 to 591 Kg/Ha). Soil analysis result shows that soils are mostly neutral in reaction; moderately fertile with available phosphorous and available potassium and low in available nitrogen content.

Secondary data on soil quality as depicted from National Aquifer Mapping and Management Plan, Ranchi, 2016 shows that soils of the area are red soil and sandy loam. Stony and Gravelly soils are low grade soils having a large admixture of cobbles, pebbles and gravels generally found at the base of the hills. Sandy Soils are found near the stream beds containing 60% sand and are easily drained. These are poor in respect of fertility and require heavy maturing. Loamy Soils consist mostly of detritus of decomposed rocks and vegetables matter. It is suitable for cultivation. Normally these are found in valleys near the hills. Clayey Soils are found near tank beds. It is sticky soils. Their water bearing capacity is very high. The area is very fertile but yielding capacity improved with addition of sand, lime and organic manures etc.

3.11 Air Environment

The air environment consists comprises of;

(a) Meteorological parameters:

- Wind direction,
- Wind speed,
- Temperature,
- Atmospheric pressure,
- Rainfall and humidity

(b) Ambient air quality parameters

- Particulate Matter (PM 10)
- Particulate Matter (PM 2.5)
- Gaseous Pollutants (SOx& NOx)
- Carbon Monoxide

The baseline studies on air environment existing levels of pollutants in ambient air within the impact zone. The existing status of air environment with respect to the identified air pollutants is assessed through air quality surveillance programme with scientifically

designed and partially based on scoping requirements. These data sets can be used in future to determine the status and trends of air pollution acting as a data source for decision makers.

Micrometeorological data collection is an indispensable part of the air pollution study. The Micrometeorological data is collected from nearest regional micrometeorological centre and is used for proper interpretation of existing air pollution status.

3.11.1 Meteorology

The study of climate and meteorological conditions of a particular region is of utmost importance to assess the ambient air quality status of that region. The prevailing meteorology at project site plays a crucial role in transport and dispersion of air pollutants released from the industrial activities.

The persistence of predominant wind direction and the wind speed at the project site will decide the direction and extent of the air pollution impact zone. The principle variables which generally affect the micrometeorology are horizontal transport and dispersion (average wind speed and direction), convictive transport and vertical mixing (atmospheric stability), and the topography of the area. Meteorological parameters considered for identifying impacts are atmospheric temperature, rainfall, wind speed, wind direction and relative humidity.

3.11.2 Methodology

A meteorological station was installed at project site, during the study period to record various meteorological parameters such as ambient temperature, relative humidity, wind speed & direction, rainfall, etc. The meteorological study was carried out as per IS: 8829 and Indian Meteorological Department. Equipments were installed at a height of 8 m above ground for continuous monitoring data.

3.11.3 Climate of the district

The normal climate of Paschim Burdwan is dry& hot characterized by hot summer, cold winter, abundant rainfall and humidity. The climate of this area deeply influenced by seasonal winds known as “monsoon”. The South-west monsoon that carries heavy load of moisture in the middle of June and lasts up to September & it is responsible for high rainfall during rainy season. There is a difference of 299 mm of precipitation between the driest and wettest months. The variation in temperatures throughout the year is 12.2 °C | 22.0°F. The month with the highest relative humidity is September (86.10 %). The month with the lowest relative humidity is March (53.09 %).The month with the highest number of rainy days is July (27.27 days). The month with the lowest number of rainy days is December (1.20 days).

The summer season starts in the month of March to June, however May-June is considered hottest months in the region with high temperature almost up-to 40° C. The month of June to

September brings Pre-Monsoon rains in the city. The winter season is between December to February.

3.11.4 Temperature

The season of the district is divided into four seasons i.e. Summer, Winter, Monsoon and post monsoon. Summer season starts with the month of March and end with mid of June where temperature ranges between 22˚C to 42˚C. The temperature is maximum during the month of May where the maximum temperature rises upto 43˚C. The winter season starts from December and continues till the end of February. December is the coolest month with the daily maximum temperature at 30^0C and the daily minimum temperature at 17˚C. The monthly variations of temperature of Paschim Burdwan district are presented in **Table no.3.12& Figure No.3.9 below:**

Table no. 3.12: Monthly Temperature (ºC) Variation (2009 - 2018)

Year/	Jan			Feb			Mar			Apr			May			June		
Month	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
2009	30	18	23	34	19	26	39	23	30	43	27	35	40	28	33	42	30	35
2010	27	15	20	32	19	25	40	24	31	46	29	36	42	30	35	39	29	33
2011	27	15	20	32	18	24	37	22	29	39	25	31	40	28	33	36	28	31
2012	26	17	21	31	19	25	37	23	29	40	27	33	42	29	34	41	30	34
2013	27	15	20	31	18	24	38	23	30	41	26	33	39	28	33	36	28	32
2014	29	16	22	31	19	25	37	23	30	43	28	35	43	29	36	41	30	35
2015	29	17	23	33	21	27	37	24	30	39	27	33	43	29	36	39	29	34
2016	30	18	24	34	22	28	38	25	32	44	29	37	42	29	35	40	29	35
2017	30	17	23	34	20	27	37	22	29	42	26	34	36	27	31	33	27	30
2018	27	17	22	33	22	27	38	25	31	38	26	32	39	28	34	39	31	36

Year/	July			Aug			Sept			Oct			Nov			Dec		
Month	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
2009	32	27	29	32	27	29	32	26	28	32	23	27	30	20	24	28	17	22
2010	33	27	29	34	26	29	33	25	28	32	24	27	31	21	26	27	17	21
2011	34	27	30	32	26	29	31	25	28	32	24	28	30	21	25	28	17	22
2012	35	28	31	32	26	29	32	25	28	32	22	26	29	19	23	28	16	22
2013	35	27	31	34	26	30	34	26	31	31	23	28	31	19	26	30	18	25
2014	36	28	31	35	27	31	34	25	30	34	24	28	33	20	26	29	17	23
2015	36	28	32	35	27	31	36	27	31	35	24	29	33	22	28	30	19	25
2016	37	28	32	35	27	31	35	26	30	34	24	29	32	20	26	31	18	24
2017	36	28	32	36	28	32	34	27	30	32	25	28	30	21	25	29	20	24
2018	35	29	33	34	28	32	34	27	30	32	24	29	31	22	28	26	18	23

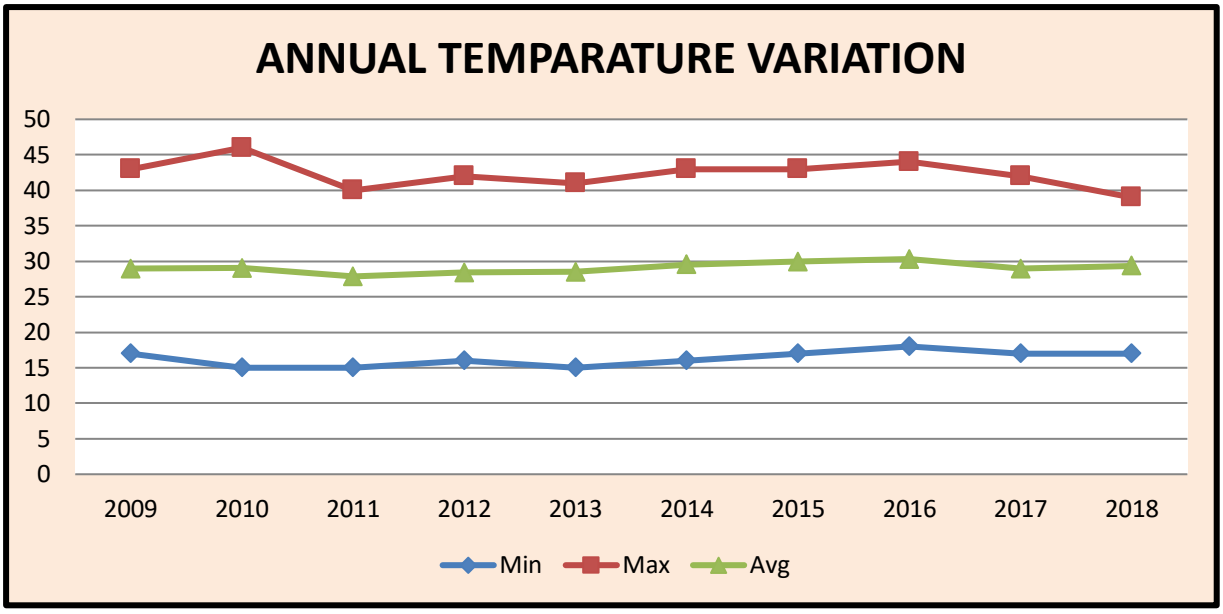


Figure No.3.9: Graphical presentation of temperature data

3.11.5 Relative Humidity

The relative humidity is found to be high during the month of August &September i.e. 90% and low during the month of March i.e. 31%. The monthly variation of humidity has been given in **Table No.3.13**and **Figure No. 3.10.**

Table no. 3.13 Monthly variation of relative humidity

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2009	48	34	31	38	57	51	86	90	90	81	66	50
2010	46	40	36	43	53	64	85	82	87	81	66	64
2011	53	45	50	58	63	71	78	85	88	78	64	50
2012	57	39	35	53	54	59	76	83	84	69	52	36
2013	35	32	32	44	64	69	75	83	84	86	64	51
2014	45	41	35	37	50	59	78	81	80	73	49	39
2015	44	39	34	50	52	60	72	75	66	61	51	40
2016	39	41	40	38	52	56	67	76	82	72	54	44
2017	41	35	45	55	70	76	70	72	75	76	57	49
2018	38	35	37	55	58	52	67	75	76	65	53	47

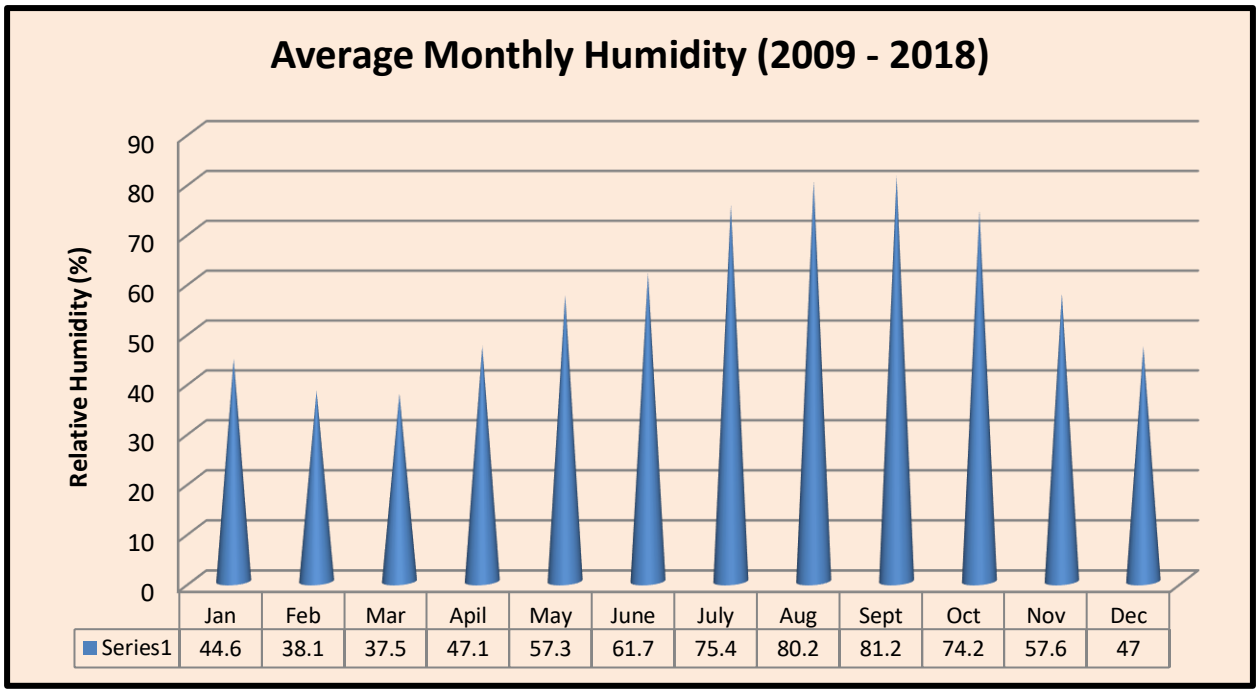


Figure No.3.10: Graphical presentation of Relative Humidity data

3.11.6 Rainfall

The average annual rainfall based on the 9 years (2009 – 2018) IMD data of Burdwan district, was observed to be 1560 mm distributed in 160 rainy days. The south-west monsoon that carries heavyload of moisture from the Bay of Bengal set in properly in themiddle of June and lasts up to September and is responsible forhigher rainfall during rainy season. The retreatof the south-west monsoon and the onset of the unsteady northeastmonsoon cause some disturbance in the atmosphere resultingin a few thunderstorms in October and November. Monthly variations in the rainfall are given in **Table No. 3.14**and **Figure No. 3.11.**

Table No.3.14 monthly rainfall in the study area

Year	Period	Rainfall	Rain days
2009	Jan-Dec	2225.1	135
2010	Jan-Dec	1549.43	149
2011	Jan-Dec	1555.3	165
2012	Jan-Dec	1196.3	153
2013	Jan-Dec	1384.7	168
2014	Jan-Dec	1031.8	136
2015	Jan-Dec	1165.93	157
2016	Jan-Dec	1157.6	175
2017	Jan-Dec	1784.6	171
2018	Jan-Dec	2543.4	157
Source: India Meteorological Department			

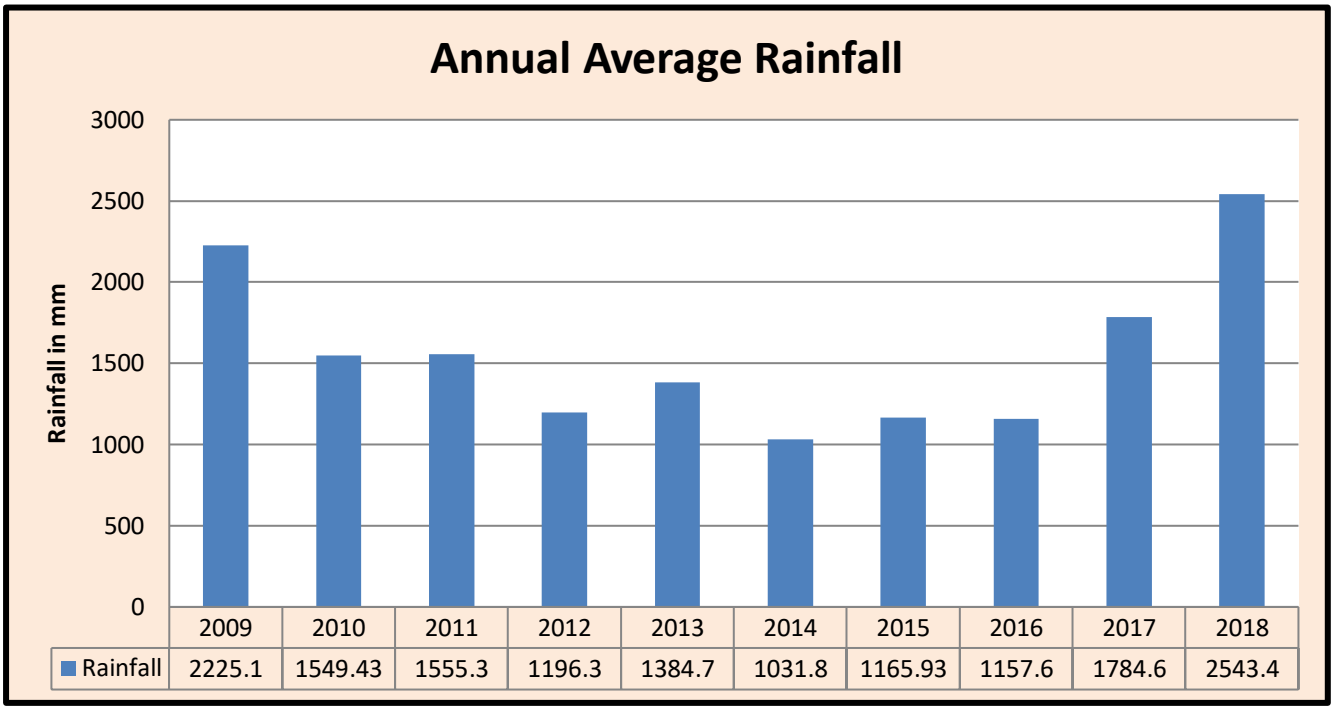


Figure 3.11: Graphical presentation of Rainfall data

3.11.7 Atmospheric pressure

The maximum pressure observed were 1016.3 occurring during the month of January. The minimum pressure observed was 996.3mb occurring during the month of June in the monsoon season. The pressure level in all other months was found to be in the range of 997.9mb to 1016.1mb. It can be seen from the data that not much variations are observed in the average atmospheric pressure levels. The pressure levels are found to be fairly consistent over the region. The monthly variations in the atmospheric pressure levels are presented in **Table No.3.15 and Figure No.3.12**given below.

Table no.3.15 Monthly atmospheric pressure in the study area

Year/ Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2009	1015.1	1011.6	1009.1	1004.8	1002.6	999	999.1	1002.7	1004.8	1009.7	1013.3	1015
2010	1016.3	1013.1	1008.8	1004.9	1002.3	1000.6	1002.3	1003.6	1005.3	1007.6	1012	1012.2
2011	1013.5	1012.1	1008.6	1007.4	1002.5	998.3	1000.6	1001.4	1002.7	1009.7	1013	1014.2
2012	1014	1011.6	1008.3	1005	1001.4	996.3	998.1	1000.7	1004.5	1010.5	1012.4	1013.5
2013	1015.1	1013.6	1009.5	1004.9	1000.4	999.2	997.9	1001	1004.1	1009.3	1013.2	1013.9
2014	1016.3	1012.2	1010.9	1006.3	1003.1	997.9	998.3	1001.4	1004.6	1011.3	1012.5	1015
2015	1016.1	1013.9	1012.3	1007.3	1002.9	1000.5	999.8	1002.3	1005.4	1011.2	1013.7	1015.7
2016	1015.5	1013.9	1010.4	1003.7	1003	1001.9	1001	1000.9	1004.3	1008.2	1013.1	1014.7
2017	1015.7	1013.9	1009.2	1005.5	1003.7	999.8	1000	1001.7	1004.9	1008	1013.1	1015.3
2018	1013.9	1013.3	1009.1	1006.7	1003.8	998.6	997.5	999	1005.3	1011.4	1013.8	1016.1

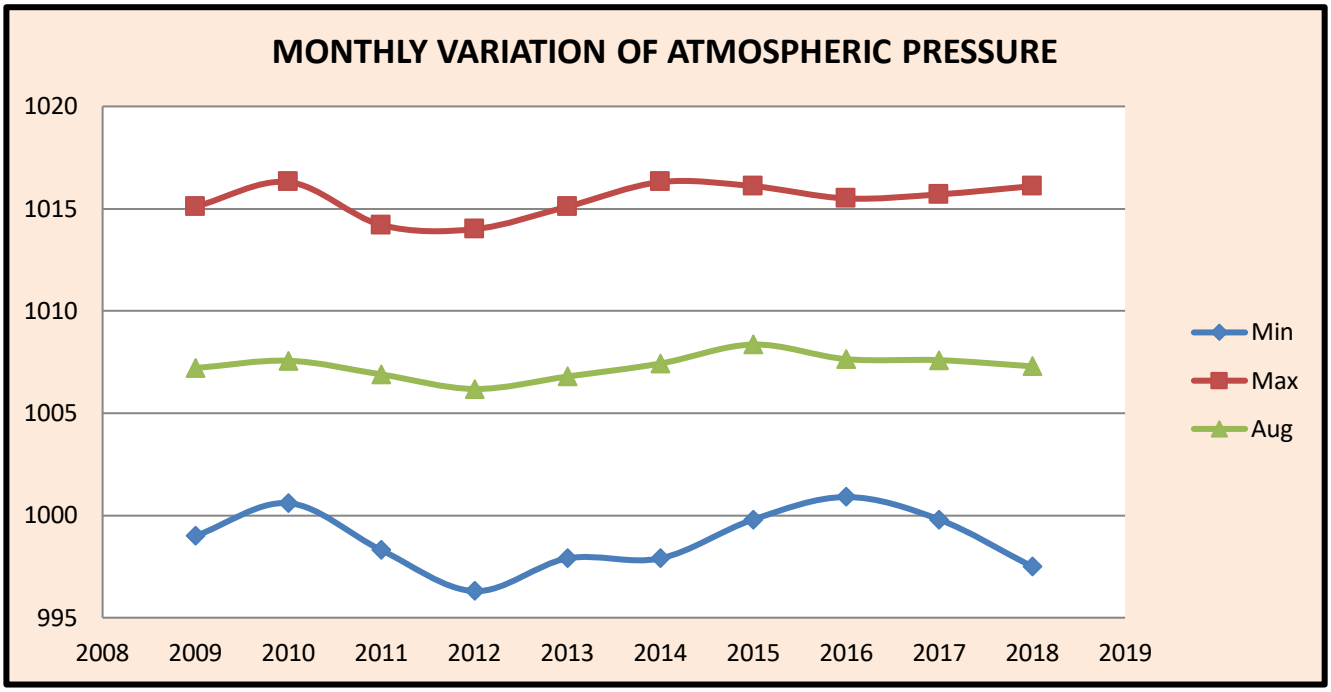


Figure No.3.12 Graphical representation of atmospheric Pressure

3.11.8. Micrometeorology Data

The site specific hourly micrometeorology data for three months i.e. **October** to **December 2021** has been collected which include wind speed, wind direction, temperature, humidity, rainfall and atmospheric pressure. The summarized meteorological information of the study period has been given in the **Table No. 3.16**below:

Table: 3.16 Summaries of Meteorological Data Monitored At Site

Month	Temp(˚C)			Relative Humidity (%)			Avg Rainfall (mm)	AvgAtmospheric Pressure (mb)
	Min	Max	Avg	Min	Max	Avg		
October	20	36	27.43	36	99	65.01	5.81	1011.46
November	21	33	26.43	32	92	53.41	3.21	1013.76
December	10	29	21.73	21	94	47.59	1.1	1016.14

- The meteorological data was collected between the period from October to December 2021 and the minimum temperature recorded is 10˚C and maximum temperature recorded is 36˚C. The average temperature during the monitoring period is 25.19˚C.
- The relative humidity was observed to range from 21% to 99% during the study period. The average rainfall during the study period is 3 mm and atmospheric pressure ranges from 1007 to 1021mb.

3.11.9 Wind speed and wind direction

The wind frequency distribution during summer season in daytime, night time and 24 hours overall in the monitoring period is given in **Tables No.3.18, 3.19 & 3.20**respectively. The average wind speed of during the monitoring period is 6.77m/s and predominant wind direction are SE and NE. The wind rose diagram of study period has been presented in **Figure No.3.12, 3.13 & 3.14.**

Table No.3.17 Wind Frequency (%) during monitoring period (Composite) at Project Site

Directions	Velocity Range (m/s)							
	0-0.5	**0.5-2**	**2-4**	**4-6**	**6-8**	**8-110**	**10-25**	**Total**
North	0.18	0	0.14	0.69	2.42	2.65	1.19	7.27
NNE	0	0.05	0.05	0.64	1.78	2.15	0.91	5.58
NE	0	0	0.18	1.19	1.83	1.05	0.55	4.8
ENE	0	0.09	0.14	0.96	1.46	0.82	1.05	4.52
East	0	0	0.14	1.14	0.37	0.55	1.28	3.48
ESE	0	0.05	0.23	0.96	0.96	1.1	0.41	3.71
SE	0	0.05	0.37	1.1	0.46	0.59	0.37	2.94
SSE	0	0.09	0.5	1.42	1.19	0.32	0.5	4.02
South	0	0.05	0.41	1.74	1.01	0.69	0.18	4.08
SSW	0	0.14	0.59	2.24	1.6	2.1	0.23	6.9
SW	0	0.05	0.46	1.83	2.42	1.46	0.41	6.63
WSW	0	0	0.73	2.1	3.29	1.51	0.37	8
West	0	0	0.69	1.74	1.97	1.42	0.37	6.19
WNW	0	0.05	0.59	2.01	1.05	1.33	0.09	5.12
NW	0	0	0.14	2.38	3.39	4.21	1.19	11.31
NNW	0	0	0.18	1.69	3.66	7.14	2.79	15.46
Total	**0.18**	**0.62**	**5.54**	**23.83**	**28.86**	**29.09**	**11.89**	**100**

Table 3.18 Wind Frequency (%) during monitoring period (Day) at Project Site

Direction	Velocity Range (m/s)							
	0-0.5	**0.5-2**	**2-4**	**4-6**	**6-8**	**8-110**	**10-25**	**Total**
North	0	0	0.08	0.76	1.43	2.6	1.68	6.55
NNE	0	0.08	0.08	0.34	1.43	2.68	1.26	5.87
NE	0	0	0.08	0.76	1.59	0.34	0.67	3.44

ENE	0	0.17	0.25	1.09	1.68	0.84	1.59	5.62
East	0	0	0.17	1.26	0.42	0.5	1.34	3.69
ESE	0	0.08	0.25	0.84	0.67	1.01	0.67	3.52
SE	0	0	0.25	1.43	0.42	0.5	0.42	3.02
SSE	0	0.08	0.42	1.93	1.59	0.5	0.76	5.28
South	0	0.08	0.17	1.17	1.01	0.67	0.25	3.35
SSW	0	0.08	0.5	1.68	1.68	1.34	0.34	5.62
SW	0	0.08	0.34	0.92	1.59	1.01	0.5	4.44
WSW	0	0	0.76	0.92	2.68	1.93	0.5	6.79
West	0	0	0.67	1.01	2.01	2.01	0.5	6.2
WNW	0	0.08	1.01	2.1	1.43	2.18	0.08	6.88
NW	0	0	0.17	2.85	3.19	5.29	2.01	13.51
NNW	0	0	0.25	2.52	2.6	7.47	3.36	16.2
Total	**0**	**0.73**	**5.45**	**21.58**	**25.42**	**30.87**	**15.93**	**100**

Table 3.19 Wind Frequency (%) during monitoring period (Night) at Project Site

Direction	**Velocity Range (m/s)**							
	0-0.5	**0.5-2**	**2-4**	**4-6**	**6-8**	**8-110**	**10-25**	**Total**
North	0.4	0	0.2	0.6	3.62	2.72	0.6	8.14
NNE	0	0	0	1.01	2.21	1.51	0.5	5.23
NE	0	0	0.3	1.71	2.11	1.91	0.4	6.43
ENE	0	0	0	0.8	1.21	0.8	0.4	3.21
East	0	0	0.1	1.01	0.3	0.6	1.21	3.22
ESE	0	0	0.2	1.11	1.31	1.21	0.1	3.93
SE	0	0.1	0.5	0.7	0.5	0.7	0.3	2.8
SSE	0	0.1	0.6	0.8	0.7	0.1	0.2	2.5
South	0	0	0.7	2.41	1.01	0.7	0.1	4.92
SSW	0	0.2	0.7	2.92	1.51	3.02	0.1	8.45
SW	0	0	0.6	2.92	3.42	2.01	0.3	9.25
WSW	0	0	0.7	3.52	4.02	1.01	0.2	9.45
West	0	0	0.7	2.62	1.91	0.7	0.2	6.13
WNW	0	0	0.1	1.91	0.6	0.3	0.1	3.01
NW	0	0	0.1	1.81	3.62	2.92	0.2	8.65
NNW	0	0	0.1	0.7	4.93	6.74	2.11	14.58
Total	**0.4**	**0.4**	**5.6**	**26.55**	**32.98**	**26.95**	**7.02**	**100**

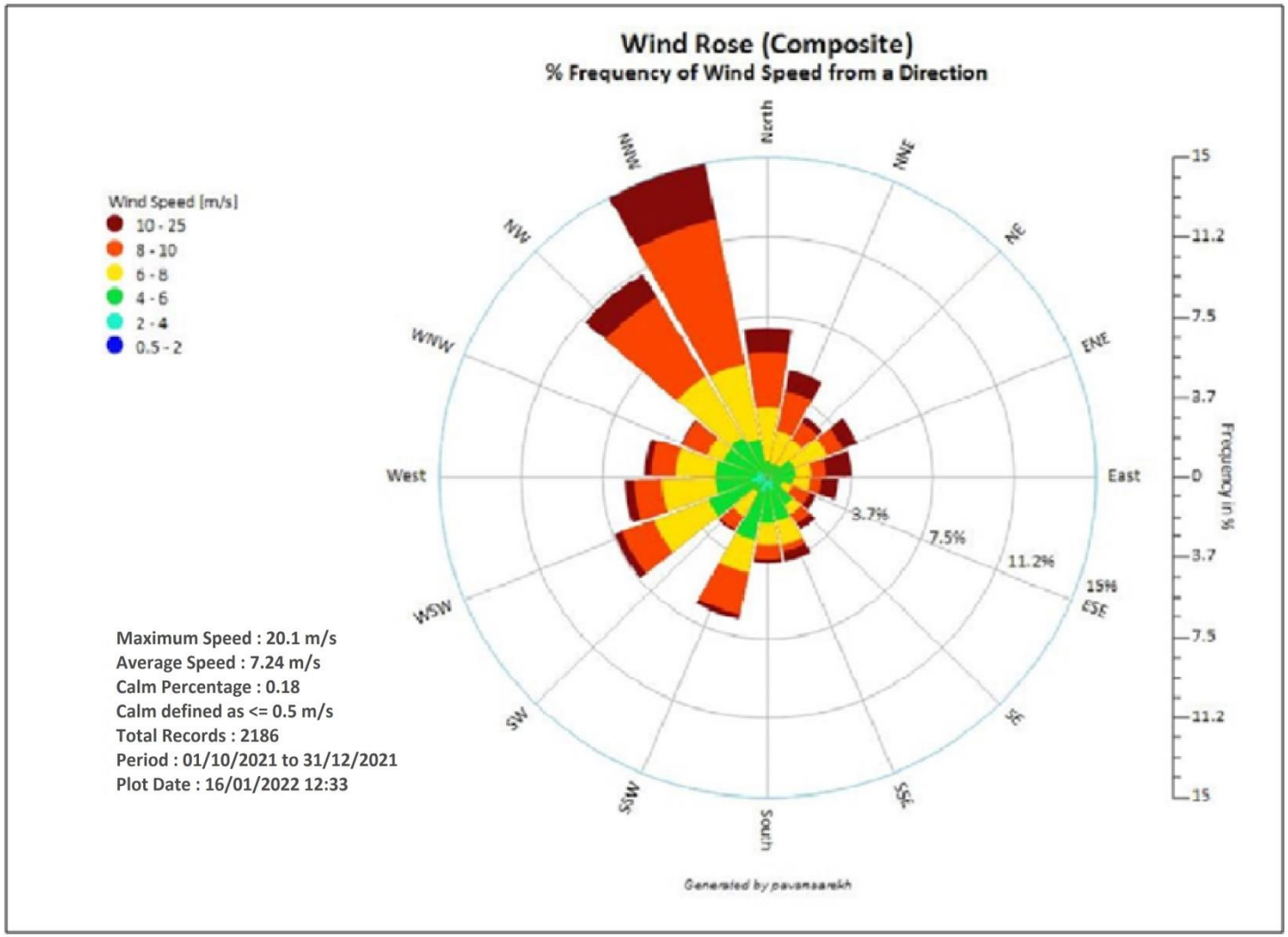


Figure No.3.13 Wind Rose Diagram (Composite)

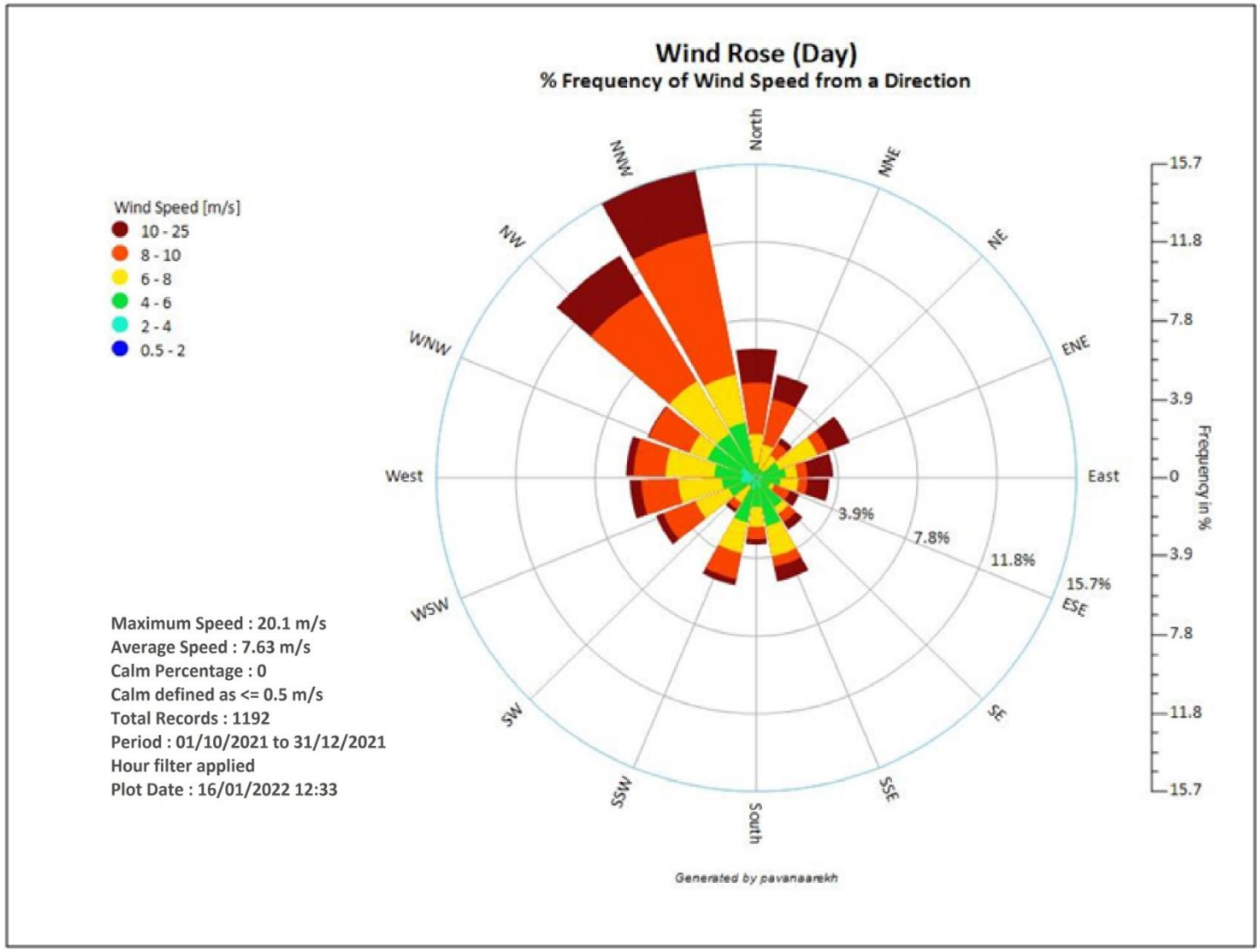


Figure No.3.14 Wind Rose Diagram (Day)

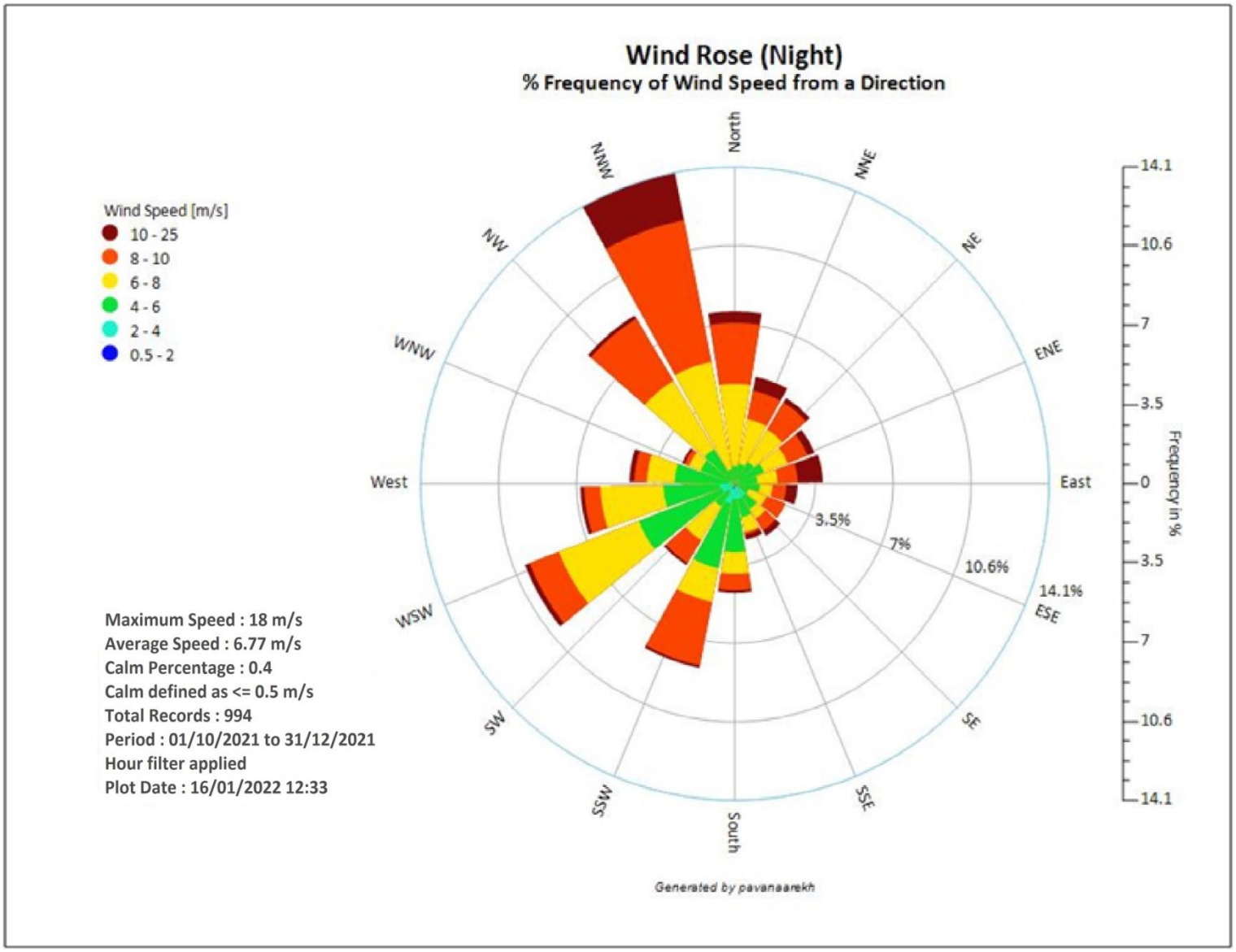


Figure No.3.15 Wind Rose Diagram (Night)

3.11.10 Ambient Air Quality

Ambient air quality monitoring was carried out at 8 locations within the study area including the plant site. This section of the report describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling for ambient air quality monitoring. The existing ambient air quality in terms of Particulate Matter (PM_{10} &$PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_X), and Carbon Monoxide (CO) has been measured through a planned field monitoring.

3.11.10.1 Selection of Sampling Stations

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality-monitoring network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions on synoptic scale.
- Topography of the study area
- Representatives of regional background air quality for obtaining baseline status.
- Representatives of likely impact areas
- Major human settlements in the area

3.11.10.2 Methodology:

The details of these Ambient Air quality-sampling stations are given in **Table No. 3.20.**

Table 3.20: Details of Ambient Air quality Sampling Locations

Sl. No	Locations	Distance in km	Direction	Latitude & Longitude	Ambient Air	Location Details
1.	Project Site	---	---	23° 38’ 12.66” N 87° 16’ 31.06” E	A1	Core zone (inside plant premises) Industrial area
2.	Sarpi	0.7	SW	23° 37’ 55.04” N 87° 16’ 07.23” E	A2	Rural
3.	Bansgora	2.1	SEE	23° 37’ 28.63” N 87° 17’ 31.77” E	A3	Rural
4.	Hetedoba	2.9	SSE	23° 36’ 48.68” N 87° 17’ 27.73” E	A4	Rural
5.	Purulia	6.7	SEE	23° 36’ 18.84” N 87° 19’ 57.03” E	A5	Rural
6.	Laudoha	4	NE	23° 39’ 33.95” N 87° 18’ 17.12” E	A6	Rural
7.	Kumardihi	3.4	NNW	23° 40’ 00.43” N 87° 15’ 53.87” E	A7	Rural
8.	Ukhra	2.7	NW	23° 38’ 50.62” N 87° 15’ 01.22” E	A8	Urban

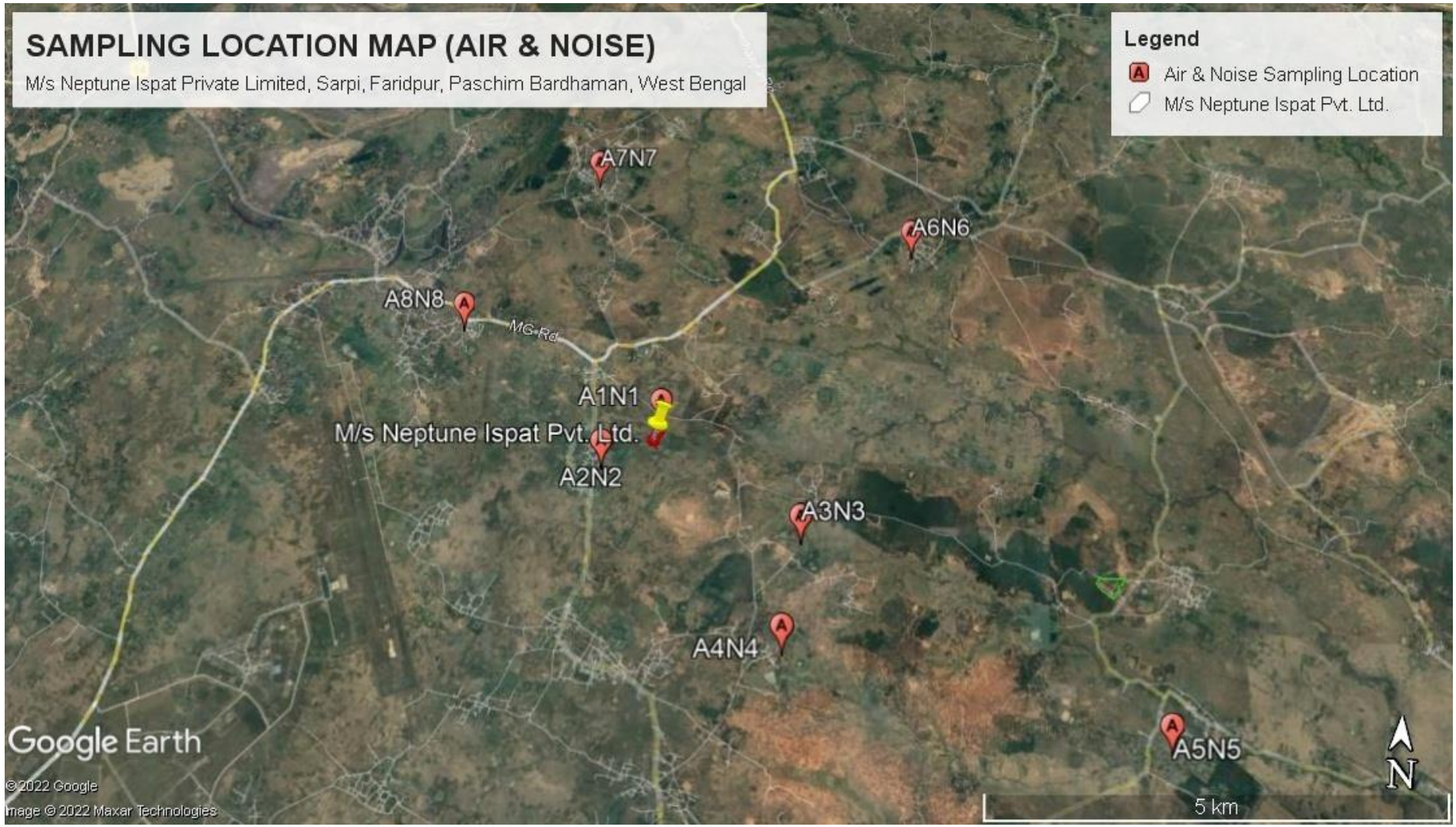


Fig. 3.16: Ambient Air Quality and Noise Monitoring Stations (Satellite Map)

3.11.10.3 Method of Sampling

Ambient Air monitoring stations were established at 8 sampling locations as per CPCB guidelines. Ambient air quality monitoring was carried out at a frequency of two days per week at each location during the study period. The Methods followed, Instruments used and standards for Ambient Air Quality Monitoring has been given in the **Table No. 3.21**below.

Table No. 3.21 Methods Followed, Instruments Used and standards for Air Quality Monitoring

Sl. No	Parameters	Time weighted Average	Concentration in Ambient Air		Methods of Measurement
			Industrial/ residential/ Rural & other areas	Ecologically sensitive area (Notified by Central Govt.)	
1	Sulphur Dioxide (SO_2), µg/m^3	Annual	50 µg/m^3	20 µg/m^3	Improved West &Gaeke
		24 Hours	80 µg/m^3	80 µg/m^3	
2	Nitrogen Dioxide (NO_2), µg/m^3	Annual	40 µg/m^3	30 µg/m^3	Modified Jacob &Hochheiser (Na – Arsenite)
		24 Hours	80 µg/m^3	80 µg/m^3	
3	Particulate Matter(PM_{10}), µg/m^3	Annual	60 µg/m^3	60 µg/m^3	Gravimetric
		24 Hours	100 µg/m^3	100 µg/m^3	
4	Particulate Matter($PM_{2.5}$), µg/m^3	Annual	40 µg/m^3	40 µg/m^3	Gravimetric
		24 Hours	60 µg/m^3	60 µg/m^3	
5	Carbon Monoxide (CO), µg/m^3	8 hours	02 mg/m^3	02 mg/m^3	Handy CO Monitor/Electrochemical
		1 Hour	04 mg/m^3	04 mg/m^3	
		24 Hours	400 µg/m^3	400 µg/m^3	

The summarized AAQ monitoring result carried out in eight sampling locations is given in table & graphs below:

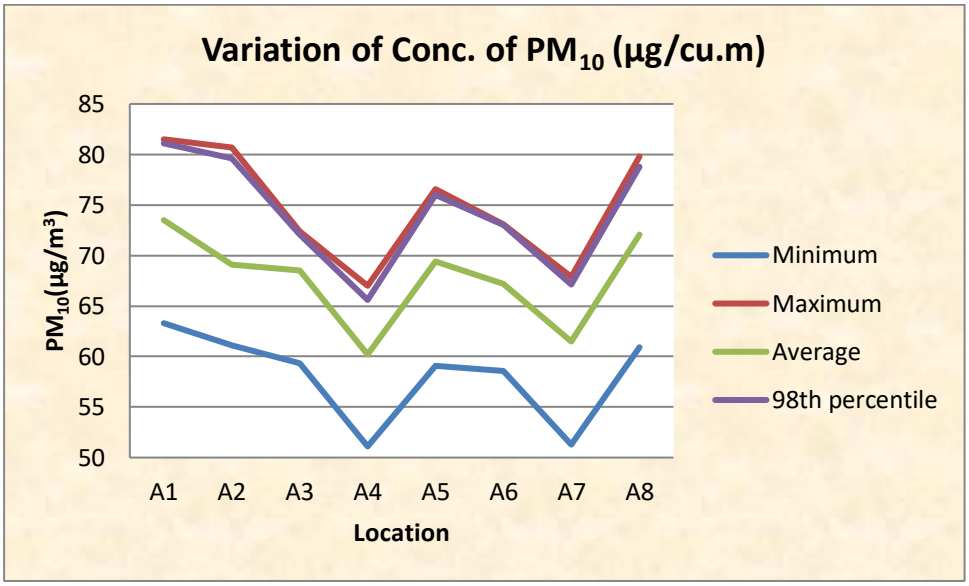
Table 3.22: Summarized AAQ monitoring result

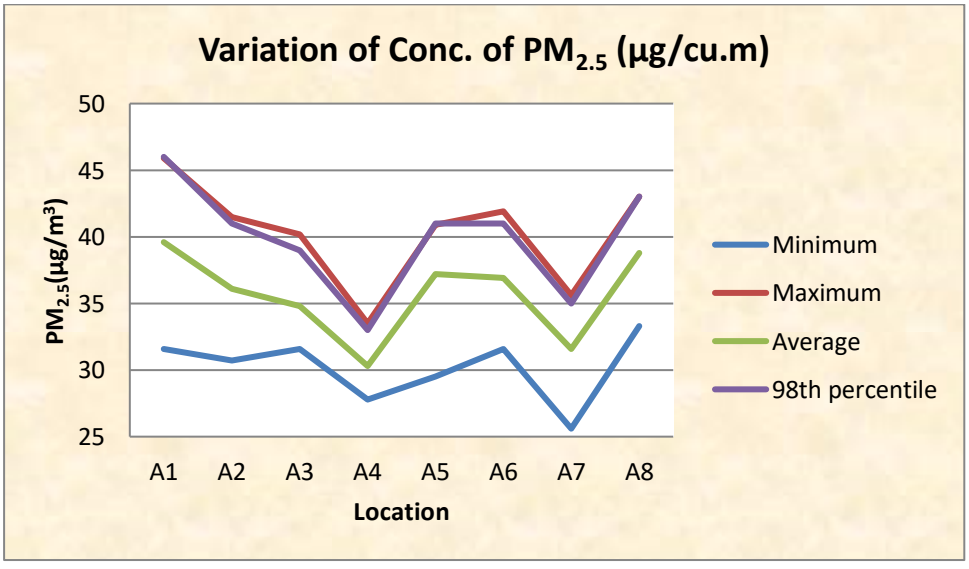
SL. No.	Location	PM_{10}(µg/m^3)				$PM_{2.5}$(µg/m^3)				SO_2(µg/m^3)				NO_X(µg/m^3)			
		Min	Max	Avg	98th perc	Min	Max	Avg	98th perc	Min	Max	Avg	98th perc	Min	Max	Avg	98th perc
1	A1	63.3	81.5	73.5	81.1	31.6	45.9	39.6	46	6.1	13.8	9.5	13	13.7	23.3	19.3	23
2	A2	61.1	80.7	69.1	79.6	30.7	41.5	36.1	41	8.0	12.7	9.9	13	11.5	17.9	13.5	17
3	A3	59.3	72.4	68.5	72.1	31.6	40.2	34.8	39	6.0	10.3	8.2	10	14.0	21.0	18.0	21
4	A4	51.1	67.0	60.2	65.6	27.8	33.5	30.3	33	6.1	10.8	8.2	11	11.8	16.6	13.9	16
5	A5	59.1	76.6	69.4	76.0	29.5	40.9	37.2	41	8.2	13.7	10.3	14	13.8	21.2	16.8	21
6	A6	58.6	73.1	67.2	73	31.6	41.9	36.9	41	6.3	11.7	8.6	11	12.5	19.3	16.7	19
7	A7	51.3	67.9	61.5	67.1	25.6	35.6	31.6	35	5.6	12.1	8.9	12	10.3	17.4	14.61	17
8	A8	60.9	79.8	72.1	78.8	33.3	43.0	38.8	43	5.7	10.7	8.4	10	17.1	22.0	20.3	22

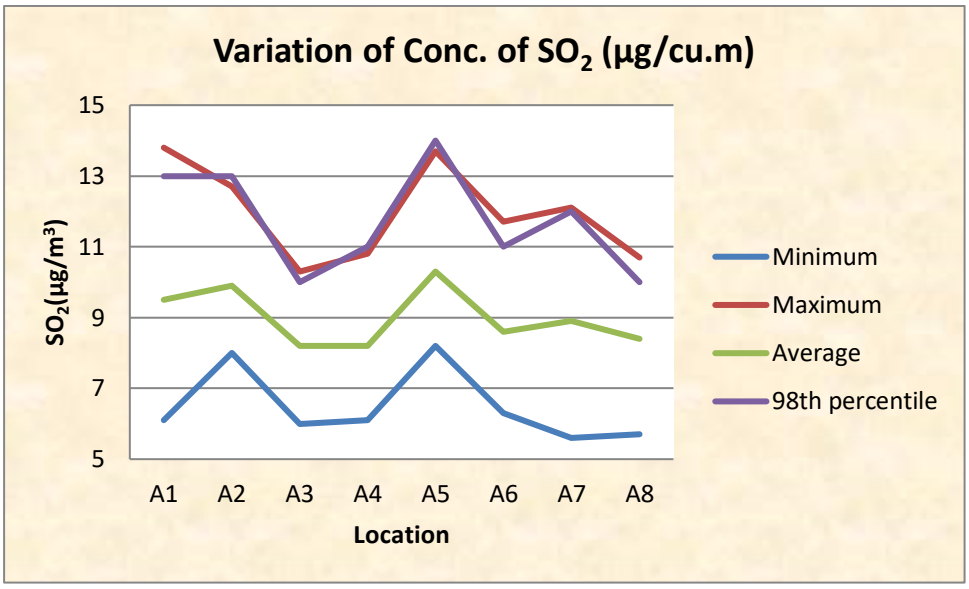
Summarized AAQ monitoring result

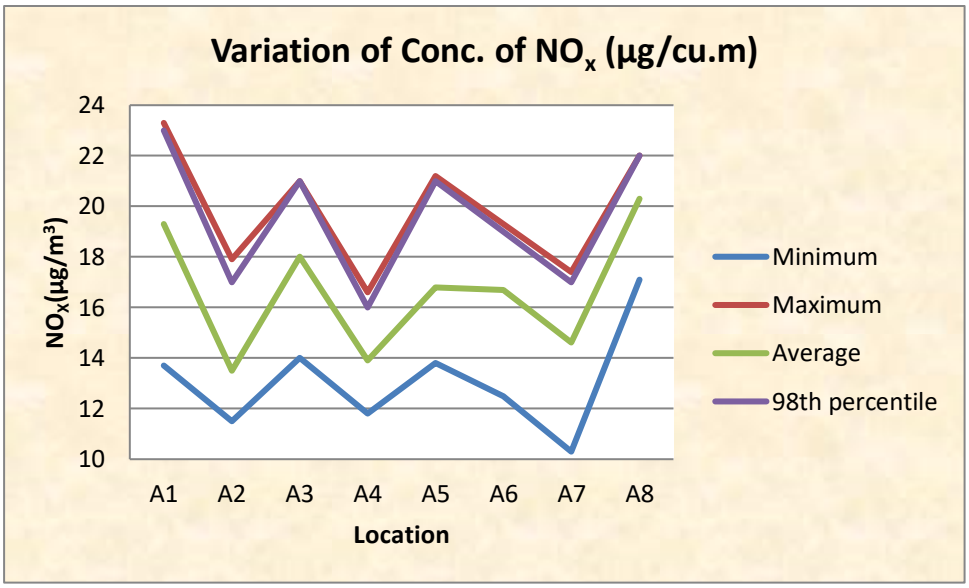
Sl. No	Location	CO (mg /m^3)			
		Min	Max	Avg.	98th perc
1	A1	0.363	0.381	0.373	0.381
2	A2	0.361	0.380	0.368	0.379
3	A3	0.359	0.372	0.368	0.372
4	A4	0.351	0.366	0.360	0.365
5	A5	0.359	0.376	0.369	0.376
6	A6	0.358	0.373	0.367	0.373
7	A7	0.351	0.368	0.360	0.367
8	A8	0.360	0.379	0.372	0.378

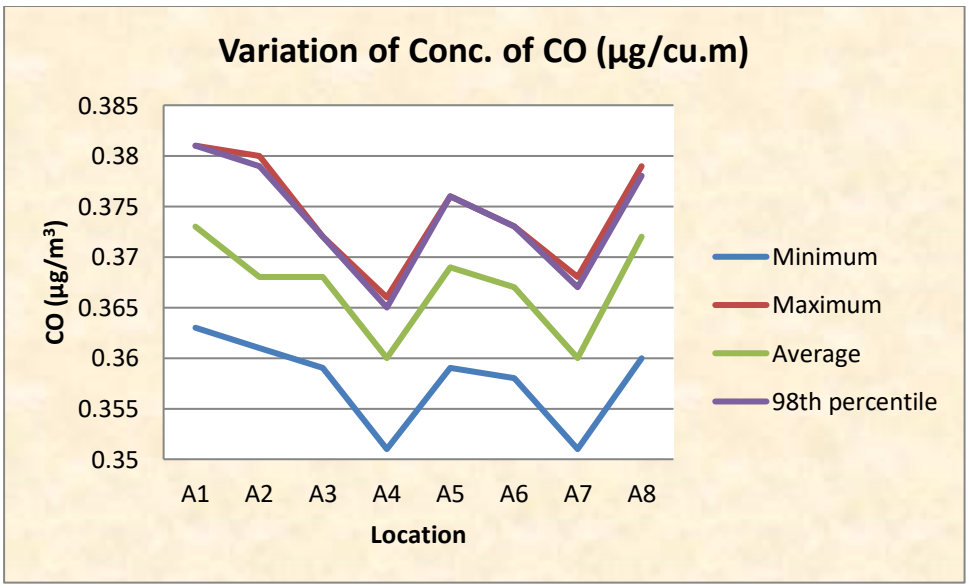
Figure 3.16 Graphs Showing Variation Of Air Quality Parameters






Variation of Conc. of SO_2 (µg/cu.m)
SO_2(µg/m³)
15
13
11
9
7
5
A1 A2 A3 A4 A5 A6 A7 A8
Location
Minimum
Maximum
Average
98th percentile


Variation of Conc. of NO_x (µg/cu.m)
NO_x(µg/m³)
24
22
20
18
16
14
12
10
A1 A2 A3 A4 A5 A6 A7 A8
Location
Minimum
Maximum
Average
98th percentile


Variation of Conc. of CO (µg/cu.m)
CO (µg/m³)
0.385
0.38
0.375
0.37
0.365
0.36
0.355
0.35
A1 A2 A3 A4 A5 A6 A7 A8
Location
Minimum
Maximum
Average
98th percentile

3.11.10.4 Discussions

From the air monitoring data it has been observed that, the concentration of PM10 in the project site varies from 63.3–81.5µg/m^3 and from 80.7.9-51.1µg/m^3 in the nearby villages. The average value of $PM_{2.5}$ in the project site is 39.6µg/m^3 and the average of $PM_{2.5}$ varies from 30.3-38.8 µg/m^3 in the surrounding villages. From the ambient air quality monitoring, it is has been found that, the concentration of particulate matter is maximum within the project site and this is mainly due to raw material handling, industrial emission and vehicular movement. The concentration of SO_2 within the project site varies from 6.1-13.8 µg/$m^3$and within the nearby villages it ranges between 5.6-13.7 µg/m^3. The average concentration of NOx within the project site is 19.3 µg/m^3 and within the villages it ranges from 10.3 -22 µg/m^3. The concentration of air pollutant is higher in the project site and Ukhra village as the area is an industrial estate. From the ambient air quality monitoring it has been found that, the concentrations of the particulate matter, SO2 and NOx, are within the NAAQM standard as prescribed by CPCB. The analysis result of all AAQ measurements in all monitoring stations has been attached as **Annexure-8.**

3.11.10.5 Secondary information of ambient air quality

As per the monitoring data at Asansol station of West Bengal Pollution Control Board, it has been observed that the average concentration of PM10 ranges 59 to 320 µg/ Cu.m, PM 2.5 ranges from 46 to 185 µg/ Cu.m, NOx ranges from 22 to 95 µg/ Cu.mandSOx concentration ranges from 12.5 to 80.0.

The level of air pollutant in the area is in higher side due to presence of several industries in the Durgapur area.

3.12 WATER ENVIRONMENT

3.12.1 Surface-Water Quality Monitoring

The water samples are collected from two ponds and analyzed for physical, chemical, and biological characteristics as per CPCB guidelines. The monitoring and analysis of surface water and ground water was carried out to assess the quality of existing water body and the impact of the existing and proposed industrial development in the area.

3.12.1.1 Methodology

A survey has been carried out by the expert team for assessment of sampling location for collecting surface water samples within the study area.

- Location of the major water bodies
- Location of project site, their water intake and effluent disposal locations

- Likely areas that can represent baseline conditions
- The water samples were collected and were analyzed for physical, chemical and biological characteristics as per IS code No.10500, 3025 & 2296.

Table No. 3.23 Surface Water Quality Criteria as per Central Pollution Control Board (Designated best Use Classification)

Parameters	Class A	Class B	Class C	Class D	Class E
pH	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.5	6.5-8.5
Dissolved oxygen (as O_2) , mg/l, min	6	5	4	4	-
BOD, 3 days at 27^0 C, Max	2	3	3	-	-
Total coliform organism, MPN/100 ml, Max	50	500	5000	-	-
Free ammonia (as N), mg/l, Max	-	-	-	1.2	-
Electrical conductivity, µmhos/cm, Max	-	-	-	-	2250
Sodium absorption ratio	-	-	-	-	26
Boron (as B), mg/l, Max	-	-	-	-	2
Below-E	**Not Meeting A, B, C, D & E Criteria**				

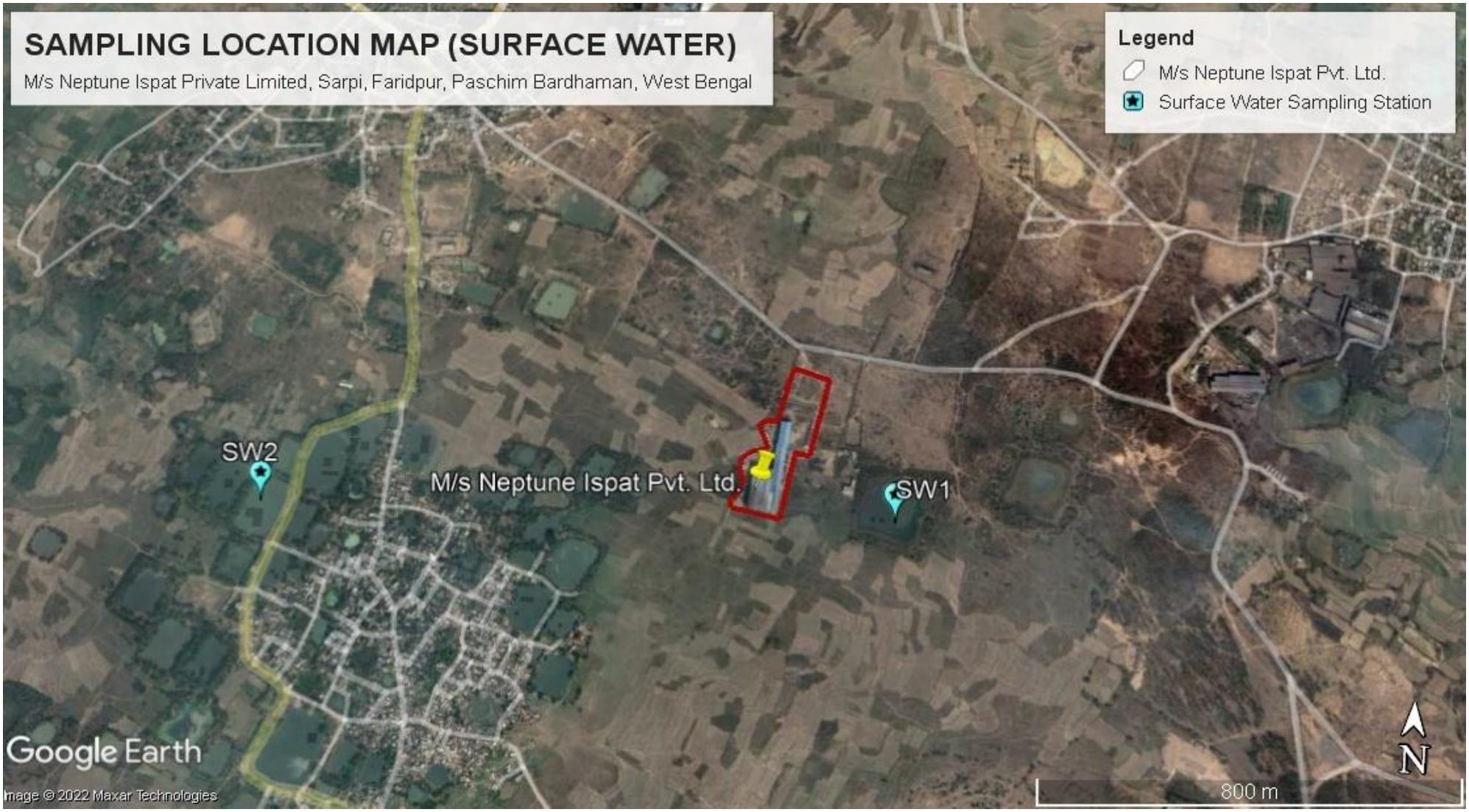
Class A: Drinking water source without conventional treatment but after disinfection
Class B: Outdoor bathing (Organized)
Class C: Drinking water source after conventional treatment & after disinfections
Class D: Propagation of Wild Life and Fisheries
Class E: Irrigation, Industrial Cooling, and Controlled Waste Disposal

Samples for chemical analysis were collected in polyethylene carboys. Samples collected for metal content were acidified with 1 ml HNO_3. Samples for bacteriological analysis were collected in sterilized glass bottles. Selected physico-chemical and bacteriological parameters have been analyzed for projecting the existing water quality status in the study area. Parameters like Temperature, Total dissolved solid, dissolved oxygen (DO) and pH was analyzed on spot at the time of sample collection. The sampling and analysis for surface water was carried out as per the standard procedure of M/s Kalyani Laboratories Pvt. Ltd., Bhubaneswar.

Table No. 3.24 Location of Surface Water Sampling Stations

S.l. no	Locations	Distance in km	Direction	Latitude & Longitude	Station No.	Details
1.	Plant Site	---	---	23° 38’ 06.10” N 87° 16’ 37.76” E	SW1	Pond
2.	Sarpi	1	W	23° 38’ 05.38” N 87° 15’ 52.74” E	SW2	Pond

Fig. No.



3.17: Surface Water Quality Monitoring Stations (Satellite Map)

The analysis result of ground water from 2nos of sampling stations is given in **table no.3.26**below

Table No.3.25: Surface water quality analysis results

Parameter	Unit	Test Method	Standard as per IS 2296:1982 Class C	2133 / DAKHIN KANDA	2135 / KHANDRA
				SW1	SW2
PHYSICAL PARAMETERS					
pH	--	IS 3025: PART11 :1983, RA 2002	6.5 – 8.5	7.2	7.9
Electrical Conductivity	µs/cm	APHA-23r^{d} Edition (2510 A): 2017	--	974	747
Total Dissolved Solid	mg/l, Max	IS 3025: PART15 :1984, RA 2002	1500	540	410
Color	HAZEN	IS3025:PART04:1 983	--	< 1.0	< 1.0
Turbidity	NTU	IS 3025 (Part 10):1984, RA 2006	--	1.2	0.7
CHEMICAL PARAMETERS					
Chemical Oxygen Demand	mg/l,	APHA-23r^{d} Edition (5220 B)	--	12	18
Biochemical Oxygen Demand	mg/l, Max	APHA-23r^{d} Edition (5210 B)	3	2.5	3.5
Chloride as Cl	mg/l, Max	IS 3025:PART 32:1988	600	77.5	34.3
Fluoride as F	mg/l, Max	IS 3025:PART 60:2008	1.5	1.08	1.09
Sulphate as SO_4	mg/l, Max	IS 3025:PART 24:1986	400	11	125
Total Hardness as $CaCO_3$	mg/l	IS3025:PART 21:2009	--	156	244
Dissolved Oxygen	mg/l, Min	APHA-23r^{d} Edition (4500-O-C)	4.0 (min)	5.6	6.1
Zinc as Zn	mg/l, Max	IS 3025:PART 49:1994	15	< 0.01	< 0.01
Manganese as Mn	mg/l, Max	IS 3025 (Part 59):2006, RA 2012	--	< 0.1	< 0.1
Iron as Fe	mg/l, Max	IS 3025:PART 53:2003	50	0.9	0.8
Nitrate as NO_3	mg/l, Max	IS 3025:PART	50	2.5	2.0

		34:1988			
Total Alkalinity HCO3	mg/l	IS 3025 (Part 23):1986, RA 2009	--	226	270
Oil & Grease	mg/l	APHA-23rd Edition (5520 B) 2017	0.1	<0.025	<0.025
Calcium as Ca	mg/l	IS 3025:PART 40:1991, RA 2003	--	28.8	68.8
Magnesium as Mg	mg/l	IS 3025 (Part 46):1994, RA 2003	--	20.41	17.5
Total Chromium Cr	mg/l	IS 3025:PART 52:2003, RA 2009	--	< 0.01	< 0.01
Sodium	mg/l	APHA 23rd Edition (3500-Na-B), 2017	--	8	5
TOXIC SUBSTANCES					
Mercury as Hg	mg/l	IS 3025:PART 48:1994	--	< 0.001	< 0.001
Cadmium as Cd	mg/l, Max	IS 3025:PART 41:1992	0.01	< 0.001	< 0.001
Lead as Pb	mg/l, Max	IS 3025:PART 47:1994	0.1	< 0.01	< 0.01
Arsenic as As	mg/l, Max	IS 3025:PART 37:1988	0.2	< 0.01	< 0.01
MICROBIOLOGICAL PARAMETERS					
Total Coliforms	MPN/100ml , Max	IS 1622:1981, RA 2009	5000	110	80

3.12.1.2 Interpretation Surface Water Quality Results

The surface water sampling was carried out from Ponds in the villages. From the surface water analysis result it has been found that, pH of the water samples varies from 7.2 to 7.9, D.O varies from 5.6 to 6.1 mg/l, Biochemical oxygen Demand varies from 1.5 to 2 mg/l, Chemical Oxygen Demand varies from 8 to 10, Total hardness varies from 156-244 mg/l and Total Dissolved solid varies from 410 to 540 mg/l.

Further the toxic elements like Cd, Pb, As etc. are found to be below detection limit.

From the water quality results it can be inferred that all the parameters analyzed are under the prescribed limit as per IS 2296:1982 and as per class C classification of CPCB. The water does not contain any pollutant which would be hazardous for human, animal or crop health.

3.12.1.3 Secondary data on surface water quality of Durgapur area:

As per the study carried out on Damodar river water quality by Burdwan University it has been observed that pH value ranged from 7.7 to 8.9 mg l−l. The electrical conductivity indicates the dissolved materials in water and its values ranged from 190 to 470 mg l−l Electrical conductance values for the premonsoon season are higher than that for the monsoon.Phosphorus is an essential, limiting nutrient in freshwater ecosystems and its values ranged from 0.03to 1.1 mg l−l , Chloride ion, the environmental contaminant, ranged from 2.18 to 42.68 mg l−l. Nitrate is the indicative of organic pollution and its values ranged from 0.14 to 4.39 mg l−l. Nitrate, the most highly oxidized form of nitrogen compounds is commonly present in surface waters because it is formed as the end product of the aerobic decomposition of organic nitrogenous matter. Sulphates in natural water body show the pollution status and anthropogenic load of it and here the values ranged from 10.83 to 89.67 mg l−l. The river water has a considerable quantity of Iron ranges from 0.1 to 0.8 mg l−l.

3.12.2.1 Ground water quality of the study area

The ground water samples were collected from 4 different sampling stations & and analyzed as per IS 10500:2012 to assess the portability of the ground water. The analysis result of the samples has been tabulated as below**,**

Table No. 3.26 Location of Ground Water Sampling Stations

S.l.	Locations	Distance in km	Direction	Latitude & Longitude	Station No.	Source
1.	Project Site	---	---	23° 38’ 12.69” N 87° 16’ 31.01” E	GW1	Pipe water supply
2.	Sarpi	0.67	SW	23° 37’ 55.20” N 87° 16’ 06.54” E	GW2	Tube well
3.	Bansgora	2.1	SE	23° 29’ 29.08” N 87° 17’ 30.86” E	GW3	Tube well
4.	Laudoha	3.8	NE	23° 39’ 36.27” N 87° 18’ 13.67” E	GW4	Tube well

Fig. 3.18: Ground Water Quality Monitoring Stations (Satellite Map)

The analysis result of ground water from 8 nos of sampling stations is given in **table no.3.18**below.

Table 3.27: Ground water quality analysis results

Parameter	Unit	Standard as per IS 10500:2012	Test Method	2134 / DAKHIN KHANDA	2136 / KHANDRA	2137 / LOUOSOHA	2138 / NEPTUNE PLANT
				GW1	GW2	GW3	GW4
PHYSICAL PARAMETER							
pH	--	6.5 – 8.5	IS 3025 (Part 11):1983, RA 2012	7.5	7.4	7.3	8.2
Turbidity	NTU, Max	1	IS 3025 (Part 10):1984, RA 2006	0.5	0.1	0.1	0.1
Total Dissolved Solid	mg/l, Max	500	IS 3025 (Part 16):1984, RA 2006	460	440	474	350
Colour	Hazen , Max	5	IS3025:PART04:1983	< 1.0	< 1.0	< 1.0	< 1.0
Odour	--	Agreeable	IS3025:PART05:1983	Agreeable	Agreeable	Agreeable	Agreeable
Taste	-	Agreeable	IS 3025 (Part -8):1984, RA 2006	Agreeable	Agreeable	Agreeable	Agreeable
CHEMICAL PARAMETER							
Phenolic Compund as C_6H_5OH	mg/l, Max	0.001	IS 3025 (Part 43):1992, RA 2009	< 0.001	< 0.001	< 0.001	< 0.001
Barium as Ba	mg/l, Max	0.7	Annex F of IS 13428:2005 or IS 15302:2003 RA 2009	< 0.2	< 0.2	< 0.2	< 0.2

Boron as B	mg/l, Max	0.5	IS 3025:PART57:2005	< 0.1	< 0.1	< 0.1	< 0.1
Silver as Ag	mg/l, Max	0.1	Annex J of IS 13428 : 2005 RA 2009	< 0.005	< 0.005	< 0.005	< 0.005
Manganese as Mn	mg/l, Max	0.1	IS 3025 (Part 59):2006, RA 2012	< 0.05	< 0.05	< 0.05	< 0.05
Selenium as Se	mg/l, Max	0.01	IS 3025 (Part 56):2003, RA 2009	< 0.005	< 0.005	< 0.005	< 0.005
Ammonia as NH3	mg/l, Max	0.5	IS 3025 (Part 34): 1988, RA 2003	< 0.3	< 0.3	< 0.3	< 0.3
Mineral oil	mg/l, Max	0.5	Clause 6 of IS 3025 (Part-39):1991, RA 2003	< 0.025	< 0.025	< 0.025	< 0.025
Zinc as Zn	mg/l, Max	5	IS 3025:PART49:1994	< 0.05	< 0.05	< 0.05	< 0.05
Copper as Cu	mg/l, Max	0.05	IS 3025:PART42:1992	< 0.02	< 0.02	< 0.02	< 0.02
Chloride as Cl	mg/l, Max	250	IS 3025 (Part 32):1988, RA 2009	88.4	61.3	86.6	72.1
Fluoride as F	mg/l, Max	1	IS 3025 (Part 60):2008	0.5	0.52	0.68	0.3
Total Alkalinity as HCO3	mg/l, Max	200	IS 3025 (Part 23):1986, RA 2009	180	172	188	182
Sulphate as SO4	mg/l, Max	200	IS 3025 (Part 24):1986, RA 2009	20	48	120	38
Anionic Detergents	mg/l, Max	0.2	Aanex K OF IS 13428:2005	< 0.1	< 0.1	< 0.1	< 0.1

(As MBAS)							
Nitrate as NO_3	mg/l, Max	45	IS 25:PART34:1988	4.6	4.4	4.5	3.5
Sulphide as H_2S	mg/l, Max	0.05	APHA 22nd Edition (4500-S2--F)	< 0.05	< 0.05	< 0.05	< 0.05
Aluminium as Al	mg/l, Max	0.03	IS 3025 (PART 55):2003, RA 2009	< 0.02	< 0.02	< 0.02	< 0.02
Total Hardness as CaCO3	mg/l, Max	200	IS 3025 (Part 21):2009	176	192	184	48
Calcium As Ca	mg/l, Max	75	IS 3025 (Part 40):1991, RA 2009	56	72	64	14.4
Magnesium As Mg	mg/l, Max	30	IS 3025 (Part 46):1994, RA 2003	8.75	2.92	5.83	2.92
Iron as Fe	mg/l, Max	1	IS 3025 (Part 53):2003, RA 2009	0.5	0.15	0.18	0.25
Total Chromium as Cr	mg/l, Max	0.05	IS 3025 (Part 52):2003, RA 2009	< 0.02	< 0.02	< 0.02	< 0.02
TOXIC SUBSTANCES							
Nickel as Ni	mg/l, Max	0.02	IS 3025 (Part 54): 2003, RA 2009	< 0.01	< 0.01	< 0.01	< 0.01
Lead as Pb	mg/l, Max	0.01	IS 3025 (Part 47):1994,	< 0.005	< 0.005	< 0.005	< 0.005

			RA 2009				
Mercury as Hg	mg/l, Max	0.001	IS 3025 (Part 48):1994, RA 2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic as As	mg/l, Max	0.01	IS 3025 (Part 37): 1988, RA 2009	< 0.001	< 0.001	< 0.001	< 0.001
Cyanide as CN	mg/l, Max	0.05	IS 3025 (Part 27):1986, RA 2009	< 0.02	< 0.02	< 0.02	< 0.02
Cadmium as Cd	mg/l, Max	0.003	IS 3025 (Part 41):1992, RA 2009	< 0.001	< 0.001	< 0.001	< 0.001
BACTERIOLOGICAL QUALITY							
Total Coliforms	MPN/100 ml	Shall not be detected in any 100 ml sample	IS 1622:1981, RA 2009	< 2	< 2	< 2	< 2
E Coli	MPN/100 ml	Shall not be detected in any 100 ml sample	IS 1622:1981, RA 2009	< 2	< 2	< 2	< 2

3.12.2.2 Discussion

pH: Ranges from 7.3 to8.2. The pH of the surface water in the study area is slightly alkaline.

Total Dissolved Solids*:* Ranges from 350-474 mg/l. This indicates the presence of higher amount of ionic substance in the water.

Total Hardness: Ranges from 48 to 192 mg/l

Iron content: Ranges from 0.15 to 0.5 mg/l.

The samples collected are suitable for drinking purpose with reference to drinking water standard IS: 10500:2012.

3.12.2.3 Secondary data on Ground water quality

As per the hydrogeological investigation of ground water in Durgapur area it has been estimated that the pH of water sample ranges from 5.0 to 6.85, Electrical conductivity ranges from 257 to 2501 µ/cm, TDS ranges from 170 to 1273 mg/l, Magnesium rangesfrom 1.9 to 48.6 mg/l, bicarbonates ranges from 40 to 520 mg/l, Nitrate 0.9 to 15.42 mg/l, Phosphate 0.02 to 1.0 mg/l and Sulphate 6.5 to 182.5 mg/l. There is the anthropogenic impact on the ground water quality in the area.

3.13 NOISE ENVIRONMENT

The environmental impact assessment of noise from the industrial activity, construction activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses. The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise.

3.13.1 Methodology

For measurement of ambient noise level, a Digital Sound Level Meter was used. The meter was calibrated with a standard acoustic calibrator before using in the field. The measurements were carried out continuously for the 24-hour period with one hour interval starting at 00.30 hrs to 00.30 hrs next day to obtain hourly equivalent sound pressure level, 1 hourLeq. 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. The levels were monitored on working days only.

3.13.2 Sampling Locations

A total of 8 sampling locations were selected for noise monitoring analysis. The station for monitoring of noise level has been given in **Table No3.29 & Figure No.3.19.**

Table No. 3.28 Location of Noise monitoring Stations

S.l. No	Locations	Distance in km	Direction	Latitude&Longitude	Station No.
1	Project Site	---	---	23° 38’ 12.66” N 87° 16’ 31.06” E	N1
2	Sarpi	0.7	SW	23° 37’ 55.04” N 87° 16’ 07.23” E	N2
3	Bansgora	2.1	SEE	23° 37’ 28.63” N 87° 17’ 31.77” E	N3
4	Hetedoba	2.9	SSE	23° 36’ 48.68” N 87° 17’ 27.73” E	N4
5	Purulia	6.7	SEE	23° 36’ 18.84” N 87° 19’ 57.03” E	N5
6	Laudoha	4	NE	23° 39’ 33.95” N 87° 18’ 17.12” E	N6
7	Kumardihi	3.4	NNW	23° 40’ 00.43” N 87° 15’ 53.87” E	N7
8	Ukhra	2.7	NW	23° 38’ 50.62” N 87° 15’ 01.22” E	N8

The result of noise level monitoring has been given in the **table no.3.30**below

Table No. 3.29 Noise Level Monitoring Results

Station No.	Location Village	L_{eq}Day	L_{eq}Night
N1	Project Site	71.7	67.9
N2	Sarpi	47.6	40.1
N3	Bansgora	46.8	39.8
N4	Hetedoba	45.1	39.9
N5	Purulia	46.7	38.3
N6	Laudoha	47.2	40.0
N7	Kumardihi	46.1	39.1
N8	Ukhra	48.0	38.6

Table No. 3.30 Noise Standards

Land Use Category	Limit in dB(A)	
	Day Time (6 A.M. to 10 P.M)	Night Time (10 P.M. to 6 A.M)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40
Source: Noise Rule – 2000		

3.13.3 Discussion

The study area includes industrial area and residential areas. The ambient noise levels were measured in 8 sampling locations. In the project site the day time noise level is 71.7dB (A) and the night time noise level is 67.9. The maximum noise level is 48dB (A) during the day time at Ukhra village and minimum noise level is 38.3dB (A) during the night time at Purulia village. The noise level is found to be maximum in Ukhra Village.

3.14 BIOLOGICAL ENVIRONMENT

The study of the biological environment includes the composition of flora and fauna of the area and aquatic ecology. The study for assessment of the biological diversity was conducted during the month of December 2021. The biological diversity was studied in buffer zone of the project. The core zone is devoid of biological environment.

3.14.1 Methodology

The primary objective of survey was to evaluate the floral and faunal communities within the study area. The sampling areas for floral inventory were selected randomly in the suitable habitats within the 10km radius from the project site. The study methodology for ecological study includes:

1. Collection of primary data through systematic ecological studies in the study area
2. Primary data collection for flora through random sampling method and phytosociological investigation for trees, shrubs and herbs from the selected locations.
3. Collection of secondary data with respect to the study area from the published literature and govt. agencies.
4. Secondary information was collected from the local forest departments and interaction with the local people regarding the availability of plants and animal in the area.

5. Preparation of checklist of plants found during the study which includes wild species, plantation species, agricultural plantation, road side plantation, village plantation, forest species etc.
6. Opportunistic observations, diurnal bird observation, active search for reptiles, faunal habitat assessment, active search for scats and foot prints and review of previous studies.

The aim was to set baselines in order to monitor and identify trends after the expansion of the project. Desktop literature review was conducted to indentify the representative spectrum of threatened species, population and ecological communities listed by IUCN, WCMC, ZSI, BSI and Indian wild Life Protection act, 1972. The status of individual species was assessed using the revised IUCN/SSC category system.

3.14.2 Primary Baseline Data collection

The primary baseline survey for the biological environment was conducted during January 2019. Various sampling sites were selected based on their biodiversity and the biological study was conducted in those sampling sites.

3.14.3 FLORA COMPOSITION IN THE BUFFER ZONE

The floral composition of the buffer zone has been given in **Table No. 3.33** below:

Table No. 3.31 Floral Composition in the Buffer Zone

Sl. No	Botanical name	Common name
TREES		
1.	*Acacia longifolia*	Mimoceae
2.	*Acacia nilotica*	Mimoceae
3.	*Aegle marmelos*	Rutaceae
4.	*Albizia lebbek*	Mimosaceae
5.	*Alstoniascolaris*	Apocyanaceae
6.	*Annogeissus latifolia*	Combretaceae
7.	*Annona squamosa*	Annonaceae
8.	*Anthocephaluskadamba*	Rubiaceae
9.	*Artocarpus intigra*	Moraceae
10.	*Azadirachta indica*	Meliaceae
11.	*Bauhinia racemosa*	Caesalpiniaceae
12.	*Bombax ceiba*	Bombacaceae
13.	*Buchnanialanzam*	Anacardiaceae
14.	*Butea monosperma*	Fabaceae
15.	*Carica papaya*	Caricaceae
16.	*Cassia fistula*	Ceasalpineaceae
17.	*Cassia siamea*	Caesalpiniaceae
18.	*Casuarina equisitifolia*	Casuarinaceae

19.	*Dalbergia sissoo*	Leguminosae
20.	*Delonix regia*	Caesalpineaceae
21.	*Diospyros affinis*	Ebenaceae
22.	*Ficus benghalensis*	Moraceae
23.	*Ficus glomerata*	Moraceae
24.	*Ficus religiosa*	Moraceae
25.	*Gmlia arborea*	Lamiaceae
26.	*Grewia asiatica*	Tiliaceae
27.	*Haldina cordifolia*	Rubiaceae
28.	*Imperata cylindrica*	Poaceae
29.	*Lagerostorma parviflora*	Lythraceae
30.	*Lagerstroemia speciosa*	Lytharaceae
31.	*Madhuca indica*	Sapotaceae
32.	*Mangifera indica*	Anacardiaceae
33.	*Melia azedarach*	Meliaceae
34.	*Mesua ferrea*	Guttiferae
35.	*Morindapubesens*	Rubiaeae
36.	*Phoenix dactylifera*	Aracaceae
37.	*Polyalthia longifolia*	Annonaceae
38.	*Pongamia pinnata*	Fabaceae
39.	*Psidium guajava*	Myrtaceae
40.	*Schleicheraoleosa*	Sapindaceae
41.	*Semicarpus anacardium*	Anacardiaceae
42.	*Shorarobusta*	Dipterocarpaceae
43.	*Spondias pinnata*	Anacardiaceae
44.	*Syzyziumcumini*	Myrtaceae
45.	*Tamarindus indica*	Caesalpiniaceae
46.	*Tectona grandis*	Verbenaceae
47.	*Terminalia alata*	Combretaceae
48.	*Terminalia bellerica*	Combretaceae
49.	*Terminalia chebula*	Combretaceae
50.	*Terminalis arjuna*	Combretaceae
Shrubs & Climbers		
1.	*Agve americana*	Agavaceae
2.	*Asparagus racemosus*	Liliaceae
3.	*Calotropis procera*	Asclepiadaceae
4.	*Clerodendrum indicum*	Lamiaceae
5.	*Clerodendrumviscosum*	Lamiaceae
6.	*Clistanthuscollinus*	Euphorbiaceae
7.	*Dioscoriaoppositifolia*	Dioscoriaceae
8.	*Euphorbia nivulia Ham.*	Euphorbiaceae
9.	*Hemidesmus indicus*	Apocyanaceae
10.	*Holarrhenaantidysenterica*	Apocyanaceae
11.	*Jatorphacurcas*	Euphorbiaceae
12.	*Jatropha gossypifolia*	Euphorbiaceae
13.	*Lantena camara*	Verbenaceae

14.	*Mucuna monosperma*	Fabaceae
15.	*Nyctanthesarbortristis*	Oleaceae
16.	*Ricinus communis*	Euphorbiaceae
17.	*Solanum xanthocarpum*	Solanaceae
18.	*Tinospora cordifolia*	Menispermaceae
19.	*Vitex nigundo*	Lamiaceae
20.	*Zizyphus jujuba*	Rhamnaceae
Herbs		
1.	*Mimosa pudica L*	Lajkuli (Lajwanti)
2.	*Ocimumsantum L*	Tulasi
3.	*Ocimumamericanum*	Wild basil (Ban Tulsi)
4.	*Ocimum sanctum*	Holy basil (Tulsi)
5.	*Euphorbia hirta*	Euphorbiaceae
6.	*Cleome viscose*	Capparaceae
7.	*Desmodiumgangeticum*	Fabaceae
8.	*Sida cordata*	Malvaceae
9.	*Sida cordifolia*	Malvaceae
10.	*Parthenium sps*	Asteraceae
11.	*Heliotropium indicum*	Boraginaceae
12.	*Curculigoorchioides*	Hypoxidaceae
13.	*Desmodiumpuchellum*	Fabaceae
14.	*Datura metel*	Solanaceae
15.	*Datura alba*	Solanaceae
16.	*Achyranthus aspera*	Nyctagenaceae
17.	*Andrographis paniculata*	Acanthaceae
18.	*Cyperus sps*	Cyperaceae
19.	*Oldenlandiacorymbosa*	Rubiaceae
20.	*Spermococehispida*	Rubiaceae
21.	*Alternatherasessilis*	Amaranthaceae
22.	*Commelinabenghalensis*	Commelinaceae
23.	*Phylanthusniruri*	Euphorbiaceae
24.	*Ageratum conyzoides*	Asteraceeae
25.	*Argemone mexicana*	Papaveraceae
26.	*Tribulus terrestris*	Zygophyllaceae

3.14.4 Plantation in Road Side, Garden and Parks

There are few plantation species present in the road side which includes, *Polyalthia longifolia, Dalbergia sisoo, Alstoniascholaris, Ficus glomerata, Cassis siamea, Tectona grandis, Aalbizialebbeck, Delonix regia, Gmelia arborea, Anthocephaluskadamba etc.*

3.14.5 Aquatic Flora

Aquatic flora of the study area found in pond, ditches and marshy areas near river and water reservoirs. These include *Pistia stratiotes. Aponogetonnatans, Hydrilla verticillata,*

Lagerosiphon roxburghli, Potamogetoncrlspus, P. nodosus, Valllsneria spiralis, Nelumbo nucifera, Nymphaea nouchali, Nvmphoideshvdrophvlla, etc.

3.14.6 Faunal biodiversity of the Buffer Zone

For the documentation of the faunal biodiversity of the study area with respect to birds, reptiles, amphibians and butterfly species, a baseline survey had been conducted.

The details of faunal diversity recorded during the study are in **Table No. 3.34**below:

Table No3.32 Faunal Diversity in the study area

Sl. No	Scientific Name	Common English Name	Reference to schedule of the Wildlife (Protection) Act 1972		
			Schedule	Part	Serial
MAMMALS					
1.	Funambulus Palmarum	Squirrel	IV		
2.	Ratus ratus	Rat	V		
3.	Herpestesedwardsi (geoffray)	Common Mongoose	IV		6A
4.	Lepus nigricollisF.Cuvier	Common Indian Hare	IV		4
5.	Sus scrota Linnaeus	Wild pig	III		19
6.	Vulpusbenghalensis	Wild fox	III		
REPTILES					
7.	*Bangaruscandidus*	Krait	*IV*		
8.	*Calotes Versicolor*	Garden lizard	*IV*		
9.	*Hemidactylus sp.*	House Lizard	*IV*		
10.	*Ptyasmucosus (Linn.)*	Rat snake	*II*	*II*	*9*
11.	*Varanus Bengalensis(Schneider)*	Monitor lizard	*II*	*II*	*15*
AVIFAUNA					
12.	*Achdotheres tristis*	Indian myna	*IV*		*11 (45)*
13.	*Athenebrama indica (franklin)*	Spotted owlet	*IV*		*11 (48)*
14.	*Bubulcus ibis*	Cattle egret	*IV*		
15.	*Centropus sinensis stephens*	Common crow pheasant	*IV*		*11 (17)*
16.	*Columbus livibus*	Rock pigeon	*IV*		*11*
17.	*Corvus splendens vieillot*	House crow	*V*		
18.	*Conrvusmacrorhynchos lesson*	Jungle crow	*V*		
19.	*Cuculusmicropterus Gould*	Indian cuckoo	*IV*		*11 (17)*
20.	*DicrurusadsimilisBechsten*	King crow	*IV*		*11 (35)*
21.	*DryocpusJavensis (Horsfield)*	Woodpecker	*IV*		*11 (79)*

		(Black)			
22.	*Eudynamysscolapacea*	Indian keol	*IV*		
23.	*FrancolinuspondicerianusGmelin*	Grey partridge	*IV*		*11 (51)*
24.	*Gallus gallus (Linnaeus)*	Jungle fowl	*IV*		*11 (36 A)*
25.	*Megalaimamerulinus*	Indian cuckoo	*IV*		
26.	*Milvus migrans (Boddaert)*	Common kite	*IV*		*11 (75)*
27.	*Passer domesticus*	house sparrow	*IV*		
28.	*Psittaculaeupatria Linnaeus*	Large parakeet	*IV*		*11 (50)*
29.	*Sturnus pagodarum*	Black headed myna	*IV*		
30.	*Sarcogyps Calvus (Scopoli)*	King vulture	*IV*		*11 (75)*
31.	*Streptopelia chinensis (gmelin)*	Spotted dove	*IV*		*11 (19)*
32.	*Ardeolagrayii*	Indian pond heron	*IV*		
33.	*Coracias bengalensis*	Indian roller	*IV*		
34.	*Ardea alba*	Large Egret	*IV*		
35.	*Bubulcus ibis*	Cattle Egret	*IV*		

3.14.7 Threatened Species

The threat status of individual species was assessed as per IUCN 2012. IUCN Red List of Threatened Species Version 2012.2<www.iucnredlist.org>. No plant and animal species in the study area found to be included under any category of threat (Critically Endangered, Endangered and Threatened). However, there is external pressure has been observed by anthropogenic activities on plants species. There is no national park, sanctuary, biosphere reserves, migratory corridors of wild animals present within 10 Km radius of the project site. The nearest wild life sanctuary is Ramnabagan Wild Life Sanctuary located at a distance of 28 Km from the project site. The map showing the distance of wild life sanctuary from the project site has been given in **Figure No.3.20.**

Figure No.3.19: Distance of Wild life Sanctuary from the Project Site

3.15 SOCIOECONOMIC ENVIRONMENT

The proposed project M/s Neptune Ispat Private Limited is located at Village - Sarpi, P.O & P.S. -Faridpur, District – Paschim Bardhaman, West Bengal. The project aimed for enhancement the production capacity within its existing plant.

As the project is coming under Category B as per EIA Notification 2006 followed by subsequent amendments, the application for EC has been duly appraised at SEIAA West Bengal under Category B. Necessary ToR issued by SEIAA, West Bengal to prepare EIA/EMP Report. Being part of EIA/EMP Report, relevant socio economic survey in the study area has been carried out to assess the status of demographic pattern, occupational profile, literacy pattern and general amenities available in the study area. Besides the primary baseline survey in the buffer zone secondary data was also collected from District statistical handbook 2011 of Bardhaman, Official census website of the district, data from Block office etc. This study evaluates both positive and negative impacts of the proposed expansion of project M/s Neptune Ispat Private Limited on the local inhabitants. The Socio-Economic study in the present case includes demographic structure, population dynamics, infrastructure resources, status of human health and economic attributes like employment, per-capita income, agriculture, trade, industrial development etc. in the project area.

The data collection on the impact of the expansion project on the socio-economic spects in the study area has been done through analysis of various secondary data and supplemented by the primary data generated through the process of limited socio- economic survey.

3.17.1 Objectives of the study

(i) To study demographic pattern in these villages including ethnic composition, workforce participation, literacy etc based on census 2011 data.

(ii) To identify and record the infrastructure and service facilities like road communication, electricity, education, health, drinking water etc available in the villages located within a radius of 10 km from the boundary of the project site.

(iii) To conduct sample household survey in these peripheral villages and find out occupational pattern, extent and sources of household income, land holding pattern, health status, skill etc of people residing in these villages.

(iv) On the basis of empirical study suggest measures for socio-economic development of the study area.

3.17.2 Study Area

There are 42 villages present within the 10 Km radius of the buffer zone of the project area.

A. Demography

Socio economic survey in the study area has been carried out to assess the status of demographic pattern, occupational profile, literacy pattern and general amenities available in the study area. Besides the primary baseline survey in the buffer zone secondary data was also collected from 2011 of Bardhaman, District statistical handbook, official website of the district, Block office etc. The detailed of the Secondary Data has been provided in **Annexure - 9 .**

3.17.3 Primary Socio Economic Study :

3.17.3.1 Occupation & Income

The main occupation of the people in the area is agriculture and industrial labour. From the household survey, it has been observed that major occupation of the people is agriculture and semiskilled and unskilled labour.

3.17.3.2 Communication

The communication facilities to the villages are found to be good. All the villages are connected to the main district road by pucca road. Most of the households are having cycle and two wheelers as the mode of transport. The villages are bus facility connecting to the nearest city.

3.17.3.3 Drinking water Supply and Sanitation

As per the baseline survey it has been found that the major sources of drinking water in the villages dug wells, tube wells and hand pumps.

3.17.3.4 Other amenities

Within the 10 Km. radial buffer zone few other amenities are available. There is availability of facilities of education, medical, drinking water, post office, transport communication, banks, agricultural credit societies & power supply are available in the occupied villages of Bardhaman district.

3.17.3.5 Major Problems / issues among the villages

The major problem area identified during the baseline survey is as follows:

- As the area is surrounded by various industries pollution and dust is a major problem for the local people.
- Less availability of irrigation facility in the buffer zone leads to low productivity and single cropping in the area.

- Health facility seems to be insufficient to supply the total population.
- Availability of safe drinking water during the summer season in the villages is an emerging problem in the area.

3.16 TRAFFIC STUDIES OF THE PROJECT SITES

For traffic study one locations has been selected, this is at connecting point of Jhanjra Road – MG Road which is connected with NH 14 at a distance of 11Km.The study was carried out on 08.12.2021 at 10.00 AM to 11.00 AM and 4.00 PM to 5.00 PM. Map showing traffic study points has been given **Figure 3.23** below.

A summary of the traffic density monitored during survey period is given **Table 3.36** below:

Table No.3.36 Traffic Density of the study area (Connecting road from lease area to Jhanjra Road – MG Road)

Time	2 wheeler		3 wheeler/ 4 wheeler		LCV		HCV		Total Vehicle	
	V/hr	PCU/hr (0.5)	V/hr	PCU/ hr (1)	V/hr	PCU/hr (2)	V/hr	PCU/ hr (3.7)	V/hr	PCU/hr
09.00- 10.00 Am	156	78	58	53	30	60	22	81.4	266	272.4
10.00- 11.00 Am	154	77	55	52	27	54	25	92.5	261	275.5
04.00- 5.00 Pm	150	75	54	48	24	48	20	74	248	245
05.00- 06.00 Pm	153	76.5	57	57	27	54	28	103.6	265	291.1

Based on the traffic load on Jhanjra Road – MG Road the volume/ capacity (V/C) and Level of service (LoS) for the road has been calculated.

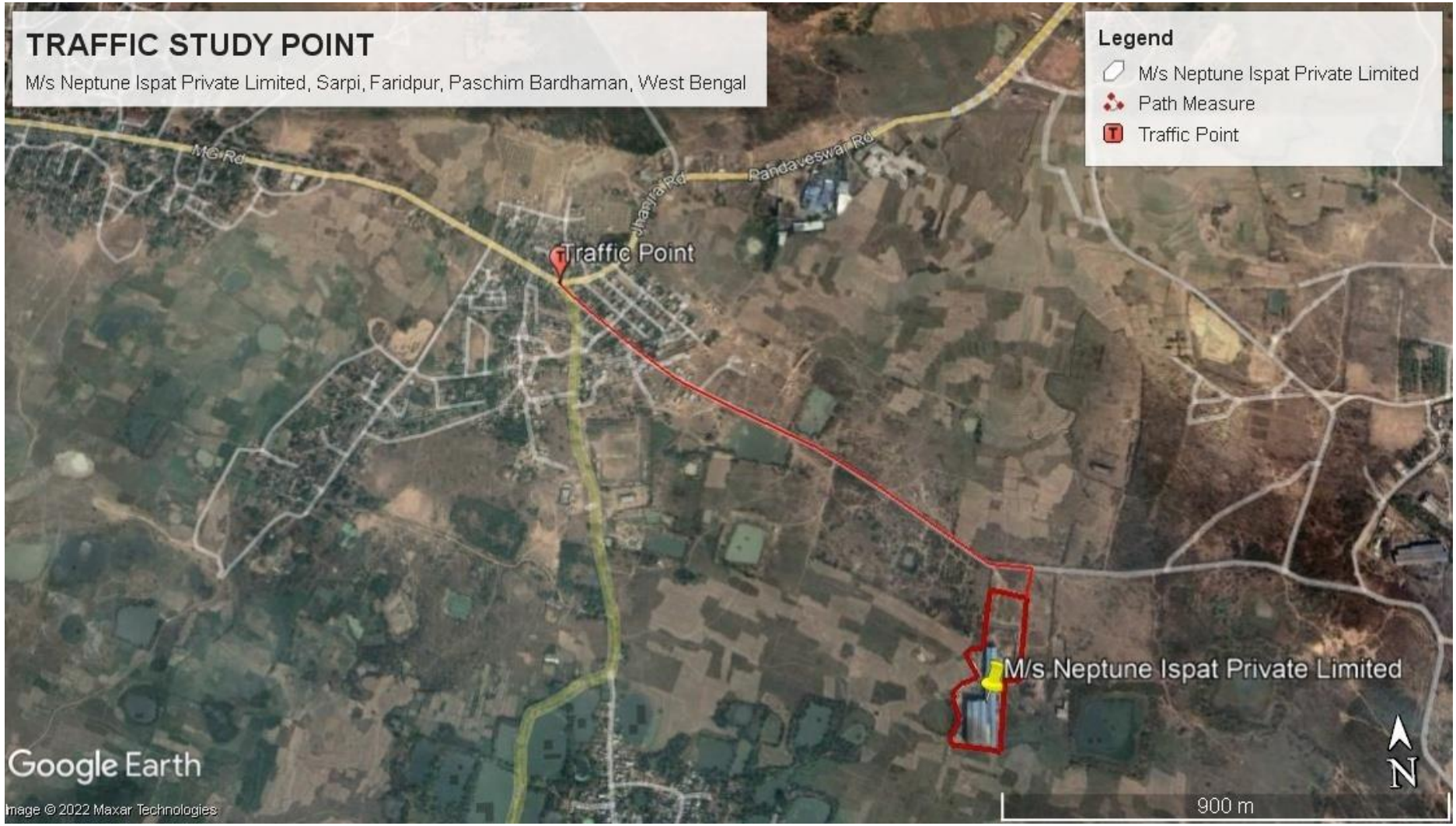


Figure 3.23 Traffic Study Point of the Study Area

Table no. 3.37 Existing and changed Level of Service on Jhanjra Road – MG Road.

Location	Existing Traffic load			Total traffic load including sand transportation		
	No. of PCUs	V/C	LoS	No. of PCUs	V/C	LoS
Connecting road from lease area to Jhanjra Road – MG Road	271	0.23	B	289.5	0.24	B
2 lane (2 way) as per IRC:106-1990- 1200 PCU/hr No of PCUs from mines considered = 18.5 during peak hour						

Fig 3.24 Level of Traffic Service

V/C	LoS	Performance
0.0 – 0.2	A	Excellent
0.2 – 0.4	B	Very Good
0.4 – 0.6	C	Good
0.6 – 0.8	D	Fair/Average
0.8 – 1.0	E	Poor
1.0 & above	F	Very Poor
V= Volume in PCU's/hr. C= Capacity in PCU's/hr. LOS= Level of Service		

The V/C ration on the traffic point is 0.23. However with the commencement of mining activity maximum of 5 trucks will be used to carry the products and raw materials which will have additional PCU load of 18.5 PCU. So with the additional PCU load due to the proposed project the V/C ratio will remain as 0.24 with LoSB.

Plate 1: Photographs of Baseline Study

CHAPTER 4
ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 GENERAL

This chapter describes the potential environmental impact due to the proposed enhancement in production and installation of additional establishment within the existing premises of M/s Neptune Ispat Private Limited. For the prediction of environment impact the attributes taken into considerationare air, water, Land, Soil, biological and socio economics etc.

4.2 IDENTIFIED ENVIRONMENTAL IMPACTS/ RISKS

The likely impacts of the proposed expansion on environmental parameters are listed as below;

- Air Quality
- Water Resources & Water Quality
- Noise level
- Land use and Soil quality
- Ecology
- Socio-economics

4.3 IMPACT DURING CONSTRUCTION PHASE

During the construction phase the pollution load will increase due to the installation of additional induction furnace and rolling mill. The impact due to construction phase may include:

1. Increase in dust pollution due to movement of construction equipment and material.
2. Increase in dust pollution due to construction work and installation of induction furnace and re-rolling mill within the existing premises.
3. Increase in noise level within the plant premises due to installation of plant and machinery within the project site.
4. Impact on water quality during construction phase may be due to discharge of construction water and domestic waste water discharge from the construction workers.

4.3.1 Mitigation Measures

The impact during the construction phase will be temporary in nature and will end with the construction work and installation of plant and machinery completed. There will be no additional land requirement for the proposed expansion project. The additional plant and machinery installation will be within the existing plant premises. The construction work for additional installation is mostly mechanical fabrication, assembly and erection. So the dust generation due to the installation will be minimal. Water requirement for the construction work is also very less and temporary sanitation facility will be provided for the construction workers

The construction material will be stored in shed to reduce the dust generation. So the overall environmental impact due to construction and installation of additional establishment will be minimal and for short term.

4.4 IMPACT DURING OPERATION PHASE

4.4.1 Ambient Air Quality

The proposed project of **M/s Neptune Ispat Private Limited** is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPD Slag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. The source of pollution in the unit is:

Table 4.1: Sources of air pollution inside the existing unit

Sl. No	Major Facilities	Details of Air Pollutants
01	Raw material storage and Handling	Particulate Matter
02	Raw material feeding section	Particulate matter
03	Induction Furnace	Particulate matter and Gaseous emission
05	Casting section	Particulate matter
06	Vehicular Movement	Particulate matter and Gaseous emission
07	Operation of DG Set	Particulate matter and Gaseous emission
08	Rolling Mill	Particulate matter

The additional source of air pollution due to the proposed enhancement in production will be as below:

1. Increase in dust pollution due to additional raw material storage and handling.

2. Increase in particulate matter and gaseous emission due to installation of two no. of induction furnaces.
3. Increase in particulate matter emission due to installation of rolling mill.

4.4.1.1 Impact prediction through Dispersion Modelling

Air pollution modelling study has been carried out taking into account the existing pollution potentiality and additional pollution load due to the proposed expansion. The model used is a steady-state Gaussian plume dispersion model. This model is approved by USEPA (United States Environmental Protection Agency). This model is also recognized by CPCB (Central Pollution Control Board) and MoEF& CC (Ministry of Environment and Forestanged Climate Cha). The impact has been predicted over 10 Km X 10 Km area with centre of plant as centre of the study area. The receptors are defined with respect to 16 radial wind directions and radial distances from the centre. Meteorological data of the pre monsoon season collected from the site is used for model study.

The complete equation for Gaussian Dispersion Modelling is given below:

$$C = \frac{Q}{u} \cdot \frac{f}{\sigma_y\sqrt{2\pi}} \cdot \frac{g_1 + g_2 + g_3}{\sigma_z\sqrt{2\pi}}$$

Where:

f, crosswind dispersion parameter = $\exp\left[-y^2/(2\,\sigma_y^2)\right]$

g, vertical dispersion parameter = $g_1 + g_2 + g_3$

g1, vertical dispersion with no reflections = $\exp\left[-(z+H)^2/(2\,\sigma_z^2)\right]$

g2, vertical dispersion for reflection from the ground = $\exp\left[-(z-H)^2/(2\,\sigma_z^2)\right]$

g3, vertical dispersion for reflection from an inversion aloft =

$$\sum_{m=1}^{\infty} \{\exp\left[-(z-H-2mL)^2/(2\,\sigma_z^2)\right] + \exp\left[-(z+H+2mL)^2/(2\,\sigma_z^2)\right] + \exp\left[-(z+H-2mL)^2/(2\,\sigma_z^2)\right] + \exp\left[-(z-H+2mL)^2/(2\,\sigma_z^2)\right]$$

C, concentration of emissions in g/m³ at any receptor located:

X, meters downwind from the emission source point

y, meters crosswind from the emission plume centreline

Q, Source pollutant emission rate in g/s

u, horizontal wind velocity along the plume centreline, m/s

H, height of emission plume centreline above ground level, in m

σz, vertical standard deviation of the emission distribution, in m

σy, horizontal standard deviation of the emission distribution, in m

L, height from ground level to bottom of the inversion aloft, in m

exp, the exponential function

z, meters above ground level

4.4.1.2 Modelling Software

The AERMOD atmospheric dispersion modelling system (AERMOD Cloud remote version) is used for assessment of incremental Ground level concentration (GLC) for the proposed enhancement in production. A meteorological data pre-processor (AERMET) that accepts surface meteorological data, upper air soundings, and optionally, data from on-site instrument towers. It then calculates atmospheric parameters needed by the dispersion model, such as atmospheric turbulence characteristics, mixing heights, friction velocity, Monin-Obukov length and surface heat flux.

Dispersion modelling using AERMOD requires hourly meteorological data. Site specific data recorded during pre monsoon season (October to December 2021) at project site is used for executing modelling studies. The site specific meteorological data is processed using AERMET processor.

Table 4.2 Details of software for Air pollution Modelling

Parameters	Details
Model Name	AERMOD Cloud remote version
Model Type	Steady state Gaussian plume air dispersion model
Topography	Rural, Flat
Average Time	24 Hrs
Source type	Point source
Boundary limit	10 Km radius
Receptor height	0
Anemometer height	10 m
Surface meteorological data	Site specific data processed by AERMET

4.4.1.3 Model Input data

The air pollution modelling is being carried out taking into account the normal operating scenarios. The pollutants considered for modelling are particulate matter as there is no major source of emission of SOx and NOx due to the existing as well as the expansion project. There are two existing stacks present within the plant premises attached to Induction Furnaces. There are the proposals for additional installations of two induction furnaces. The details of the stack present within the plant premises and additional installation in **Table No. 4.3** below:

Table 4.3 Details of stacks

Attributes	**Existing (1x8 Ton IF)**	**Proposed (1x10 T IF)**	**Proposed (1x10 T IF)**
	Stack 1	**Stack 2**	**Stack 3**
Height of stack from ground level(m)	20	30	30
Stack Attached to	IF-1	IF-2	IF-3
Inner dimension of stack(m)	0.9	1.0	1.0
Height of port hole(m)	7.62	7.62	7.62
Atmospheric Pressure(mm of Hg)	755	755	755
Stack Gas Temperature(˚C)	55	60	60
Stack Gas Velocity(m/s)	9.5	9.5	9.5
Volumetric Flow rate (Nm^3/Hr)	20,000	30,000	30,000
Dust Concentration (g/s)	0.1	0.18	0.18

The emission from the project is mostly particulate matter emission from the induction furnace and the air pollution modelling is being carried out for particulate matter only. As there is very less use of Calcined Petroleum Coke in the project there will be no emission of SOx due to the operation of induction furnace. The predicted incremental Ground Level Concentrations (GLCs) for air pollutants is given in table below.

4.4.1.4 Air pollution modelling for Proposed Expansion Project

With the expansion of production of billet and M.S/ TMT Bar the pollution load will increase marginally. The incremental pollution load due to installation of additional induction furnace and installation of rolling mill has been detailed in **Table No. 4.4** below:

Table 4.4: First Highest, 24 Hr Average Predicted Concentration of air pollutants (Proposed Expansion)

Avg. Period	Order	Conc.	X, m	Y, m
24-HR	1	3.4003	528100.693	2613498.616
24-HR	2	3.26477	528066.491	2613592.585
24-HR	3	2.95806	528134.895	2613404.646
24-HR	4	2.55527	528169.097	2613310.677
24-HR	5	2.30208	528203.299	2613216.708

4.4.1. 5 Incremental Concentration at the Sampling sites

The incremental GLCs due to the proposed expansion project for particulate matter is superimposed on the maximum baseline concentrations recorded during the study period in different sampling location to arrive at the likely resultant concentrations during the same period after implementation of the proposed expansion project. The cumulative concentrations (baseline +incremental) after implementation of the project are tabulated below in **Table No-4.5**.

Table 4.5: Resultant Concentrations Due To Incremental GLC's (Proposed Expansion)

Location	PM (µg/m3)		
	Avg Conc.	Incremental Conc.	Resultant
Project Site	81.5	3.4	84.9
Sarpi	80.7	3.2	83.9
Bansgora	72.4	3	75.4
Hetedoba	67	2.8	69.8
Purulia	76.6	0.9	77.5
Laudoha	73.1	1.7	74.8
Kumardihi	67.9	2.1	70
Ukhra	79.8	2.9	82.7
NAAQ Standard	***100***		

The isopleths for pollutants after the proposed expansion has been presented in **Figure No.4.1**. The ouput data of Aermod has been given in **Table No 4.6** below,

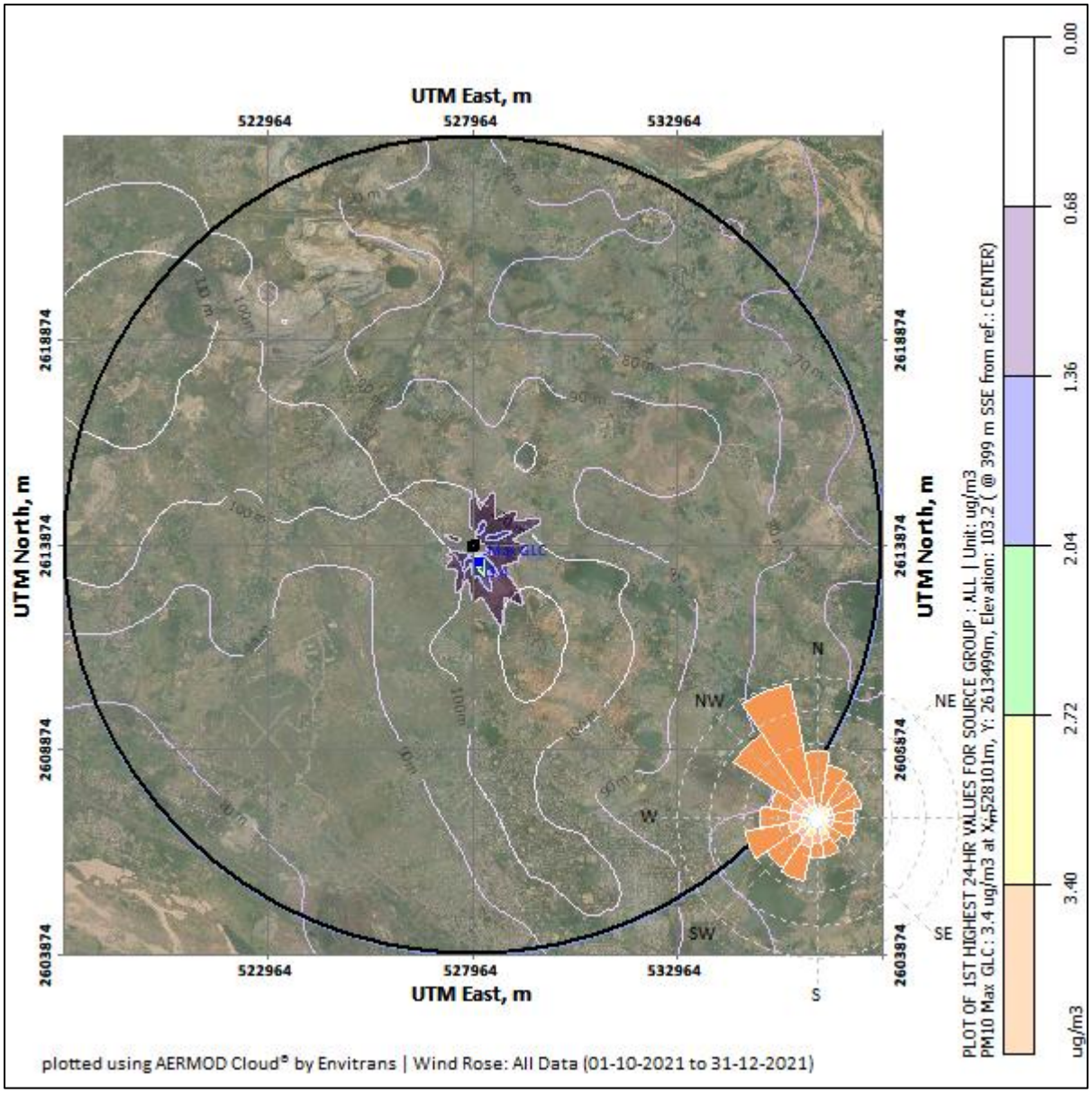


Figure No.4.1 Isopleths Showing the Incremental GLC due to the Existing and Proposed Enhancement Project

4.4.1.6 Conclusion from the Model Study

The results of the air pollution modelling study indicate that the maximum increase of GLC taking into consideration of the existing PM10 concentration and the proposed enhancement in production and increasing pollution load. The maximum ground level concentration will be 3.4 µg/cu.m at a distance of 400m from the project site in SE direction. The GLC predicted at all receptor locations after the proposed expansion are within prescribed limit in NAAQS

(National Ambient Air Quality Standard) stipulated by CPCB. The increase in pollution load due to enhancement in production will be managed with taking proper pollution control measures within the plant premises.

4.4.1.7 Mitigation measures

- Fume extraction system with bag filter to control the emissions from the process and fugitive emissions at furnace has been installed and the same will be installed in the proposed induction furnace.
- The fume extraction system of the induction furnace is attached to stack of 30m height. There is the proposal for installation of two nos of additional stack with fume extraction attached to the proposed induction furnace.
- Periodic checking of vehicles and construction machinery to ensure compliance to emission standards.
- All the vehicles used for raw material transportation will be covered by tarpaulin and overloading of the vehicles will be strictly prohibited.
- The raw material is being stored under covered roof and near to the furnace for easy handling of raw material.
- Internal road has been concreted and the connecting road from the main road to the plant has been constructed by the company.
- Regular air pollution monitoring is being carried out for the stack emission and ambient air quality.
- Mobile water sprinklers, water sprinkling systems has been installed to minimize fugitive dust emissions. There will be proposal for addition dustr extraction sytem, fume hood and bagfileters for the proposed enhancement proposal.
- Attenuation of pollution/protection of receptor through green belts/green cover.
- The slag crushing area will be provided with dust extraction system and water sprinklers to minimize the dust load.

The table below details the emission control systems installed within the project site to reduce the air pollution within the plant premises.

Table 4.6: Air pollution Control system within the project

Units	Induction Furnace (Existing & Proposed)	Slag Crushing Unit	Rolling Mill (Proposed)
Pollution control equipments installed	Bag Filters and Fume Extractor, Mobile & Fixed type water sprinklers, Dust Catcher	Dust extraction system and Water sprinklers	Dust catcher, Water sprinklers Mobile water sprinklers

For Existing 1 X 8 Ton Induction Furnace, 1 Nos Bag filter System has been Installed & for expansion unit 2 x 10 Ton Induction Furnace, additional 2 Nos Bag filter System is proposed. The details of PCD is as below:

Bag Filter System For Existing & Proposed Induction Furnace:

SL No	DESCRIPTION	For Existing Units	For Expansion Units
1	No of Bag Filter System.	1 No for 8 Ton Furnace)	2 No (One for each 10 Ton Furnace)
2	Type	PULSE JET	PULSE JET
3	Quantity	01	02
4	Gas volume	20,000 AM^3/Hr.	30,000 AM^3/Hr.
5	Gas Temp.	100 - 110 ^{0}C	100 - 110 ^{0}C
6	Inlet dust load	1.0 – 1.5 gm/Nm^3.	1.0 – 1.5 gm/Nm^3.
7	Filter bag Material	Polyester needle felt wt 500 GM/M^2.	Polyester needle felt wt 500 GM/M^2.
8	Max design Temp	130 ^{0}C	130 ^{0}C
9	Treatment for bags	Anti – adhesive Silicon Treatment	Anti – adhesive Silicon Treatment
10	Emission Guaranteed	<100 mg/Nm^3.	<100 mg/Nm^3.
11	Air to cloth ratio	1.54 m3/m2/min	1.54 m3/m2/min
12	No of bag	120 nos	180 nos
13	Dia of bag	160 mm	160 mm
14	Length of bag	3600 mm	3600 mm
15	Motor	35 h.p	45 h.p
16	Compressor	10 h.p.	10 h.p.
17	Induced draft fan volume	20,000 M^3/Hr	30,000 M^3/Hr
18	Total pressure of fan	250 mm w. g.	250 mm w. g.
19	Size of solenoids	50 mm	50 mm
20	Type of solenoids	Pilot operated	Pilot operated
21	Timer	EAPL M9	EAPL M9
22	Rotary air lock	160 MM	160 MM

BAG HOUSE SYSTEM

Bag Filter type Pollution Control System is designed to screen the emitting flue gases through anti static polyester fiber bags to control the gases so as to bring the emissions significantly below the prescribed limit of 100 mg/NM^3.

I. D. FAN

Design of I. D. Fan is such that it maintains the same draught as in the case of natural draught. This is essential to ensure that working of the furnace is not affected.

4.5 IMPACTS DUE TO TRANSPORTATION

The major raw material for the unit is Sponge Iron and Pig Iron which are sourced from the sponge Iron. There will increase in raw material consumption from 95 TPD to 330 TPD which result in increase in use of truck for raw transportation from 7 nos to 17 nos.The daily production has been increased from 80 TPD to 280 TPD which require14 nos of trucks. The additional truck load for the proposed expansion project will be20 nos per day. The transportation route is through the black topped road connecting NH -14 to the Jhanjra Road – MG Road. The increase in vehicular movement has following impact on the environment:

1. Dust and gaseous emission due to movement of vehicles within the plant premises and connecting road.
2. Dust emission due to overloading and leakage from the trucks.

4.5.1 Mitigation Measures

- The vehicles used in transportation of raw material and product will comply the pollution control norms.
- The internal road of the plant has been concreted.
- The road connecting Bamunara Industrial Estate to be well maintained and regular water sprinkling needs to be done on the road.
- The vehicles used for transportation is to be well maintained.

4.5.2 Noise Environment

The major sources of noise within the project have been tabulated below:

Table No.4.7 Sources of Noise within the project site

Sl. No	Source of Noise	Noise Level	Nature
01	Slag Crushing Unit	120 dB(A)	Intermittent
02	Operation Induction furnace	100 dB(A)	Continuous

	(Crane operation, movement of ladder, raw material feeding)		
03	Raw material & Product loading and unloading	90 dB(A)	Intermittent

4.5.2.1 Noise Modelling:

Minute details of noise propagation have been studied by mathematical model and impacts of noise on surrounding area have been brought out below. As the operation of different equipment generate noise generally not higher than 100 dB(A) at source it can be safely assumed that the ambient noise levels on any point of boundary line of the plant are not higher than 100 dB(A). It has, also been assumed that the area within the core zone within an imaginary line running at a distance of 3-5 m (say) from noise generating machines is termed as point noise source to avoid complication in the absence of availability of exact location of various noise generating units, their arrangements and shapes. Such source noise level has been considered here for anticipating the impacts. Noise attenuation with distance in all directions over flat open bare ground is given by;

Sound level dB (A) = $Lw - 20 \log r_2/r_1$

Where: L_W = Sound level of source, dB (A) assumed 85 dB (A)

r_1, r_2 = distance from source (m)

During operation phase the major source of noise will be Operation of induction furnace and the slag crusher unit. The noise from the slag crusher unit will be maximum upto120 dB(A) and noise from induction furnace operation will be maximum upto100dB(A). The propagation of noise from the source at different distance has been enumerated in **Table No.4.8 & 4.9** given below:

Table 4.8: Noise level at source in dB (A)

	Source Level-1	**Source Level-2**
Assumed	120	100
Cut off	35	
Step	2	

Table 4.9: Predicted Noise Level of Different Sources at Various Distances

Distace in m	Source Level-1 (120 dB(A))	Source Level-2 (100 dB(A)
5	103	84
10	98	79
15	95	76
20	93.15	73.56
30	89.90	70.17
40	87.54	67.74
50	80.68	62.85
60	79.15	61.29
70	77.85	59.97
80	76.72	58.83
90	75.72	57.82
100	74.83	56.91
150	71.36	53.42
200	68.89	50.94
250	66.97	49.01
300	65.40	47.43
350	59.07	46.09
400	57.92	44.94
450	56.90	43.92
500	54.00	43.02

Fig 4.2 (A) Noise Attenuation at various distances from Source {Source 120 dB (A)}

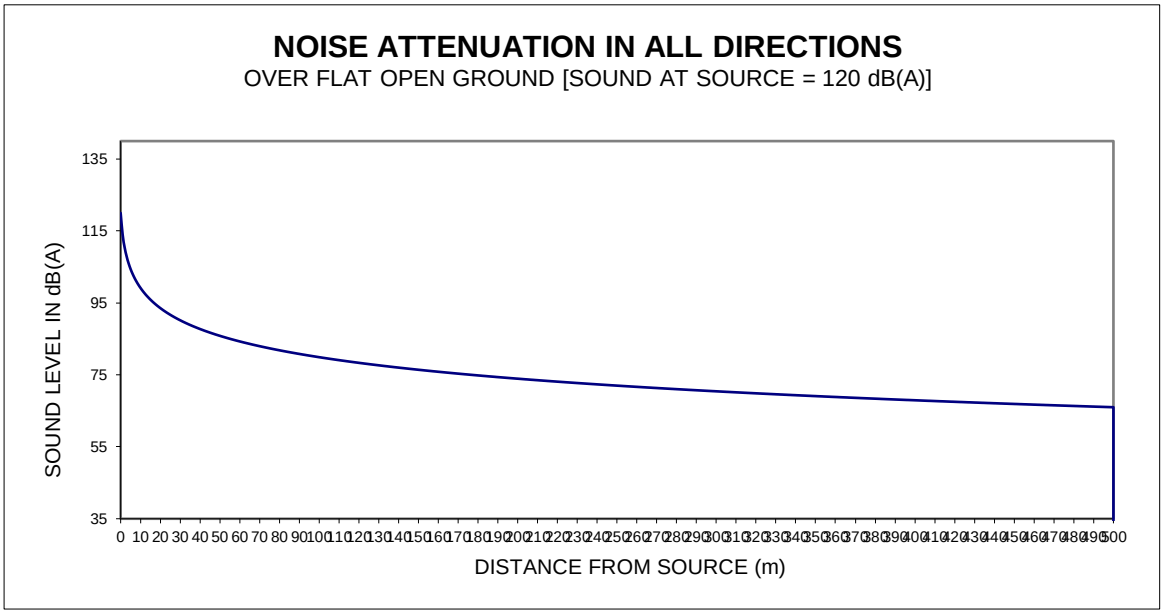
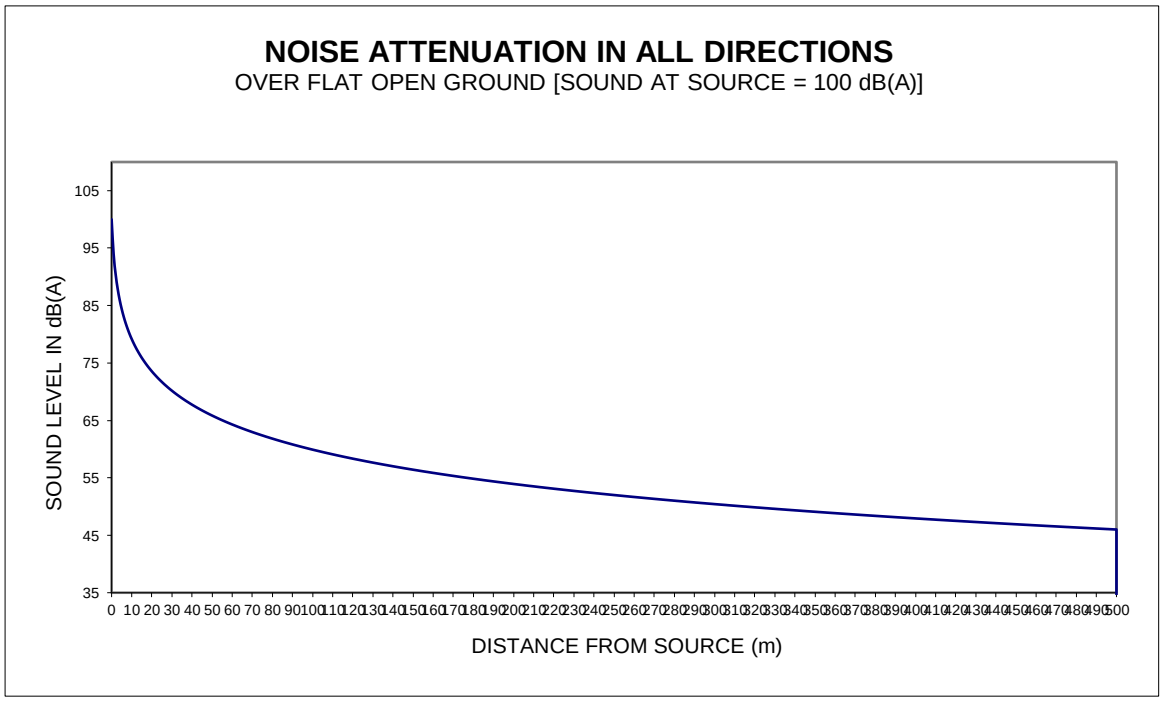


Fig 4.2(B) Noise Attenuation at various distances from Source {Source 75 dB (A)}



Maximum noise level of 103 dB (A) will be experienced at a distance of 2m mts from the source. Beyond 500 meters noise level will be less than 45 dB (A). Distance of sensitive receptors i.e. plant residential area and villages are beyond 500 mts from the source.

4.5.2.2 Mitigation measures

- Use of suitable muffler systems/enclosures/sound-proof glass panelling on heavy equipment/pumps/blowers.
- Pumps and blowers may be mounted on rubber pads or any other noise absorbing materials.
- Proper scheduling of high noise generating activities to minimize noise impacts.
- Usage of well maintained construction equipment meeting the regulatory standards.
- Placement of equipments emitting high noise in an orientation that directs the noise away from sensitive receptors.
- Periodic maintenance of equipments/replacing whenever necessary/lubrication of rotating parts, etc.
- Performance specifications for noise represent a way to insure the procured item is controlled.
- Use of ear protective devices like Ear plugs and ear muffs by the workers in noise prone area.
- In case of steady noise levels above 85-dB (A), initiation of hearing conservation measures.
- Implementation of greenbelt for noise attenuation has been taken up.

4.6 WATER RESOURCE & QUALITY

Total water requirement for the proposed expansion project will be 74 KLD which will be the makeup water will be sourced from bore well. Existing water requirement for the plant is 23 KLD which is makeup water sourced from bore well. The water requirement is only for cooling purpose of billet and TMT rod. At present the water requirement of the plant is met from the existing borewell within the plant premises. The additional water requirement will also met from the existing bore well. The plant is in the process of obtaining permission for withdrawal of required quantity of water from CGWB.

As the water requirement is only for cooling purpose and water will be kept in closed circuit, there will not be any discharge to the outside area. Hence at present there is no requirement for any Effluent treatment plant. Domestic discharge from canteens and toilets will be channelized through proper sewage channels and soak pits. The cooling tower water will be re-circulated after proper settling and the plant will operate in zero discharge norms.

4.6.1 Zero Liquid Discharge

As per the record of the unit the zero liquid discharge status is maintained and the unit is maintaining the norms as per CTO by West Bengal Pollution Control Board. Since the unit is using water only for cooling purpose there is no discharge of effluent from the process.

To monitor the process of no discharge a flow meter and a camera have been installed and the connection to the CPCB portal for continuous monitoring of zero discharge is done.

4.6.2 Rain water Harvesting

Rain water harvesting will be established with in the plant premises. The major rain water harvesting area is as below:

- Non contaminated (roof drain)
- Contaminated (Raw material stock yard)
- Garland drains around the plant premises

Rain water harvesting proposal has been incorporated within the plant premises. The maximum rainfall intensity has been taken for calculation is 100mm/hr.

Quantity of rain water harvested (Q) = Intensity of rainfall x area x Run off coefficient

Runoff coefficient is 0.80 for roof top area, 0.60 for parking area and road, 0.20 for green area. Based on the above harvested quantity of rain water harvested is given in **Table No.4.11** below:

Table 4.10 Rain water Harvesting Details

Sl. No	Rain water harvesting area	Area in Sq.m	Rainfall/ Annum (m)	Run off co-efficicent	Volume of harvestable quantity of rain water (cu.m) per hr
01	Induction Furnace &CCM , Rolling Mill	8579.343	1.5	0.8	10295.21
02	Storage and Solid waste handling area	242.8116	1.5	0.8	291.37
03	Administrative office	161.8744	1.5	0.8	194.25
4	Road and Paved	3237.488	1.5	0.6	2913.74

	area				
5	Green belt	9226.841	1.5	0.2	2768.05
6	Vacant Land	4815.763	1.5	0.2	1444.73
Total Rain water Harvestable					**17907.36**
Total Rainwater (Evaporation Loss = 10%)					**16116.62**

There is the proposal for construction of two rain water harvesting pond over an area of 400 sq.m with dimension of 20mx20mx2m.

4.6.2.1 Mitigation measures

- Storm water drainage system to collect surface runoff is separately connected to rain water harvesting tank.
- Dewatering of sludge and appropriate disposal of solids from the settling tank.
- Treated wastewater (such as sewage, industrial wastes, or stored surface runoffs) is being re-circulated in the process.
- Handling, storing, and disposal of hazardous materials will be done as per hazardous waste management rules.
- Emergency response plan will be strictly followed.

4.7 SOLID WASTE GENERATION & MANAGEMENT

The Solid waste from Induction Furnacein the form of Slag will be 23.40 TPD and 0.25 TPD as PCD dust. The Slag will be further processed in house in Slag Crashing Plant for recovery of Scrap Iron.

The Solid Waste after expansion from the Unit will be 23.65 TPD (from Slag Crashing Plant & PCD Dust) which will be used for road making / Low filling and it is also given to out sider who takes it for there low land filling.

Table No. 4.11 Solid Waste Inventory

Units	**Solid Wastes**	**Qty In TPD**	**Disposal practice**
Slag Crushing Unit	Slag	23.40	Solid Waste after expansion from the Induction Furnace will be 26.00 TPD (after recovery of 2.60 TPD Iron the net Solid Waste will be 23.40 TPD) The total 23.65 TPD slag will
Pollution Control Device	PCD Dust	0.25	
TOTAL		**23.65 TPD**	

			be used for road construction and also sold to brick manufacturers
Domestic Solid waste			
Domestic Waste & Canteen	Food Waste From Canteen	5 Kg / Day	Will be used as manure for gardening / Panchayet Vat

4.7.1 Mitigation measures

- Most of the solid waste generated are non hazardous in nature.
- Proper maintenance procedure of equipments will be done to ensure minimum risk.
- Waste oil shall be collected through the drain ports and stored in leak proof steel drums.
- Other solid waste like debris, cotton waste etc so generated will be collected and segregated. These will be separately disposed of through waste disposal site allocated by local administrative authorities.

4.8 IMPACT ON SOCIAL ENVIRONMENT

4.8.1 Impact during construction and operation phase:

The components of the construction phase that could result in effects on the social environment include the following:

- Local skilled, semi skilled and unskilled labour got direct and indirect employment in the plant. This results in a rise in economic status of the area in terms of wages. Hence, this plant created positive impacts on socio-economic conditions of the area are anticipated during the construction phase.
- There is risks related to transportation of machineries and materials through public roads due to increase in the local traffic and also, there is a requirement for warning signs to minimize damage to the third-party vehicles.

4.8.2 Mitigation measures:

- Health and safety measures for workers and supply of PPEs to the workers working within the plant premises.
- Up-gradation of roads and intersections of the industrial estate.
- Development of social infrastructure and health facility for local people.

4.9 IMPACTS ON ECOLOGY

4.9.1 Impact during operation phase:

The project is located within Bamunara Industrial Estate and 10 Km radius of the project site does not include any national park or sanctuary. The emission from the plant is very less and the predicted ground level concentration of PM10 is maximum of 3.4 at a distance of 400m from the project site. There is no forest area located within 1 Km radius of the project site. The company has initiated green belt along the boundary and developed a garden near the office building.However to mitigate the impact of the existing plant there will be development of three tier green belt along the plant boundary and in the open space present within the plant premises.

4.9.2 Mitigation measures

- Proposal for three tier green belt along the plant boundary with the endemic plant species.
- Increase in avenue plantation along the approach road of the industrial estate.
- Measures to be taken to reduce the pollution level.

4.10 OCCUPATIONAL HEALTH & SAFETY

4.10.1 Impact during construction and operation phase:

Occupational health problem may arise from worker exposure mainly to dust and heat. Prolonged exposure to noise may also pose as a critical occupational health concern.

- Respiratory diseases due to exposure to dust.
- Noise induced hearing loss
- Heat stress around Induction furnace area, CCM and rolling mill area
- Accident prone areas including, Industion furnace, slag disposal area and casting areas.
- Accident due to movement of internal vehicles and due to machineries.
- Accident due to loading and unloading of heavy weight billets.

Table 4.12: Personal Protective Equipments

Protection For	Equipment	Protection Against
Hand	Leather gloves Asbestos gloves Electrical resistance gloves Canvas gloves Hand sleeves	Heat radiation Electrical shock Cuts/ Burns
Legs	Leg guards	Sparks

	Leather safety boots Asbestos safety boots	Stepping on sharp/ hot objects Heat radiations/ Electrical shock
Eye	Goggles	Foreign objects reflections
Head	Helmet	Fall of objects
Ear	Ear plug/ muff	High noise level
Nose	Dust protection mask	Fine dust particles

4.10.2 Mitigation measures

- Provision of dust extraction system, water sprinklers at all the dust prone area.
- Maintain dust levels within the prescribed standards ad regular monitoring to ascertain the dust level within the plant premises
- Provide dust masks to the workers when conc. Of dust are exceeded to the standard requirement.
- Provision of worker camps with proper sanitation and medical facilities, as well as making the worker camps self- sufficient with resources like water supply, sanitation, power supply, etc
- Arrangement of periodic health check-ups for early detection and control of communicable diseases.
- Arrangement to dispose off the wastes at approved waste disposal sites.
- Provide preventive measures for potential fire hazards with requisite fire detection, fire-fighting facilities and adequate water storage.

4.11 ENVIRONMENTAL IMPACT DUE TO THE PROPOSED EXPANSION PROJECT

Summarised environment impact due to the proposed expansion project has been tabulated below:

Table 4.13: Impact Matrix of environmental components

Sl. No.	Environmental components	Project activities	Adverse/ Beneficial
1.	Surface and Ground water resources	Dumping of waste (Slag &Raw material)	Adverse
2.		Abstraction of water	Adverse
3.		Waste water disposal	Adverse
4.	Socio economic aspects	Employment	Beneficial
5.		CSR activities	Beneficial
6.		Occupational health	Adverse
7.	Land use Pattern & Soil	Dumping of waste	Adverse
8.	Surface & Ground	Storage and handling/	Adverse

	water quality	stock piling	
9.		Dumping of waste	Adverse
10.	Air quality	Raw material storage and handling/ stock piling	Adverse
11.		Operation of Induction furnace	Adverse
12.		Operation of Slag Crushing Unit	Adverse
13.		Transportation	Adverse
14.	Noise Quality	Operation of Slag Crushing Unit	Adverse
15.		Operation of Induction furnace, CCM, Rolling Mill etc	Adverse
16.	Health	Operation of Slag Crushing Unit	Adverse
17.		Operation of Induction furnace, CCM, Rolling Mill etc	Adverse
18.		Transportation	Adverse
19.		Storage of chemicals & Inflammables	Adverse
20.		Development of health facility	Beneficial
21.	Ecology	Operation of Slag Crushing Unit	Adverse
22.		Operation of Induction furnace, CCM, Rolling Mill etc	Adverse
23.		Transportation	Adverse
24.		Green belt development & Social forestry	Beneficial

CHAPTER 5

ANALYSIS OF ALTERNATIVES

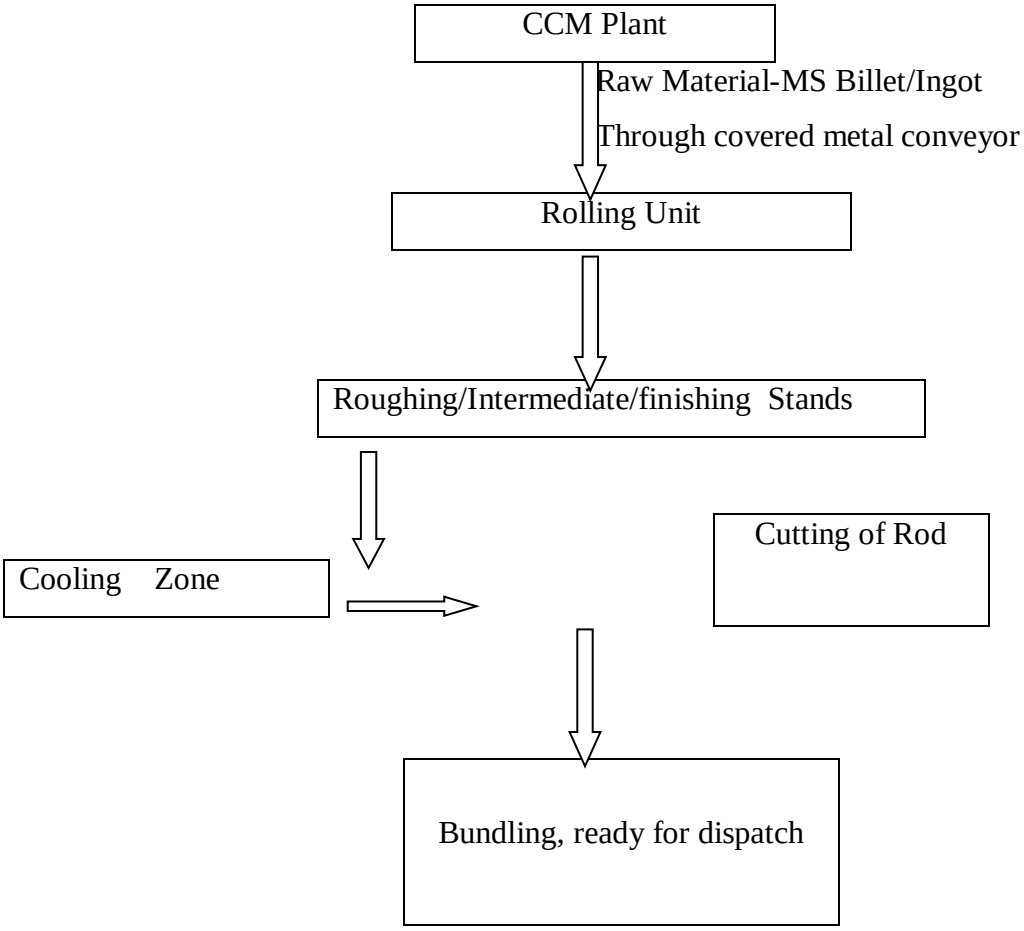
(Technology & Site)

The project is for enhancement in production of billet from 24,000 TPA to 84,000 TPA and installation of rolling mill for production of 80,000 TPA rolled out product and 7500 TPA Slag Crushing unit. The plant is located within the Sarpi village and the proposed expansion is within the existing plant premises. So no alternate sites have been assessed.

Raw Material heated M.S. Billet will be received from captive CCM Plant through metal conveyor, need not to be heated again before re-rolling. Re-Rolling of steel is a metal forming process in which steel is passed through a pair of rotating rolls for deformation of the steel. Deformation is caused by the compressive forces applied through the rotating rolls. High compressive stresses are as a result of the friction between the rolls and the steel stock surface. The steel material gets squeezed between the pair of rolls, as a result of which the thickness gets reduced and the length gets increased. To begin with M.S. Billets are transferred to the Re-Rolling Mill's Roughing section. These Billets are rolled several times to and fro in stand no 1 to 2,2 to 3 and 3 to 4 and so on several times. Front and tail end of the bar which gets split or turns cold during the rolling process are cut by rotary shears and recycled again through SMS plant.

From TMT line the bars are transferred to cooling bed where they are appropriately cut into required marketable length and left to cool till the time both the internal and the external surface of the bar reaches to around 600 deg C. The above bars are then transferred to the finishing bay where bundling and binding takes place.

Figure No.5.1 Production Flow Chart of M.S./TMT Bar, Rod



CHAPTER-6

ENVIRONMENTAL MONITORING PROGRAMME

This chapter describes the details of environmental monitoring, schedule, institutional arrangements for pollution control, cost for environmental protection measures and details of greenbelt development for the proposed project.

The environmental monitoring programmewill be followed by the company to ascertain the implementation of the environmental management plan. The senior management of the company periodically reviews the Environmental management system (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement has been ascertained and revisions made accordingly. EMS based on the above objectives has been formulated and implemented at the industry level. For implementation of the environment management plan there is the Environment Management cell headed by the plant manager.

6.1 ENVIRONMENT MONITORING

The environmental monitoring is important in terms of evaluating the performance of pollution control equipments installed in the project. The sampling and analysis of the environmental attributes is being done as per the Consent to Operate obtained from West BengalPollution Control Board (WBPCB). The frequency of sampling and location of sampling is as per the requirement of the existing consent condition and the report is being submitted to the conserned authority.

With the enhancement in production the environment monitoring will be carried out as per the EC conditions and will be submitted to the concerned authority.

6.2 OBJECTIVE:

The major objective of the environment monitoring plan is as below:

- To follow the trend of parameters which have been identified as critical existing status of environmental pollution.
- To assess the efficacy of the pollution control system.
- To establish a database of the area with respect to the pollution potential of the existing industry.

The attributes, which require regular monitoring, are given below:

1] Air Quality;

2] Water and Wastewater Quality;

3] Noise Levels;

5] Green belt development

6] Socio Economic Aspects and CSR activities

6.3 MONITORING SCHEDULE

A monitoring schedule is very important in order to ensure that the pollution load from the existing unit will conform to the standard for which control measures have been designed. As it is required that installation and operation of air pollution control facilities should limit concentration and quantum of pollutants released to the environment. A comprehensive monitoring program for the plant is as in **Table No.6.1** given below:

Table 6.1 Monitoring schedule for environmental parameters

Sl. No.	Description	Locations	Schedule and duration of monitoring	Important monitoring parameter
1.	**Air quality**			
	Selected 3 location (one in core zone and 2 in buffer zone)for ambient air quality monitoring specified by SPCB	Project Site Sarpi village Bansgola	Once in a month	PM_{10}, $PM_{2.5}$,SO_2, NOx & CO
		Project Site Sarpi village Bansgola	Once in a year in study villages as in Baseline study	12 parameters as per ambient air quality norms.
b.	Stack monitoring	SMS and Rolling mill stacks	By third party monitoring by MoEF& CC Recognised Lab	Quaterly once
c.	Fugitive dust sampling at work zone as per CPCB/SPCB guide line	Work zone within Plant premises	Once in a month in work zone	Fugitive dust
2.		**Water and waste water quality**		
a.	Ground water	Project Site Sarpi Village	Quarterly Once	As per IS:10500 (General and few critical parameters as in Baseline study)
b.	Surface water	Pond near Sarpi village	Quarterly Once	(General and few critical parameters as in Baseline study)
c.	Rain water Harvesting Pond	RWH pond within Plant site	Quaterly once	The parameters listed in the General Standards for discharge of environmental

				pollutants to Inland Surface water as prescribed by MoEFCCvide notification dated 19th May, 1993 and amendment in December, 1993.
3.		**Noise level monitoring**		
a.	Noise Level 3 location (1 core zone and 2 buffer zone)	Project Site Sarpi village Bansgola	Half yearly once	Noise level in dB(A)
Green belt monitoring				
5.	Monitoring of green belt development		Once in 6 months for 2 years followed by once in a year	Survival rate
7.	Occupationl health check up	Plant workers	As per the schedule	As per the schedule
The agency for monitoring and analysis will be appointed based on MoEF& CC/ NABL accreditation.				

6.4 Monitoring of Implementation and reporting of environment management programme within the plant

A proper reporting system will be developed which will be accountable to ensure the implementation of environment management plan within the plant premises. The monitoring and evaluation of the critical environmental management measures implemented in the project. The reporting system provides feedback to the top management regarding proper implementation of environment management plan. The rational for a reporting system is based on accountability to ensure that the measures proposed as part of Environmental Management Plan get implemented in the project. The reporting system of environment management plan during the operation stage of the project is given in the table below:

Table 6.2 Reporting System for Environmental Monitoring Plan

Attributes	**Indicators**	**Responsibility**
Ambient air quality	Parameters as specified by statutory authority	Plant Head/ Environment management cell
Water quality (Surface, ground water and surface runoff from the plant)	Parameters as specified by statutory authority	Plant Head/ Environment management cell
Stack emission from the process	All parameters as specified for stacks of different units by	Plant Head/ Environment management cell

	statutory authoritis	
Solid waste generation, utilization and dumping	As per the guideline of statutory bodies. Utilization as per the proposal submitted	Plant Head/ Environment management cell
Hazardous waste generation, utilization and management	As per the guideline of statutory bodies	Plant Head/ Environment management cell
Green belt	Survival rate of the planted saplings	Environment management cell
Occupational health	As per the statutory requirement for the workers working in different units	Unit head/ Environment management cell

6.5 Post Monitoring of Environment Management System

- Examination of all air pollution control system with due respect to its performance regularly. A record shall be maintained and will be shown to regulatory authority as and when required.
- Examination of rainwater harvesting systems and storm water drains.
- Checking water contamination by drawing regular samples of run off water. Collection and analysis of water samples from nearby surface water body as suggested by SPCB.
- Regular measurement of ground water level and quality.
- Checking the quality of air by drawing regular air samples and getting them analyzed.
- Maintenance of the record of plantation to monitor plantation scheme, the area of plantation, the observance of growth rate and survival of plants. Observance of growth of fauna in the area.
- Sampling for noise pollution inside the mines, which produce excess noise, and to study likely impact on workers.

6.6 Updating Of EMP

The directives from MoEF&CC and the regulations of state pollution control authority in force at any time shall govern the periodicity of monitoring. However, it is suggested that the implementation of various measures recommended in the Environmental Monitoring Programme be taken as a prt of Environment Management Plan to effectively implement the measures for continual improvement in environmental performance.

CHAPTER 7

ADDITIONAL STUDIES

7.1 ENVIRONMENTAL RISK MANAGEMENT

M/s Neptune Ispat Private Limited has taken up all the safety featuresduring the installation of the existing induction furnace and CCM and with the additional establishment care will be taken to implement all the safety features. However accident cannot be planed and this section describes the risk assessment of the existing unit along with the proposed expansion project and preparation of disaster management plan, occupational health and safety for the workers.

7.1.1 OBJECTIVES

The objectives of environmental risk assessment are governed by the following which excludes natural calamities:

- To identify the potential hazardous areas of the industrial establishment so that necessary design safety measures can be adopted to minimize the probability of accidental events.
- To identify the potential areas of environmental disaster that can be prevented by proper design of the installations and its controlled operation.
- To manage the emergency situation or accident, if any form of the plant operation.

Managing a disastrous event will require prompt action by the operators and the crisis management team by using all available resources like alerting the people and other plant personnel remaining inside, deployment of fire fightingequipments, operation of emergency shut off of valves, opening of the escape doors, rescue etc.

Minimizing the immediate consequence of a hazardous event include coordinating of, evacuation, medical assistance and giving correct information to the families of the affected persons and local public for avoiding rumors and panic. Lastly an expert committee is required to probe the cause of such events and the losses encountered and suggest remedial measures for implementation so that in future such events or similar events do not recur.

7.2 DEFINITION OF ENVIRONMENT RISKS

The following terms related to environmental risks are defined before reviewing the environmental risks:

HARM: Damage to the person, property, or environment.

HAZARD: Something with the potential to cause harm; this could be characteristics of material being processed or malfunctioning of the equipment. An environmental hazard is thus going to be a set of circumstances, which leads to the direct or indirect degradation of environment and damage to the life and property.

RISK: The probability of the harm or like hood of harmful occurrence. Being released and its severity. Environmental risk is a measure of the potential threat to the environment, life and property.

CONSEQUENCE: Effect due to occurrence of the event, which may endanger the environment permanently or temporarily and or loss of life and property.

ENVIRONMENTAL

DISASTER: The consequence is so severe that it can extensively damage a one or all the four components of the environment namely a) Physico – chemical b) Biological c) Human and d) Aesthetics

7.3 HAZARD IDENTIFICATION AND RISK ASSESSMENT(HIRA)

The operation of induction furnace and CCM is a hazardous activity which may affect the workforce working within in the plant premises. Following hazard may occur in the existing as well as proposed expansion project:

- Heat related hazards
- Hazard due to Dust emission
- Electrical hazard
- Explosion hazard
- Accident due to fall of Machinery
- Automation of equipment
- Operation of Equipments
- Movement of heavy vehicles, loading and unloading
- Noise related hazard

7.4 ENVIRONMENT RISK EVALUATION

From environmental hazards point of view for the raw materials and consumable chemical and processing of the same in production unit, relative risk potential analysis is made on the following three factors:

- ♣ Likelihood of occurrence
- ♣ Likelihood of detection
- ♣ Severity of consequences

Each of these factors is graded and complied with determined the risk potential. The factors governing the determination of relative risk potentials are presented in the **table No.7.1 below:**

Table No. 7.1 Environment risk evaluation

Likelihood of occurrence		**Likelihood of detection**		**Severity of consequences**	
Criteria (A)	**Rank**	**Criteria(B)**	**Rank**	**Criteria(C)**	**Rank**
Very high	5	Very high	1	None	2
High	4	High	2	Minor	4
Moderate	3	Moderate	3	Low	6
Low	2	Low	4	Moderate	8
Very low	1	Very low	5	high	10

Risk Potential can be calculated by:

Risk potential= (A+B) x C

The Risk potential associated with the existing plant operation and proposed expansion project has been calculated as **Table No.7.2** given below:

Table No. 7.2 Risk Potential

Activities	**Likelihood of occurrence**		**Likelihood of detection**		**Severity of consequences**		**Risk Potential**
	Criteria (A)	**Rank**	**Criteria(B)**	**Rank**	**Criteria(C)**	**Rank**	
Induction Furnace							
Burn injury due to over flow of hot metal &Sparkling of hot Metal	Moderate	3	Low	4	Moderate	8	54
Fall of ladle due to broken of hanger	Low	2	Low	4	High	10	60
Fall of object due to failure of EOT	Low	2	Low	4	High	10	60

Crane							
Slip and fall due to accumulation of sponge iron on floor	Moderate	3	Moderate	3	Minor	4	24
Electrical Flashing / shock during Air cleaning of furnace capacitors and switch gear	Low	2	Low	4	High	10	60
Splashing of molten metal and slag	Moderate	3	High	2	High	10	50
CCM							
Falling of hot billet during handling	Low	2	Low	4	High	10	60
Splashing of hot metal during billet formation	Low	2	Low	4	High	10	60
Failure of crane during the handling of billet for loading	Low	2	Low	4	High	10	60
Electrical short-circuit	Low	2	Low	4	High	10	60
Rolling Mill							
Fall of material during hot slab handling	Low	2	Low	4	High	10	60
Body part in between slab/chain	Low	2	Low	4	Moderate	8	48
Fall of Bar, Cutting set, Fall on person during Bar /Cobble Cutting	Low	2	Low	4	Low	8	48

The mitigation measures suggested for the identified risk are as in **Table No.7.3** below:

Table No.-7.3: Potential Hazard/ Source and Mitigation measures

Type of Hazard	Source	Risk related to Hazard	Mitigation measures
Heat	Induction furnace (Molten metal and hot surfaces), CCM and Process of rolling, Slag disposal area, etc.	Burn/ Heat stress	Use of helmet, heat resistant clothing, heat resistant gloves, Use of Goggles by the workers. Workers are advised to work at a distance of 4m from the molten metals. Rotation of workers on shift basis.
Dust and Gaseous emission	Induction furnace, Raw material and product storage yard, Transportation of raw material.	Pulmonary disease	Use of Nose Mask, Water sprinkling arrangement at requisite places, Provision of Bag filters and dust extraction system as required. Stack monitoring and work zone monitoring to ensure the gaseous emission and dust emission within the prescribed standard.
Electrical	IF, Motors, Panels, Sub Station; Electrically operated equipments	Electrical shock and burn	Electrical area to be separated and assess given to authorized personnel. Spark proof motors used. Insulated cover provided in the electrical area. Proper earthling has been provided.
Explosion	Molten metal, Contaminated scrap handling, During Casting	Burn, Injury	Use of contaminated scrap is completely avoided Combustible and flammable material to be separated from the molten metal area.
Accident related to fall of machinery	Moving machinery, on-site transport, forklifts and cranes	Injury	Safety check of operation of equipments at regular intervals. Properly trained workers appointed to operate machineries, Workers working with cranes will be provided with all PPEs with safety belts.
Accident due to operation of equipments	Operation of CCM, Rolling Mill and Induction furnace	Burn & Injury	Workers provided with PPE, Properly trained workers appointed to operate machineries

Storage & Handling of HSD	Leak, Spill, Fire explosion, Toxicity	Injury, Burn	PPEs provided to the personnel working in the area. Fire extinguishers provided
Noise & Vibration	Rolling Mill D.G Set, IF melting process, Crushing, fuel burners, raw material, scrap and product handling, rotating equipment, furnace charging.	Hearing loss / Fatigue	Noise monitoring, Audiometic examination of workers, Workers provided with PPE like ear plug, muff isolation, substitution and engineering control installation of acoustical booth rotation of workers and minimize the time enclose fans, insulate ventilation pipes, cover and enclose scarp and storage and handling area adopting slag practice in IF.

7.5 RISK MANAGEMENT MEASURES

The risk management measures for the proposed project activities require adoption of the best safety practice at the respective construction zones within the project boundary. In addition, the design and engineering of the proposed facilities would take into consideration of the proposed project protection measures for the air and water environment.

7.5.1 Safety Measures

The work place and surrounding area are need to kept clean and free from all obstructions. Solid waste, Hazardous waste like oily cotton, oily rags and empty barrels are properly stored away from any source of fire. Spill of oil and grease is immediately cleaned to reduce accidental fall.

7.5.2 Provision of PPEs:

Personal protective equipments like heat resistant gloves, goggles, face masks, apron, Safety boots, helmets, Nose masks has been provided to the workers working in the hazard prone area.

7.5.3 Loading and transportation of Materials

- Overloading of the trucks is strictly prohibited and material is properly distributed and tied as far as possible.
- Care should be taken during the loading of heavy billets by crane. Supervision of the crane movement to be given importance by the safety supervisor of the industry.
- Care to be taken by the drivers while moving back to avoid any accident.

- The maximum speed limit of the heavy vehicle is <20Km/ hr.

7.5.4 Operating Machineries

- Only the authorized person should operate the machine or equipment.
- The repairing, cleaning and oiling of machineries will do when the machineries are not in use.
- Before switching on electricity, gas, acid, air or gas this is ensured by the safety supervisor that no person should be injured nearby.
- All the exposed part of the moving machines like pully, belt, chains, and rotating collars is properly guarded.
- The machine guard and safety device is confirming the statutory provisions required for the machine.
- No person allowed standing in unsafe position while a Bucket (for Scrap or Sponge) is being loaded or unloaded by crane.
- No person is allow to stand in unsafe position while a Scrap or Sponge is being loaded or unloaded by Magnets though EOT crane.
- No one will ride stand or walk under load suspended from cranes
- When any defect is observed in a crane, it will be immediately reported to the officer/supervisor concerned for repair.
- A crane driver will not make a lift without standard signals from the person with the job and he will take signal only from one person at a time. All persons in places over which crane is operating, will listen for crane bells and other signaling devices

7.5.5 Vehicular Traffic

- All vehicles will comply with all the traffic regulations within the plant and they will not exceed the safe speed limits i.e. 20 Km/ hr.
- Sitting on the side flaps or standing in a truck while in motion is strictly prohibited.
- Overloading of the trucks are strictly prohibited

7.6 ONSITE EMERGENCY PLAN

In this plant, it is imperative that accidents occurring due to unforeseen acts and events will not affect the surrounding areas. Therefore an onsite emergency plan for prevention and mitigations of accidents will be enough to cater unforeseen acts and events that may occur.

7.6.1 Objectives of Onsite Emergency Plan

The main objective of the plan is to take immediate actions to meet any emergency situation for speedy and efficiency rescue and relief operations. The main steps in an onsite emergency plan are described below:

- Cordon and isolate the affected area for smooth rescue operation.
- Rescue and treat casualties and safeguards the rest.
- Minimize damage to person, property and surroundings.
- Secure and safe rehabilitation of the affected area.
- Identify any death and provide compensation as per labour law.
- Provide necessary information to statutory agencies.
- Provide authoritative information to the news media.
- Ward off unsocial elements and prying onlookers.
- Counter rumour mongering and panic by relevant accurate information.

7.6.2 Onsite Emergency Control Canter

Emergency Control Centre is located at Main Security Gate have been designated as Emergency Control Centres in case of any emergency. Plant manager shall operate and give directions from the Emergency Control Centre. The emergency control centre is having

- Telephone line connecting to all areas of the Plant specially those prone to emergency as well as to outside for obtaining emergency services.
- Dedicated Emergency Telephones facility.
- A site map showing details like location of fire-fighting equipments and hydrants, location of emergency exists etc.
- List of all possible emergency services providers with their contact numbers & address.
- Internal telephone directory of the plant including contact numbers of residences of senior personnel.
- List of Disaster team members and First Aiders.
- Stock of safety equipments like gloves mask etc.
- List of contacts of external emergency services like police station, fire station and local health centre.

The flow sheet of the emergency control system is **Figure No.7.1** below:

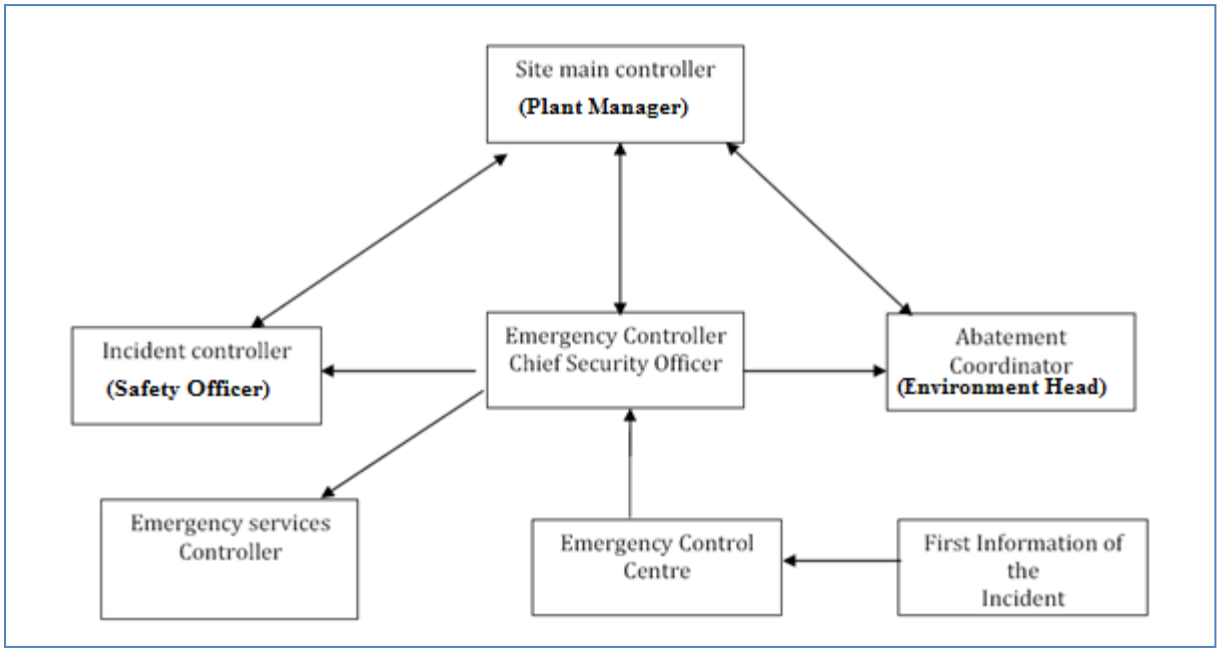


Figure No.7.1 Emergency Control System

7.6.3 Roles and Responsibility

7.6.3.1 Site-Main-Controller

1. Overall responsibilities for handling of emergency situation within the plant site.
2. This responsibility has been designated to the plant head.
3. Continual review of the cause of accident and determine best counter measures.

7.6.3.2 Incident Controller

1. Responsible for handling the emergency situations and head the emergency control centre.
2. Informing to all external authorities in case of emergency requirement.
3. Arrangement of first –aid facilities from plant Dispensary.
4. Arrangement of transport facilities.

7.6.3.3 Emergency Controller

- Overall responsibility for handling & controlling the emergency incidents & operations with the help of disaster management team.
- Keep the entire gate closed to avoid any kind of rush on the gates.
- Provide all kinds of information regarding emergency to Incident Controller.

- Will inform to all nearby hospitals for medical aid for sufferers and fire station for fire brigade.

7.6.3.4 Emergency Services Controller

- Assist external services in directing them to the areas of incident and providing any help and assistance to them on their arrival.
- Ensure that breathing apparatus, torches and proper lighting arrangement is made at the place of emergency.
- Ensure proper arrangement of water.
- Arrange adequate work force for assistance.

7.6.3.5 Abatement Co-ordinator

- Keep watch on entire emergency operation.
- Guide the Rescue teams for safe functioning
- Ensure proper arrangement of safety equipment at site
- Ensure that water, air and any other disaster fighting operation does not pollute the environment.

Table No. 7.4 Action plan for management Onsite emergency

Steps	Initiator	Action tobe taken
Step 1	The person noticing the emergency	Inform the Security Gate, Emergency controller, team leader and the concerned Shift-in –charge immediately.
Step 2	Emergency Controller	Inform to chief security officer and rush to spot and organize his team. Take charge of the situation, arrange for fire fighting and medical first-aid available at site. To start combating, shut-down equipments, arrest the leakage of gas/fire.
Step 3	Chief Security Officer	Inform Abatement coordinator and rush to emergency site. Discuss with Emergency control team leader and safety officer, assesses the situation and call the Rescue Team Leader
Step 4	Incident Controller	Consult with emergency controller and take necessary action to arrest fire fighting and medical treatment. Rush to Emergency Site through safe route along with the team members. Arrange to set off the fire by firefightingequipments and hydrant points to

		arrest the fire or to evacuate the area Shift the injured persons to hospital by ambulance after providing necessary first aid.
Step 5	Abatement Coordinator	Rush to emergency site and observe the ongoing activities. Take stock of the situation in consultation with the chief security officer and safety officer. Move to Emergency Control Room. Declaration of Emergency situation. Decide on declaration of cessation of emergency. Ensure that the emergency operations are recorded chronologically.

7.7 INDUSTRIAL SAFETY AND FIRE FIGHTING

For protection of working personnel, equipment and machineries from any damage or loss and to ensure uninterrupted production, adequate safety and fire fighting measures have been planned for the proposed plant. Important provisions are as follows:

- Provision of adequate personnel protective equipment to workers engaged in hazardous installations.
- Provision of detection and alarm system to allow a developing fire to be detected at an early stage.
- Provision of water sprinkler fire extinguishing system and portable extinguisher using carbon dioxide or chemical powder.

7.7.1 Portable Fire Extinguishers

All plant units, offices, buildings, stores, etc. has been provided with adequate number of portable fire extinguishers to be used as first aid fire appliances. The distribution and selection of extinguisher will be done in accordance with the requirement of fire protection manual.

7.7.2 Fire Hydrant System

Internal hydrants have been provided in all major plant units at suitable locations and in different levels inside the plant buildings. Yard hydrants have been provided in the vicinity of each plant unit, normally along the road to meet the additional requirement of water to extinguish fire.

7.7.3 Automatic Fire Detection System

Unattended vulnerable premises like electrical control rooms, cable tunnel, MCC rooms, has been provided with automatic fire detection and alarm system.

7.7.4 Manual Call Point System

All major units and welfare or administrative building will be provided with manual call points for summoning the nearest fire station for necessary assistance.

7.8 SOCIAL IMPACT ASSESSMENT/ R&R ACTION PLANS

The project is an existing project and the proposed expansion is within the existing plant premises without any further land acquisition. So social impact assessment and R& R action plans are not required for the project.

CHAPTER 8

PROJECT BENEFITS

8.1 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The proposed project is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPD Slag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. The proposed enhancement in production will create positive impact on the socio economicstatus of the local people. This includes infrastructure development and sustainable development of the area.

Following physical infrastructure facilities will improve due to proposed project.

- Road development and maintenance facilities within the plant premises and internal road of industrial estate.
- Water supply and sanitation
- Support for supply of slag for low land filling and road construction as per the requirement of the nearby villages.

8.2 IMPROVEMENT IN SOCIAL INFRA STRUCTURE

Beneficial impacts in terms of employment, education, infrastructure development has been done by the company. Following steps will be undertaken to improve the socio economic status of the surrounding area:

- Local people will provide with transportation facility.
- Support to the local school in terms of education material, different celebration and environment awareness programme among the school children.
- Availability of safe drinking water for the villagers.
- Organizing different social and cultural programme at district level.
- Development of medical and first aid facility for the workers and local people.

8.3 IMPROVEMENT IN EMPLOYMENT POTENTIAL

- The proposed enhancement project will provide direct and indirect employments. So that the people residing in the nearby areas will be benefited directly and indirectly as well.
- All the labour required for the proposed project is mostly from local areas, which will create employment opportunity for people residing nearby areas.

- It is anticipated that the existing project provides benefits for the locals during construction and also operational phase of the plant and this will lead to the enhancement in economic status of the people.

8.4 PLACES OF HISTORICAL IMPORTANCE

There is no historical or archaeological monument within 10 km of the area. The project site and its surrounding is mostly industrial area and this leads to economic development of the localpeople and improve of living condition.

8.5 OTHER TANGIBLE BENEFITS

The project has other tangible benefits as given below:

- Indirect employment opportunities to local people in contractual works like transportations, sanitation, for supply of goods and services to the project and other community services
- Providing improvement in cultural, recreation and aesthetic facilities
- Improvement in communication, transport, education, community development and medical facilities

8.6 CORPORATE SOCIAL RESPONSIBILITY

The project proponent will invest Rs. 45,00,000.00 for CSR activity. The details of CSR activities will be finalised after the completion of public hearing as per the public need and demand. However as per the socioeconomic study conducted in the study area the CSR plan has been formulated as in **Table No.8.1** given below:

Table No.8.1 Proposed CSR Plan

Sl. No	Proposed Activities	Location	Proposed Budget in Rs.
Health & Sanitation			
01	Annual Health Check-up Camp	Sarpi	4,00,000.00
02	Provision of RWH & Drainage Facility	Sarpi	6,00,000.00
03	Mobile Medical & Ambulance facility	Near By villages	10,00,000.00
Education			
04	Scholarship to the school children	Sarpi& Near By Villages	2,50,000.00
05	Repair & maintenance of school furniture & Building	Sarpi& Near By Villages	5,50,000.00
Infrastructure Facility			
07	Repair & Maintenance of Connecting Road	1 Km stretch	10,00,000.00
08	Provision of Hand Pump and tube well in the villages	Sarpi& Near By Villages	12,00,000.00

CHAPTER 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

The environmental cost benefit analysis is not recommended for this project during scoping stage.

CHAPTER 10

ENVIRONMENT MANAGEMENT PLAN

Environment Management Plan is the important attributes to mitigate the negative impact of the proposed enhancement in production by installation of additional establishment by M/s Neptune Ispat Private Limited. The environmental pollutants discharge outside without control measures is likely to have adverse effect to the environmental parameters like water, air, soil, flora, fauna and also to socio economic status of the region. It is the responsibility of the project proponent to control the discharges of waste product by adopting suitable control measures in the plant to avoid adverse effect.

The main objective of the EMP is as below:

- To prepare an environmental hierarchy.
- Monitoring of cumulative long term and long term impacts and implementation of the environment management plan to mitigate the impact.
- Establishment of Environment Management cell to implement and monitoring of the Environment management plan within the plant premises.

The following aspects of environmental pollution from this unit have been considered for EMP.

- Air environment
- Noise environment
- Water environment
- Solid waste
- Greenbelt

The management measures of the above parameters have been visualized both during construction and operation phase.

10.1 Scope of EMP

The initial focus of the EMP is the protection of surrounding physical, biological and social environment due to increase in pollution load of the proposed expansion project. The project activities may give rise to significant environmental impacts, the EMP includes a strategies and action plant to mitigate the identified impacts. The EMP also supports collaboration and joint actions with project team, contractors and associated workers. In line with the Environment Policy, the following criteria will be used to determine priorities for attention:

- Impact on the physical, biological and social environment.
- Contribution to innovation and definition of best environmental practice.
- Compliance with statutory requirements and other environmental commitments.

10.2 Availability of resources.

The EMP acknowledges the social and cultural dimensions of responsible environmental management alongside the biological and physical, reflecting a holistic view for protection of environment.

The scope of the EMP includes the following functional areas:

Management systems: Those systems employed in the management of the operational activities. It will include financial systems; engagement and supervision of workers; purchasing policies, etc.

Knowledge systems: Those processes which build knowledge and capacity on environmental issues, principles and sustainable behaviours. It will include training; communications; campaigns; links with operational departments, etc.

Water management: Aspects of supply, usage, treatment and conservation of water for the project.

Pollution prevention: Those aspects of planning and management which support minimisation of air and water pollution and contamination of land resulting from proposed expansion activities.

Biodiversity and open space: Those aspects of management and maintenance which support conservation and enhancement of biodiversity and environmentally sustainable use of open space in the plant premises. Green belt development, avenue plantation programme may be included under these aspects.

10.3 Environment Policy

M/s Neptune Ispat Private Limited has developed a well defined Environmental policy by which the company is committed to conduct business with strong environmental conscience towards community, customer & employees. M/s Neptune Ispat Private Limited being advised to implement ISO 14001 system for development in practicing EMP.

The safety and environment policy is as below:

- The Environment, health and safety policy is the rules and commitment driven towards conservation of environment with protection of employee's health and safety.

- M/s Neptune Ispat Private Limited committed towards efficient use of natural resources based on reduce, recycle and reuse method.
- M/s Neptune Ispat Private Limited committed towards identification of possible impacts and will take necessary management plan to mitigate the impacts.
- The environment and safety performance will regularly monitored and reported and helps for continual improvement of our environment and health performance.
- The company's business policy is not only seeks to minimise the impact on the environment but also improve the environmental quality of the plant and its surrounding area.
- For health and safety of workers, our efforts is for identification of workplace hazards and creating awareness among the workers for reduce accident. Training to the workforce regariding prvention of accident, accident response and emegency preparedness.
- We strongly believe that accident and adverse environment impact can controlled through good quality of working environment, safety management and worker's involvement.

The safety and environment policy of M/s Neptune Ispat Private Limitedis attached as **Annexure 10.**

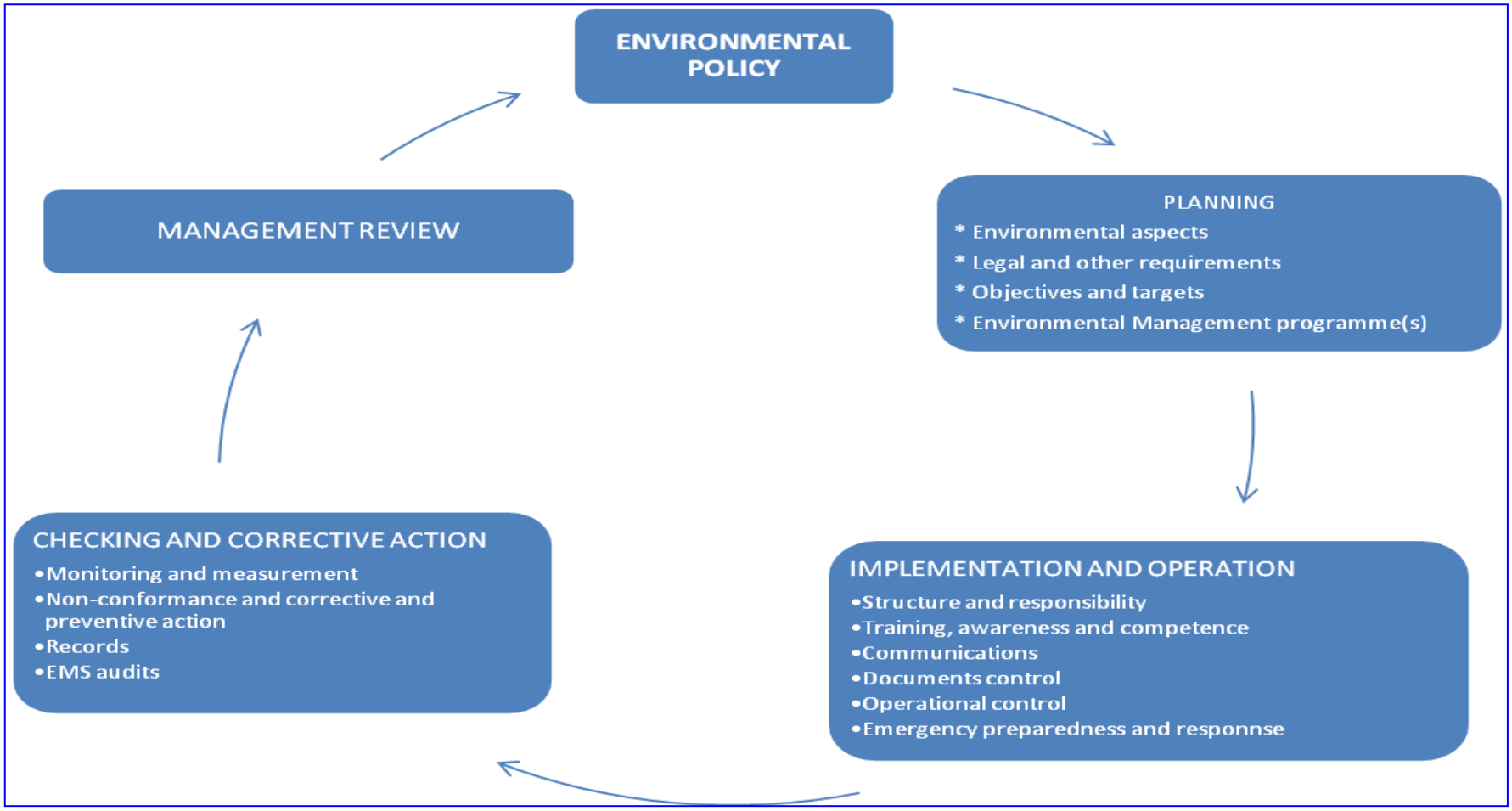


Figure10.1: ENVIRONMENT POLICY IMPLMENTATION

10.3.1 Environmental Management Cell

The environmental management cell is headed by qualified environmental engineers/ Scientist to deal with all EMP related matter like environmental monitoring, environmental system, environmental performance, compliance requirement and liasioning with regulatory authority safety and disaster management and occupation health. He is assisted by manager (safety), and manager (Environment).At the bottom safety officers, health workers and chemist to perform all day-to-day routine work. The environment management systems (EMS) will provide guidelines to manage the environmental impact of proposed activities. This also include detail organization structure, responsibilities, practices, procedure and resources for environment management.

The detail hierarchical system of M/s Neptune Ispat Private Limitedis given in the **Figure 10.2** below:

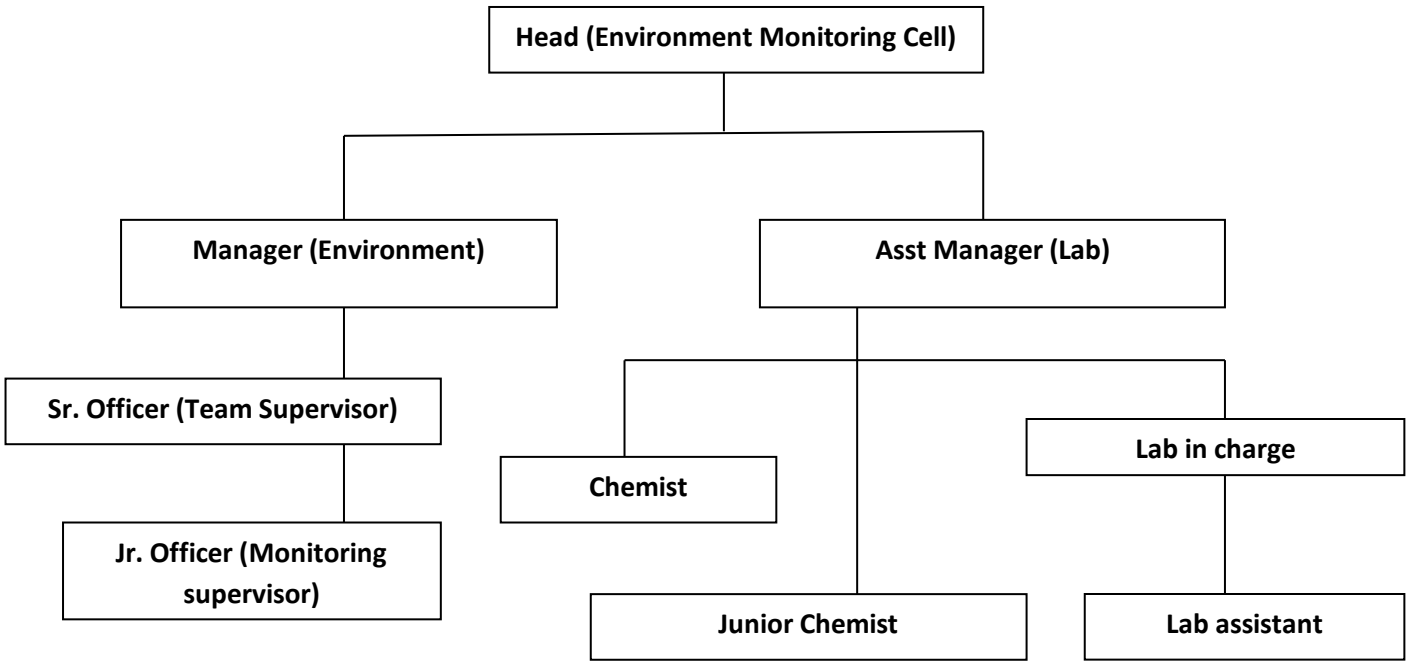


Figure 10.2: Organizational Chart for Environmental Monitoring Cell

10.3.2 Function of Environment Management Cell

The functions of Environment management cell are:

- Obtaing environmental permits such as NOC or consent from state pollutioncontrol board
- Carrying out environmental monitoring as per regulatory requirement
- Submission of compliance to the regulatory authority in time.

- Implementation and monitoring of environment management plan.
- Implementing the, Environmental pollution control and protective measures.
- Coordinating the environment related activities within the project as well as with outside stake holders. Collecting statistics of health of workers and people of the surrounding villages, green belt development status and peripheral development activities.
- Environmental training particularly in environmental monitoring is to be imparted to all project personnel.
- Inspection of facilities, activities for compliance with environmental regulations,
- Coordinate with the Board of directors and management personnel on environmental issues.

10.3.3 Procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions

The company will develop a system of reporting non-compliance/violations of environmental norms to the Board of Directors of the company. This is detailed as below;

- EMS review will be carried out quarterly. The meeting will be presided by Plant head and members of environment cell.
- The agenda points will be covered as below
    - **a.** Fulfilment of environment objective
    - **b.** Statutory compliances conditions
    - **c.** Outcome of environmental monitoring programme(any deviation there to)
    - **d.** Effectiveness of EMP implementation
    - **e.** Public complaints and feedback.
    - **f.** Effectiveness of any implemented improvements in terms of revised standards and operating system
    - **g.** Feedback of managerial and supervisory persons
    - **h.** Suitability of policies and procedures
- Any non-compliance/ violations of environmental laws and norms reported through Environment Management Cell are reviewed at the management review meeting.
- Head, Environment and safety brings the same to the notice of Plant head immediately and carries out root cause analysis. Corrective actions are proposed

for mitigation of the adverse effects if any due to such non-compliance/violation and preventive action to ensure non repetition of the same.

- Corrective and preventative actions will be taken as relevant to the magnitude of the potential problem.
- Environmental reports and updates are generated by Environment Section personnel and circulated to relevant site personnel. Relevant information on incidents, non-conformances and corrective and preventative action is also included in these reports and is submitted for management review of the EMS.

Table 10.1: EMS responsibility matrix

EMSElements	Managing Director	Plant Head/ Director (Operation)	Head Environment & Safety	Manager Environment	Manager Safety
Establishment and Implementation of Environment& Safety policy	R/A	R	R	R	R
Establishment and maintenance of environmentalImpact Register.			R/A	R	R
AnnualandQuarterlyreviews of EMS and other legal compliances (Internal and External)		R/A	R	R	R
Conduct annual review and update EnvironmentalObligations		R/A	R	R	R
Annual and quarterly review of implementation of Environment Management plan		R/A	R	R	R
Annual and quarterly review of public complaints and Feedbacks related to Environment and safety and to address them		R/A	R	R	R
AnnualupdateofActionPlantoachieveenvironmentalobjectivesandtargets		R/A	R	R	R
Identificationofenvironmentaltrainingneedsand conducting environmental Training			R/A	R	R
Forward correspondence on environmental issuestoEnvironment Management Cell		R/A	R	R	R
Submission of reports to authorities as per regulatory requirement		R	R/A	R	R

Regular Maintenance of EMS documentation and monitoring data base		R	R/A	R	R
EmergencyResponsePlan Crisis Management and Recovery Plan FireProtection Plan		R	R	R	R/A
Develop and implement monitoring programs toassess performance of the EMP, objectives andtargets, control mechanisms, legal and other statutory requirements	R/A	R	R		
Recordskeepingandmanagementofresultsfromperiodic evaluations of compliance with legal andotherrequirements			R/A	R	R
Reporting of progress e.g., Annual EnvironmentalManagement andMonitoringReport.			R/A	R	R
RaisenonconformanceswithEMS		R/A	R		
Filing of Environment monitoring data, reports, correspondence to address regulatory requirements			R/A	R	R
Develop annual program for internal audit for EMS		R/A	R	R	R
Major and minor non-conformances andobservations arising from internal audits, route cause analysis and suggest corrective and preventive		**R**	R/A	R	R

action for the issues					
Monitoring ofcorrectiveactions arisingfromtheManagementReview	R	R/A	R	R	R
Implementation and monitoring of Continuous Improvement		R	R/A	R	R
Maintaining records for minutes of meeting			R/A	R	R
R –Responsibility; A- Authorization					

10.3.4 Environment Management Manual & Documentation

The documentation is intended to provide an adequate description of the environmental management system. The manual is expected to provide a reference to the implementation and maintenance of the system.

10.3.5 Operational control

The management responsibilities defined to ensure that the control, verification, measurement and testing of environmental parameters are adequately co- ordinate and effectively performed within the industry. The control, verification, measurement and testing should be made through documented procedures and work instructions defining the manner of conducting activities, the absence of which can lead to violation of the environmental policy. In the event of non- compliance, procedure for investigation of the causative mechanism will be established and the factors reported for corrective actions.

10.4 Environmental Management Plan with Administrative Aspects

The details of responsibilities for implementing the environmental management plant are being given in the table below:

Table 10.2:

Environmental Parameters	**Potential Impact**	**Proposed mitigation measures**	**Administrative responsibility**
Land environment	The proposed expansion project will be within the existing plant premises. So the impact on land environment will be negligiable	As the expansion project will be within the existing premises the expansion project has negligible impact on land use pattern of the area. However, the topsoil scrapped during the construction phase will be stored and utilized for plantation purpose. The excavated top soil will be stacked and will be used for plantation.	Head Environment & Safety Manager Environment
Air Environment	Major impact on human and ecological environment due to emission of dust, particulate matter, gaseous emission due to various plant operation	Installation, operation & maintenance of APC equipments for fugitive & point source emissions. Process optimization to control emission of PM10 within 50µg/m^3. Pneumatic or covered conveying of raw material Construction and maintenance of internal plant roads and use of	Head – Operation Head- Environment

		industrial vacuum cleaners Installation and operation of water sprinklers and water fogging system in raw material and product handling area.	
Water environment	No surface water will be discharge outside the plant premises.	Installation of rain water harvesting structure. 100% recirculation of water in the process. Plant will operate on zero liquid discharge technology. Water auditing and provision of water consumption meters for each production facility to facilitate water budgeting, minimize losses and monitor water consumption on regular basis.	Head – Operation Head-Environment
Noise environment	Impact on health of the worker and nearby population due to incremental noise level of the plant operation	Noise levels for the equipment and machineries to be fixed at 85 dB (A) Leq within 3 m distance. Highly noise generating equipment will be under acoustic enclosure. Use of PPEs by the workers.	Head – Operation Head-Environment
Socio Economic Environment	Positive impact due to peripheral development, employment generation Negative impact on health of the people near the plant	Implementation of peripheral developmental activities as per the public demand during public hearing. Health check up and medical camps for local people to be provided	Head-Environment Director (Operation)
Impact on Ecology and Biodiversity	Impact on surrounding ecology due to air pollution and noise pollution.	Development of thick green belt along the plant boundary, open space, along the road and in village avenue plantation (2.3 acres with 2300 saplings)	Head-Environment

10.5 Environmental Management Record

The industry has established and maintained a system of records to demonstrate compliance with the environmental objectives and targets. In addition the other record (legislative, audit and review reports) environment management records which address following:

- Details of failure in compliance and corrective action;
- Details of corrective action;
- Details of compliant and follow- up actions;
- Appropriate of contractor and suppliers information;
- Inspection and maintenance reports;
- Product identification and composition data;
- Monitoring data;
- Environmental training records

10.6 Environmental Management Reviews

The senior management periodically reviews the Environmental management system (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement should be ascertained and revisions made accordingly. EMS based on the above objectives has been formulated and implemented at the industry level.

A full-fledged environment cell will be operated in the industry which is headed by the Plant manager. The regular monitoring and analysis is being outsourced to the recognised environmental laboratory. The technical support team of the environment cell are:

- Environmental head
- Manager Environment and Manager safety
- Adequate & Permanent field staff

10.6.1 Implementation of EMP

The effective implementation of EMP is not only reduce pollution load and comply the regulatory requirement but also increase productivity and improve marketability of product.

Table 10.3 Environmental Management Matrix

Environmental parameters	Environment management activities	Existing	Proposal for additional Implementation	Budget in Rs. Crores
Air Pollution Control	De-dusting and water sprinkling system to cater to all material transfer points.	Fixed type of Water sprinklers installed at road side, raw material stack yard and material loading area	Additional water sprinklers and de-dusting system will be installed within 24 months	0.5
	Dust suppression consisting of water sprinkling facilities,	Fixed water sprinklers installed	water sprinkling facilities, mechanical gas	0.5

	mechanical gas cleaning equipment, dust recycle arrangement		cleaning equipment, dust recycle arrangement will be done 24 months	
	Suction hoods, cyclones, Fume extraction system, bag filters for furnaces	Fume extraction system with scrubber is provided at SMS unit	Suction hoods, cyclones, Fume extraction system, bag filters will be installled at SMS 24 months	0.5
Noise Pollution Control	Noise absorber systems in pump houses.	--	Noise absorber system will be installed 24 months	1.0
	All the equipment proposed to be installed will be designed/ operated such that the noise level shall not exceed 85 dB (A).	Implemented	Will be implemented with the additional units	
	PPEs such as ear muffs will be provided to personnel working in high noise zones.	Implemented	Will be implemented with the additional units	
Water Pollution and conservation	Proposal for waste water treatment facility and ZLD	Settling tank and reuse of the process water and rain water harvesting facility is presently practiced.	Proper drainage arrangement, settling and reuse of the water, rain water harvesting with additional one RWH pond will be done 36 months	1.0
	Dedicated Sewage treatment plant for treating sewage and reusing for industrial purposes.	Not present	20 KLD STP proposed 36 months	
	Rain water harvesting proposal for utilization in the process	One RWH present	Additional one proposed 36 months	
Land Environment	100% utilization of slag generated from the plant for utilization by brick manufacturers and for construction	At present slag is used for road construction and used for internal road construction	SMS slag will be used for brick manufacturing after recovery of Iron.	1.0

	purpose	and low land filling.	36 months	
Ecology and Biodiversity	Development of three tier plantation within the plant premises with 2300 saplings	At present there is no existing plantation.	Proposal for development of green belt over 2.28 acres with 2300 saplings 24 months	0.1
Socio Economic activities	Peripheral development wotk will be carried out as per public demand	--	--	0.45
Occupational health & safety	Initial and Periodical medical check up of the workers	IME and PME is being carried out for existing workers	The occupational health and safety programme will be carried out as per the requirement 48 months	1.0
	Supply of PPEs to the workers	All the workers at present are supplied with PPEs		
	Occupational safety training for the workers	Continuing		
Environmental Monitoring	Monitoring of Environmental parameters as per post EC monitoring plan	Halfyearly monitoring of Envirionmental parameters are being carrie out	Post EC monitoring will be carried out as per the propose monitoring plan 48 months	0.5

10.7 ENVIRONMENT COMPONENTS AND ITS CONTROL MEASURES

10.7.1 Air Environment

The potential sources of air pollution arising from the project are raw material handling, Induction furnace, haul roads, and transportation in the surrounding area. The major air pollutant due to the operation of the plant is particulate matter. Gaseous emission is very less as the operation process does not include any burning of coal or coke. A very less quantity of CPC is used in the induction furnace. The gaseous emission is only due to movement of transportation vehicles. The level of air pollution is not anticipated to raise the concentration of the pollutants beyond the prescribed limits of CPCB.

The proposed rolling process is a standard procedure for manufacturing of TMT bar and rod using surplus heat of CCM plant. So no re-heating furnace and chimney is required in this process. So the proposed rolling mill does not have any additional pollution load. The additional pollution load is due to installation of additional 2 nos of Induction furnace and increase in capacity of slag crusher unit.

Following pollution control equipments/devices will be installed for the proposed hot rolling mill required to full-fill air pollution control norms:

a. Stack with dust extraction system and bag filter attached to the additional induction furnaces
b. Dust extraction system attached to the slag crushing unit.
c. Sprinkler
d. Mobile water sprinklers, and
e. Dust catcher

The primary focus of the operational level pollution control management will be on control of air pollution and minimizing its impact on the surrounding environment. Details of the pollution control devices proposed for the induction furnace has been given in **Table No.10.4** below:

Table No.10.4 Pollution Control devices proposed for the induction furnace

Sl No.	Unit Detail	Pollution Control Measures (Existing / Proposed)
1.	Induction Furnace	Existing one stack attached to IF (1x8 TPA) provided with bag filter of capacity 20,000 AM^3/Hr. Proposed two stack attached to (2 x10 TPA) provided with bag filter of capacity 30,000 AM^3/Hr.
2.	Rolling Mill (Proposed)	Hot rolling mill does not required any reheating furnace and therefore no pollution control measure proposed
3.	Slag Crusher (Proposed)	Bag filter and water fogging system and in closed unit
4.	Other Pollution Control Measures	Water sprinkler arrangement, water fogging system near raw material storage yard, Green Belt development

In order to control the flue gas emission, stack with height of 30 m has been envisaged with furnace at the site. This height of the stack will be adequate for the proper dispersion of the pollutant. Besides bag filters will be provided with stack as air pollution control devices.

However, the following control measures are suggested to control the PM levels in ambient air.

- Regular water sprinkling should be carried out on the roads leading to the active area of the project site during all the shifts by water sprinklers to ensure effective dust suppression.
- The stacks are provided with pollution control equipments like Bag filters & ID fans.

- Good housekeeping practices are maintained.
- Dust suppression systems will be adopted to control the fugitive dust emanated during quantity of raw materials unloading operations.
- Work area and the road needs to be concreted to reduce the fugitive emission.
- Proper maintenance of the heavy earth moving machinery and vehicles.
- Afforestation and green belt should be developed.

10.7.2 Noise Environment

The following control measures shall be adopted to keep the ambient noise levels well below the limits:

- Provision of ear muffs/ear plugs for the workers in noise prone zones.
- Proper maintenance of machinery to reduce noise.
- Low noise generating equipment used for the plant. Proper vibration dampening arrangement provided to minimize the vibration.
- Ensure by the management that the noise level at plant boundary compiles with the standards of 75 dB (A) during day time and 70 dB (A) during night time.
- The layout of the plant and greenbelt is designed appropriately to achieve the standard. In other case enclosure or sheds will be constructed.
- Thick vegetation in the plant premises to attenuate continuous noise.

10.7.3 Water Environment

The project will be designed with zero discharge technology. Effort has been made to reduce the water use in the plant and re use of the water. Presently the water requirement is 38 KLD which will increase up to 79 KLD during the proposed expansion project. No industrial wastewater is generated due to the project activities and domestic waste water is treated in septic tank and soak pit. The cooling tower water will be settled and reused in the process. The control measures to be adopted for controlling water pollution are as follows:

- Rain water harvesting will be practiced in plant area
- The plant cooling water will be settled and reused in the process.
- Domestic wastewater generated from plant will be treated in Septic Tank- Soak Pit system.

10.7.3.1 Storm water management

Based on the rainfall intensity of the area, storm water drainage has been designed and connected to the storm water networks. Storm water drainage system consists of well-

designed network of open surface drains and rainwater harvesting pits along the drains so that all the storm water is efficiently drained off without any water logging.

10.7.3.2 Rain water Harvesting

Rain water harvesting structure has been constructed within the project site. The rain water harvesting includes surface water catchment and roof top rain water harvesting. The total quantity of harvested rain water from the project site is 1746 Cu.m which is being stored in the storage tank of 20x10 x10m capacity and used for the water requirement of the plant.

10.7.4 Solid Waste Environment

Table No.10.5 Solid Waste management & its Disposal

Units	SolidWastes	Qty In TPD	Disposal practice
Slag Crushing Unit	Slag	23.40	Solid Waste after expansion from the Induction Furnace will be 26.00 TPD (after recovery of 2.60 TPD Iron the net Solid Waste will be 23.40 TPD) The total 23.65 TPD slag will be used for road construction and also sold to brick manufacturers
Pollution Control Device	PCD Dust	0.25	
TOTAL		**23.65 TPD**	
Domestic Solid waste			
Domestic Waste & Canteen	Food Waste From Canteen	5 Kgs/ Day	Will be used as manure for gardening/ Panchayet Vat

10.7.5 Green belt Development

Green belt is an effective tool for control of air pollution, abatement of noise and to maintain an aesthetic environment within the plant premises. The green belt acts as a sink for the pollutants released from the industry. M/s Neptune Ispat Private Limited did not initiate the green belt plan in the plant boundary. There is no plant species exists within the plant premises.However with the proposed expansion project there will be a well planned three tier green belt programme. The three tier plantations proposed for the plant are given in **Table 10.6** below:

Table 10.6 Proposal for three tier plantation

Tier of Plantation	Habitat	Width of Row	Species proposed	No of saplings
1st Tier	Trees	4m	Mango,Sisoo, Teak, Deodar,	500 Nos

			Neem,Alstonia, Kachnar, Gulmohr etc.	
2nd tier	Small Trees/ Large shrubs	2.0m	Nyctanthes, Nerium, Mesua ferra, Lagerostromea, Ceaslpineapulcherima, Cassia fistula etc	800 Nos
3rd Tier Shrubs	Shrubs/ Herbs	1.5m	Hibiscus, Bougianvillea, Nerium oleander, Lawsoniainnerme etc.	800 Nos.

10.8 OCCUPATIONAL HEALTH & SAFETY

General health check up for employees is being conducted once in a year. The company maintain occupational safety & health of the employees with well defined procedures, as per ISO- 14001 and OSHA-18001. A well defined onsite emergency plan, monitoring and mock drills conducted regularly. Ambulance is kept ready for the plant emergency.

10.8.1Schedule for Medical Examination

The following schedule for medical check up is being followed:

1. Comprehensive Pre-employment medical check up for all employees.
2. General check up of all employees once every year
3. Chest X- Ray once a year for workers working near the Induction furnace area.
4. Chest X- Ray for all other employees once every 3 years.
5. Comprehensive medical examination of all the employees after retirement and all those employees with more than 5 years of service leaving the company.
6. Local hospitals and Govt. health monitoring system will be engaged.
7. All safety gears have been provided to workers and care has been taken that these are used properly by them. All safety norms have been followed.

The safety of employees needs to be taken care of during operation as permissible under rule. Following measures are suggested:

1. Regular maintenance of equipment.
2. Regular checking and up keeping of break down or leakage.
3. Provision of earplugs or muffs to workers exposed to high noise levels.
4. Rotation of duties of workers.
5. Creating awareness amongst workers concerning health, pollution and safety through posters, discussion, slogan etc.
6. Periodical medical examination of workers.

7. Provision of suitable civil amenities such as plain drinking water, good service in canteen, etc.
8. Assessment of risk from health hazards at work place.
9. Monitoring of different factors leading to occupational health hazards and taking timely action to mitigate the impact.
10. Inspection and maintenance of pollution control systems only after getting official shut down or with the permission of authorized officer.
11. Immediate cleaning of any coal dust accumulated on floors, road, roof tops, conveyor galleries and other places.
12. Heat insulation of hot surfaces.
13. Provision of rubber mats around the electrical panels.
14. Fire barriers at appropriate places.
15. Provision of all safety measures like use of safety appliances, safety training, safety awards, posters, slogans related to safety etc.
16. Fire protection systems by means of providing fire hydrants, fire extinguisher at vulnerable points within the plant boundary have been envisaged.
17. All the necessary safety kits like hand gloves, gumboots, aprons, helmets etc need to be provided.
18. Proper sanitation facilities, rest room, adequate plant lighting is also envisaged for the project.

The following personal protective equipments are being supplied to the workers to maintain safety within the work premises.

- Industrial Safety Helmet
- Crash Helmets
- Zero power plain goggles with cut type filters at both the ends
- Welders equipment for face and eye protection
- Ear plug, ear muff
- Leather apron
- Gloves and safety shoes

10.9 Environment Management Manual & Documentation

The documentation is intended to provide an adequate description of the environmental management system. The manual is expected to provide a reference to the implementation and maintenance of the system.

10.9.1 Operational control

The management responsibilities defined to ensure that the control, verification, measurement and testing of environmental parameters are adequately co- ordinate and effectively performed within the industry. The control, verification, measurement and testing should be made through documented procedures and work instructions defining the manner of conducting activities, the absence of which can lead to violation of the environmental policy. In the event of non- compliance, procedure for investigation of the causative mechanism will be established and the factors reported for corrective actions.

10.10 ENVIRONMENTAL MANAGEMENT RECORD

The industry has established and maintained a system of records to demonstrate compliance with the environmental objectives and targets. In addition, the other record (legislative, audit and review reports) environment management records which address following:

- Details of failure in compliance and corrective action;
- Details of corrective action;
- Details of compliant and follow- up actions;
- Appropriate of contractor and suppliers information;
- Inspection and maintenance reports;
- Product identification and composition data;
- Monitoring data;
- Environmental training records

10.11 ENVIRONMENTAL STATEMENT

As a mandatory requirement under the environmental protection rules (1986) as amended through the notification issued by ministry of environment and forests in April 1993, an environmental statement is being submitted annually to the State Pollution Control Board. This includes the consumption of total resources (raw material and water per metric ton of product, quantity and concentration of pollutant (air and water discharged, quantity of hazardous and solid waste generation, pollution abatement measure, conversion of natural resources and cost of production vis-à-vis the investment on pollution abatement. This may be internal or external audits, but carried out impartially and effectively by a person properly trained for it. Board knowledge of the environment process and expertise in relevant disciplines is also required.

The annual capital and recurring expenses for implementation of environment management plan have been given in **Table** below:

Table No.10.7 Budget for EMP

Environmental parameters	**Environment management activities**	**Budget in Rs. Crores**
Air Pollution Control	De-dusting and water sprinkling system to cater to all material transfer points.	0.5
	Dust suppression consisting of water sprinkling facilities, mechanical gas cleaning equipment, dust recycle arrangement	0.5
	Suction hoods, cyclones, Fume extraction system, bag filters for furnaces	0.5
Noise Pollution Control	Noise absorber systems in pump houses.	1.0
	All the equipment proposed to be installed will be designed/ operated such that the noise level shall not exceed 85 dB (A).	
	PPEs such as ear muffs will be provided to personnel working in high noise zones.	
Water Pollution and conservation	Proposal for waste water treatment facility and ZLD	1.0
	Dedicated Sewage treatment plant for treating sewage and reusing for industrial purposes.	
	Rain water harvesting proposal for utilization in the process	
Land Environment	100% utilization of slag generated from the plant for utilization by brick manufacturers and for construction purpose	1.0
Ecology and Biodiversity	Development of three tier plantation within the plant premises with 2300 saplings	0.1
Socio Economic activities	Peripheral development wotk will be carried out as per public demand	0.45
Occupational health & safety	Initial and Periodical medical check up of the workers	0.2
	Supply of PPEs to the workers	
	Occupational safety training for the workers	
Environmental Monitoring	Monitoring of Environmental parameters as per post EC monitoring plan	0.5
Total		**4.75**

CHAPTER 11

SUMMARY & CONCLUSION

11.1 INTRODUCTION

M/s Neptune Ispat Private Limited is located at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal. The proposed project of the company is for enhancement the production capacity of Existing Induction Furnace 1x8 Ton with CCM (Under construction) and 1 x 25 TPDSlag Crusher. The Company has taken up an expansion project to set up 2x10 Ton Induction Furnace and 280 TPD Rolling Mill within its existing plant. Present capacity of the Plant is 24000 TPA M.S Ingot/ Billets.After expansion the total plant capacity will be M.S. Ingot / Billets 84000 TPA, Rolled Product 80,000 TPA and Slag Crushing 7500 TPA.

11.2PROJECT DESCRIPTION

As per EIA notification, 2006 and subsequent amendments the proposed enhancement project is listed at Schedule 3(a) under Category-B and require environment clearance from MoEF& CC. Project will be appraised at SEAC, West Bengal. The present EIA/EMP report for the enhancement in production has been prepared based on the approved ToR by SEIAA, Kolkata.The additional installation of induction furnace and the rolling mill will be within the premises of the existing plant. The detail of the existing unit and expansion project is given in **Table No.11.1** below:

Table No.11.1

Sl. No	Name of the Unit	Configuration			Capacity	Product
		Existing	Proposed	Final		
1	Induction Furnace (Steel Melting)	1x8 TPH	2x10 TPH	1x8 TPH & 2x10 TPH	84,000 TPA (10 heat/day)	Molten Metal
2	Continuous Caster (for Billet making)	****	2x6/11 m Radius	2x6/11 m Radius	84,000 TPA	MS Billet
3	Rolling Mill	****	80,000 TPA	80,000 TPA	80,000 TPA	TMT Bar
4	Slag Grinding Unit	7500 TPA	****	7500 TPA	7500 TPA	Iron recovery

11.2.1 Location of the Project

The proposed expansion will be within the existing plant premises located at Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal. The plant site is located in Survey of India Toposheet no. 73 M/6 and bounded by Latitude 23˚38'07.9"N and longitude 87˚16'27.8"E. The present land use pattern of the area is industrial. The detail location of the project is given in **Table No.11.2** below:

Table No.11.2 Detail Location of the project

Sl. No.	Particulars	Details
12.	Name	**M/s Neptune Ispat Private Limited**
13.	Location	Village - Sarpi, P.O &P.S. -Faridpur, District – Paschim Bardhaman, West Bengal
3.	Location	**Latitude:** 23˚38'07.9"N **Longitude:** 87˚16'27.8"E
14.	Plot Area	6.49 Acres
15.	Type of Land	Industrial Land
16.	Nearest Highway	National highway (NH 19) – 7.5 km from Site
17.	Nearest Railway line	Durgapur Railway Station –16 Km from the site
18.	Nearest Airport	Andal3.4 km from the Site
19.	Nearest Rivers	Ajay river - 9.5Km
20.	Forest	Gangajalghati Forest 27.3 km, Beliator Forest 35.3 Km

The overall raw material requirement is given in Table below. The raw materials and finished products will be transported by rail/road.

Table No. 11.3 Requirement of Raw Material for Proposed Expansion Project

Sl. No.	Name Of TheRaw Materials	Quantity (TPA)	Source	Mode Of Transportation
Steel Melting Shop				
	Name of Raw material	**Qty. Required per Ton of production (T)**	**Total qty Required per annum**	**Source**
1	Sponge Iron	221.80	66,540 TPA	Captive production
2	Pig Iron	91.25	27,375 TPA	Open market
3	Steel Scrap/ Alloys	13.15	3945 TPA	Open market
Rolling Mill				
9	Billet	294	84,000	Captive production

.11.2.2 Land Use Details

The detail land use break up for the plant has been given in **Table No.11.4** below:

Table No.11.4 Detail of Land use Breakup

Sl. No.	Type of use	Existing Area (Acres)	Proposed Area (Acres)	Total Area (in acres)
1	Induction Furnace &CCM , Rolling Mill	0.86	1.26	2.12
2	Storage and Solid waste handling area	0.02	0.04	0.06
3	Administrative office	0.04	--	0.04
4	Road and Paved area	0.6	0.2	0.8
5	Green belt	1.3	0.98	2.28
6	Vacant Land	3.67	1.19	1.19
	Total	**6.49**		**6.49**

A detail of the cost of the project is estimated at 25.28 Cr. Both skilled and unskilled labour is available in the nearby areas. The total man power in the existing plant is 35 which will expected to go 75 after the commissioning of expansion project.The power requirement for the proposed expansion production capacity enhancement of would be about 13.5 MVA from DVC and 0.275 MVA from DG Sets is proposed.

Requirementof water after expansion project will be about 74 KLD.However, for the proposed expansion project the water will be sourced from Bore Well. Further additional one RWH pond of same capacity is being proposed for the expansion.

There are two existing stacks present attached to the furnaces and for the enhancement in production another two stacks are proposed which will attach to the new induction furnace.

11.3 DESCRIPTION OF ENVIRONMENT

The baseline environmental status helps in assessing the present environmental conditions of the project site and its buffer zone (10 Km) & identifying the critical attributes after implementation of the proposed expansion. The baseline study was conducted during the period of October to December, 2021in the core and buffer zone of

the project site **M/s Neptune Ispat Private Limited**. The elevation of the buffer zone varies from 36 to 162 m AMSL.

11.3.1 Land Environment

As per the land use pattern of the buffer zone of the project site it has been observed that about 23% of the land cover is used as crop land, fallow land is covered by52% of the total land area, forest cover of the area is only 4% , scrub land is about 2% and land without scrub is 5%. Other land use pattern of the buffer zone of the project site include river bed 0.01%, water body 2%, settlement 7% and plantation of 2%. Industrial establishment in the study area coversonly 1% and quarry site covers 3% of the total land use plan.

11.3.2 Soil Quality

Soil samples were collected from 4 selected sampling locations in the study area to assess the existing soil quality of the area. The soil has been grouped into major grey and brown loam sedimentary types with loam texture. Soil pH lies in the range of 6.55 – 6.7. Total organic carbon content is moderate to high (0.56 to 0.78%) at most of the places. Macro nutrients like phosphorus (P_2O_5) is moderate (14 to 18 Kg/Ha). Soils are deficient in available nitrogen content (151 to 188 kg/Ha) at most of the sites. Available potassium in soils of this area is high (524 to 591 Kg/Ha). Soil analysis result shows that soils are mostly neutral in reaction; moderately fertile with available phosphorous and available potassium and low in available nitrogen content.

11.3.3 Air Environment

The normal climate of Paschim Burdwan is dry & hot characterized by hot summer, cold winter, abundant rainfall and humidity. The climate of this area deeply influenced by seasonal winds known as “monsoon”. The South-west monsoon that carries heavy load of moisture in the middle of June and lasts up to September & it is responsible for high rainfall during rainy season. The summer season starts in the month of March to June, however May-June is considered hottest months in the region with high temperature almost up-to 40° C. The month of June to September brings Pre Monsoon rains in the city. The winter season is between December to February. The average wind speed of during the monitoring period is 6.77m/s and predominant wind direction are SE and NE.

11.3.3.1 Ambient Air Quality

From the air monitoring data it has been observed that, the concentration of PM10 in the project site varies from 63.3–81.5µg/m^3 and from 80.7.9-51.1µg/m^3 in the nearby

villages. The average value of $PM_{2.5}$ in the project site is 39.6μg/m^3 and the average of $PM_{2.5}$ varies from 30.3-38.8 μg/m^3 in the surrounding villages. From the ambient air quality monitoring, it is has been found that, the concentration of particulate matter is maximum within the project site and this is mainly due to raw material handling, industrial emission and vehicular movement. The concentration of SO_2 within the project site varies from 6.1-13.8 μg/$m^3$and within the nearby villages it ranges between 5.6-13.7 μg/m^3. The average concentration of NOx within the project site is 19.3 μg/m^3 and within the villages it ranges from 10.3 -22 μg/m^3. The concentration of air pollutant is higher in the project site and Ukhra village as the area is an industrial estate. From the ambient air quality monitoring it has been found that, the concentrations of the particulate matter, SO2 and NOx, are within the NAAQM standard as prescribed by CPCB.

11.3.4 Water Environment

11.3.4.1 Surface-Water Quality Monitoring

The water samples are collected from two different sampling locations including upstream and downstream of Damodar River and analyzed for physical, chemical, and biological characteristics as per CPCB guidelines.

The surface water sampling was carried out from Ponds in the villages. From the surface water analysis result it has been found that, pH of the water samples varies from 7.2 to 7.9, D.O varies from 5.6 to 6.1 mg/l, Biochemical oxygen Demand varies from 1.5 to 2 mg/l, Chemical Oxygen Demand varies from 8 to 10, Total hardness varies from 156-244 mg/l and Total Dissolved solid varies from 410 to 540 mg/l. Further the toxic elements like Cd, Pb, As etc. are found to be below detection limit. From the water quality results it can be inferred that all the parameters analyzed are under the prescribed limit as per IS 2296:1982 and as per class C classification of CPCB. The water does not contain any pollutant which would be hazardous for human, animal or crop health.

11.3.4.2 Ground water quality of the study area

The ground water samples were collected from 4 different sampling stations & and analyzed as per IS 10500:2012 to assess the portability of the ground water. **pH:** Ranges from 7.3 to8.2. The pH of the surface water in the study area is slightly alkaline.

Total Dissolved Solids*:* Ranges from 350-474 mg/l. This indicates the presence of higher amount of ionic substance in the water.

Total Hardness: Ranges from 48 to 192 mg/l

Iron content: Ranges from 0.15 to 0.5 mg/l.

The samples collected are suitable for drinking purpose with reference to drinking water standard IS: 10500:2012.

11.3.5 Noise Environment

The study area includes industrial area and residential areas. The ambient noise levels were measured in 8 sampling locations. In the project site the day time noise level is 71.7dB (A) and the night time noise level is 67.9. The maximum noise level is 48dB (A) during the day time at Ukhra village and minimum noise level is 38.3dB (A) during the night time at Purulia village. The noise level is found to be maximum in Ukhra Village.

11.3.6 Biological Environment

The study of the biological environment includes the composition of flora and fauna of the area and aquatic ecology. The study for assessment of the biological diversity was conducted during the month of January 2021. This is an existing project and the management has not taken up initiative for carrying out plantation. Now the proponent has the planning of developing green belt over an area of 3.0 acre of the area. There are few plantation species present in the road side which includes, *Polyalthia longifolia, Dalbergia sisoo, Alstoniascholaris, Ficus glomerata, Cassis siamea, Tectona grandis, Aalbizialebbeck, Delonix regia, Gmelia arborea, Anthocephaluskadamba etc.*

11.3.7 Socioeconomic Environment

Socio economic survey in the study area has been carried out to assess the status of demographic pattern, occupational profile, literacy pattern and general amenities available in the study area. Besides the primary baseline survey in the buffer zone secondary data was also collected from 2011 of Bardhaman, District statistical handbook, official website of the district, Block office etc.

The demography of the project area is summarized from census data 2011 for Bardhaman district. The buffer zones of the study area include 45 villages with total 27641 households and population 131399.

Out of the total population, 79222 persons are literate which contribute about 60% of the total population within the buffer zone. Out of the total literate, male literacy is contributed by 44684 and female literacy is contributed by 34538. It is observed that the literacy percentage is more among the male as compare to the female population.42177 of the total population of the project villages is illiterate.

The work force classification in the study area helps in formulating strategies in any development programme. It also helps in identifying the potential workforce, their aptitude, skill etc in any targeted population. Out of the total workers 16834 are main workers and 17874 are marginal workers. In both main and marginal workers population the male is dominated.

11.4 ANTICIPATED ENVIRONMENT IMPACT AND MITIGATION MEASURES

This chapter describes the potential environmental impact due to the proposed enhancement in production and installation of additional establishment within the existing premises of M/s Neptune IspatPrivateLimited.

11.4.1 Impact during Construction Phase

During the construction phase the pollution load will increase due to the installation of additional induction furnace and rolling mill. The impact due to construction phase may include:

5. Increase in dust pollution due to movement of construction equipment and material
6. Increase in dust pollution due to construction work and installation of induction furnace and re-rolling mill within the existing premises.
7. Increase in noise level within the plant premises due to installation of plant and machinery within the project site.
8. Impact on water quality during construction phase may be due to discharge of construction water and domestic waste water discharge from the construction workers.

11.4.1.1 Mitigation Measures

The impact during the construction phase will be temporary in nature and will end with the construction work and installation of plant and machinery completed. There will be no additional land requirement for the project. The additional plant and machinery installation will be within the existing plant premises. The construction work for additional installation is mostly mechanical fabrication, assembly and erection. So the dust generation due to the installation will be minimal. Water requirement for the construction work is also very less and temporary sanitation facility will be provided for the construction workers

The construction material will be stored in shed to reduce the dust generation. So the overall environmental impact due to construction and installation of additional installation will be minimal and for short term.

11.4.2 Impact during Operation Phase

The proposed project is for enhancement in production of billet and TMT Bar through additional installation of two nos of 15 Ton capacity of Induction furnace and 1x 500TPD capacity of hot rolling mill. There are two existing stacks present within the plant premises. The source of pollution in the unit is given in **Table No.11.5** below:

Table No.11.5 Sources of air pollution inside the existing unit

Sl. No	Major Facilities	Details of Air Pollutants
01	Raw material storage and Handling	Particulate Matter
02	Raw material feeding section	Particulate matter
03	Induction Furnace	Particulate matter and Gaseous emission
05	Casting section	Particulate matter
06	Vehicular Movement	Particulate matter and Gaseous emission
07	Operation of DG Set	Particulate matter and Gaseous emission
08	Rolling Mill	Particulate matter

The additional source of air pollution due to the proposed enhancement in production will be as below:

1. Increase in dust pollution due to additional raw material storage and handling.
2. Increase in particulate matter and gaseous emission due to installation of additional two no. of induction furnaces.
3. Increase in particulate matter emission due to installation of rolling mill.

The results of the air pollution modelling study indicate that the maximum increase of GLC taking into consideration of the existing PM10 concentration and the proposed enhancement in production and increasing pollution load. The maximum ground level concentration will be 4.08 µg/cu.m at a distance of 400m from the project site in SE direction. The GLC predicted at all receptor locations after the proposed expansion are within prescribed limit in NAAQS (National Ambient Air Quality Standard) stipulated

by CPCB. The increase in pollution load due to enhancement in production will be managed with taking proper pollution control measures within the plant premises.

11.4.2.1 Mitigation measures

- Fume extraction system with bag filter to control the emissions from the process and fugitive emissions at furnace has been installed and the same will be installed in the proposed induction furnace.
- All the vehicles used for raw material transportation will be covered by tarpaulin and overloading of the vehicles will be strictly prohibited.
- The raw material is being stored under covered roof and near to the furnace for easy handling of raw material.
- Internal road has been concreted. The internal road of the industrial estate will be properly maintained by the joint collaboration of the industries present within the industrial estate.
- The slag crushing area will be provided with dust extraction system and water sprinklers to minimize the dust load.

11.4.3 Air pollution Control system installed within the project

Table No.11.6 Air pollution Control system

Units	Induction Furnace (Existing & Proposed)	Slag Crushing Unit	Rolling Mill (Proposed)
Pollution control equipments installed	Bag Filters and Fume Extractor, Mobile & Fixed type water sprinklers, Dust Catcher	Dust extraction system and Water sprinklers	Dust catcher, Water sprinklers Mobile water sprinklers

11.4.4 Water Resources & Quality

Total water requirement for the proposed expansion project will be 74 KLD which will be the makeup water will be sourced from bore well. Existing water requirement for the plant is 23 KLD which is makeup water sourced from bore well. The water requirement is only for cooling purpose of billet and TMT rod. At present the water requirement of the plant is met from the existing borewell within the plant premises. The additional water requirement will also met from the existing bore well. The plant is in the process of obtaining permission for withdrawal of required quantity of water from CGWB.

As the water requirement is only for cooling purpose and water will be kept in closed circuit, there will not be any discharge to the outside area. Hence at present there is no requirement for any Effluent treatment plant. Domestic discharge from canteens and

toilets will be channelized through proper sewage channels and soak pits. The cooling tower water will be re-circulated after proper settling and the plant will operate in zero discharge norms.

11.4.5 Solid waste generation and Management

The Solid waste from Induction Furnacein the form of Slag will be 26 TPD and 0.25 TPD as PCD dust. The Slag will be further processed in house in Slag Crashing Plant for recovery of Scrap Iron.

The Solid Waste after expansion from the Unit will be 26.25 TPD (from Slag Crashing Plant & PCD Dust) which will be used for road making / Low filling and it is also given to out sider who takes it for there low land filling.

11.4.5.1 Mitigation measures

- Proposal for three tier green belt along the plant boundary with the endemic plant species.
- Increase in avenue plantation along the approach road of the industrial estate.
- Measures to be taken to reduce the pollution level.

11.4.6 Occupational Health and Safety

11.4.6.1 Impact during construction and operation phase:

Occupational health problem may arise from worker exposure mainly to dust and heat. Prolonged exposure to noise may also pose as a critical occupational health concern.

- Respiratory diseases due to exposure to dust.
- Noise induced hearing loss
- Heat stress around Induction furnace area, CCM and rolling mill area
- Accident prone areas including, Induction furnace, slag disposal area and casting areas.
- Accident due to movement of internal vehicles and due to machineries.
- Accident due to loading and unloading of heavy weight billets.

11.4.6.2 Mitigation measures

- Provision of dust extraction system, water sprinklers at all the dust prone area.
- Maintain dust levels within the prescribed standards ad regular monitoring to ascertain the dust level within the plant premises.
- All the workers has been provided with PPEs

- Provision of worker camps with proper sanitation and medical facilities, as well as making the worker camps self- sufficient with resources like water supply, sanitation, power supply, etc
- Arrangement of periodic health check-ups for early detection and control of communicable diseases.
- Arrangement to dispose off the wastes at approved waste disposal sites.
- Provide preventive measures for potential fire hazards with requisite fire detection, fire-fighting facilities and adequate water storage.

11.5 ENVIRONMENTAL MONITORING

The environmental monitoring programme will be followed by the company to ascertain the implementation of the environmental management plan. The senior management of the company periodically reviews the Environmental management system (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement has been ascertained and revisions made accordingly.

11.6 ENVIRONMENTAL RISK MANAGEMENT

M/s Neptune IspatPrivatehas taken up all the safety features during the installation of the existing induction furnace and CCM and with the additional establishment care will be taken to implement all the safety features.

11.7 PROJECT BENEFITS

Following physical infrastructure facilities will improve due to proposed project.

- Road development and maintenance facilities within and internal road of industrial estate
- Water supply and sanitation
- Support for supply of slag for low land filling and road construction as per the requirement of the nearby villages. Local people will provided with transportation facility
- Support to the local school in terms of education material, different celebration and environment awareness programme among the school children.
- Availability of safe drinking water for the villagers
- Organizing different social and cultural programme at district level
- Development of medical and first aid facility for the workers and local people

The proposed CSR Plan for the Project is given in **Table No.11.7** below:

Table No11.7 CSR Plan for the project

Sl. No	Proposed Activities	Location	Proposed Budget in Rs.
Health & Sanitation			
01	Annual Health Check-up Camp	Sarpi	4,00,000.00
02	Provision of RWH & Drainage Facility	Sarpi	6,00,000.00
03	Mobile Medical & Ambulance facility	Near By villages	10,00,000.00
Education			
04	Scholarship to the school children	Sarpi& Near By Villages	2,50,000.00
05	Repair & maintenance of school furniture & Building	Sarpi& Near By Villages	5,50,000.00
Infrastructure Facility			
07	Repair & Maintenance of Connecting Road	1 Km stretch	10,00,000.00
08	Provision of Hand Pump and tube well in the villages	Sarpi& Near By Villages	12,00,000.00

11.8 ENVIRONMENT MANAGEMENT COST

The annual recurring expenses for implementation of environment management plan will be 4.75 crores.

CHAPTER 12

DISCLOSURE OF CONSULTANTS ENGAGED

The EIA report is prepared on behalf of the proponents, collecting inputs from proponent's office staff, project management section etc by M/s **Kalyani Laboratories Pvt Ltd (KLPL)**, Bhubaneswar. KLPL is an Environmental Consultancy firm and Laboratory which have been accredited by QCI NABET. AlsoKLPL got approval from State Pollution Control Board, Odisha (Category A) for Environmental Consultancy services like Mining, Building Constructions, Industries and other related areas. The details accreditation of KLPL is as below:

ACCREDITATIONS

1. NABET: Certificate No. **NABET/EIA/2023/SA 0149**dated 2nd Feb 2022 Validity till 2nd March 2023.

2. NABL: Certificate No.TC -7043 dated 11.05.2020 validity till 10.05.2022

2. MoEF: File No: Q-15018/46/2018-CPW dated 24.10.2019 valid for 5 years

3. Odisha State Pollution Control Board: Letter no. 698/ VISC (lem) i&PR-41/2019-20 dated 12.04.2019 valid till 08.04.2022

Kalyani Laboratories Private Limited also provided laboratory services for monitoring and analysis of environmental parameters like Air, Water, Waste water, and Soil, Stack, Noise and Meteorological data to its clients. The EIA expert team of KLPL is given in **Table No.12.1** below:

Table No.12.1 Lists of Experts with Kalyani Laboratories Private Limited

Sl. No.	Name	Area of Expertise
EIA Coordinators		
01	Dr. D. Biswal	Mining of minerals (Open cast & underground) Coke oven plants Mineral Beneficiation Metallurgical Industries Thermal power Plant
02	Dr. R. Nayak	Mining of mineral (Open cast & underground), Coal washeries Building and large construction projects
03	Mr. Rajesh Kanungo	Metallurgical Industries

		Thermal power Plant
04	Dr.Madhusmita Jena	Building and large construction projects
Functional Area Experts		
01	Dr. D. Biswal	Air Pollution, Water pollution, Solid and Hazardous Waste management, Air quality modelling
02	Dr. R. Nayak	Water pollution, Soil Conservation, Ecology & Biodiversity
03	Ms. M. Jena	Ecology & Biodiversity & Soil Conservation
05	Mr. C.B. Das	Geology
06	Mr. N.K. Patel	Hydrogeology
07	Mr. JagabandhuBisoi	Socio economics
09	Mr.RajeshKanungo	Risk & Hazard Management
10	Dr.Santilata Sahoo	Ecology & Biodiversity
11	Mr. S.C. Nayak	Geology, Noise & Vibration
14	Mr. Sahil Sood	Land use

12.1 Areas of Expertise of KLPL

A. Impact Assessment Studies

- Conducting Environmental Impact Assessment Studies for industries, mines and construction projects.
- Baseline data generation- Monitoring of environmental attributes meteorology and forest surveys.
- Impact Modelling & formulation of Environmental Management plan.
- Hazardous waste audit for industrial establishments.
- Onsite Emergency plans for combating dangers related to fire or toxic release in industries.
- Pre Project health Assessments &socio economic surveys.
- Ecological and Biodiversity Survey and Preparation of Biodiversity Management Plan.

B. Technical Services

- Operation and Maintenance of Effluent Treatment Plants and Sewerage Treatment Plants in industries.
- Designing of ETP and STPs.

- Integrated Solid waste management.
- Carrying out hazardous waste audit for different industrial projects

C. Laboratory Services

Laboratory of KLPL has been accredited by NABL and MoEF. The laboratory facility available with KLPL is as below:

- Wet chemical and instrumental analysis of air, water, soil, noise, Biochemical, Radiological, solid, Food & hazardous waste analysis.
- Monitoring of ambient air, stack, noise etc.
- Meteorological monitoring
- Ore and Mineral Analysis.
- Bioassay of industrial effluents.
- Micro Biological analysis of food and water.
- Bio monitoring of surface water