Application Form For Environmental Clearance (Public Hearing)

August 2023

Application Form
(Draft EIA Report)

For

Proposed Expansion of Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill

at

Plot No. D-19, Sipcot Industrial Complex, Gummidipoondi. in S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu

Sector No. 1(a) (Sector No. 1 as per NABET)

Category of the Project: B1 Cluster Mining

Baseline Period: March 2023– May 2023

Environmental Consultant & Laboratory details:

Ecotech Labs Pvt Ltd,

No 48, 2nd Main road,
South extension Ram nagar,
Pallikaranai, Chennai -600100.

Proponent details:

M/s. Viki Industries Private Limited

No: 1, Krishna Street,
Nungambakkam,
Chennai - 600034.

UNDERTAKING

We, M/s. Viki Industries Private Limited, undertaking that the Draft Environmental Impact Assessment (EIA) Report for expansion of existing Steel Rolling Mill and inclusion of Steel Melting Shop at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu under project category B1 and Schedule S.No.3(a)

TOR issued by the State Expert Appraisal Committee, TN vide Letter No. SEIAA-TN/F.No.9790/SEAC/3(a)/ToR-1390/2023 dated:27.03.2023.

I, hereby assure that all the information and data provided in the EIA report is accurate, true and correct and owns responsibility for the same.

Place: Tiruvallur

Yours faithfully

Date:

M/s. Viki Industries Private Limited

Plot No.48A, 2nd Main Road,
Ram Nagar, South Extension,
Pallikkaranai, Chennai - 600 100
GST NO. 33AADCE6103A2ZH
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Eco Tech Labs Pvt Ltd

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Website www.ecotechlabs.in
CIN : U74900TN2014PTC094895

UNDERTAKING

I, Mr. R. Rajendran, EIA coordinator confirms that this Draft EIA Report for expansion of existing Steel Rolling Mill and inclusion of Steel Melting Shop at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu has been prepared at M/s. Ecotech Labs Pvt. Ltd., Chennai.

I also confirm that I shall be fully accountable for any miss-leading information mentioned in this Report.

Signature:

Name: Dr. A. Dhamodharan

Designation: Managing Director

Name of the EIA Consultant Organization: M/s. Ecotech Labs Pvt Ltd., Chennai.

NABET Certificate No: NABET/EIA/2124/SA 0147

Date: 29.08.2023 Place: Chennai

Declaration of Experts contributing to the EIA

Declaration by experts contributing to the EIA report for expansion of existing Steel Rolling Mill and inclusion of Steel Melting Shop at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.

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

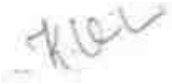
Project	Rolling Mill
Type & Category	3 (a) Metallurgical industries (ferrous & non-ferrous)
Project Proponent	M/s. Viki Industries Private Limited
Environment Consultant with their Accreditation Status	M/s. Eco Tech Labs Pvt. Ltd., QCI Accreditated
NABET Certificate No.	NABET/ EIA/2124/ SA 0147
EIA Coordinator Name **Signature** **Period of Involvement**	Mr. R. Rajendran March 2023 to May 2023
Contact Information	**M/s. Eco Tech Labs Pvt. Ltd.** No. 48, 2nd Main Road, Ram Nagar South Extension Pallikaranai, Chennai - 600 100 Mobile: +91 9789906200 E-mail: dhamo@ecotechlabs.in

Functional Area Experts

The basic fact division that environment and laboratory are accredited by NABL and Ministry of Environment and Forests, India and by other international bodies, stand testimony to its emphasis.

S. No.	Functional areas	Name of the experts	Involvement (period and task)	Signature and date
1	AP	Mrs. K. Vijayalakshmi	1. Selection of Baseline Monitoring stations based on the wind direction 2. Interpretation of Baseline data by comparing it with standards prescribed by CPCB against the type of area 3. Identification of sources of air pollution and suggesting mitigation measures to minimize impact ***Period: March 2023 – Till now***	
2	WP	Dr. A. Dhamodharan	1. Selection of baseline Monitoring Locations for Ground water analysis and also identifying nearest surface water to be studied. 2. Interpretation of baseline data collected 3. Identification of impacts based on the baseline study conducted and also to the ground water and nearby surface water due to the proposed project 4. Preparation of suitable and appropriate mitigation plan. ***Period: March 2023 – Till now***	
3	SHW	Dr. A. Dhamodharan	1. Identification of nature of solid waste generated 2. Categorization of the generated waste and estimating the quantity of waste to be generated based on the per capita basis. Identification of impacts of SHW on Environment 3. Suggesting suitable mitigation measures by recommending appropriate disposal method for each category of waste generated 4. Top soil and refuse management	

			Period: March 2023 – Till now	
4	SE	Mr. S. Pandian	1. Primary data collection through the census questionnaire 2. Obtaining Secondary data from authenticated sources and incorporating the same in EIA report. 3. Impact assessment & proposing suitable mitigation plan 4. CSR budget allocation by discussing with the local body and allotting the same for need based activity. ***Period: March 2023 – Till now*** ****INVOLVES PUBLIC HEARING***	
5	EB	Dr. A. Dhamodharan	1. Primary data collection through field survey and sheet observation for ecology and biodiversity 2. Secondary Collection through various authenticated sources 3. Prediction of anticipated impacts and suggesting appropriate mitigation measures. ***Period: March 2023 – Till now***	
6	HG	Dr. T. P. Natesan	1. Study of existing surface drainage arrangements in the core and buffer zone, impact due to mining on these drainage courses and suggestion of mitigative measures 2. Determination of groundwater use pattern, development of rainwater harvesting program. Storm water management through garland drainage system. ***Period: March 2023 – Till now***	
7	GEO	Dr. T. P. Natesan	1. Field survey for assessing regional and local geology, aquifer distribution, Determination of groundwater use pattern, development of rainwater harvesting program. ***Period: March 2023 – Till now***	

8	SC	Dr. A. Dhamodharan	1. Interpretation of baseline report 2. Identification of possible impacts on soil, prediction of soil conservation and suggesting suitable mitigation measures. ***Period: March 2023 – Till now***	
9	AQ	Mrs. K. Vijayalakshmi	1. Collection of Meteorological data for the baseline study period 2. Plotting wind rose plot and thereby selecting the monitoring locations based on the wind pattern 3. Estimation of sources of air emissions and air quality modeling is done 4. Interpretation of the results obtained 5. Identification of the impacts and suggesting suitable mitigation measures. ***Period: March 2023 – Till now***	
10	NV	Mrs. K. Vijayalakshmi	1. Selection of monitoring locations 2. Interpretation of baseline data 3. Prediction of impacts due to noise pollution and suggestion of appropriate mitigation measures ***Period: May 2022 – Till now***	
11	LU	Dr. T. P. Natesan	1. Collection of Remote sensing satellite data to study the land use pattern. 2. Primary field survey and limited field verification for land categorization in the study area 3. Preparation of Land use map using Satellite data for 10km radius around the project site. ***Period: March 2023 – Till now***	
12	RH	Mrs. K. Vijayalakshmi	1. Identification of the risk 2. Interpreting consequence contours 3. Suggesting risk mitigation measures ***Period: March 2023 – Till now***	

Declaration by the Head of the accredited consultant organization/ authorized person

I, Mr. R. Rajendran, hereby confirm that the above-mentioned experts prepared the EIA report for expansion of existing Steel Rolling Mill and inclusion of Steel Melting Shop at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.

I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.

Signature: 

Name: Mr. R. Rajendran

Name of the EIA consultant organization: M/s. Eco Tech Labs Private Limited

NABET Certificate No: NABET/ EIA/2124/ SA 0147

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DRAFT EIA REPORT

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1 INTRODUCTION

The existing steel rolling mill of Viki Industries Private Limited is located at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.

1.1 Purpose of the Report

As per the EIA Notification dated 14th September 2006 and its further amendments, the proposed expansion project activity comes under Metallurgical Industry and falls under Category 'B'. Hence it requires Environment Clearance from State Level Environment Impact Assessment Authority (SEIAA), Tamilnadu under item 3(a) of the Schedule of EIA Notification, 2006. In order to assess the environment impacts due to the proposed expansion, EIA report has been prepared.

As a part of above process, the application (Form-1 & PFR) submitted to State Level Environment Impact Assessment Authority (SEIAA) for the proposed expansion & it was considered by the State Expert Appraisal Committee (SEAC) in its meeting held on 24th February 2023 for issuing Terms of Reference (ToR). The Committee and Authority has suggested specific Terms of Reference (ToR) for preparation of the EIA report and it was communicated vide Letter No. SEIAA-TN/F.No.9790/SEAC/3(a)/ToR-1390/2023 dated:27.03.2023 which is enclosed as **Annexure – 1**. This EIA report is prepared adhere to all the conditions of ToR.

1.2 Identification of Project & Project Proponent

1.2.1 Project

Due to increase in demand for the Steel Rods, Angles, Squares, Flats, Channels & Rounds in the domestic as well as export market Viki Steels has proposed to expand the existing Steel Rolling Mill and inclusion of Steel Melting Shop with 2 Nos of Induction Furnace having capacity of 15 Tons each to melt the scrap and sponge iron and convert it to MS Billets using a concast machine to manufacture 1,80,000 TPA of MS Billets, 2,16,000 TPA of Steel Rods & Structural Components.

1.2.2 Project Proponent

VIKI TMT 550 & ISTEEL 550D are product of VIKI INDUSTRIES PVT. LTD, a leading name in TMT bars. With a heritage of over 30 years in steel making and rolling, we are known for our relentless focus on quality. We have built our reputation with an ever-increasing number of highly satisfied customers, both in the domestic and international markets.

1.3 Brief Description of the Project

The proposed expansion of steel melting shop & steel rolling mill is covered under the Schedule 3(a) "Metallurgical Industries" of Environmental Impact Assessment (EIA) Notification 2006 & its further amendments.

1.3.1 Nature of the Project

The proposed expansion involves expand of the Steel Melting Shop & Steel Rolling Mill. Since the project activity comes under Secondary Metallurgical processing industry as per the EIA Notification, 2006 and the project activity falls under Category "B". It requires Environment Clearance from State Level Environment Impact Assessment Authority (SEIAA), Tamilnadu under Category 'B' in the Schedule 3(a) of EIA Notification 2006.

1.3.2 Size of the Project

The expansion of existing Steel Rolling Mill from 1,20,000 TPA to 2,16,000 TPA and inclusion of Steel Melting Shop having capacity of 1,80,000 TPA.

1.3.3 Location of the Project

The project site is located at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.. The Site location of the project area is represented in **Figure- 1.1**. The satellite image showing the project site is given in **Figure -1. 2** The topomap of the study area is given in **Figure –1.3.**

TABLE 1.1 DETAILS OF ENVIRONMENT SETTING

S. No.	Particulars	Details	
1	Latitude	13°24'58.25"N	
2	Longitude	80° 6'57.14"E	
3	Elevation above MSL	18 m	
4	Topography	Plain Terrain	
5	Nearest Highway	NH-16, West Bengal - Tamilnadu – 0.01 km, W	
6	Nearest Railway station	Gummidipoondi Railway station - 1.15 km SE	
7	Nearest Air Port	Chennai International Airport – 48.21 km SE	
8	Nearest Habitation	Gummidipoondi – 0.54 km, SE	
9	Nearest Town	Gummidipoondi – 0.54 km, SE	
10	Reserve Forests	Puliyur R.F. - 6.87 km, SW Siruvada R.F. – 10.04 km, W	
11	Nearest Waterbody	Thamarai Eri Panapakkam lake Arani River Pattupalli Lake Poovalambedu Lake Pulicat Lake Chinnambedu Big Lake	0.68 km, SE 4.70 km, SE 7.36 km, S 6.79 km, NE 8.29 km, SW 9.24 km, NE 9.84 km, S
12	Ecologically sensitive sites	Pulicat Bird Sanctuary - 9.24 km, NE	
13	Defence Installation	Nil in 10 km radius	
14	Historical places	Nil in 10 km radius	

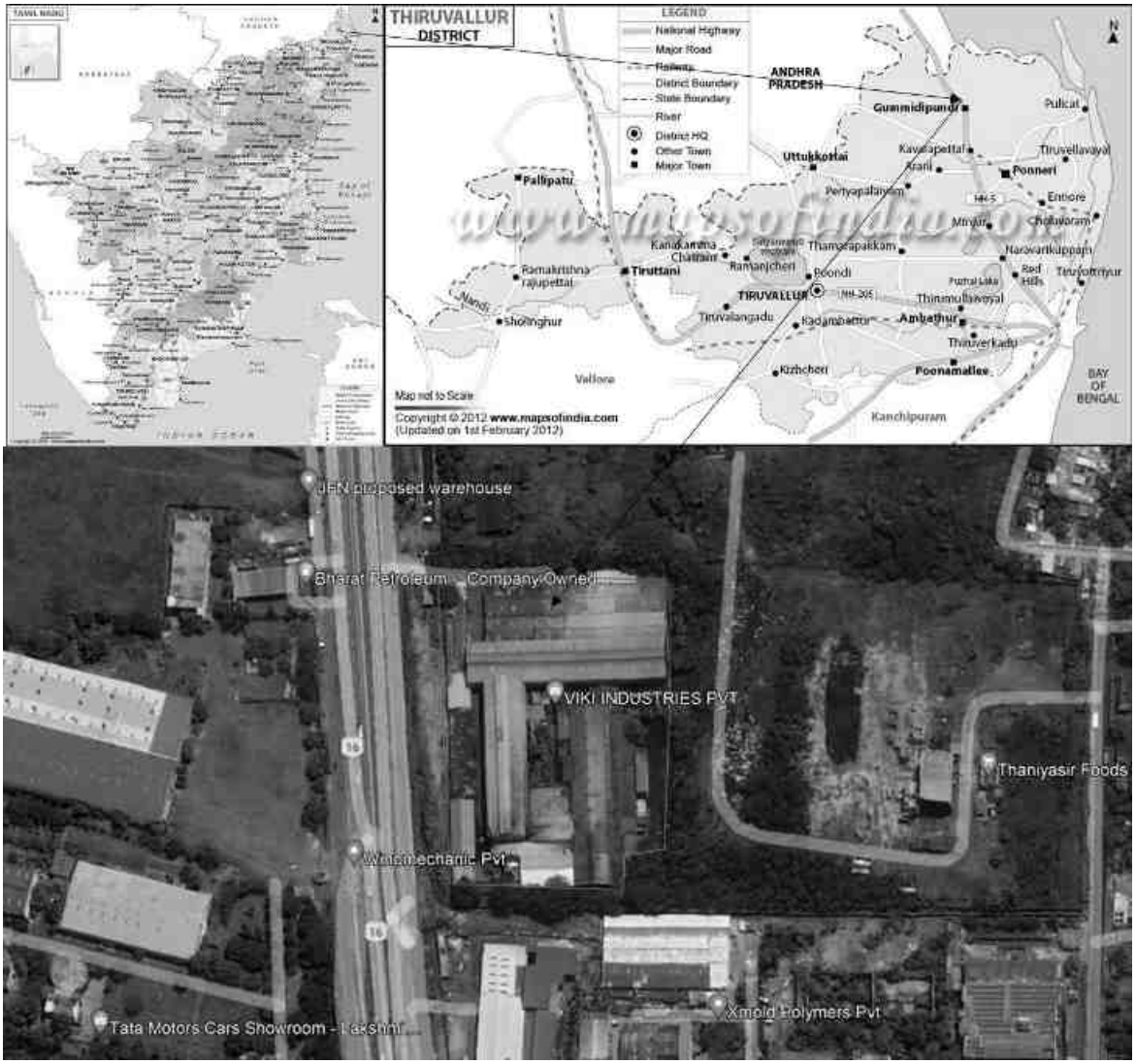


Figure 1-1 LOCATION MAP OF THE PROJECT SITE

FIGURE 1-2 SATELLITE IMAGERY SHOWING THE PROJECT SITE

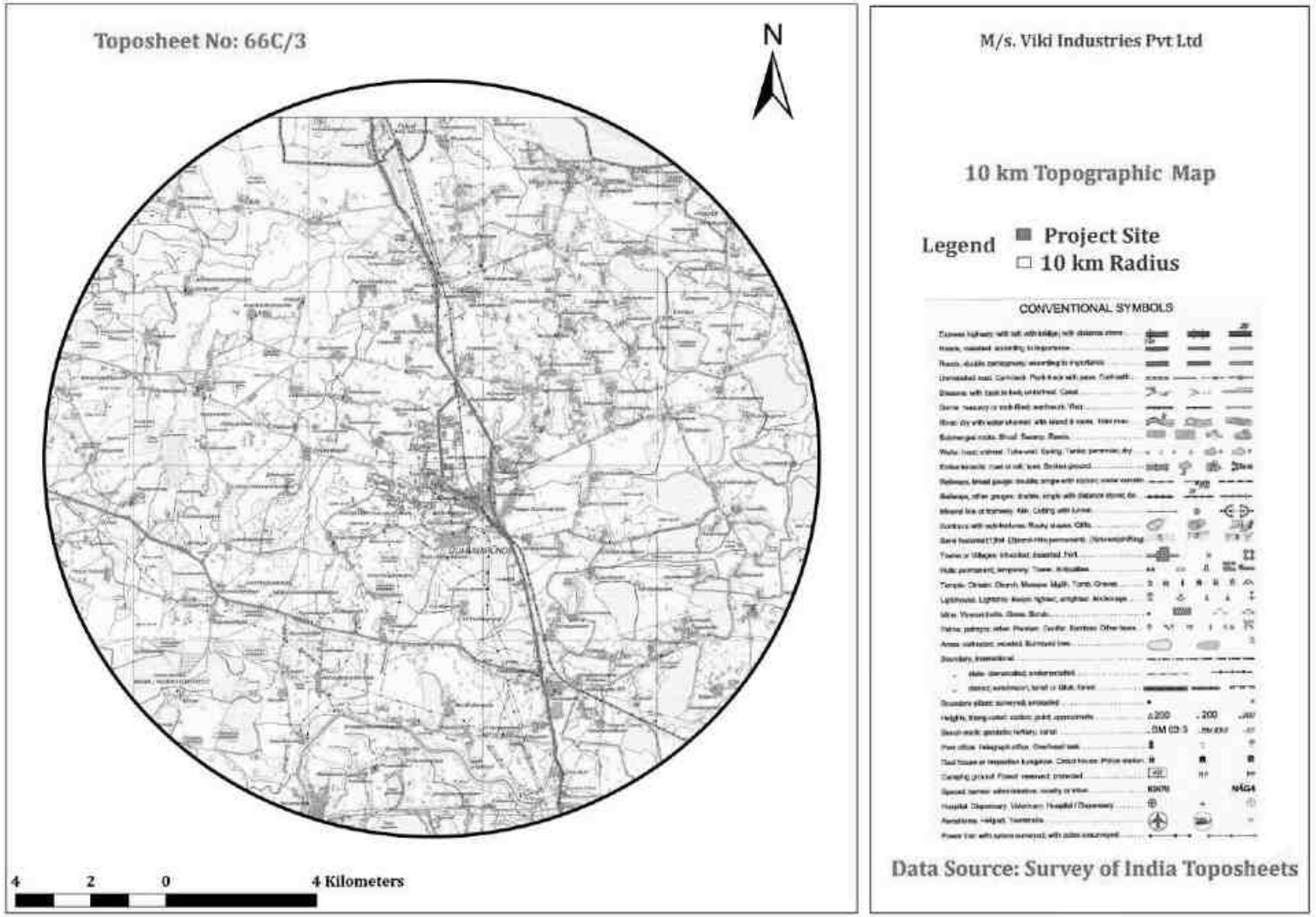


FIGURE 1-3 TOPO MAP OF THE STUDY AREA (10 KM RADIUS)

1.3.4 Importance to the Country and Region

Steel being the basic commodity for all Industrial activities, quantum of its consumption is considered an index of Industrial prosperity. Since, independence, there has been a sustainable growth in the steel sector in India from 1.1 Million Tons crude steel production in 1950-51 to about 89 Million Tons in 2015-16 and the crude steel capacity in the country is envisaged to reach 300 MT by 2030-31 from the current level of 122 MT, capital requirement will be of gargantuan proportions. Despite the above, growth per capita steel consumption in India continues to remain at a level of 60 kg only, compared to about 350 kg in the developed countries. Further with nearly 20% of the World population, India's contribution is only 5.5% of the World steel production. It is expected that with the measures taken by Govt. of India for promotion of consumption of iron & steel and expected growth of Indian economy, the requirement of steel will significantly improve and accordingly the domestic manufacturing capacity needs to be increased.

1.4 Scope of the Study

M/s. Viki Industries Private Limited has appointed the services of M/s. Ecotech Labs Private Limited, Chennai to carry out EIA study and preparation of Environment Impact Assessment (EIA) report to assess the anticipated impacts of the proposed expansion project on the environment and suggest suitable mitigation measures for likely adverse impacts due to the activities. The EIA/EMP report has been prepared for the project following the generic structure specified in the EIA Notification, 2006.

An EIA study is useful to understand and mitigate the impact of the proposed expansion project on various parameters of environment. Therefore, the scope of the EIA study includes detailed characterization of the existing status of the land, water, air, biological and socio-economic environment in the project area. It also includes identification of the potential environment impacts of the project and formulation of an effective Environment Management Plan (EMP) and monitoring plan. The scope of EIA study includes,

- Literature review and collection of data relevant to the study area;
- Collection of data related to the project related activities;
- Establish the baseline environment aspects in and around the proposed expansion project;

- Collate secondary data including socio-economic data from published literature / government publications;
- Identify various existing pollution loads due to various proposed activities;
- Predict incremental levels of pollutants in the study area due to the proposed expansion operations;
- Evaluate the predicted impacts on various environment attributes in the study area by using scientifically developed and widely accepted environment impact assessment methodologies;
- Preparation of cost effective and appropriate Environment Management Plan (EMP) encompassing strategies for minimization of potential adverse impacts on various environment components along with budgetary provisions for implementation of pollution control measures;
- To delineate measures for human health and safety during operation of proposed expansion project; and
- Delineation of post-study Environment quality monitoring programme.

The scope also includes all the conditions given in the ToRs prescribed by SEAC-TN, Chennai for the steel plant. Baseline studies were carried out for a period of three months from April 2023 to June 2023, representing Winter season. Field studies have been conducted to determine existing conditions of various environment attributes as outlined in **Table-1.2**.

TABLE 1.2 ENVIRONMENT ATTRIBUTES AND FREQUENCY OF MONITORING

S. No.	Environment Component	Sampling Locations	Sampling Parameters	Sampling Period	Sampling Frequency
1	Meteorology	One central location	Temperature, Relative Humidity, Wind Speed, Wind Direction & Rain fall	3 months	Hourly / Rainfall – Daily
2	Ambient Air Quality	8 Locations	PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, O_3, Pb, NH_3, C_6H_6, BaP, As, Ni	Two days per week for 12 weeks	24 hourly

S. No.	Environment Component	Sampling Locations	Sampling Parameters	Sampling Period	Sampling Frequency
3	Water Quality	8 Ground Water & 2 surface water	As per IS:10500-2012	Grab sampling	Once during study period
4	Noise	8 Locations	L_{day} & L_{night}	24 hourly	Once during study period
5	Soil	8 Locations	Soil profile, Chemical constituents, Suitability for agricultural growth	Composite sample	Once during study period
6	Terrestrial Ecology	Study area	Flora and fauna	Field observations	Once in study period
7	Demography and Socio-economic aspects	Study area	Demographic profile	Based on data collected from secondary sources	
8	Land Use	Study area	Land use data based on recent satellite data	Based on availability	Once in study period
9	Geology & Hydrogeology	Study area	Geological history, Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources	

Since, Ecotech Labsss Private Limited has been carrying out the EIA studies for the similar projects earlier, the points mentioned in the ToR were contemplated beforehand and the same were included in the study. Hence, even though the ToR letter was not received before starting the baseline data generation for this project, the entire scope of studies were covered.

1.5 Methodology

Environment Impact Assessment report has been prepared with the following steps:

1.5.1 Establishment of Baseline Environment Status

A comprehensive database on the baseline environment status of the study area has been established through review, compilation & analysis of

- Existing published secondary data/literature/information, and
- Primary data generated/collected through initial site surveys and field study

The field monitoring has been carried out as per the guidelines of CPCB and requirement of the MoEF for one complete season. Field study/monitoring has been conducted on:

- Ambient Air Quality;
- Noise;
- Water Quality;
- Soil Quality;
- Ecological Aspects;
- Land Use Pattern;
- Socio- Economic Aspects;

1.5.2 Environment Impact Assessment

The project data/activities has been analyzed & linked with the existing baseline environment conditions in order to list out the affected environment parameters and assess the likely impacts on such parameters. Compliance of the project with national standards has been duly checked.

1.5.3 Preparation of Environment Management Plan

Environment Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environment mitigation measures existing in the project may not be obtained without a management plan in order to assure its proper implementation & function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. EMP has been prepared addressing issues such as:

- Details of management plans
- Pollution control / mitigation measures for abatement of the undesirable impacts caused during operational activities
- Maintenance of water resources and water quality
- Institutional set up identified/recommended for implementation of the EMP
- Post project environment monitoring programme.

2 PROJECT DESCRIPTION

2.1 Type of Project

The proposed project involves expansion of existing Steel Rolling Mill and inclusion of Steel Melting Shop. Since the project activity comes under secondary metallurgical processing industry as per the EIA Notification, 2006, the project activity falls under Category "B". It requires Environmental Clearance from State Environmental Impact Assessment Authority (SEIAA), Tamil Nadu under Category 'B' in the Schedule 3(a) of EIA Notification 2006.

2.2 Need of the Project

The steel industry in India is rapidly expanding. It is forecast that steel production will rise from 40.5 million Tons in 2017 to 70 million Tons in 2027. Extensive capacity increases are planned for this same period. Despite the stellar increase in production, India's share of global crude steel output is forecasted to rise to 4% in the next ten years. The Indian steel ministry plans to raise the export share from 15% at present to 24% in the next 15 years. In view of the increased demand domestically the company proposes to establish a steel melting shop and steel rolling mill. There is always demand for Indian steel products in domestic as well as export market due to upcoming infrastructure projects including industrial establishments. To fulfil requirement of steel in all sectors expansion of steel plants are always welcomed.

2.3 Project Location & Layout

The project site is located at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.

Geographically, the plant is situated at latitude 13°24'57.97"N and longitude 80° 6'58.70"E. The Site location of the project area is represented in Figure-1.1 of Chapter – 1. The google image showing the project site is given in Figure – 1.2. The Topo map of the study area is given in Figure 1.3.

2.4 Size or Magnitude of Operation

The proposed expansion project involves expansion of existing Steel Rolling Mill from 1,20,000 TPA to 2,16,000 TPA and inclusion of Steel Melting Shop having capacity of 1,80,000 TPA.

2.4.1 Land Requirement

The total area of land available for the proposed expansion is 2.74 Ha which is under the ownership of project proponent and the land use classification is unclassified Land use. The land-use breakup of the site area is given in **Table 2.1**.

TABLE 2.1 LAND USE BREAK-UP OF PLANT AREA

S. No.	Description	Existing		After Expansion	
		Area (Ha)	Percentage (%)	Area (Ha)	Percentage (%)
1.	Built-up area	1.25	46	1.45	53
2.	Green belt area	0.865	31	0.865	31
3.	Solid Waste area	0.125	5	0.125	5
4.	Open area	0.500	18	0.300	11
	Total	**2.74**	**100.0**	**2.74**	**100.0**

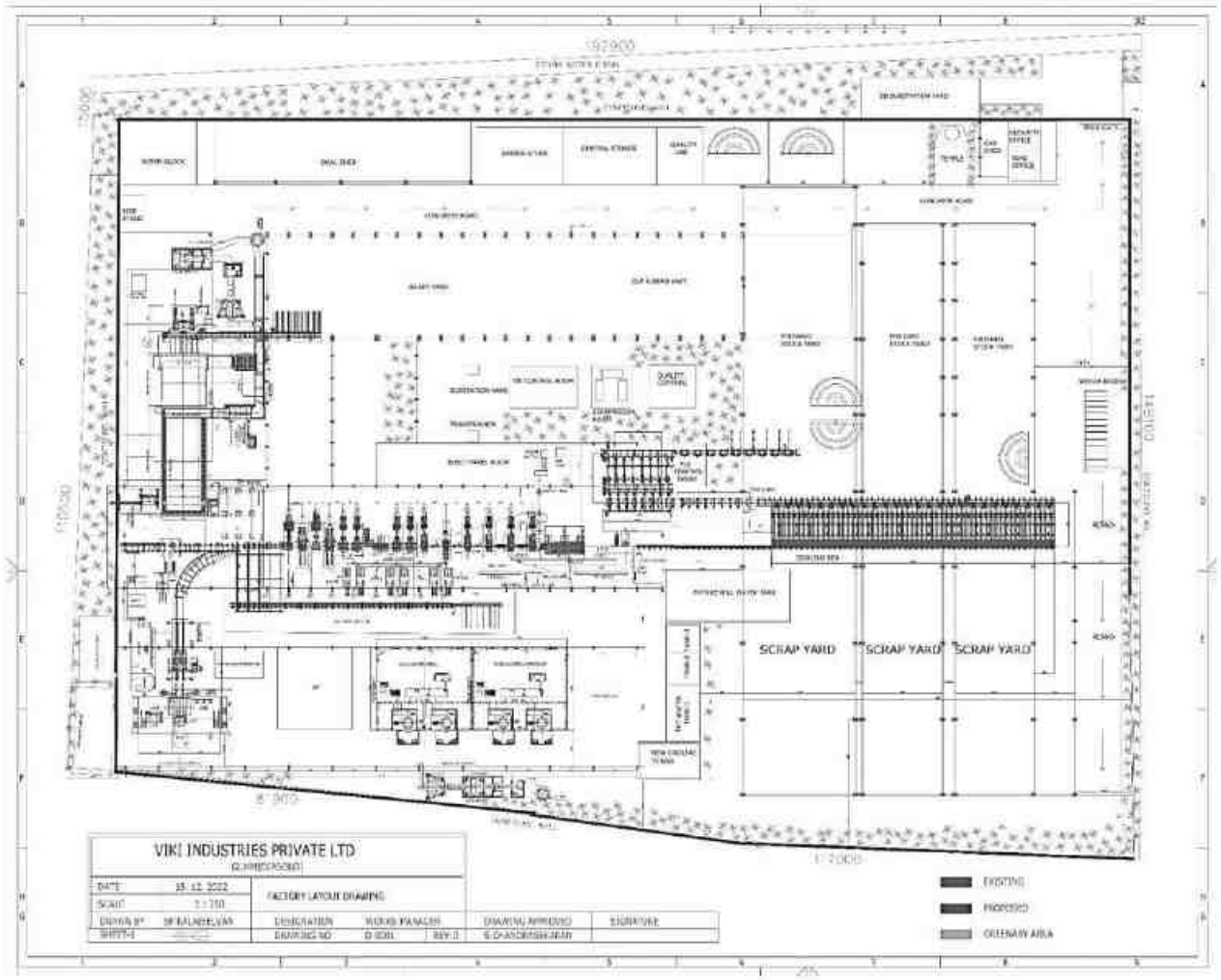


FIGURE 2-1 PLANT LAYOUT OF THE PROJECT

2.4.2 Raw Material Requirement & Material Balance

The raw materials required for the production of MS Billets followed by TMT Rods & steel structural components like Angles, Squares, Flats, Channels & Rounds including its quantity are tabulated in **Table – 2.2.** The Mass balance of making MS Billets, Steels Rods & components is shown in **Figure–2.2.**

TABLE 2.2 RAW MATERIAL REQUIREMENT (MS BILLETS)

S. No.	Raw Material	Requirement (Tons/Annum)	
		Existing	After Expansion
1	MS Scrap	---	137340
2	Sponge Iron	---	52800
3	Ferro Manganese	---	3240
4	Ferro Silicon	---	120
5	Aluminium	---	60

TABLE 2.3 RAW MATERIAL REQUIREMENT (STEEL RODS & STRUCTURAL COMPONENTS)

S. No.	Raw Material	Requirement (Tons/Annum)	
		Existing	After Expansion
1	MS Billets	1,29,000 (Outsourced currently)	Raw material Total– 2,32,200 Proposed Inhouse production of 1,80,000 Proposed Outsourcing - 52,200

Unit – Tons/Annum

Raw Material	Quantity (TPA)		Products & Wastes	Quantity (TPA)
MS Billets	1,27,800		Steel Rods & Structures	1,20,000
			Burning loss	600
			Steel Scrap	4500
			Mill Scale	2700
Total	**1,27,800**		**Total**	**1,27,800**

FIGURE 2-2 EXISTING MASS BALANCE

MASS BALANCE – STEEL MELTING SHOP *Unit – Tons/Annum*

Raw Material	Quantity (TPA)		Products & Wastes	Quantity (TPA)
MS Scrap	137340		MS Billets	1,80,000
Sponge Iron	52800		Furnace Slag	13,355
Ferro Manganese	3240		Dust of Cyclone & Bag Filter	205
Ferro Silicon	120		-	
Aluminium	60			
Total	**193560**		**Total**	**193560**

MASS BALANCE – STEEL ROLLING SHOP *Unit – Tons/Annum*

Raw Material	Quantity (TPA)		Products & Wastes	Quantity (TPA)
MS Billets - Inhouse	180000		Steel Rods & Structures	2,16,000
MS Billets - outsource	52,200		Burning loss	1,100
			Steel Scrap	9,300
			Mill Scale	5,800
Total	**2,32,200**		**Total**	**2,32,200**

FIGURE 2-3 PROPOSED MASS BALANCE

2.4.3 Manpower Requirement

The proposed project will provide employment to about 300 persons directly and 400 persons indirectly. So about 450 families get benefited due to the project and economic condition of the family improved due to the proposed expansion project. Adequate capacity of social infrastructure like road, water supply, etc. is available in the region to manage the current proposal.

2.4.4 Power and Fuel Requirement

The total power required for the steel plant will increase from 12000 KVA which will be sourced from TANGEDCO through a dedicated line. However, to meet the emergency power requirement during the grid failure DG set having capacity of 1 No. of 500 KVA & 1 No. of 250 KVA.

Coal and Diesel are the fuel used in the plant. Coal will be used in reheating furnace to reheat the billets before rolled into Rods. The reheating furnace is proposed as standby to manage the rolling of billets if there is any break down in the continuous hot charging system. So, the coal requirement will be depending upon the failure/breakdown of hot charging system only. Diesel will also be used as fuel in standby DG sets and requirement will also vary with TANGEDCO's power failure and its maximum requirement will be about 200 Lit/hr during its operation.

2.4.5 Water Requirement

Water is required in the plant for Induction Furnace Cooling, Concast Cooling, TMT Bar Cooling, Scrubber make-up and domestic purposes. The total water requirement of the plant is 507 KLD with freshwater requirement of 42 KLD and recycled water requirement of 465 KLD after the proposed expansion proposal. Water requirement in the plant is for Induction Furnace Cooling, Concast Cooling, TMT Bar Cooling, scrubber make-up and domestic purposes. The entire water requirement will be sourced from SIPCOT bore wells. Water requirement details are provided in **Table – 2.4**. The water balance diagram showing source, water requirement and wastewater generation & usage of treated water is shown in **Figure – 2.4**.

TABLE 2.4 WATER REQUIREMENT

S. No.	Activity	Requirement (KLD)	
		Existing	After Expansion
1	TMT Bar Cooling	36	15
2	Scrubber make-up	1	4
3	Domestic uses	4	9
4	Induction Furnace Cooling	---	-
5	Concast cooling	---	10
6	Plantation & Sprinkling	---	4
	Total	**41**	**42**

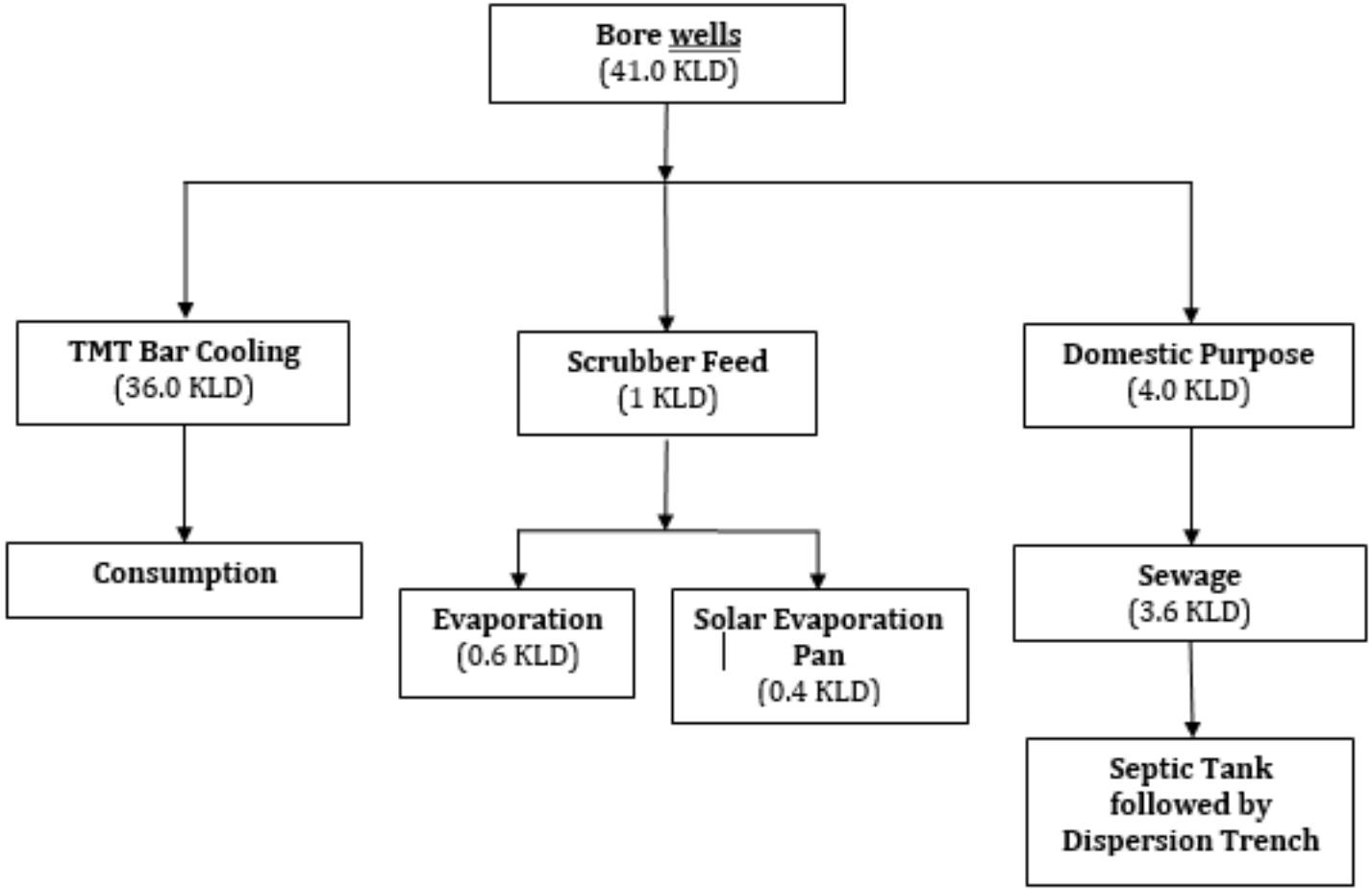


FIGURE 2-4 WATER BALANCE-EXISTING

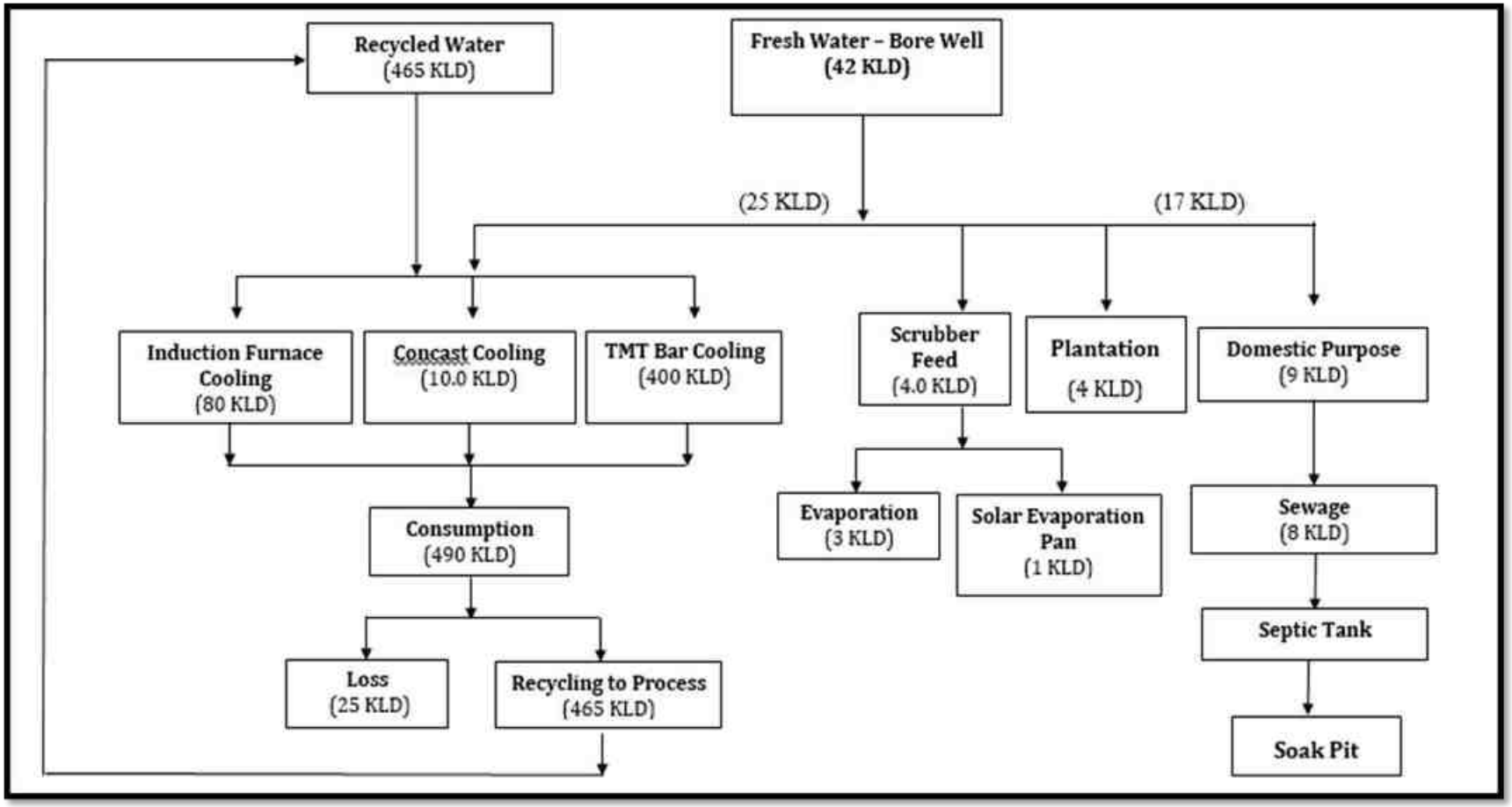


FIGURE 2-5 WATER BALANCE-EXPANSION

2.4.6 Infrastructure Facilities

The industrial unit is located in an industrial area with all sort of required infrastructure facilities. The water requirement will be sourced from SIPCOT borewell. Adequate power is being sourced from by TANGEDCO. The manpower will be sourced locally. The raw materials and other spares are sourced from Gumidipoondi region. All sort of supply as well as supporting industries are also available in the region to support the growth of this plant.

2.5 Proposed schedule for approval and implementation

The proposed expansion will be implemented immediately after obtaining EC from SEIAA and CTE from TNPCB. The implementation period of the project is 1 year from the date of implementation to achieve the significant production with new equipment.

2.6 Technology and Process Description:

The conversion of iron scrap into billets does not requires any sophisticated technology. Various grades of scraps and sponge iron are melted in electrically operated induction furnace and will be convert into billets using a Continuous casting machine.

The billets to the desired finished section in the hot condition by way of passing the material between a pair of grooved rolls and providing suitable drafts at various stages. The whole operation is conducted at a particular temperature range and within a limited time span. The stages of rolling operation are comprised of rolling the feeding stock in different mill stands, cropping the hot bar during the process of rolling between mill stands as applicable and subsequently finishing in form of hot rolled deformed bar in straight length. The hot bar coming out of the last pass is then conveyed through TMT line and collecting in a cool bed after shearing.

Charging:

- Analyze the time required to load materials (such as ingots, billets, or scrap) into the rolling mill or furnace.
- Evaluate the efficiency of charging processes and identify any delays or bottlenecks.

- Propose strategies to streamline the charging process, reduce loading times, and minimize idle periods.

Slagging:

- Studied the slagging process, which involves removing impurities and excess slag from the molten metal.
- Quantify the time and energy consumed during slagging operations.
- Optimize slagging process, enhance efficiency, and reduce downtime.

Sampling:

- Examine the frequency and duration of sampling activities to monitor product quality.
- Assess the impact of sampling on operational downtime and efficiency.
- Suggest ways to improve sampling techniques and practices to minimize disruptions.

Charge Material Handling:

- Evaluate the handling and preparation of charge materials before they are fed into the melting furnace or rolling mill.
- Analyze the time and steps involved in preparing charge materials for processing.
- Recommend approaches to expedite charge material handling and minimize delays.

Molten Heel Practice:

- Investigate the practice of maintaining a molten metal "heel" in the furnace or rolling mill between processing batches.
- Assess the benefits of this practice in terms of energy efficiency and operational readiness.
- Propose strategies to optimize molten heel practices and reduce startup times during subsequent operations.

Furnace Cover Losses:

- Study the time and energy losses associated with opening and closing furnace covers for various activities.
- Analyze the impact of cover operations on downtime and overall process efficiency.
- Identify methods to minimize cover-related idle periods and improve cover handling practices.

2.6.1 Manufacturing Process of Steel Billets

Various types of iron scraps and Sponge Iron (Direct Reduced Iron) are added into the furnace and the scraps are melted in the Medium Frequency Induction Furnace. When the scraps are melted into fluid, certain additives like,

a) Ferro Manganese - added to strengthen the fluid
b) Ferro Alloys - to achieve the metal fluidity
c) Aluminium ingots - to reduce the carbon contents

The above additives will be added at various intervals. Accurate temperature and compositional control is ensured in this melting system. The melting process will be carried for duration of 1½ hrs. Before the molten metal is poured into the ladles, they will be tested for their chemical composition.

Continuous casting is the process where the molten steel will be solidified into a "Semi finished" billets, bloom or slab for subsequent rolling in the finishing mills. Continuous casting has opted to achieve improved yield, quality and cost efficiency. Steel from the electric furnace is tapped into a ladle and taken to the continuous casting machine. The ladle is raised onto a turret that rotates the ladle into the casting position above the Tundish. Liquid steel flows out of the ladle, into the tundish and then into a water-cooled copper mould. Solidification begins in the mould and continues through the first one and stranded. In this configuration, the strand is straightened, torch-cut, then discharged for intermediate storage or hot charged for finished rolling. Depending on the product end-use various shapes are casted. In recent years, the melting / casting / rolling processes have been linked while casting a shape that substantially confirms to the finished product. The complete process chain from liquid metal to finished rolling can be achieved within two hours and the above process is represented in the following flowchart **Figure – 2.6**.

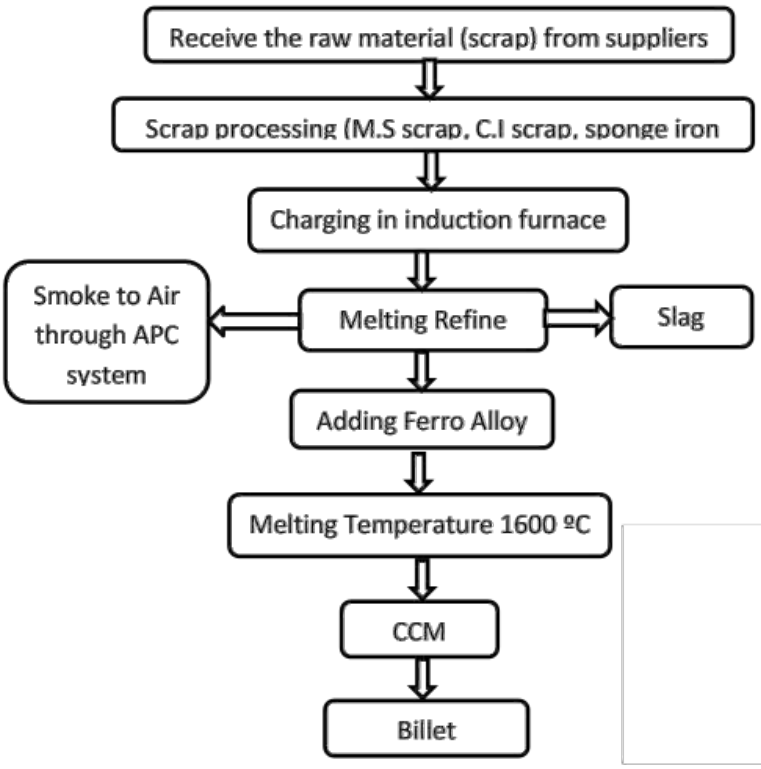


FIGURE 2-6 MANUFACTURING PROCESS OF MS BILLETES

2.6.2 Manufacturing process of Steel Rods & Structural Components

The hot billet from concast machine is pass through the rough rolling mill strand to elongate and reduce the diameters. Such reduced rods are passed through an intermediate mill strand followed by finish mill strand to achieve the required diameter of the rod / structural component.

In some unavoidable circumstance, the billets are cooled during casting process which will be heat up to 1150ºC - 1200ºC in a reheating furnace at the rolling plant. The billets are heated using coal / furnace oil. The heated billet pushed out by the pusher mechanism provided inside the furnace.

TMT bars are produced using the Tempcore process designed by Ra TMT, against cold twisting which is used to manufacture CTD Bars. The TMT Bars are produced using the "Quenching & Tempering" process. As the bar leaves the last finishing stand it is subjected to undergo the following three stages.

- In the first stage quenching takes place, where the bar is rapidly quenched by a special water spray system. While the core remains hot and austenitic forms an outer surface of crude martensitic.
- In the second stage the bar is subjected to self-tempering where it leaves the TMT box and is exposed to air. The heat from the core flows to the surface causing tempering of the outer martensitic layer. This ensures adequate ductility while maintaining high Yield Strength levels.
- The final stage takes place on the cooling bed where the still un-transformed austenite in the rod converts to ferrite-pearlite structure.

The resultant bar structure is of tempered martensite at the periphery (surface hardness) and of fine-grained ferrite pearlite at the core (ductility). The product exhibits high yield point, surface hardness, toughness, ductility and weldability.

Steps involved in manufacturing of steel rods & structural components are shown in the following flowchart **Figure -2. 7**.

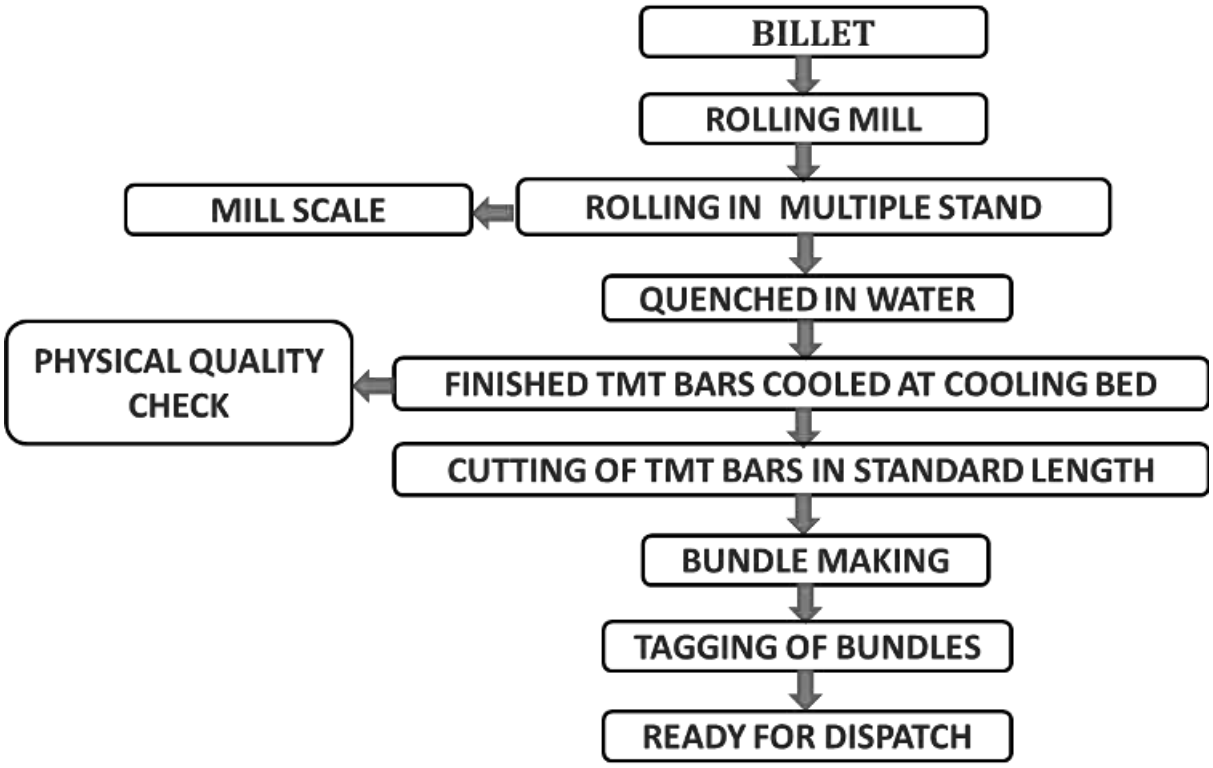


FIGURE 2-7 MANUFACTURING PROCESS OF STEEL RODS & STRUCTURAL COMPONENTS

Project Description

The additional facilities proposed in the project includes two new induction furnaces having melting capacity of 15.0 Ton and a concast machine to cast the billets.

2.6.3 Induction Furnaces

The proposed Induction Furnaces represents the most contemporary technology with static power supply, proven low loss melting furnace.

- **Furnace, Power Source & Control system**

The installation will comprise of a set of Induction Steel Melting equipment consisting of two numbers of crucibles to function alternately in running or standby mode and powered by suitable Solid-State Power Supply, with one Hydraulic Power Unit remote controlled through an operating console to facilitate Furnace Tilting / Metal Pouring. One Operator's Control Desk shall be provided to facilitate start-up, shutdown, power control, metering and annunciation; while lever operated switches shall be provided with each Furnace Crucible for quick selection and changeover.

- **Electrical Mains Equipment**

The mains input power source voltage level shall be 33 kV. A Furnace Duty Converter Transformer shall be provided to step down the voltage at an appropriate level needed by the Static Frequency Converter. Transformer shall be protected by 33 kV Vacuum Circuit Breaker fitted with fault sensing relays.

❖ **Steel Frame Furnace**

Hydraulically tilted steel frame furnace constructed from steel structure to provide higher rigidity and strength. Iron shunts prevent heating of the steel frame from the strong magnetic field; the shunt also holds the coil and prevents the coils from deformation.

The induction coil is placed between the special top refractory block and bottom made out of special refractory clamped by a vertical steel channel. The coil is made out of electrolytic hollow copper section with top and bottom cooling turns made out of non – magnetic stainless steel. The complete steel frame is pivoted on strong stanchions. Included in each furnace will be:

1. A set of Hydraulic cylinders for the hydraulic tilting of each set of furnaces
2. Manually operated hydraulic direction control valve for tilting
3. Ground Leak detector assembly with stainless steel probe wires and hardware
4. Flexible water-cooled power leads for connection between the power Induction coil and power supply unit
5. Water cooled leads are with sleeves for protection against metal splash

❖ **Advantages of steel frame furnace**

1. High efficiency voltage fed series inverter design for lowest energy consumption for each ton of Iron melted.
2. Highest performance index- more kg/hour produced per KVA demand.
3. Low loss energy storage in DC capacitor.
4. High power factor at all power levels – 0.98 Lag.
5. Lower harmonic distortion

❖ **Plant Cooling System**

The water reservoir of suitable capacity is filled with properly treated water with desired level of softness. The Cooling system shall have a Cooling Tower and two sets of Pumps, one set connected to the primary side of the Heat Exchanger to cool DM water. And second set of pumps will circulate soft water through both the crucibles. Another set of non-ferrous pumps connected to the secondary side of the Heat Exchanger shall circulate DM water through SFC Capacitors and DC Choke in close loop. One number Diesel pump is also required for emergency fill-up of overhead water tank. The heat absorbed by the soft water from the furnace coils, cables & the heat exchanger Primary is effectively cooled by the cooling tower from a maximum of 41^0C down to 32^0C. The Technical Specification of proposed Induction Furnaces details is presented in **Table-2.5.**

TABLE 2.5 TECHNICAL SPECIFICATION OF INDUCTION FURNACES

S. No.	Description of Items	Specifications
1	**Application Requirements**	
	Alloy to be melted	Steel
	Melting Temperature	1600°C
2	**Characteristics of recommended power unit**	
	Rated KW	
	Type of Furnace	6000 KW
	Maximum KW	6000 KW
	Nominal furnace frequency	500 Hz
	Line Power Factor	0.98 and above
	KVA required at input	5315 KVA on load
	Melt rate at 5000 KW	15000 Kg/hour - Steel
	Power Connection	575 V, 12 Phase – 24 Pulse, 50 Hz
3	Characteristics of recommended melting furnace	
	Nominal capacity (Steel capacity)	15000 KG
	Style of Furnace	Steel Frame
	Pouring Mechanism	Hydraulic tilt
	Furnace lining	Silica

2.6.3.1 Charging and operation of Melting forbetter and efficient operation of induction furnaces

Operating induction furnaces efficiently in a steel plant involves specific considerations due to the unique properties of steel and the requirements of the steelmaking process. Here's a guide on charging and operating induction furnaces for better efficiency in a steel plant:

1. Charge Preparation:

- Ensure the scrap metal and other raw materials are clean, dry, and free from contaminants. Contaminants like oil, paint, and moisture can lead to inefficient melting and reduced quality.
- Sort and segregate the scrap materials based on their composition and size. This helps achieve a more homogeneous melt and prevents overheating in localized areas.

2. Scrap Preheating:

- Preheating the scrap materials before charging can significantly reduce the energy required for melting. Consider using a scrap preheating station or using the waste heat from other processes for this purpose.

3. Charging Strategy:

- Use a balanced charging strategy to evenly distribute the scrap materials within the furnace. Avoid creating air gaps or areas with excessive material buildup, as these can lead to inefficiencies and uneven melting.

4. Power and Frequency Settings:

- Experiment with power levels and frequency settings to determine the most efficient combination for melting steel. Higher power levels and lower frequencies are often used for steel melting compared to other metals.

5. Stirring and Mixing:

- Consider using electromagnetic stirring systems to ensure thorough mixing and temperature uniformity. This is particularly important for steel melting, as it helps in achieving consistent quality.

6. Temperature Control:

- Implement accurate and responsive temperature control systems to maintain the desired melting temperature. Rapid temperature changes and fluctuations can lead to inefficiencies and quality issues.

7. Refractory Maintenance:

- Regularly inspect and maintain the refractory lining of the furnace. Proper refractory materials and lining design are essential for withstanding the high temperatures and corrosive nature of steel melting.

8. Energy Management:

- Implement energy-saving measures such as optimizing power factor correction, using energy-efficient power supplies, and minimizing heat losses through insulation improvements.

9. Process Monitoring and Automation:

- Implement real-time process monitoring and automation systems to track temperature, power levels, and other relevant parameters. Automation can help optimize the melting process and reduce human errors.

10. Skimming and Slag Removal:

- Regularly remove slag from the surface of the molten steel to maintain efficient heat transfer and prevent re-absorption of unwanted elements.

11. Charging Sequence and Recipe Optimization:

- Develop optimized charging sequences and recipes based on the types of steel being melted. Different steel grades and compositions might require specific charging patterns for efficient melting.

12. Training and Skill Development:

- Provide comprehensive training to furnace operators regarding the nuances of steel melting in induction furnaces. Skilled operators can make informed decisions to enhance efficiency and product quality.

13. Data Analysis and Process Improvement:

- Utilize data analytics to identify trends, patterns, and areas of improvement in furnace operation. This data-driven approach can lead to continuous process optimization.

Efficiently operating induction furnaces in a steel plant involves a combination of technical expertise, process optimization, and equipment management. Regularly reviewing and adjusting your practices based on the specific requirements of steel melting will help you achieve better efficiency and product quality.

2.6.4 Continuous Casting Machine

Continuous Casting Machine is an equipment to convert liquid steel into cast semis of the desired size. The main features of this machine are:

- Ladle stool
- Tundish
- Tundish Car
- Mould Jacket Assemblies
- Mould Oscillator
- Secondary cooling
- Strand Guide Frames
- Withdrawal-cum-straightening machine
- Hydraulic pusher type skid bank
- Electrical / Instrumentation etc.

Molten Steel from the furnace is poured at correct temperature into the Ladle and the Ladle is brought to the casting position. After ascertaining the temperature of the liquid metal Slide Gate is opened so as to allow the liquid metal to flow into the Tundish, which is placed on the Tundish car. After metal reaches the ferro static height the refractory nozzle of the Tundish is opened to allow the metal to distribute in the mould assembly. The mould box contains the copper mould. Primary water circulates around the periphery of the mould to form a shell around the molten core. The Stand is withdrawn with the help of the dummy bar.

The surface of the mould is lubricated to minimize any sticking of the molten metal to the copper mould. This lubrication is accomplished with rapeseed oil at water free condition. Mould Oscillation Mechanism is used for oscillating the mould so that the newly formed stand shell does not stick to the mould wall. Good oscillator mechanism provided good surface quality to the stand and minimizes the transverse cracks and deep oscillation marks.

The newly formed stand leaves the mould and passes through the cooling chamber to complete the solidification process. Suitable Metallurgical length is provided for this purpose.

Cooling water volume can be adjusted to suit the steel grade and size of casting. Exhaust fan is provided to suck off the steam produced due to the contact of cooling water and hot strand. After passing through the cooling chamber the strand passes through the withdrawal and straightening unit. This unit provided the drive for withdrawal and straightening for each of the hot stand. It also provides the drive the dummy bar for its insertion in Mould during start of the east. Here the strand radius changes for 4 M to 7 M to infinite radius i.e. straight. Cutting of the strand into billets is affected with manual / auto gas cutting torches. Cutting of strands into billet takes place between intermediate and cutting roller table. The cut billets are then transported to discharge area until it comes in contact to the end buffer which in terms actuates the pusher which carries the billet to cooling bed. In discharge area, two ventilated rooms are located one below the other for electrical and hydraulic controls. The multi-motor control centre is positioned on the top floor and hydraulic power pack on the ground floor. The Continuous Caster Machine design data are presented in **Table - 2.6.**

TABLE 2.6 CONTINUOUS CASTING MACHINE DESIGN DATA

S. No.	Description	Specifications
1	Type of Machine	Curved Mould, Bow type
2	Number of Machine	1
3	Number of Strands	2
4	Design Limits	100 mm sq to 140 mm sq
5	Machine equipped to cast	100 mm sq
6	Casting Radius	4 m with second unbending Radius of 7 m
7	Billet Length	1.2 – 4 M
8	Type of Ladle	Bottom Pouring with slide gate
9	Ladle support	Ladle stand
10	Melting Unit	2 x 15 Ton
11	Ladle capacity	15 Tons
12	Method of Discharge	On Horizontal Discharge Roller Table to Cooling beds
13	Steel Grade	Mild Steel
14	Dummy bar	Rigid Dummy Bar

15	Casting practice	Open Casting
16	Tundish Practice	Cold
17	Mould support	Long lever Oscillator
18	Automation	Secondary (Spray) Water Automation & Drive Communication

2.7 Waste generation & Mitigation measures

In the process, along with the useful product several waste materials will also be generated. These waste materials include gaseous emissions, wastewater generation and solid wastes generation. By volume, gaseous waste is the largest waste source from steel plant. But most of the gaseous emissions are captured in the emissions control systems attached to emission sources like furnaces.

The quantities and the composition of the gaseous and solid waste that are generated in the plant will be regulated such that their final disposal into the environment meets all the statutory requirements and the environment impacts are minimized.

- The sources of emissions are Induction Furnaces, Reheating Furnace and standby DG sets.
- The sources of wastewater are Wet scrubbers and domestic usages.
- The solid wastes generated from the plant are Furnace Slag, Steel Scraps, Fly Ash and Bag Filter, Scrubber & Solar Pan Dust.

2.7.1 Gaseous Emission and Control measures

The pollutants in the form of particulates and gases are generated from various parts of the steel complex. This has been taken into account and adequate measures are being taken to arrest the emission of pollutants within the stipulations of statutory norms. Adoption of technology like recovery of dust / ash for re-use as raw material is fulfilling the twin objectives of material conservation and pollution control. The measures to control the air pollution ensure the ambient air quality standards as laid down by Central Pollution Control Board for industrial and mixed-use areas. The details of the stacks are given in **Table – 2.7.**

TABLE 2.7 EXISTING & PROPOSED STACK DETAILS

Stack No.	Stack attached to	Height above GL in m	Control Measure
	Existing		
1	Reheating Furnace (15 Ton)	30.0	Wet scrubber with stack
2	DG Set – 250 KVA	4.0	Acoustic enclosure with stack
	After Expansion		
1	Induction Furnace – 2 No with 4 crucibles (15 T each)	30.0	Cyclone Separator & Bag Filter with stack
2	Reheating Furnace (25 Ton)	30.0	Wet scrubber with stack
3	DG Set – 500 KVA	4.0	Acoustic enclosure with stack
4	DG Set – 250 KVA	4.0	Acoustic enclosure with stack

2.7.1.1 Fugitive Emissions

All other dust sources are considered as secondary sources since they are not process implied. These dust sources may occur wherever relatively dry or dusty material is handled, conveyed, pumped or extracted. Water spray is being carried out to control fugitive dust due to wind. All the materials will be stored in covered storage facilities.

2.7.2 Wastewater Generation and Disposal Measures

The quantity of wastewater generation depends on the quantity of water used for various purposes. As the steel melting and rolling plant will be operated on the dry process, water is mainly used only in a stage in the processes like Cooling of Concast, TMT bar and Induction furnace. Water is also used for scrubber make-up and domestic usages. No wastewater is generated from the processes and there is no cooling blow down and the entire quantity of the make-up water lost into the atmosphere due to evaporation and wind.

Water is also used in wet scrubbers to control the dust emission from the induction and reheating furnace. About 2 KLD of effluent will be generated from the wet scrubbers which will be evaporated in the elevated Solar Evaporation Pan. From the domestic uses, the sewage will be generated about 8 KLD. The total quantity of the sewage will be treated in Sewage Treatment Plant and used for green belt development.

2.7.3 Solid Waste Generation and Management

The quantities of solid waste generation and their disposal in the plant are presented in **Table – 2.8.**

TABLE 2.8 SOLID WASTE GENERATION AND DISPOSAL

S. No.	Source	Quantity (TPA)		Disposal Method
		Existing	After Expansion	
Industrial waste				
1.	Furnace Slag	---	13,255	Cement plant / Road laying contractors
2.	Steel Scraps	4500	9300	Reuse in melting
3.	Mill Scale	2700	5800	Sent to Authorized

				vendors
4.	Bag Filter, Scrubber & Solar Pan Dust	60	205	Filling material in road laying
Domestic Waste				
5.	Septic Sludge	40 Kg/Annum	100 Kg/Annum	Will be removed through lorry.
6.	Garbage	4 Kg/Day	10 Kg/Day	Composting

- The solid wastes will be stored in designated storage areas.
- The scrap and mill scale from rolling mill will be reuse in the melting.
- The furnace slag from the furnaces not contains any hazardous / heavy metals and it will be disposed to cement plant as alternate raw material or the contractors to reuse it as filing material in road lying / construction / brick making.
- Fly ash from reheating furnace will be sold for brick making units.
- Bag filter, Scrubber & Solar pan dust will be used as filling material in road laying.

2.7.4 Noise Pollution and Mitigation Measures

The major noise generating sources in the proposed plant will be Induction Furnace, Continuous Casting Machine, Rolling Mill, Cooling Tower pumps and DG sets. The noise levels anticipated from the different machineries are given below in **Table-2.9.**

TABLE 2.9 NOISE LEVELS ANTICIPATED AT THE PROPOSED PLANT

S. No.	Location	Noise Levels - dB (A)
1	Induction furnaces	69
2	Scrap unloading	74
3	Continuous Casting Machine	73
4	Rolling Mill	77
5	DG set	85

3 DESCRIPTION OF THE ENVIRONMENT

3.1 Introduction

The Environment Impact Assessment Study includes an assessment of the various environment impacts likely to be caused on the surrounding nature in and around the proposed expansion project. It will also incorporate the appropriate control measures required to be adopted or implemented in order to minimize the adverse effects thereof.

In order to carry out such assessment study, it is first necessary to delineate and define the existing environment factors in and around the proposed expansion project on the existing environment scenario which will include various environs like Ecology, Flora-fauna, Socio economic profiles, Environment quality in respect of air, water, noise & soil etc.

This section incorporates the description of the existing environment settings within the area encompassed by a circle of 10 km radius around the project site. The base line study was conducted during Winter from the month of March 2023 to May 2023 and secondary data collected from various Government, Semi-Government and public sector organizations.

3.2 Meteorology

The meteorological data recorded during the study period is very useful for proper interpretation of the baseline information as well as for input to prediction models for air quality dispersion.

On site monitoring was undertaken for various meteorological parameters in order to generate the site-specific data. The central monitoring station (CMS), equipped with continuous monitoring equipment to record wind speed, wind direction, temperature, humidity and rain fall was set up at the top of an industry at a height of ~ 5.0 m above the ground level located adjacent to the project site as there is no permanent structure and power source available at project site. The methodology adopted for monitoring surface observations was as per the Standard norms laid down by the Bureau of Indian Standards (IS: 8829) and IMD.

3.2.1 Meteorological data recorded at site

The meteorological parameters were recorded at site on hourly basis during the study period and consists of parameters like wind speed, wind direction and temperature. The total rainfall was recorded daily once at 0830 hrs. The maximum and minimum values for all the parameters except wind speed and wind direction are presented in **Table - 3.1**. The graphical presentation of wind direction and speed for the period of post mansoon is shown in **Figure - 3.1.**

TABLE 3.1 SUMMARY OF THE METEOROLOGICAL DATA GENERATED AT SITE

Month	Temperature (˚C)		Relative Humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	
March-2023	33	22	94	29	63
April-2023	35	26	94	35	72
May-2023	38	28	100	38	95

Source: Eco Tech Labs Pvt Ltd

3.2.2 Secondary Data from Indian Meteorological Dept. (IMD), Chennai(Meenambakkam)

The nearby India Meteorological Department station that is generating meteorological data is 58 km from the plant site i.e. IMD, Chennai, Meenambakkam. Hence, secondary information on meteorological conditions has been collected from IMD station at Chennai International Airport. Indian Meteorological Department at Tuticorin regularly monitors wind direction, wind speed, relative humidity, temperature, rainfall, evaporation and pressure at 08.30 hours and 17.30 hours every day. Wind rose diagrams are collected from IMD for the period 1969-1990 and are shown in **Figure 3.1.**

3.2.2.1 Temperature

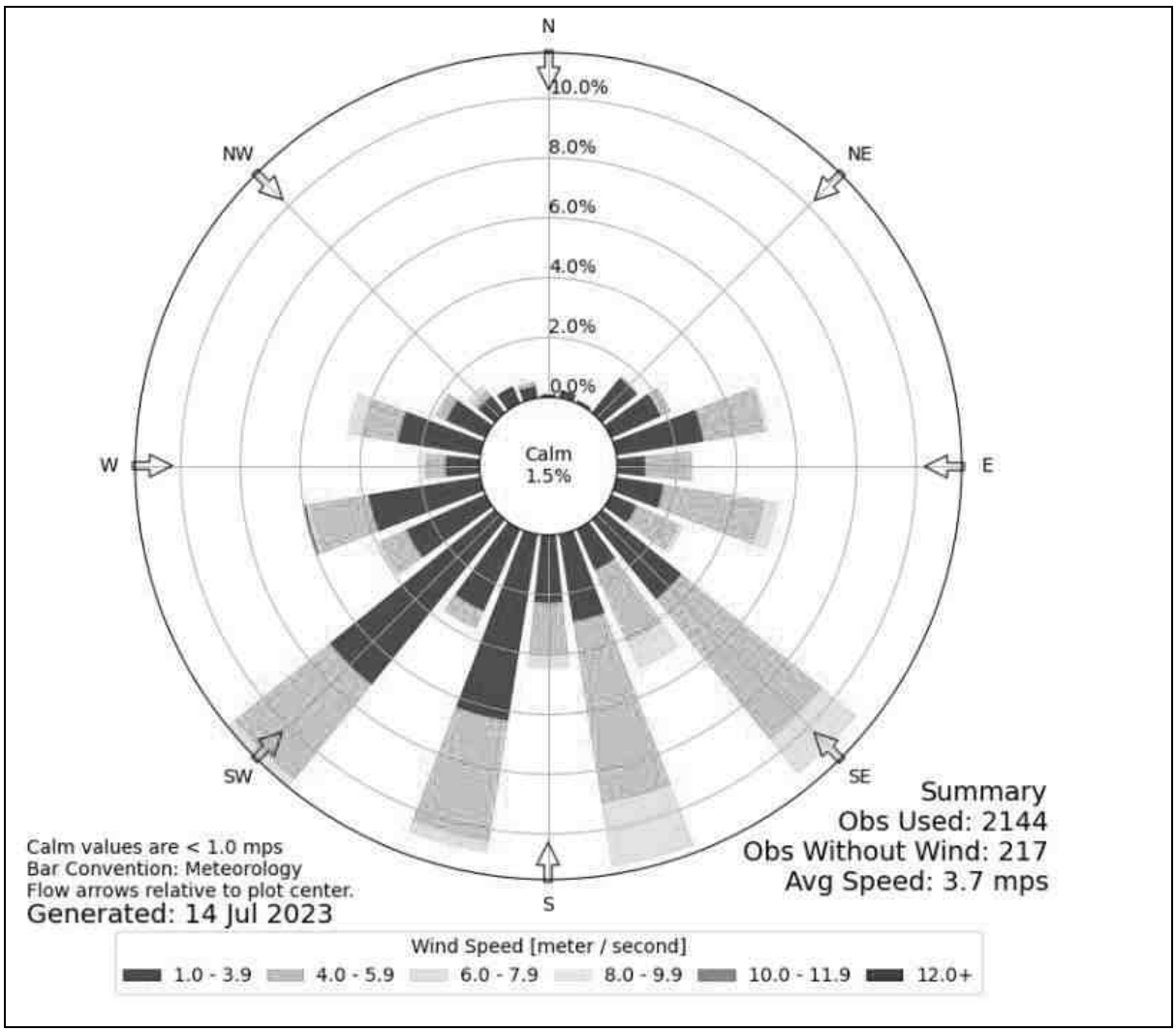
The period from April to June is generally hot and dry. The weather is pleasant during the period from November to January. Usually mornings are more humid than afternoons. The annual mean minimum and maximum temperature are 24.3 ° and 32.9°C respectively. The day time heat is oppressive and the temperature is as high as 41.2°C. The lowest temperature recorded is of the order of 18.1°C.

3.2.2.2 Relative Humidity

The relative humidity varies between 65 and 85% in the mornings while in the afternoon it varies between 40 and 70%.

3.2.2.3 Rainfall

Rainfall data analysis shows that the normal annual rainfall varies from 950mm to 1150mm. It is minimum around Chengam (982.1mm) in the south eastern part of the district. It gradually increases towards west and a maximum around Wandavasi (1117.1mm) is notaiced.



Source: IMD regional office, Chennai

FIGURE 3-1 WINDROSE DIAGRAM OF IMD, CHENNAI

3.3 Air Environment

The prime objective of the baseline air monitoring is to evaluate the existing air quality of the project area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed expansion project. This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling.

3.3.1 Selection of Sampling Locations

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 programme has been based on the following considerations:

- Topography / Terrain of the study area
- Human Settlements
- Health status
- Accessibility of monitoring site
- Resource Availability
- Representativeness of the region for establishing baseline status
- Representativeness with respect to likely impact areas

Ambient Air Quality Monitoring (AAQM) stations were set up at five (5) locations with due consideration to the above-mentioned points. The Ambient Air Quality monitoring locations are given in the **Table - 3.2** and shown in the **Figure - 3.2.**

TABLE 3.2 DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

Code	Location	Latitude	Longitude	Direction	Distance w.r.t. plant (km)
AAQ1	Project site	13°24'58.95"N	80° 6'58.06"E	Within site	
AAQ2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	13°24'30.91"N	80° 7'49.32"E	SE	1.68
AAQ3	Nagaraja Kandigai	13°26'35.12"N	80° 5'22.83"E	NNW	4.04
AAQ4	Elite Public school	13°24'10.82"N	80° 5'30.99"E	SW	2.91
AAQ5	Madanlal Khemai Vivekananda Vidyalaya school	13°25'42.93"N	80° 7'22.16"E	NE	1.48

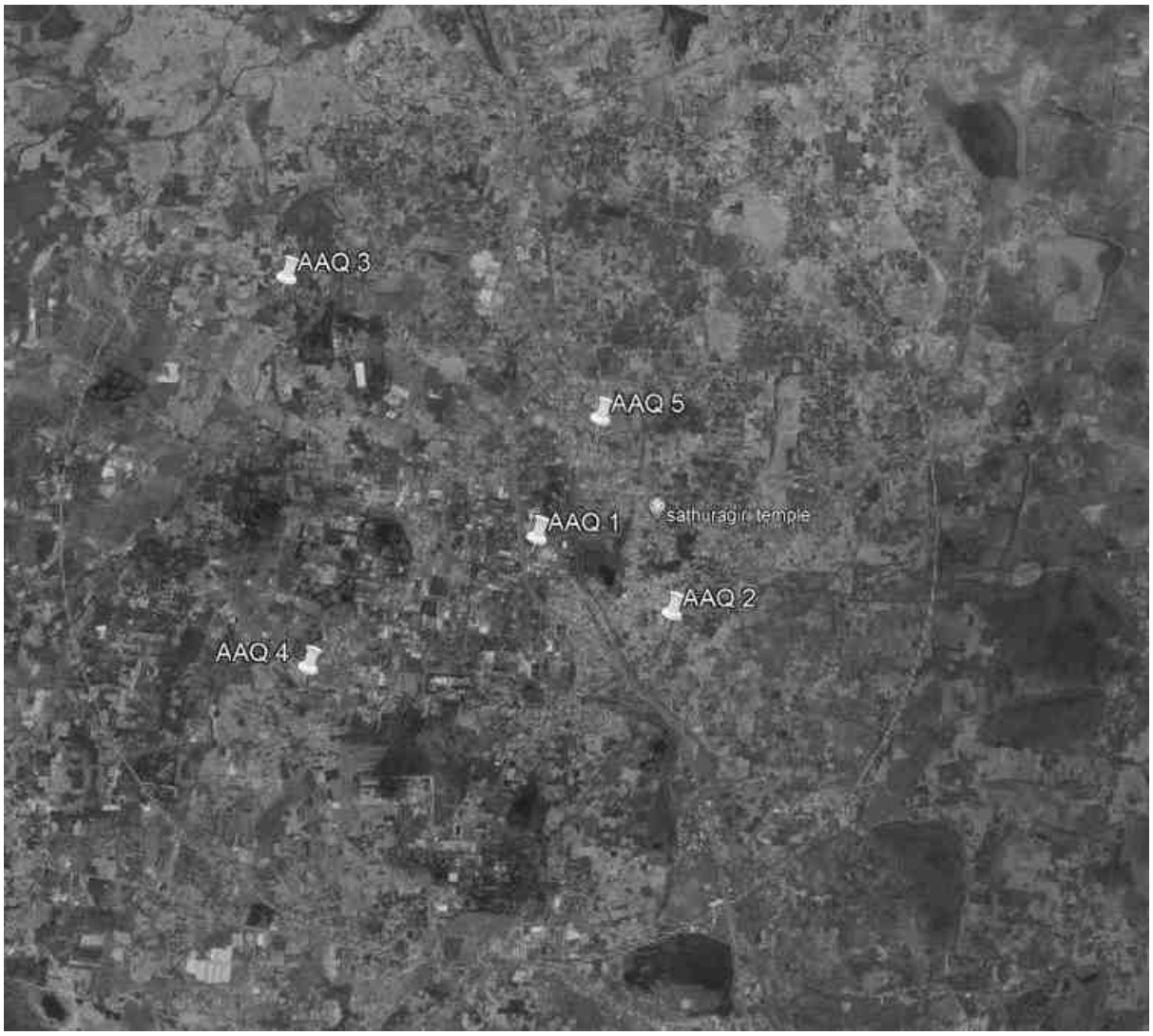


FIGURE 3-2 AIR QUALITY SAMPLING LOCATIONS

3.3.2 Frequency and Parameters for Sampling

Ambient air quality monitoring was carried out at a frequency of two days per week at each location for three months.

3.3.3 Instruments used for Sampling

Respirable Dust Samplers APM 460 BL of Envirotech was used for monitoring Particulate matter (PM_{10}) and Fine Particulate Samplers APM 550 of Envirotech was used for monitoring ($PM_{2.5}$). For gaseous pollutants APM 411 has been used along with APM-460.

3.3.4 Sampling and Analytical Techniques

The sampling and analytical techniques used for the monitoring of Ambient Air quality is given in **Table - 3.3.**

TABLE 3.3 TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

S. No.	Parameter	Technique	Detectable Limit
1	Particulate Matter (PM_{10})	EPA -40 (CFR Part 50)	2.0 µg / m^3
2	Particulate Matter ($PM_{2.5}$)	EPA -40 (CFR Part 50)	2.0 µg / m^3
3	Sulphur Dioxide (SO_2)	Improved West and Gaeke	5.0 µg / m^3
4	Nitrogen Dioxide (NO_2)	Modified Jacob & Hochheiser	5.0 µg / m^3
5	Carbon Monoxide (CO)	IS 13270 : 1992	0.1 mg / m^3
6	Ozone (O_3)	KI Absorption Method	5.0 µg / m^3
7	Lead (Pb)	IS 5182 P 22	0.1 µg / m^3
8	Ammonia (NH_3)	Nessler's Method	5.0 µg / m^3
9	Benzene (C_6H_6)	IS 5182: Pt 22: 2004	0.01 µg / m^3
10	Benzo (a) pyrene – Particulate Phase	IS 5182: Pt 22: 2004	0.1 ng / m^3
11	Arsenic (As);	IS 5182: Pt 22: 2004	1.0 ng / m^3
12	Nickel (Ni):	IS 5182: Pt 22: 2004	1.0 ng / m^3

3.3.5 Presentation of Results

The survey results for the study period of three months are presented in detail in **Annex - 2.** The summary of these results for each location is presented in **Table-3.4.** These are compared with the standards prescribed by Central Pollution Control Board (CPCB).

TABLE 3.4 AMBIENT AIR QUALITY RESULTS

Code	Location	PM_{10} µg/m³				$PM_{2.5}$ µg/m³				SO_2 µg/m³			
		Min	Max	Avg	98%	Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Project site	51	61	57	61	22	29	26	29	8	15	11	15
AAQ2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	48	58	54	58	20	28	25	28	7	16	11	15
AAQ3	Nagaraja Kandigai	41	55	48	55	16	24	21	24	6	11	9	11
AAQ4	Elite Public school	54	64	58	63	22	32	26	31	12	19	15	19
AAQ5	Madanlal Khemani Vivekananda Vidyalaya School	56	67	62	66	26	34	29	33	16	22	19	22
CPCB Standards[#]		**100**				**60**				**80**			

**** All values are expressed in µg/m³***

[#]Standards for Industrial /Residential / Rural and Other Area

Source: Eco Tech Labs Pvt Ltd

Code	Location	NO_2 µg/m^3			
		Min	**Max**	**Avg**	**98%**
AAQ1	Project site	14	27	20	27
AAQ2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	14	31	21	30
AAQ3	Nagaraja Kandigai	11	23	17	23
AAQ4	Elite Public school	23	34	27	33
AAQ5	Madanlal Khemani Vivekananda Vidyalaya School	27	43	34	43
CPCB Standards#		**80**			

**** All values are expressed in µg/m^3***

#Standards for Industrial /Residential / Rural and Other Area

Source: Eco Tech Labs Pvt Ltd

3.3.6 Observations

PM_{10}: The maximum and minimum concentrations for PM_{10} were recorded as 67 μg/m^3 and 41 μg/m^3 respectively. The maximum concentration was recorded at vidyalaya school and the minimum concentration was recorded at Nagaraja Kandigai. The average concentrations were ranged between 48 – 62 μg/m^3.

$PM_{2.5}$: The maximum and minimum concentrations for $PM_{2.5}$ were recorded as 34 μg/m^3 and 16 μg/m^3 respectively. The maximum concentration was recorded at Vidyalaya school and the minimum concentration was recorded at Nagaraja Kandigai. The average values were observed to be in the range of 21-29 μg/ m^3.

SO_2: The maximum and minimum concentrations for SO_2 were recorded as 22 μg/$m^3$and 6 μg/ m^3 respectively. The maximum concentration was recorded at Vidyalaya school and the minimum concentration was recorded at Nagaraja Kandigai. The average values were observed to be in the range of 9 -19 μg/m^3.

NO_2: The maximum and minimum NO_2 concentrations were recorded as 43 μg/$m^3$and 11 μg/m^3. The maximum concentration was recorded at Vidyalaya school and the minimum concentration was recorded at Nagaraja Kandigai. The average values were observed to be in the range of 17– 34μg/m^3

The values of PM_{10}, $PM_{2.5}$, SO_2, NO_2 were observed well within the standards prescribed by Central Pollution Control Board (CPCB) for Industrial, Rural, Residential and Other area.

3.4 Noise Environment

Noise survey has been conducted in the study area to assess the background noise levels in different zones viz., Residential, Industrial, Commercial and Silence zones. The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise expected to be generated in the surrounding areas.

3.4.1 Methodology

❖ ***Identification of Sampling Locations***

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise monitoring has been conducted at five (5) locations in the study area. The physical location of noise monitoring stations is given in **Table - 3.5.** The map showing Noise Quality Monitoring Locations is enclosed as **Figure – 3.3.**

TABLE 3.5 DETAILS OF NOISE MONITORING LOCATIONS

Code	Location	Latitude	Longitude	Direction w.r.t. plant	Distance w.r.t. plant (km)
N1	Project site	13°24'58.95"N	80° 6'58.06"E	Within site	
N2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	13°24'30.91"N	80° 7'49.32"E	SE	1.68
N3	Nagaraja Kandigai	13°26'35.12"N	80° 5'22.83"E	NNW	4.04
N4	Elite Public school	13°24'10.82"N	80° 5'30.99"E	SW	2.91
N5	Madanlal Khemani Vivekananda Vidyalaya School	13°25'42.93"N	80° 7'22.16"E	NE	1.48

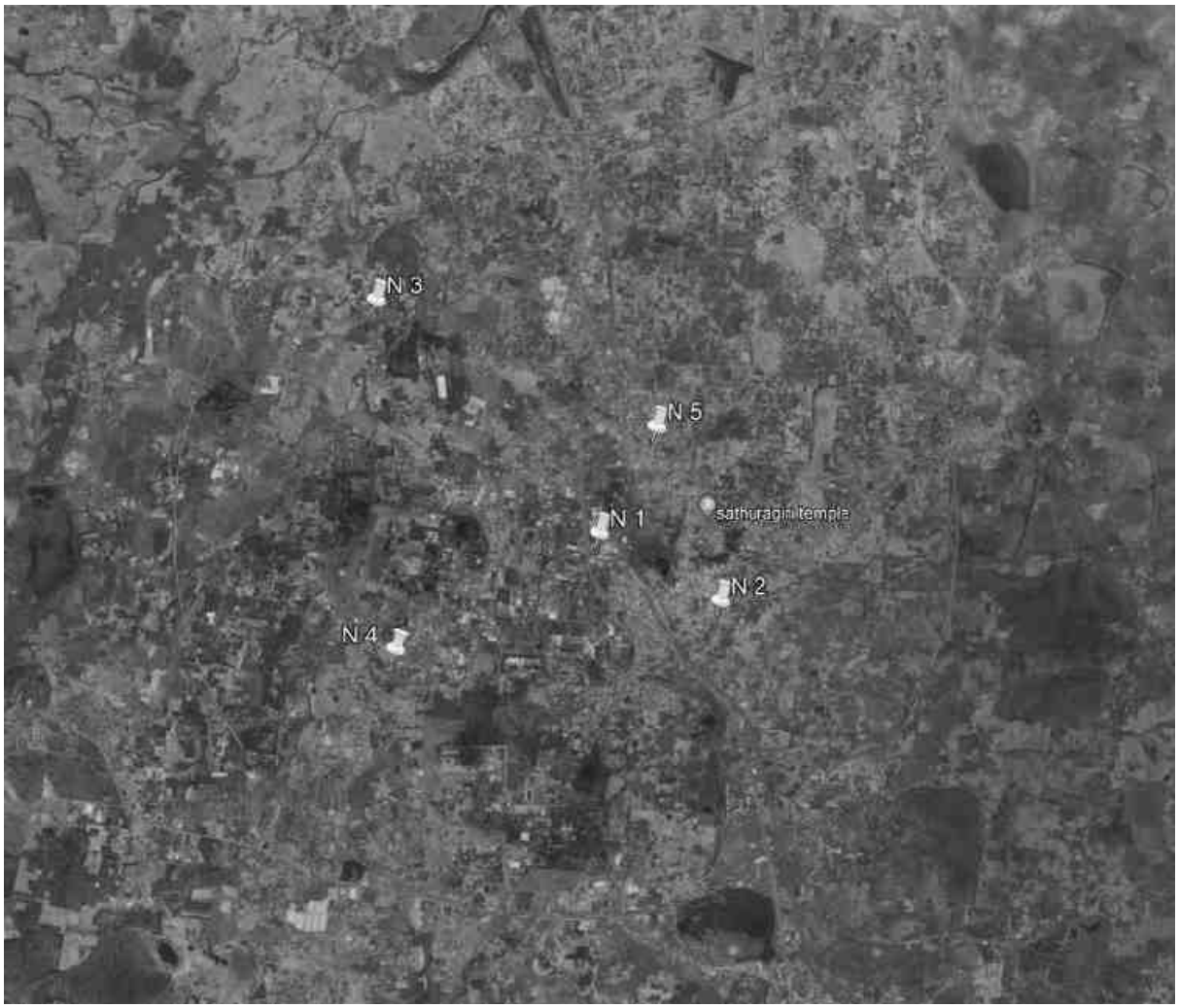


FIGURE 3-3 NOISE SAMPLING LOCATIONS

- ***Instrument Used for Monitoring***

Noise levels were measured using a Sound Level Meter. The sound level meter measures the Sound Pressure Level (SPL), the Maximum Sound Pressure Level (max) and the equivalent continuous noise level (Leq) by switching on the corresponding functional modes.

- ***Method of Monitoring***

Sound Pressure Level (SPL) measurements were taken at the specified locations, with an interval of 1 minute over a period of one hour for 24 hours. The noise levels during day time have been monitored between 6 am to 10 pm and night noise levels during 10 pm to 6 am at all the locations covered in the study area. Noise levels were recorded every one minute in the following manner. To obtain noise levels at 8 AM, noise readings, with setting at 'A'

response – slow mode, were recorded continuously for 60 minutes. All the readings were obtained for 24 hours.

❖ ***Parameters Measured During Monitoring***

For noise levels measured over a given period of time interval, it is possible to derive important features of noise using statistical methods.

- L_{day} Average noise levels between 6.00 hours to 22.00 hours.
- L_{night} Average noise levels between 22.00 hours to 6.00 hours.

3.4.2 Presentation of Results

The summary of computed ambient noise level parameters like L_{day} and L_{night} for all the sampling locations are presented in **Table – 3.6** and compared to the standards specified by CPCB as given below in **Table - 3.7.**

TABLE 3.6 AMBIENT NOISE LEVELS RECORDED IN THIS STUDY AREA

Code	Location	L_{day} [dB(A)]	L_{night}[dB(A)]
N1	Project site	64	51
N2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	57	47
N3	Nagaraja Kandigai	55	42
N4	Elite Public school	62	48
N5	Madanlal Khemani Vivekananda Vidyalaya School	65	52

Source: Eco Tech Labs Pvt Ltd

TABLE 3.7 AMBIENT NOISE STANDARDS

Land Use	L_{day} [dB(A)]	L_{night}[dB(A)]
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

❖ **Observations**

Day time Noise Levels

The Average Noise levels during day time were found to be in the range 43 to 65 dB(A). The maximum noise level was observed to be 65 dB(A) at Vivekanda vidhalaya and a minimum of 43 dB(A) was observed at Nagaraja Kandigai.

Night time Noise Levels

Noise levels observed to fall in the range 35 to 52 dB(A) during the night time. The maximum of 52 dB(A) was observed at Vivekanda vidhalaya and a minimum of 35 dB (A) was observed at Nagaraja Kandigai.

3.5 WATER QUALITY

Water sampling has been conducted to establish baseline water quality in the area. Water analysis was carried out for physical and chemical parameters as per the methods prescribed in IS and "Standard Methods for the Examination of Water and Wastewater (American Public Health Association)". Water samples were examined to assess the effect of industrial and other activities on ground water. 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.

3.5.1 Water Sampling Locations

Five (5) ground water samples & Two (2) surface water samples were collected as grab samples and analyzed for various parameters to compare with the standards for drinking water as per IS: 10500:2012. The water sampling locations are identified in **Table-3.8** and shown in **Figure-3.4**.

TABLE 3.8 WATER SAMPLING LOCATIONS

Code	Location	Latitude& Longitude	Direction w.r.t. plant	Distance w.r.t. plant (km)
GW1	Project site	13°24'58.95"N 80° 6'58.06"E	Within site	
GW2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	13°24'30.91"N 80° 7'49.32"E	SE	1.68

GW3	Nagaraja Kandigai	13°26'35.12"N 80° 5'22.83"E	NNW	4.04
GW4	Elite Public school	13°24'10.82"N 80° 5'30.99"E	SW	2.91
GW5	Madanlal Khemani Vivekananda Vidyalaya School	13°25'42.93"N 80° 7'22.16"E	NE	1.48
SW1	Thamarai Eri	13°24'52.90"N 80° 7'24.35"E	E	0.77
SW2	Panapakkam Lake	13°22'37.80"N 80° 7'46.66"E	S	4.45

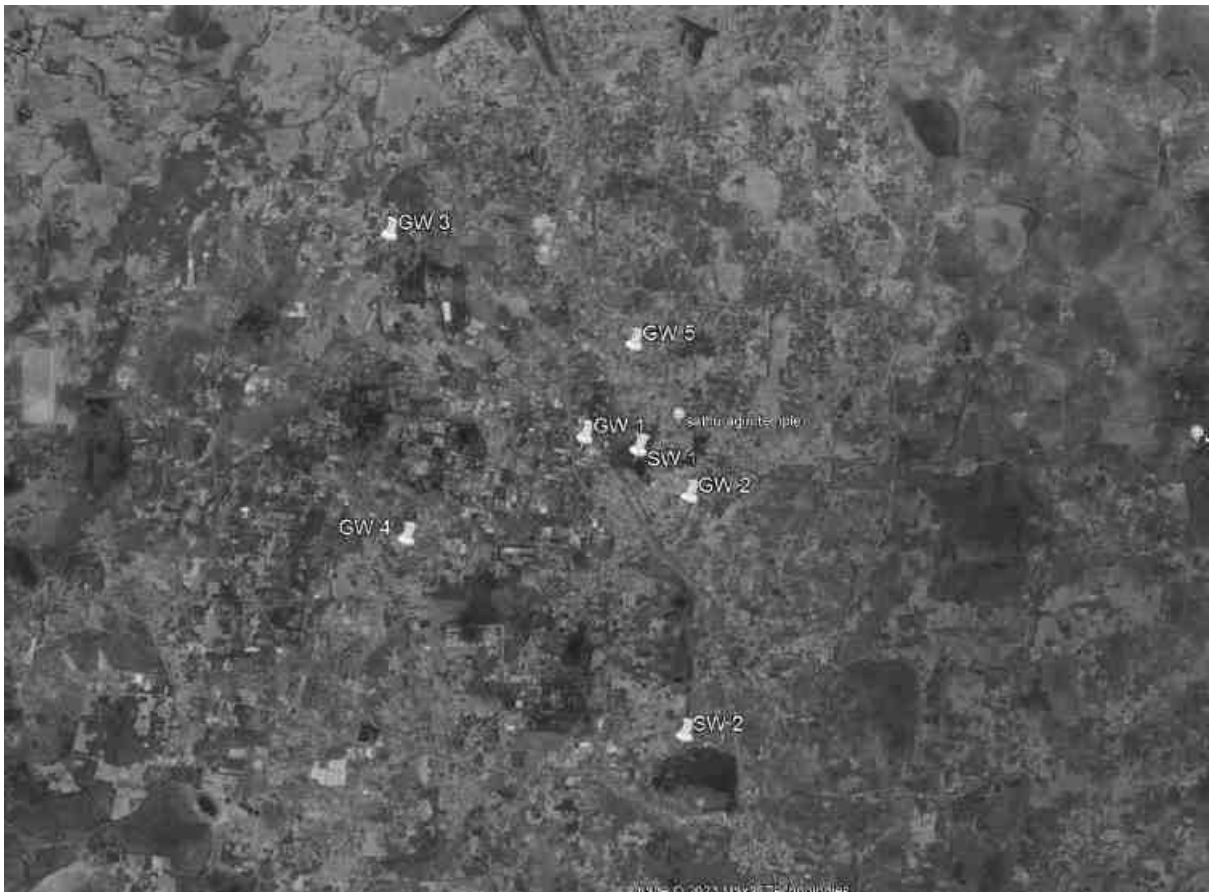


FIGURE 3-4 WATER SAMPLING LOCATIONS

3.5.2 Presentation of Results

The results of the ground water quality are tabulated in **Table – 3.9** and the surface water quality results are tabulated in **Table – 3.10**.

TABLE 3.9 GROUND WATER QUALITY RESULTS

S. No.	Parameters	Unit	Test Method	Limit as per IS 10500	GW1	GW2	GW3	GW4	GW 5
1	Colour	Hazen	APHA 22nd Edition	5	2	3	2	2	3
3	pH at 25°C	-	IS : 3025 Part 11- 1983 (Reaff:2017)	6.5-8.5	7.15	6.63	6.07	7.44	6.27
4	Electrical Conductivity,	µS/cm	IS : 3025 Part 14- 1984 (Reaff: 2012)	Not Specified	1245	239	616	501	2770
5	Turbidity	NTU	IS : 3025 Part 10-1984 (Reaff: 2017)	1	BQL(LOQ:1)	BQL(LOQ:1)	BQL(LOQ:1)	BQL(LOQ:1)	BQL(LOQ:1)
6	Total Dissolved Solids	mg/l	IS : 3025 Part 16-1984 (Reaff: 2017)	500	795	166	424	320	1602
7	Total Suspended Solids	mg/l	IS : 3025 Part 17-1984 (Reaff: 2012)	Not Specified	BQL(LOQ:2)	BQL(LOQ:2)	BQL(LOQ:2)	BQL(LOQ:2)	BQL(LOQ:2)
8	Total Hardness as CaCO3	mg/l	IS : 3025 Part 21-2009 (Reaff: 2014)	200	448	90.9	176	228	878
9	Total Alkalinity as CaCO3	mg/l	IS : 3025 Part 23-1986(Reaff:2014)	200	234	63.3	84.5	150	209
10	Chloride as Cl	mg/l	IS : 3025 Part 32-1988 (Reaff: 2014)	250	166	23.5	96.6	39.1	502

S. No.	Parameters	Unit	Test Method	Limit as per IS 10500	GW1	GW2	GW3	GW4	GW 5
11	Sulphate as SO_4	mg/l	APHA 22ND EDITION - 4500- SO_4^{2-} E	200	149	19.3	39.2	55.7	151
12	Fluoride as F	mg/l	APHA 22ND EDITION - 4500-F B&D	1.0	0.64	0.26	0.43	0.43	0.41
13	Nitrate as NO_3	mg/l	APHA 22ND EDITION - 4500- NO_3^- B	45	7.52	23.1	34.2	7.18	22.2
15	Sodium as Na	mg/l	IS : 3025 Part 45-1993 (Reaff:2014)	Not Specified	129	20.8	67.8	35.2	403
16	Potassium as K	mg/l	IS : 3025 Part 45-1993 (Reaff:2014)	Not Specified	10.8	1.34	6.59	2.39	41.2
17	Calcium as Ca	mg/l	IS : 3025 Part 40-1991 (Reaff:2014)	75	138	22.6	46.9	46.9	219
18	Magnesium as Mg	mg/l	APHA 22ND EDITION	30	25.5	8.35	14.3	26.9	80.3
19	Iron as Fe	mg/l	APHA 22nd EDN -3111 B	0.3	BQL(LOQ:0.1)	BQL(LOQ:0.1)	BQL(LOQ:0.1)	BQL(LOQ:0.1)	BQL(LOQ:0.1)

Source: Eco Tech Labs Pvt Ltd

TABLE 3.10 SURFACE WATER QUALITY RESULTS

S. No.	Parameters	Unit	Test method	Limit as per IS 10500 : 2012	SW1	SW2
1	Colour	Hazen	APHA 22ND EDITION	5	60	40
2	Odour	-	APHA 22ND EDITION	Unobjectionable		
3	Turbidity	NTU	IS : 3025 Part 10-1984 (Reaff: 2002)	1	28.1	7.5
4	pH at 25°C	-	IS : 3025 Part 11- 1983 (Reaff: 2002)	6.5-8.5	7.66	7.78
5	Electrical Conductivity,	µS/cm	IS : 3025 Part 14- 1984 (Reaff: 2002)	Not Specified	523	483
6	Total Dissolved Solids	mg/l	IS : 3025 Part 16-1984 (Reaff: 2003)	500	310	286
7	Total Hardness as $CaCO_3$	mg/l	IS : 3025 Part 21-1983 (Reaff: 1998)	200	32.5	14
8	Total Alkalinity as $CaCO_3$	mg/l	IS : 3025 Part 23- 1986(Reaff:2003)	200	134	121
9	Chloride as Cl	mg/l	IS : 3025 Part 32-1988 (Reaff: 2003)	250	80.2	79.3
10	Sulphate as SO_4	mg/l	APHA 22ND EDITION -4500- SO_4^{2-} E	200	6.79	7.06
11	Fluoride as F	mg/l	APHA 22ND EDITION -4500-F B&D	1.0	0.27	0.36
12	Nitrate as NO_3	mg/l	APHA 22ND EDITION -4500- NO_3^- B	45	10.1	6.82
13	Sodium as Na	mg/l	IS : 3025 Part 45-1993 (Reaff:2003)	Not Specified	75.2	62.6
14	Potassium as K	mg/l	IS : 3025 Part 45-1993 (Reaff:2003)	Not Specified	4.14	3.19
15	Calcium as Ca	mg/l	IS : 3025 Part 40-1991 (Reaff:2003)	75	27.5	24.2
16	Magnesium as Mg	mg/l	APHA 22ND EDITION	30	12.7	14.2
17	Iron as Fe	mg/l	IS : 3025 Part 53-2003	0.3	2.02	0.23
18	Dissolved Oxygen as O_2	mg/l	IS:3025:Part-38:1989 (Reaff:2003)	Not Specified	4.51	2.38
19	Chemical Oxygen	mg/l	IS:3025:Part-58:2006	Not Specified	44.5	60.7

	Demand					
20	Bio-Chemical Oxygen Demand at 27°C for 3 days	mg/l	IS:3025:Part-44:1993 (Reaff:2003)	Not Specified	11.9	16.3

BDL - Below Detection Limit SW1 – , SW2 –

❖ **Observations**

Ground Water

The pH value of the collected ground water in the study area varies between 6.07 to 7.44 and conductivity varies from 239 to 2770 µS/cm. TDS values were found to be from 166 to 1602 mg/L. The Total alkalinity varies from 63.3 to 234 mg/L and Total Hardness varied from 90.9 to 878 mg/L.

The chloride values were found to be in the range 23.5 mg/L to 502mg/L and Sulphate values varies from 19.3 mg/L to 151 mg/L. The Calcium and Magnesium values range from 22.6 to 219 mg/L and 8.35 to 80.3 mg/L respectively.

Surface Water

The pH value of the collected Surface water in the study area is 7.66 & 7.78 and conductivity 483 & 523 µS/cm. TDS values were found to be 286 & 310 mg/L. The Total alkalinity is 121 & 134 mg/L and Total Hardness is 119 & 121 mg/L.

The chloride values were found to be 79.3 & 80.2 mg/L and Sulphate values is 6.79 & 7.06 mg/L. The Calcium and Magnesium are 24.2& 27.5 mg/L and 12.7 & 14.2 mg/L respectively.

3.6 Soil Environment

The present study of the soil quality establishes the baseline characteristics and this will help in future in identifying the incremental concentrations if any, due to the operation of the proposed project. The sampling locations have been identified with the following objectives;

- To determine the baseline soil characteristics of the study area; and
- To determine the impact of proposed project on soil characteristics

3.6.1 Data Generation

For studying soil quality of the region, five (5) sampling locations were selected to assess the soil conditions in and around the project area based on various land use conditions. The physical and chemical concentrations were determined. The samples were collected from different specified depths viz., 30 cm, 60 cm and 90 cm. The samples were analyzed for physical and chemical characteristics. The samples have been analyzed as per the established scientific methods for physio-chemical parameters.

3.6.2 Soil Sampling Locations

The details of the sampling locations selected for soil sampling are given in **Table - 3.11** and shown in **Figure – 3.5.**

TABLE 3.11 DETAILS OF SOIL SAMPLING LOCATIONS

Code	Location	Latitude& Longitude	Direction w.r.t. plant	Distance w.r.t. plant (km)
S1	Project site	13°24'58.95"N 80° 6'58.06"E	Within site	
S2	Sri Kalaimagal Vidya Mandir Matric Hr sec school	13°24'30.91"N 80° 7'49.32"E	SE	1.68
S3	Nagaraja Kandigai	13°26'35.12"N 80° 5'22.83"E	NNW	4.04
S4	Elite Public school	13°24'10.82"N 80° 5'30.99"E	SW	2.91
S5	Madanlal Khemani Vivekananda Vidyalaya School	13°25'42.93"N 80° 7'22.16"E	NE	1.48

Source: Eco Tech Labs Pvt Ltd

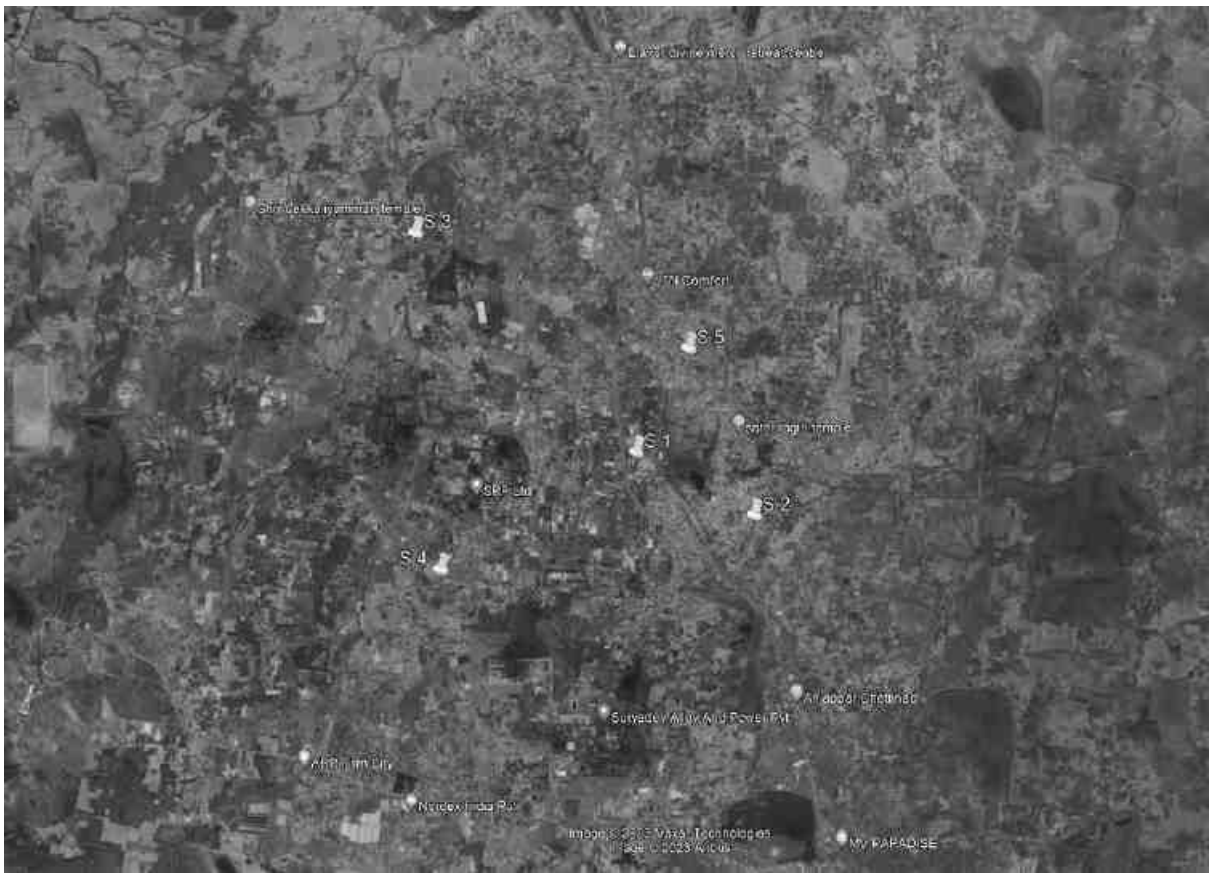


FIGURE 3-5 SOIL SAMPLING LOCATIONS

3.6.3 Baseline Soil Status

The soil quality at all the locations during the study period is tabulated in **Table-3.12.** The results are compared with "Standard Soil Classification" given in **Table-3.13**.

TABLE 3.12 SOIL QUALITY RESULTS

S. No.	Parameters	S1	S2	S3	S4	S5
1	pH (1:5 Soil Suspension)	7.55	7.79	6.56	6.83	7.16
2	Bulk Density, g/cc	1.32	1.27	1.35	1.32	1.3
3	Electrical conductivity, mS/cm (1:5 Soil Suspension)	2.86	0.28	0.11	0.12	0.08
4	Total Nitrogen as N, kg/ha	0.04	0.37	0.36	0.12	0.21
5	Available Phosphorous as P, kg/ha	165	188	192	159	168
6	Available Potassium as K, kg/ha	787	542	399	143	199
7	Exchangeable Calcium as Ca, m.eq/100g	264	125	89.4	35.4	26.2
8	Exchangeable Magnesium as Mg, m.eq/100g	47.4	34.5	9.04	9.83	19.6
9	Exchangeable Sodium as Na, m.eq/100g	943	590	497	329	283
10	Organic matter (%)	3.64	3.52	2.8	2.88	3.34
11	Sand (%)	71.5	80.1	46.2	53.8	63.6
12	Clay (%)	7.14	6.66	15.4	15.4	27.4
13	Silt (%)	21.4	13.3	38.5	30.8	9.09

Source: Eco Tech Labs Pvt Ltd

TABLE 3.13 STANDARD SOIL CLASSIFICATION

S. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Electrical Conductivity (mS/cm)	Upto 1.00 Average 1.01-2.00 Harmful to germination 2.01-3.00 Harmful to crops
3	Organic Carbon (%)	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better > 300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient > 80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better > 360 more than sufficient

❖ ***Observations***

- It has been observed that the pH of the soil was ranging from 6.56 to 7.79 indicating the soils are neutral to slightly alkaline in nature.
- Conductivity of the soil ranges from 0.08 to 2.86 mS/cm indicating the soil in the study area is non-saline in nature.

- Soil organic content varied from 2.8 to 3.64% which indicates average to more than sufficient quantities of organic matter.
- The available nitrogen content ranges between 0.04 to 0.37 kg/ha, indicate in the soil has better quantity of Nitrogen in the locality.
- The value of phosphorus content varies between 159 to 192 kg/ha indicates that the soil has average sufficient quantities of Phosphorus.
- The potassium content varies from 143 to 787 kg/ha which indicates that the soils have sufficient quantities of potassium.

3.7 Ecological Environment

Ecology and Biodiversity is studied for 10 km radius around the project site. Project site is considered as core zone and from radius of 5 km radius, it is considered as buffer zone.

- Primary field survey is carried out for the assessment of flora and fauna
- In addition to that, Secondary data from Journals/Literature were studied and compiled to understand the species present

Survey Purpose and Approach:

The basic purpose is to explore the biological environment under Environment Impact Assessment (EIA) and to assist in the decision-making process and to ensure that the project options under consideration are bio-environmentally friendly. EIA identifies ways of improving project environmentally by preventing, minimizing, mitigating or compensating for adverse impacts before construction and development phase. The present study on the floral & faunal assessment of the proposed project is based on field survey of the area supported by secondary data from various governmental and non-governmental sources.

Objectives of the Study:

The objectives of this study were as follows:

- To conduct detail study for floral/faunal/avifaunal elements in the Study area.
- To assess scheduled species in the Study area (Rare, endangered, critically endangered, endemic and vulnerable).
- Baseline data for the study area along with a description of the existing terrestrial, wetland and aquatic vegetation.

- To identify impact of project on the biological environment, this will be discussed under Chapter 4.

Tools used for field study

- Nail
- String/Ropes,
- Paper,
- Pen,
- Tape &
- Hammer

Monitoring Locations

TABLE 3.14 ECOLOGY & BIODIVERSITY – MONITORING LOCATIONS

S. No	Location	Distance w.r.t. project site	Direction w.r.t. project site
1.	Project site	-	-
2.	Sri Kalaimagal Vidya Mandir Matric Hr sec school	1.68	SE
3.	Nagaraja Kandigai	4.04	NNW
4.	Elite Public school	2.91	SW
5.	Madanlal Khemani Vivekananda Vidyalaya School	1.48	NE

3.7.1 List of Flora in the study area

The list of flora in the study area is given below:

TABLE 3.15 LIST OF FLORA IN THE STUDY AREA

S. No	Scientific Name	Family
1.	Emblica officinalis	Euphorbiaceae
2.	Mangifera indica	Anacardiaceae
3.	Spondias mangifera	Anacardiaceae
4.	Saraca asoca	Caesalpiniaceae
5.	Ficus religiosa	Moraceae

6.	Annona squamosa	Annonaceae
7.	Ziziphus jujuba	Rhamnaceae
8.	Ficus hispida	Moraceae
9.	Semecarpus anacardium	Anacardiaceae
10.	Anacardium occidentale	Anacardiaceae
11.	Helictres isora	Tiliaceae
12.	Anogeissus latifolia	Combrataceae
13.	Ficus carica	Moraceae
14.	Ficus glomerata	Moraceae
15.	Ocimum sanctum	Labiatae
16.	Jatropha gossypifolia	Euphorbiaceae
17.	Jusrtia simplex	Acanthaceae
18.	Jussiaea suffraticosa	Onagraceae
19.	Abutilon indicum	Malvaceae
20.	Mimosa pudica	Mimosaceae
21.	Osimum americanum	Labiataceae
22.	Desmodium trifolium	Fabaceae
23.	Casurina	Casuarinaceae
24.	Melia azadiractha	Meliaceae
25.	Oxalis cornicula	Oxalidaceae
26.	Aegle marmelos	Rutaceae
27.	Aegle marmelos	Rutaceae
28.	Tephrosia purpuria	Fabaceae
29.	Polyalthia longifolia	Annonaceae
30.	Feronia elephantum	Verbanaceae

3.7.2 List of Fauna in the study area

The list of fauna in the study area is given below:

TABLE 3.16 LIST OF FAUNA IN THE STUDY AREA

Sr. No.	Scientific name	Common name	Conservation status as per WPA (1972)
I.Aves			
1	Apus affinis	House Swift	Sch-IV
2	Corvus corvus	Jungle crow	Sch-IV
3	Corvus splendens	House crow	Sch-V
4	Halcyon symyrnensis	White Kingfisher	Sch-IV
5	Ceryle rudis	Pied kingfisher	Sch-IV
6	Columba livia	Rock Pigeon	Sch-IV
7	Bubo bubo	Indian great horned Owl	Sch-IV
8	Copsychus saularis	Magpie Robin	Sch-IV
9	Oriolus oriolus	Indian Oriole	Sch-IV
10	Temenuchus pagodarum	Brahmny Myna	Sch-IV
11	Acridotheres tristicus	Common myna	Sch-IV

12	Ploceus philippinus	Weaver bird	Sch-IV
13	Uroloncha striata	Spotted munia	Sch-IV
14	Passer domesticus	House Sparrow	Sch-IV
15	Megalaima merulinus	Indian Cuckoo	Sch-IV
16	*Eudynamis scolopaceus*	Asian Koel	Sch-IV
17	*Centropus sinensis*	Crow Pheasant	Sch-IV
18	*Psittacula crammeri*	Rose ringed parakeet	Sch-IV
19	*Coracias bengalensis*	Indian Roller	Sch-IV
20	*Merops leschenaultia*	Chestnut headed BeeEater	Sch-IV
21	*Alcedo atthis*	Common Kingfisher	Sch-IV
22	*Fulica atra*	Common Coot	Sch-IV
23	*Caprimulgus asiaticus*	Common Indian jar	Sch-IV
24	*Bubulcus ibis*	Cattle Egret	Sch-IV
25	*Ardeola grayii*	Pond Heron	Sch-IV
II.Reptiles			
1	*Calotes versicolor*	Common garden lizard	Sch-IV
2	*Chameleon zeylanicus*	Indian chameleon	Sch-II
3	*Bangarus caeruleus*	Krait	Sch-IV
III.Butterflies			
1	*Pachliopta hector Lin.*	Crimson rose	Sch-IV
2	*Papilio demoleus*	Lime butterfly	Sch-IV
3	*Junoria almanac*	Peacock pansy	Sch-IV
4	*Hypolimnas bolina*	Great egg fly	Sch-IV
5	*Euploea core*	Common crow	Sch-IV
6	*Neptih hylas moore*	Common sailor	Sch-IV
7	*Eurema hecabe*	Common grass yellow	Sch-IV
IV.Amphibians			
1	*Rana tigrina*	Bull frog	Sch-IV
2	*Bufo malanosticus*	Common Toad	Sch-IV
V.Mammals			
1	*Bandicota indica*	Bandicoot	Sch-IV
2	*Rhinolopus* spp.	Bat species	Sch-IV
3	*Hipposiderus* spp.	Bat species	Sch-IV
4	*Macaca mulatta*	Monkey	Sch-II
5	*Rattus* sp.	Rat	Sch-V
6	*Funambulus* spp.	Palm Squirrel	Sch-IV
7	*Rattus norvegicus*	Field mouse	Sch-V
8	*Lepus nigricollis*	Hare	Sch-IV
9	*Rattus rattus*	House rat	Sch-V

Aquatic Systems

Phytoplankton

Phytoplankton forms the basis of food chain in any aquatic water body. The diversity and abundance of phytoplankton mainly depends on the region, type of water body, either lentic or lotic, the nutrient flux in the system and the amount of sunlight available for photosynthesis. These factors together form the dynamic s of phytoplankton productivity over the seasons. The phytoplankton of given water body determines the zooplankton populations and the fish productivity of the ecosystem.

Phytoplankton group reported from the study area were Basillariophyceae, Chlorophyceae, Myxophyceae and Euglenophyceae members. About 20 species of phytoplankton were reported from all the locations. Dominanc e of Bacillariophyceae members followed by Myxophyceae was observed in studied samples. The highest percentage observed was Ankistrodesmus sp. and Navicula sp. and the lowest percentage observed was Ophora sp and Synedra sp.

Zooplankton

The zooplankton of the aquatic water body are the primary consumers and also in cases secondary producers which play an important role for the fisheries of that system. The diversity and abundance of zooplankton also depends on whether the water body is eutrophic or oligotrophic. About 14 species of zooplankton were reported from all the locations. They also are good representatives of the ecosystem health. The amount and type of pollutants in the water body determine the type of zooplankton species. Species of copepod will usually dominate in the tropical region while more eutrophicated waters with high nutrient or organic loads will harbor high number of crustaceans and arthropods. The less polluted waters will have more of cladocerans and rotifers.

Detailed studies were conducted near to villages, forest blocks and along the highways to identify the common plant species and to identify the presence of any threatened, medic inal and rare plant species in study area.

Among the zooplankton group, Asplancha sp. had highest percentage composition and the lowest percentage composition was of Ceriodaphnia sp. The list of plankton recorded in fresh water bodies in study area during the study period is presented in Table 3.17

TABLE 3.17 List of plankton recorded during study period

S. No.	Phytoplankton	Zooplankton

1	Gyrosigma sp.	Keratella monospina
2	Achananthes affinis	Brachirous caudatus
3	Gyrosigma accuminatus	Asplancha brighwell
4	Pandorina sp.	Colpidium colpoda
5	Ankistrodesmus falcatus	Daphnia sp.
6	Ankistrodesmus sp.	Ceriodaphnia reticulate
7	Pediastrum boryanum	Mesocyclops leuckarti
8	Scenedesmus bijuga	Mesocyclops hyalinus
9	Melosira granulate	Coleps hirsutus
10	Cyclotella meneghiana	Arcella sp.
11	Microcystis sp.	Actinophyros sp.
12	Navicula gracilis	Asplancha sp.
13	Nitzschia gracilis	Ceriodaphnia sp.
14	Chroococcus minutes	Mesocyclops sp.
15	Spirulina princepes	
16	Pinnularia braunii	
17	Synedra tabulate	
18	Ophora sp.	
19	Cymbella sp.	
20	Navicula radiosa	

Fishes

The Arani River is the principle fish catchment areas in the study area. The list of aquatic fauna in the study area is given in Table 3.18.

TABLE 3.18 AQUATIC FAUNA FROM STUDY AREA

S.No.	Local Name	Zoological Name
1	Catla	*Catla catla*
2	Rohu	*Labeo rohita*
3	Mrigal	*Cirrhinus mrigala*
4	Silver Carp	*Thirmethrix molitrix*
5	Grass Carp	*Ctenopheringodon idella*

6	Common Carp	*Cyprinus carpio*
7	Mullet	*M. cunnesius*
8	Catfish	*Macrones Vittatus*

3.7.3 Conclusion

From the field observations it can be concluded that the forests in the study area are under anthropogenic pressure and show signs of degradation in the form of tree cutting, lopping, grazing and collection of Non- timber forest products (NTFPs) and habitat fragmentation. As per MoEF and Forest Department of Tamil Nadu state, there are no Wildlife sanctuaries, National parks/biosphere reserves in 10 km radius from the plant boundary. As per the records of the Botanical Survey of India, there are no plants of conservation importance in the study area. It can be concluded that there are no species belonging to Sch- I, two Sch-II species present in the study area and rest of the species belongs to Sch-III, Sch-IV and Sch-V of Wildlife Protection Act, 1972

3.8 Traffic Density

The traffic studies have been conducted to know the prevailing traffic volumes on the existing roads. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project. The variations of traffic densities depending upon the working days and time and also varies in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at three locations for 24 hours.

3.8.1 Methodology

3.8.1.1 Vehicle Count

The vehicles passing through the road (in both ways) was counted separately for 24 hours at the three selected locations from 0600 hrs to 0600 hrs of next day continuously. Category-wise vehicle counting has been done continuously and recorded in the traffic volume count on hourly basis under respective categories.

3.8.1.2 Categorization of Traffic

The engine driven vehicles were categorized into various heads viz. Multi Axle Vehicles, Trucks/Bus, Light Motor Vehicles (LMV), Two, Three Wheelers and others.

3.8.2 Sampling Locations

Traffic locations are represented in **Table-3.19.**

FIGURE 3-6 ROAD CONNECTIVITY

TABLE 3.19 DETAILS OF TRAFFIC MONITORING LOCATIONS

Location Code	Location Details	Distance w.r.t site (km)	Direction w.r.t site
T1	AH-45-Srinagar - Kanyakumari	Adjacent to site	W

3.8.3 Presentation of Results

The hourly vehicular traffic densities for continuous normal day at each location observed during the study period and the same are presented in **Table - 3.20 & 3.21.**

TABLE 3.20 TRAFFIC DENSITIES

Location Number : T1

Details of Location : AH-45-Chennai – Kolkatta Highway

AH45 Road			
Six Lane One way			
Time	**Two Wheelers**	**Four Wheelers**	**Six Wheelers**
	(Motorcycle, Scooter etc.)	**(Passenger cars, Pickup vans etc.)**	**(Light commercial vehicles, Trucks etc.)**
07.00 - 07.30 Hrs	630	580	390
07.30 - 08.00 Hrs	581	620	371
08.00 - 08.30 Hrs	669	610	257
08.30 - 09.00 Hrs	585	587	373
09.00 - 09.30 Hrs	593	461	362
09.30 - 10.00 Hrs	475	518	351
10.00 - 10.30 Hrs	528	524	348
10.30 - 11.00 Hrs	567	635	343
Item Total	4628	4535	2795
M. Factor	0.75	1	1.2
PCU	3471	4535	3354
Total No. of PCUs (For 4 Hrs)	11360		
Total No. of PCUs/Hr (Avg.)	2840		

AH 45 Road			
Six Lane One way			
Time	**Two Wheelers**	**Four Wheelers**	**Six Wheelers**
	(Motorcycle, Scooter etc.)	**(Passenger cars, Pickup vans etc.)**	**(Light commercial vehicles, Trucks etc.)**
07.00 - 07.30 Hrs	697	652	523
07.30 - 08.00 Hrs	675	596	576
08.00 - 08.30 Hrs	578	518	612
08.30 - 09.00 Hrs	520	671	532
09.00 - 09.30 Hrs	638	681	584
09.30 - 10.00 Hrs	551	657	568
10.00 - 10.30 Hrs	619	662	610
10.30 - 11.00 Hrs	586	574	528
Item Total	4864	5011	4533
M. Factor	0.75	1	1.2
PCU	3648	5011	5440
Total No. of PCUs (For 4 Hrs)	14099		
Total No. of PCUs/Hr (Avg.)	3525		

Existing Traffic Load in AH 45 Main Road (PCUs)	**Increase in Vehicular Population due to the Proposed Residential Development (PCUs)**	**Estimated Future Traffic Volume in PCUs (V)**	**Capacity of Existing Road in PCUs per Hour as per IRC 106-1990 (C)**	**V/C Ratio**

MP-2840, EP-3525	260 PCU	MP-3100, EP-3785	5400 PCU	0.70

The proposed project consists of Six- Lane one -way traffic.

The capacity of road for Urban Arterial Two-lane road as per IRC 106-1990 = 5400 PCU. The existing traffic flow in the road is 3525 PCU/hour and estimated future traffic volume in PCU is 3785 and hence it is well below the capacity of existing road. Driveway is provided within the project site for the internal movements of vehicles without traffic congestion. The site will be completely barricaded with compound wall to prevent the mitigate the noise from movement of vehicles in the nearest road. In addition, two-tier tree belt is provided along the periphery of the project site to prevent noise and air pollution.

Source: Eco Tech Labs India Private Limited

3.9 Geology and Hydrogeological Aspects

3.9.1 Geology

The Thiruvallur district can be geologically classified into hard rock and sedimentary (alluvial) formation. This district is principally made up of Archaean, upper Gondwana and the tertiary formations. These are over laid by laterites and alluvium. The oldest of the crystalline rocks of Archaean age are of Biotite and Hornblende Gneiss, Charnockite and granite. These are intruded by Amphibole dykes, and occasionally with veins of quartz and pegmatites. Granites and gneisses of Archaean age are mainly seen in Tiruthanitaluk. These crystalline rocks have under gone weathering to variable extent.

Source: District Survey Report

3.9.2 Geomorphology

The prominent geomorphic units identified in the district through interpretation of Satellite imagery are 1) Alluvial Plain, 2) Old River Courses 3) Coastal plains 4) Shallow & deep buried Pediments, 5) Pediments and 6) Structural Hills. The elevation of the area ranges from 183 m amsl in the west to sea level in the east. Four cycles of erosion gave raise to a complex assemblage of fluvial, estuarine and marine deposits. The major part of the area is

characterised by an undulating topography with innumerable depressions which are used as irrigation tanks. The coastal tract is marked by three beach terraces with broad inter-terrace depressions. The coastal plains display a fairly lower level or gently rolling surface and only slightly elevated above the local water surfaces or rivers. The straight trend of the coastal tract is resultant of development of vast alluvial plains. There are a number of dunes in the coastal tract. **Figure-3.7.**

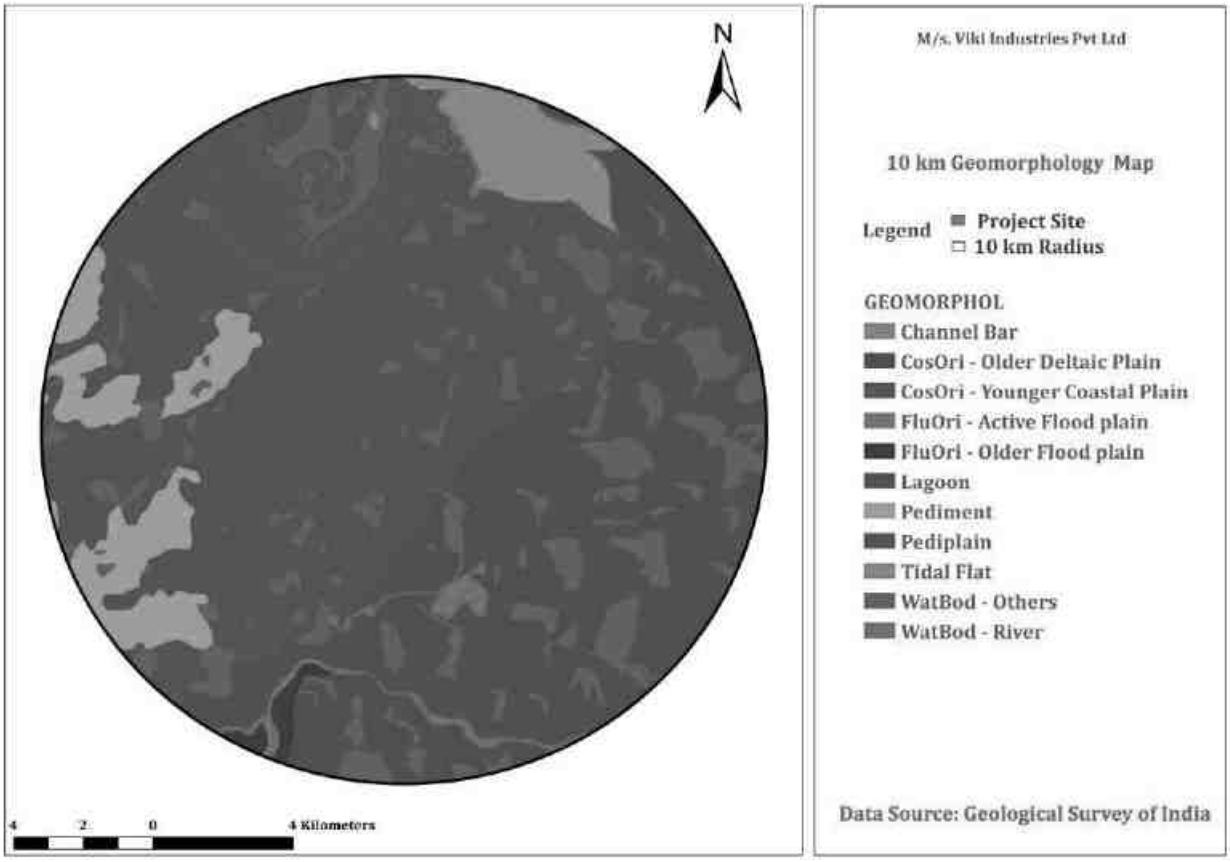


FIGURE 3-7 GEOMORPHOLOGY OF THIRUVALLUR DISTRICT WITH SITE LOCATION

3.9.3 Soil

Soils in the area have been classified into i) Red soil ii) Black soil iii) Alluvial soil iv) colluvial soil. The major part is covered by Red soil of red sandy/clay loam type. Ferrugineous red soils are also seen at places. Black soils are deep to very deep and generally occurs in the depressions adjacent to hilly areas, in the western part. Alluvial soils occur

along the river courses and eastern part of the coastal areas. Sandy coastal alluvium (arenaceous soil) are seen all along the sea coast as a narrow belt.

3.9.4 Hydrogeology

The district is underlain by both porous and fissured formations. . The important aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and ii) weathered, fissured and fractured crystalline rocks. The porous formations in the district include sandstones and clays of Jurassic age (Upper Gondwana), marine sediments of Cretaceous age, Sandstones of Tertiary age and Recent alluvial formations. As the Gondwana formations are well-compacted and poorly jointed, the movement of ground water in these formations is mostly restricted to shallow levels. Ground water occurs under phreatic to semi-confined conditions in the inter-granular pore spaces in sands and sandstones and the bedding planes and thin fractures in shales. In the area underlain by Cretaceous sediments, ground water development is rather poor due to the rugged nature of the terrain and the poor quality of the formation water. Quaternary formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district. The maximum thickness of alluvium is 30.0 m. whereas the average thickness is about 15.0 m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Alluvium, which forms a good aquifer system along the Araniyar and Korattalaiyar river bed which is one of the major sources of water supply to urban areas of Chennai city and also to the industrial units. Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fissured and fractured zones at deeper levels. The thickness of weathered zone in the district is in the range of 2 to 12 m. The depth of the wells ranged from 8.00 to 15.00 m bgl. The yield of large diameter wells tapping the weathered mantle of crystalline rocks ranges from 100 to 500 lpm and are able to sustain pumping for 2 to 6 hours per day. The yield of bore wells drilled down to a depth of 50 to 60 m ranges from 20 to 400 lpm. The yield of successful bore wells drilled down to a depth of 150 m bgl during the ground water exploration programme of Central Ground Water Board ranged from 1.2 to 7.6 lpm. The depth to water level in the district varied between 2.38 – 7.36 m bgl during pre-monsoon (May 2006) and 0.79 – 5.30 m bgl during post monsoon (Jan 2007). The seasonal fluctuation shows a rise between 0.28 and

4.80 m bgl. The piezometric head varied between 2.20 to 10.30 m bgl (May 2006) during premonsoon and 2.72 to 8.55 m bgl during post monsoon.

3.9.5 Drainage

Araniyar, Korattalayar, Cooum, Nagari and Nandhi are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. Korattaliar river water is supplied to Cholavaram and Red Hill tanks by constructing an Anicut at Vellore Tambarambakkam. After filling a number of tanks on its further course, the river empties into the Ennore creek a few kilometres north of Chennai. The Cooum river, flowing across the southern part of the district, has its origin in the surplus waters of the Cooum tank in Tiruvallur taluk and also receives the surplus waters of a number of tanks. It feeds the Chembarambakkam tank through a channel. It finally drains into the Bay of Bengal. The drainage pattern and nearest water bodies are shown in **Figure -3.8.**

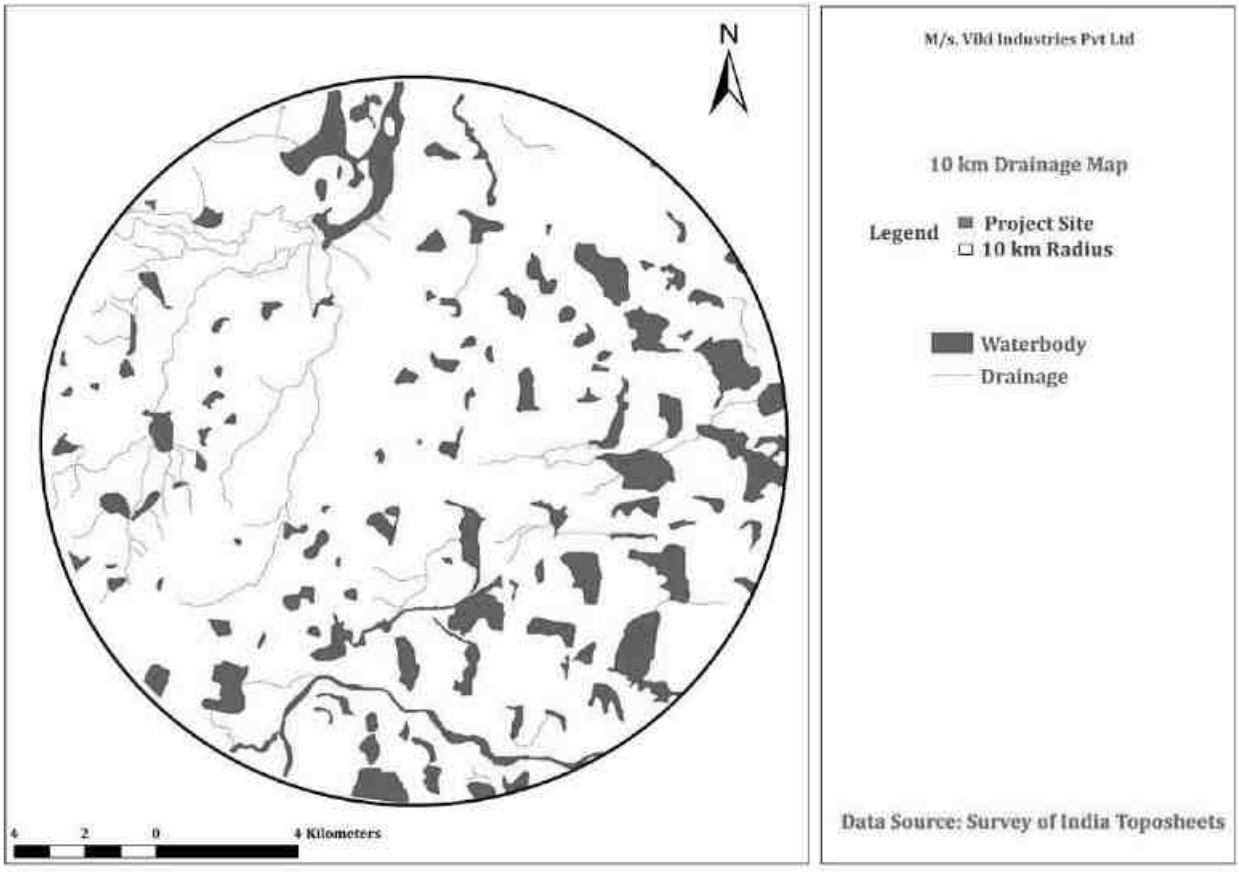


FIGURE 3-8 DRAINAGE PLAN AROUND 10 KM RADIUS

3.10 Land Use Studies

3.10.1 Objectives

The objectives of land use studies are:

- To determine the present land use pattern;
- To analyze the impacts on land use due to the proposed plant site in the study area;
- To give recommendations for optimizing the future land use pattern and associated impacts.

3.10.2 Land use pattern based on remote sensing data

Remote sensing satellite imageries were collected and interpreted for the 10-km radius study area for analyzing the land use pattern of the study area. Based on the satellite data, Land use/ Land cover maps have been prepared.

3.10.2.1 Land use / Land cover classification system

The present land use / land cover maps were prepared based on the classification system of National standards.

3.10.2.2 Data requirements

IRS-P6 Geo-Coded FCC on 1:50000 scale of LIS IV acquired during January 2023 and was used for the mapping and interpretation. Besides, other collateral data as available in the form of maps, charts and census records other reports and especially topographical survey of India maps on 1:50000 scale are used. In addition to this, ground truth survey was also conducted to verify and confirm the ground features.

3.10.2.3 Methodology

The methodology adopted for preparation of Land use/ land cover thematic map is monoscopic visual interpretation of geo coded scenes of IRS-P6 Satellite LIS-IV and field

observations are aken. The various steps involved in the study are preparatory field work, field survey and post field work.

3.10.2.4 Pre field Interpretation of Satellite Data

The False Color Composite (FCC) of IRS-P6 satellite data at 1:50000 scale is used for pre field interpretation work. Taking the help of toposheets, geology, geomorphology and by using the image elements the features are identified and delineated the boundaries roughly. Each feature identified on the image by their image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of Land Use/Land cover, Physiography and erosion was formulated. The sample areas for field check are selected covering all the physiography, land use/Land cover feature cum image characteristics.

- **Ground Truth Collection**

Both topo sheets and imagery were taken for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as possible to observe the broad Land use features and to adjust the sample areas according to field conditions. Detailed field observations and investigations were carried out and noted the land use features on the imagery.

- **Post Field Work**

The base maps of the study area were prepared, with the help of Survey of India toposheets on 1:50000 scale. Preliminary interpreted land use and the land cover featuers boundaries from IRS-P6 False color composite were modified in light of field information and the final thematic details were transferred onto the base maps. The final interpreted and classified thematic map was cartographed. The cartographic map was coloured with standard color coding and detailed description of feature with standard symbols. All the classes noted and marked by the standard legend on the map.

3.10.2.5 Final Output

The final output would be the land use/land cover map on 1:50000 scale, numerals were given different colour code for each category as shown in map. Area estimation of all features of land use/land cover categories was noted.

3.10.2.6 Observations

The following are the main interpreted land use / land cover classes of the study area and their respective areas are given in hectares in **Table – 3.21**. The land use / land cover map within 10-km radius is shown in **Figure – 3.9.**

TABLE 3.21 LAND USE PATTERN OF STUDY AREA

S. No.	Land use	Area (Sq.km.)	Percentage (%)
1.	Water Body	10.23	3.2
2.	Trees	9.47	3
3.	Grass	1.05	0.4
4.	Flooded Vegetation	1.23	0.4
5.	Crops	223.53	69.7
6.	Scrub/Shrub	28.27	8.9
7.	Built-up Area	46.82	14.6
8.	Barren Land	0.31	0.1
	Total Area	**320.91**	**100**

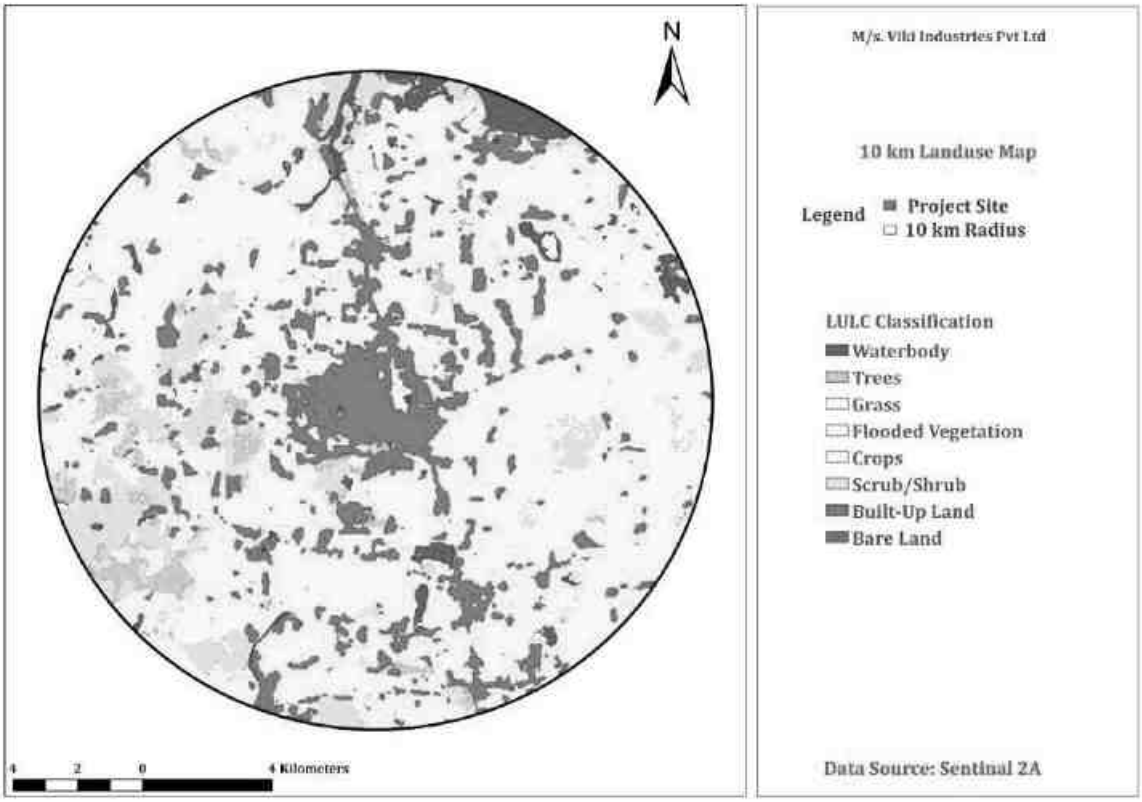


FIGURE 3-9 LAND USE/LAND COVER MAP AROUND 10 KM RADIUS

3.11 Demography and Socio-economics

For assessing the prevailing socio-economic aspects of people in the study area around the proposed plant, the required data has been collected from various secondary sources and analyzed.

3.11.1 Methodology Adopted for the Study

The methodology adopted for the study is primarily based on the review of secondary data, such as District Primary Census Statistical Handbook of Thiruvallur District, 2011 for the parameters of demography, occupational structure of people within the study area of 10-km radius around the proposed plant. The village wise demographic data as per 2011 census is presented in **Annex - 3**. The salient features of the demographic and socio-economic aspects of the study area are described in the following sections.

3.11.2 Demographic Aspects

❖ ***Distribution of Population***

As per 2011 census the study area consisted of 143893 persons inhabited in the 10 km radius study area. The distribution of population in the study area is shown in **Table-3.22.** The males and females constitute about 72076 and 71817 of the study area.

TABLE 3.22 DISTRIBUTION OF POPULATION IN STUDY AREA - 2011

1. Particulars	General Study Area
No. of Households	38100
Male Population	72076
Female Population	71817
Total Population	143893

Source: District Primary Census Hand Book – Tiruvallur District, 2011

❖ ***Sex Ratio***

The configuration of male and female indicates that the males and females constituted about 50% and 50% of the total population respectively, as per 2011 census records.

3.11.3 Social Structure

In the study area, as per 2011 census, 27% of the population belonged to Scheduled Castes (SC) and 3% to the Scheduled Tribes (ST). The distribution of population in the study area by social structure is shown in **Table-3.23.**

TABLE 3.23 DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE - 2011

S. No.	Particulars	Population	Percentage (%)
1	Scheduled Castes	39031	27
2	Scheduled Tribes	3943	3
	Total	**42974**	**30**

Source: District Primary Census Hand Book – Thiruvallur District, 2011

3.11.4 Literacy Levels

The analysis of the literacy levels in the study area reveals a moderate literacy rate in the study area. The litrecy rate of the study area is ------% in 2011. If this is computed only for the people of above the age group of 5 years, i.e. the school going age people, this would considerably increase the literacy rates. The distribution of literates and literacy rates in the study area is given in **Table-3.24.**

TABLE 3.24 DISTRIBUTION OF LITERATES AND LITERACY RATES - 2011

S. No.	Particulars	Study Area
1	Total Literates	93731
2	Average Literacy Rate (%)	100
3	Male Literates	52077
4	Male Literacy (%)	56
5	Female Literates	41654
6	Female Literacy (%)	45

Source: District Primary Census Hand Book – Thiruvallur District, 2011

3.11.5 Occupational Structure

The occupational structure of the study area is presented in **Table-3.25.**

TABLE 3.25 OCCUPATIONAL STRUCTURE – 2011

S. No.	Occupation	Study Area	
		Population	**Percentage (%)**
1	Total main workers	63996	100
	Male	43499	68
	Female	20497	32
2	Marginal workers	15653	100
	Male	7989	51
	Female	7664	49
3	Non-workers	79897	100
	Male	28577	36
	Female	51320	64
Total Population		**159546**	

Source: District Primary Census Hand Book – Thiruvallur District, 2011

4 ANTICIPATED ENVIRONMENT IMPACTS & MITIGATION MEASURES

4.1 Introduction

This chapter presents identification of impacts and appraisal of various impacts due to the proposed expansion on the surroundings and proposed mitigation measures to minimize the adverse impacts. The impacts have been studied for the proposed expansion project, taking into account that the pollution due to the activities has already been covered under baseline environment monitoring and will continue to remain same during the operation of the project.

Impact assessment describes identification and appraisal of various impacts due to the proposed expansion. "Environment Impact" can be defined as any alteration of environment conditions or creation of a new set of environment conditions, adverse or beneficial, caused or induced by the action or set of actions under consideration.

Generally, the environment impacts can be categorized as either primary or secondary.

- Primary impacts are those, which are attributed directly by the project,
- Secondary impacts are those, which are indirectly induced and typically include the associated investment and changed patterns of social and economic activities by the proposed action.

Mitigation is the implementation of measures designed to reduce the undesirable effects of the proposed expansion on the environment. For mitigation to be effective the following factors should be taken care of

- The measure proposed must be achievable within time, resources and capabilities
- The mitigation measures must correspond to impacts
- Funding must be adequate over the life of the activity
- Preventive mitigation is usually cheapest and most effective. It must be done at design stage.

4.2 Identification of Impacts & Mitigation Measures

The construction and operation of the proposed expansion comprises various activities each of which may have an impact on some or other environment parameters. Various impacts during the construction and operation phase on the environment parameters have been studied to estimate the impact on the environment and are elaborated in the subsequent sections.

4.3 Impacts during Construction Phase

For the proposed expansion, the construction activity is temporary and the impact during the construction phase will be short term. This includes the activities related construction of infrastructures like plant facilities for the proposed machineries and installation of equipment during constructional phase will have varying impacts on the following attributes.

4.3.1 Topography

a. Impact

The topography of the project site is plain without any undulations. No major levelling would be required for the proposed construction. During construction of foundation, excavated top soil will be removed which may be lost. Thus, the impact during the construction is reversible, short term and insignificant.

b. Mitigation Measures

During construction, excavated topsoil will be conserved and reutilized for gardening/landscape development. The development being proposed on a flat terrain, there will not be any significant impact on the topography. However, the existing topography will be maintained during construction for the proposed plant.

4.3.2 Land use

a. Impact

The proposed expansion will be developed within the existing land. Moreover, the land use classification is industrial land use. No felling of timber yielding trees except some bushes and shrubs which will be cleared for construction of proposed buildings. Thus, the overall impact on land use will be Nil.

b. Mitigation Measures

It will be developed greenbelt in 31 % of the total site area covering all along the plant boundary as well as vacant places to control the pollution within the plant premises and improve the aesthetics of the area.

4.3.3 Drainage Pattern

a. Impact

The overall terrain of the project site will be changed by the construction of buildings and this will bring moderately significant change in the existing pattern of surface drainage. The change of surface drainage will lead to increase the run-off water during monsoon season. Mainly, the impact will arise from the creation of impermeable surfaces (roofs, pavements, etc.) which results in reduction of percolation.

b. Mitigation Measures

Adequate rain water harvesting system is proposed in the plant as detailed in EMP. Rainwater harvesting structures will prevents the flooding of low-lying areas in the project premises. A basic surface drainage system can be provided for the site to avoid water runoff on to the surrounding properties and roads, especially during the monsoon.

4.3.4 Material Transportation

a. Impact

The various materials required for construction (e.g. Steel, Blocks, Cement, Stones, Asphalt, etc.) will be obtained from sources elsewhere and transported to the site. Transportation of these materials, typically in over-laden and sometimes uncovered trucks, usually results in undue road wear-and tear. In the case of fine earth materials, dusting and spillages occur on the roadways between source and site. Dusting degrades local air quality and material spillages worsen road-driving conditions and increase the risk of road accidents. These occurrences represent indirect, short-term, reversible, negative impacts on public health and safety related to the project.

b. Mitigation Measures

- All fine earth materials should be covered during transportation to the site to prevent spillage and dusting.

- Trucks used for that purpose on the project should be fitted with tailgates that close properly and with tarpaulins to cover the materials.
- The cleanup of spilled earth and construction material on the main roads should be the responsibility of the contractor and should be done in a timely manner (say within 4 hours) so as not to inconvenience or endanger other road users.
- Transportation of lubricants and fuel to the site should only be done in the appropriate vehicles and containers, i.e. fuel tankers and sealed drums.
- As far as possible, transportation of construction materials should be scheduled for off-peak traffic hours. This will reduce the risk of traffic congestion and of road accidents on the access roads to the site.

4.3.5 Soil Quality

a. Impact

The soil at the plant site predominantly consists of Red Loam. Moreover, the site is plain, it may not require any filling and leveling, but just grading the site may be enough to start the construction. Topsoil loss is envisaged from the project as new buildings are proposed to construct. Apart from much localized construction impacts at the plant site, no significant adverse impact on soil in the surrounding area is anticipated.

b. Mitigation Measures

The following mitigation measures shall be adopted for soil and land environment:

- Greenbelt development and related activities shall be taken up during construction phase itself, so that plantation will grow to adequate height by the time of plant commissioning. Thus, greenbelt will be effective in containing the fugitive emissions during operation;
- After completion of the construction, the surplus earth shall be utilized to fill up the low-lying areas, the debris shall be cleared and all un-built surfaces will be reinstated;
- Species selected in this plantation shall be fast growing and they shall be adaptable to local conditions. Their ability to combat localized pollution is the prime factor for their selection and placement in the planting grid/pattern. Most of the varieties shall be eco-friendly i.e. generate lot of oxygen while helping reduce/absorb gases and dust;
- There shall be minimum concreting of the top surfaces so that there is a scope for maximum ground water recharge due to rainfall; and

- Plantation outside the plant premises, in the nearby villages shall be encouraged by supplying free saplings to the villagers.

4.3.6 Air Quality

a. Impact

The various activities include during construction phase such as drilling, foundation, deployment of machinery, erection, transportation, dumping will cause dust and gaseous emissions. These emissions are expected to result in change in baseline air quality, primarily in the working area and cause immediate effect on the construction workers. The particulate matter will be the main pollutant from the above activities. Further, concentration of NO_2 and CO may also slightly increase due to increased vehicular traffic movement. However, the increase in ambient concentrations of air quality will be negligible and short term. As most of the construction equipment will be mobile, the emissions are likely to be fugitive. The impacts will be localized in nature and the areas outside the project boundary are not likely to have any major adverse impact with respect to ambient air quality.

b. Mitigation Measures

During dry weather conditions, it is necessary to control the dust generated by excavation and transportation activities. This will be achieved by regular water sprinkling. There will not be any concentration of emissions at any single point. It shall be ensured that both gasoline and diesel-powered construction vehicles are properly maintained to minimize smoke in the exhaust emissions. Additional recommendations include the following:

- Sprinkling of water shall be done at frequent intervals by preferably using truck-mounted sprinklers;
- Sprinkling of water shall be done along the roads and work zone areas to reduce the fugitive dust;
- All machineries to be used for construction purpose will be of highest standard of reputed make and company will emphasize compliance of noise pollution control norms by these equipments.
- Construction equipment shall be maintained and serviced regularly such that the gaseous emissions from this equipment are maintained within the design specifications; and

- Since temporary electrical power is possible in the proposed plant, attempts shall be made to utilize the electrically powered machinery to the extent possible to minimize the emissions of SO_2 and NO_2 during construction.

4.3.7 Water resources and quality

a. Impact

The water requirement during construction phase is estimated at 10 - 15 m^3/day. The water requirement will be sourced from SIPCOT. The wastewater generation during the construction period will be from the sanitary units provided for the workers. This waste will be treated in the proposed septic tanks / mobile STP and discharged into soak pits. Hence, there will not be any impact on the water regime due to discharge of sanitary treated wastewater.

b. Mitigation Measures

The earthwork (cutting and filling) will be avoided during rainy season and will be completed during summer season. Stone pitching on the slopes and construction of concrete drains for storm water to minimize soil erosion in the area will be undertaken. Also, development of green belt in and around plant will be taken up during the monsoon season and in-plant roads will be paved.

4.3.8 Noise Environment

a. Impact

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, pumps, compressors, pneumatic tools, saws, vibrators etc. The operation of these equipments will generate noise ranging between 85-90 dB(A) near the source at 1-m distance. These noises will be generated within the plant boundary and will be transient in nature.

b. Mitigation Measures

Equipment will be maintained appropriately to keep the noise level within 85- 90 dB (A). Wherever possible, equipment will be provided with silencers and mufflers. Construction activities will be restricted to day time only. Greenbelt will be developed from construction stage. Further, workers working in high noise areas will be provided with necessary

protective devices e.g. ear-plug, ear-muffs, etc.

4.3.9 Ecology

a. Impact

Dust emissions from the construction activity will affect the plant and animal respiration activity. Construction activities change the natural environment. Emissions such as PM, NOx, SOx from D.G sets and other equipment / vehicles may also cause respiration problem for the surrounding organisms. The anticipated impact on biological environment (both terrestrial and aquatic) is very low magnitude, short term and overall impact on biological environment is insignificant.

b. Mitigation Measures

The dust emissions will be suppressed by spraying water. Emissions from D.G sets and vehicles will be minimized by proper maintenance and by avoiding use of adulterant fuels and will be maintained below the standard limits prescribed by competent authority.

4.3.10 Socio Economic Condition

The impact of construction of the proposed expansion project would be both positive and negative impact on Socio-Economic Environment. The beneficial impacts are significant, short term as well as long term and regional level. Whereas, the adverse impacts will be extended either within the site or extent to immediate vicinity only and it will be short term, low magnitude. The mitigation measures may prevent the adverse impact on human environment.

a. Positive Impacts

- Income to the Equipment and Material suppliers
- This project will promote the procurement of equipment and machineries for various activities involved during the construction phase.
- Procurement of material suppliers for various activities involved in the construction phase which will also promote economic growth of local material suppliers in and around the proposed Project site.
- Proposed project will create employment opportunities to the local people present around the Project Site.

b. Negative Impacts

- During construction phase of the proposed project the employers are subject to Health and Safety Risks.
- At the project site direct exposure to dust generation and high noise generation sources will cause occupant health related impact such as asthma, bronchitis and noise induced hearing loss, etc.

c. Mitigation Measures

- To eradicate the Health and Safety risks to the employees Personal Protective Equipment will be provided
- Ensuring good housekeeping and cleaning operations
- Proper on-site sanitation facilities will be provided for the employees
- The wastewater generated during construction phase will be treated in the proposed septic tank / mobile STP.

4.4 Impacts during Operational Phase

The envisaged operation that will impact the environment would be the production activities of the proposed expansion. Activities related to the operational phase will have varying impacts on the following attributes:

- Land use;
- Air quality;
- Water quality;
- Noise levels;
- Soil;
- Ecology; and
- Demography and socio-economics.

4.4.1 Land use

The impact on the land use during the operational phase of the proposed expansion will not be distinct as there will be no major change after completion of the construction activities. Moreover, the proposed project land is under the ownership of project proponent and the land

use classification is industrial land use. Hence, any additional impact on land use will be insignificant.

4.4.2 Air Quality

a. Impact

Being a steel plant, the main source of air pollution is Induction Furnaces, Reheating Furnace and standby DG Sets. The major pollutant envisaged from the above sources is Particulate Matter (PM). Along with above gaseous pollutants like Sulphur dioxide (SO_2) and Nitrogen dioxide (NO_2) are also envisaged to increase due to the Reheating Furnace, DG sets operation along with increased vehicle movement. The sources of air pollution have been identified and quantified to predict the impact of proposed project on air quality.

4.4.2.1 Mathematical Modeling - AERMOD

Prediction of impacts on air environment has been carried out by employing a mathematical model. In the present case, Dispersion modeling of approved substances was performed in accordance with the Air Quality Model Guidelines developed by USEPA. These guidelines ensure consistency in the use of dispersion models in air quality assessments.

A new generation dispersion model AERMOD recommended by USEPA as a replacement of ISCST3, was selected for this project. Emission rates of substances were used as AERMOD input values to obtain the maximum Ground Level Concentration (GLC) and two-dimensional concentration distribution for each of the modeled substances around the plant. The computations deal with major pollutants like Particulate Matter (PM10 & PM2.5), Sulphur dioxide and Oxides of Nitrogen.

The AERMOD dispersion model is a steady-state Gaussian plume model that can be used to assess pollutant concentrations and/or deposition fluxes from a wide variety of sources associated with an industrial source complex. The EPA's Regulatory Model Improvement Committee (AERMIC) developed AERMOD specifically as a replacement for previous generation dispersion model ISCST. AERMOD is intended to use hourly averaged meteorological data sequentially through at least one year, although 5-year meteorological data is desired. AERMOD includes improved treatment of the atmospheric boundary layer

and a more complete understanding of diffusion processes. EPA refers to AERMOD as "state-of-the practice".

The AERMOD can use measured values of horizontal and vertical turbulence directly in calculating diffusion. This capability is a significant improvement over ISCST model because it replaces the empirically derived Pasquill-Gifford-Turner stability categories (A through F) with direct measurements. This provides a much more accurate approach to diffusion estimation. This capability is not available unless the turbulence parameters are measured. AERMOD includes a new computational method for evaluating the effects of building downwash on stack emissions with the algorithm PRIME. This algorithm is more accurate than the previously used ISCST model. When comparing the results of the old algorithms with PRIME, some situations may see significant decreases in model concentrations, while others may see increases. The AERMOD model was designed to support the U.S. EPA regulatory modelling options, as specified in the EPA Guidelines on Air Quality Models (Revised). This model is considered as a supporting tool for ambient air quality regulations across the world.

Model Options used for Computations

The options used for short-term computations are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer;
- Stack tip down wash is not considered;
- Buoyancy induced dispersion is used to describe the increasing plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents are used by default, 'Irwin';
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physicochemical transformations and that there is no pollutant removal by dry deposition;
- Washout by rain is not considered; and
- Cartesian co-ordinate system has been used for computations.

4.4.2.2 Model Input Parameters

Emission Sources

The primary pollutants from the stack/point sources are the particulates which are emitted from stacks within the facility. The SO_2 and NOx are also emitted from stacks whenever they are in operation. Based on the manufacturers and client information, all stack meets the corresponding emission limits. The names of primary point emission sources, emission parameters and stacks/vents dimensions are listed in **Table – 4.1**.

TABLE 4.1 DETAILS OF ADDITIONAL STACK EMISSIONS

S. No.	Stack attached to	Units	Induction Furnace – 15 Tons with 2 crucibles	Reheating Furnace (15 Ton)	DG Set – 500 KVA	DG Set – 500 KVA
1	Stack Height	m	30	30	4	4
2	Stack Diameter	m	1.00	1.00	0.30	0.30
3	Temperature	^oC	80	100	150	150
4	Velocity	m/s	11	10.5	15	15
5	Flow Rate	m^3/hr	33,900	33,900	3,815	3,815
6	Particulate Matter	mg/Nm^3	50	50	50	50
		g/s	0.47	0.47	0.05	0.05
7	Sulphur Dioxide	mg/Nm^3	-	-	-	-
		g/s	-	0.06	0.06*	0.06*
8	Nitrogen Dioxide	mg/Nm^3	-	350	150	150
		g/s	-	3.3	0.16	0.16

Source: Viki Industries Private Limited

Traffic Sources

It is anticipated there would be increase in traffic for shipment of raw materials and finished to and from the facility. About 100 numbers of trucks/day are anticipated upon full operation of the proposed plant. The traffic movement would be along the main roadways and therefore any traffic congestion due to the movement of trucks is not anticipated. The emission factors used to estimate the corresponding emissions from the movement of trucks are given in **Table-4.2.**

TABLE 4.2 AVERAGE EMISSION RATES FOR HEAVY DUTY VEHICLES

Pollutant of Concern	Emission Factor (g/km)
PM_{10}	0.14
$PM_{2.5}$	0.13
SO_2	0.01
NO_X	5.38

Ref: USEPA, MOVES2010b

In order to estimate the incremental increase in the ambient air quality, the above-mentioned sources (point and traffic sources) were combined.

Meteorological Input Data

The hourly meteorological data recorded at site is converted to the mean hourly meteorological data as specified by CPCB and the same has been used in the model. Hourly mixing heights are taken from the "Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India" published by India Meteorological Department, New Delhi.

4.4.2.3 Modeling Results

Modeling results consist of maximum concentrations (in $\mu g/m^3$) for each of the modeled substances. The concentration isopleths are shown in **Figure – 4.1 to 4.4** and the summary of dispersion modeling results for each of the selected substances is given in **Table - 4.3**.

TABLE 4.3 SUMMARY OF DISPERSION MODELING RESULTS

S. No.	Pollutant	Predicted GLC, $\mu g/m^3$
1	Particulate Matter (PM10)	1.61

S. No.	Pollutant	Predicted GLC, µg/m^3
2	Particulate Matter (PM2.5)	0.83
3	Sulphur Dioxide (SO_2)	3.64
4	Nitrogen Dioxide (NO_2)	1.22

Source: Ecotech Labs Private Limited

Cumulative impact on baseline ambient air quality, after the implementation of the proposed expansion has been arrived by superimposing the present baseline maximum air quality levels of each pollutant. The resultant ambient air quality after implementation of the proposed expansion is given in **Table - 4.4.**

TABLE 4.4 RESULTANT CONCENTRATIONS FOR PROPOSED PLANT

S. No.	Pollutant	Concentration (µg/m^3)			NAAQS Limits
		Baseline	Incremental	Resultant	
1	PM_{10}	57	1.61	58.61	100
2	$PM_{2.5}$	26	0.83	26.83	60
3	SO_2	11	3.64	14.64	80
4	NO_2	20	1.22	21.22	80

Source: Ecotech Labs Private Limited

The predictions indicate that the PM_{10}, $PM_{2.5}$, SO_2 and NO_2 concentrations are likely to be well within the prescribed limit for industrial, residential and rural zone even after proposed machineries comes into operation.

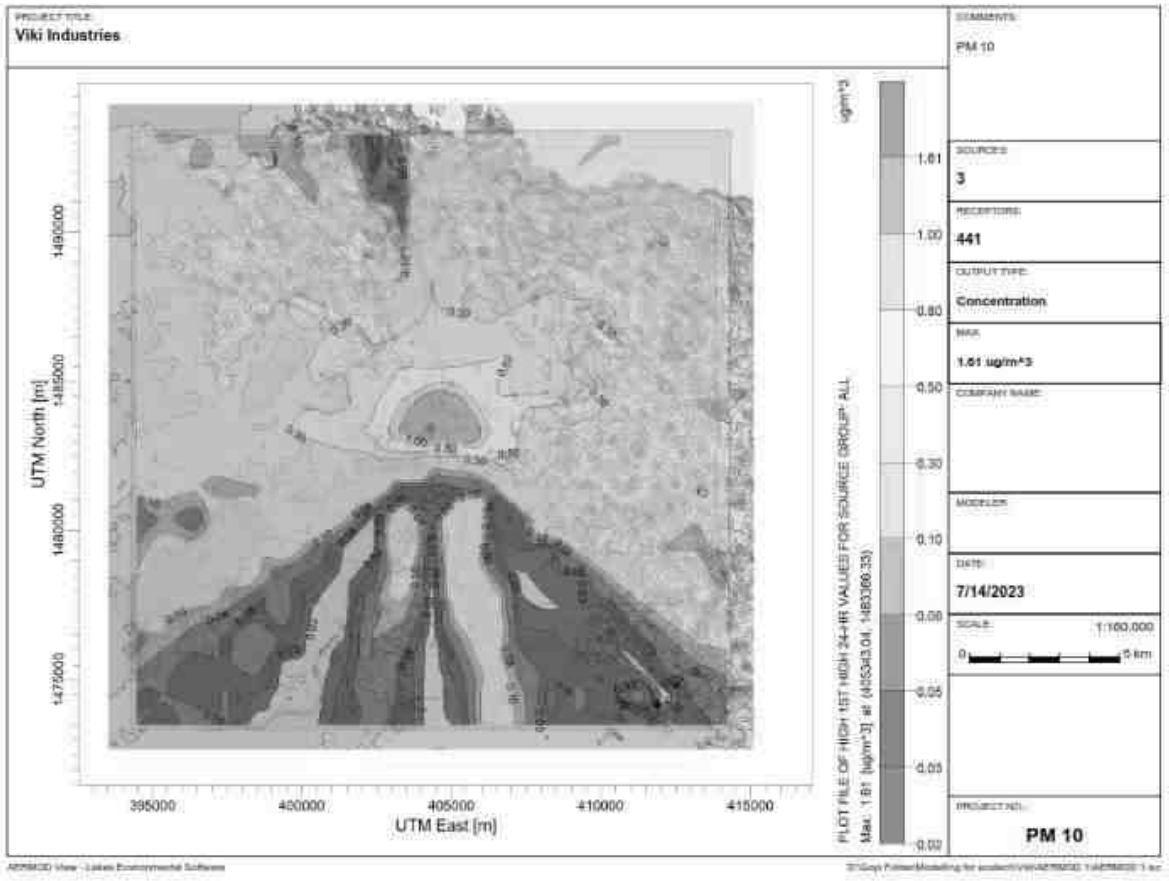


FIGURE 4-1 SHORT TERM 24 HOURLY INCREMENTAL GLCs – PM10

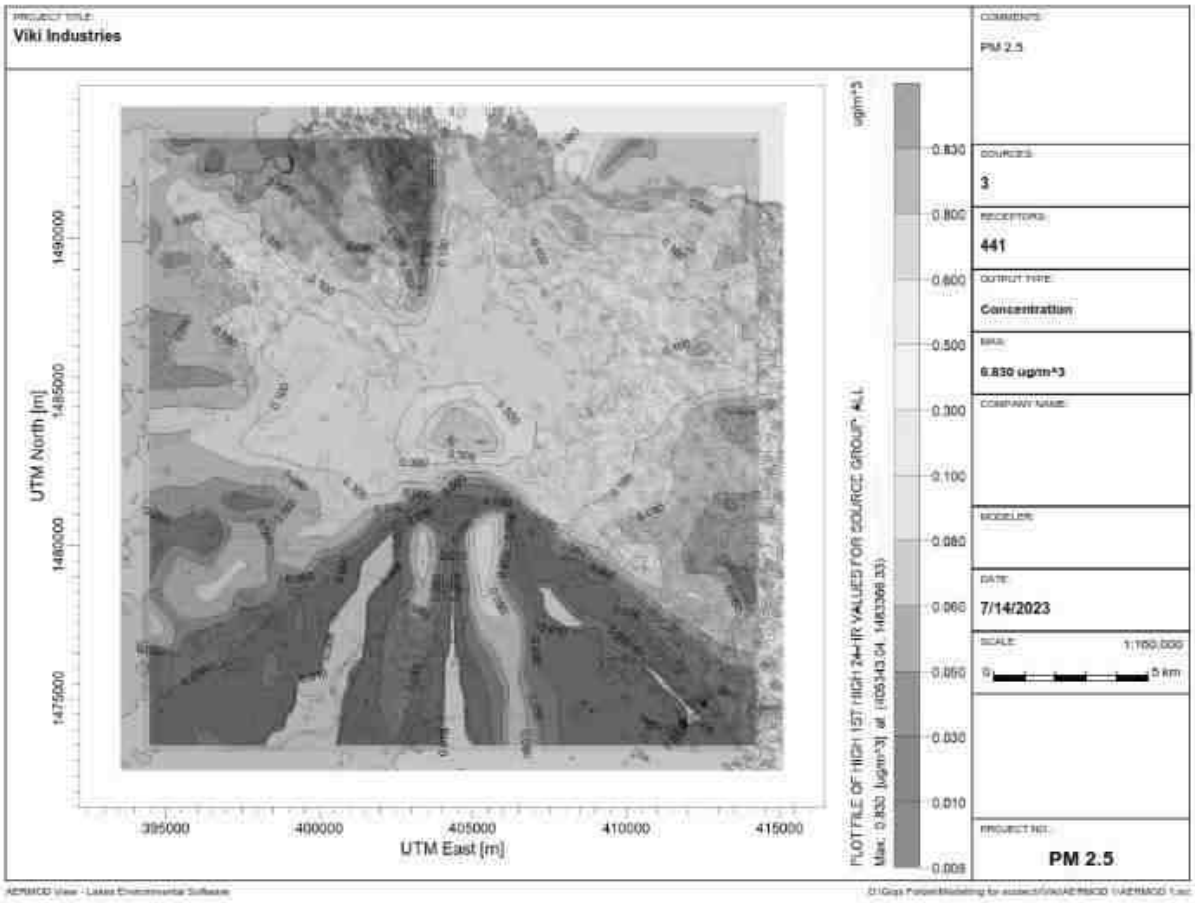


FIGURE 4-2 SHORT TERM 24 HOURLY INCREMENTAL GLCs – PM2.5

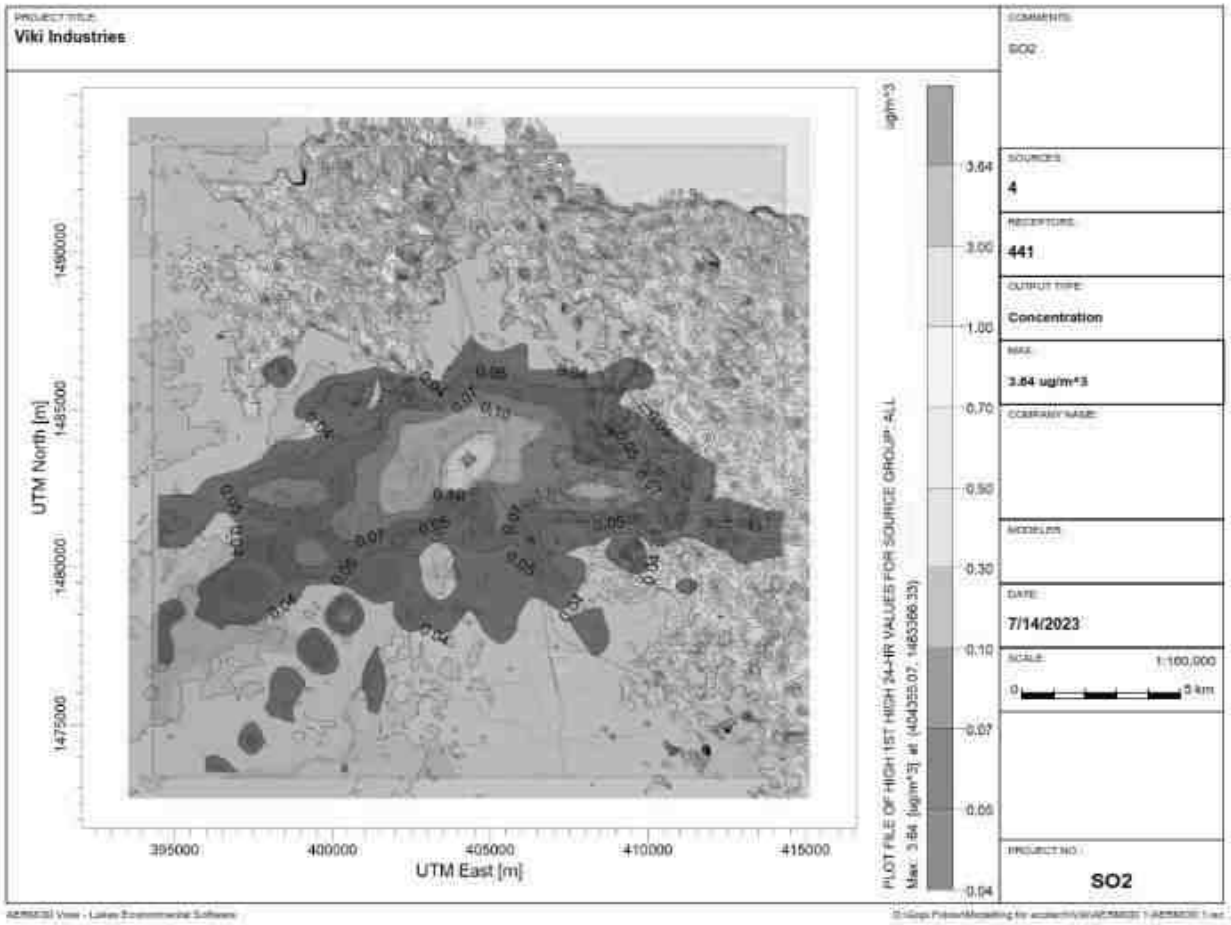


FIGURE 4-3 SHORT TERM 24 HOURLY INCREMENTAL GLCs - SO2

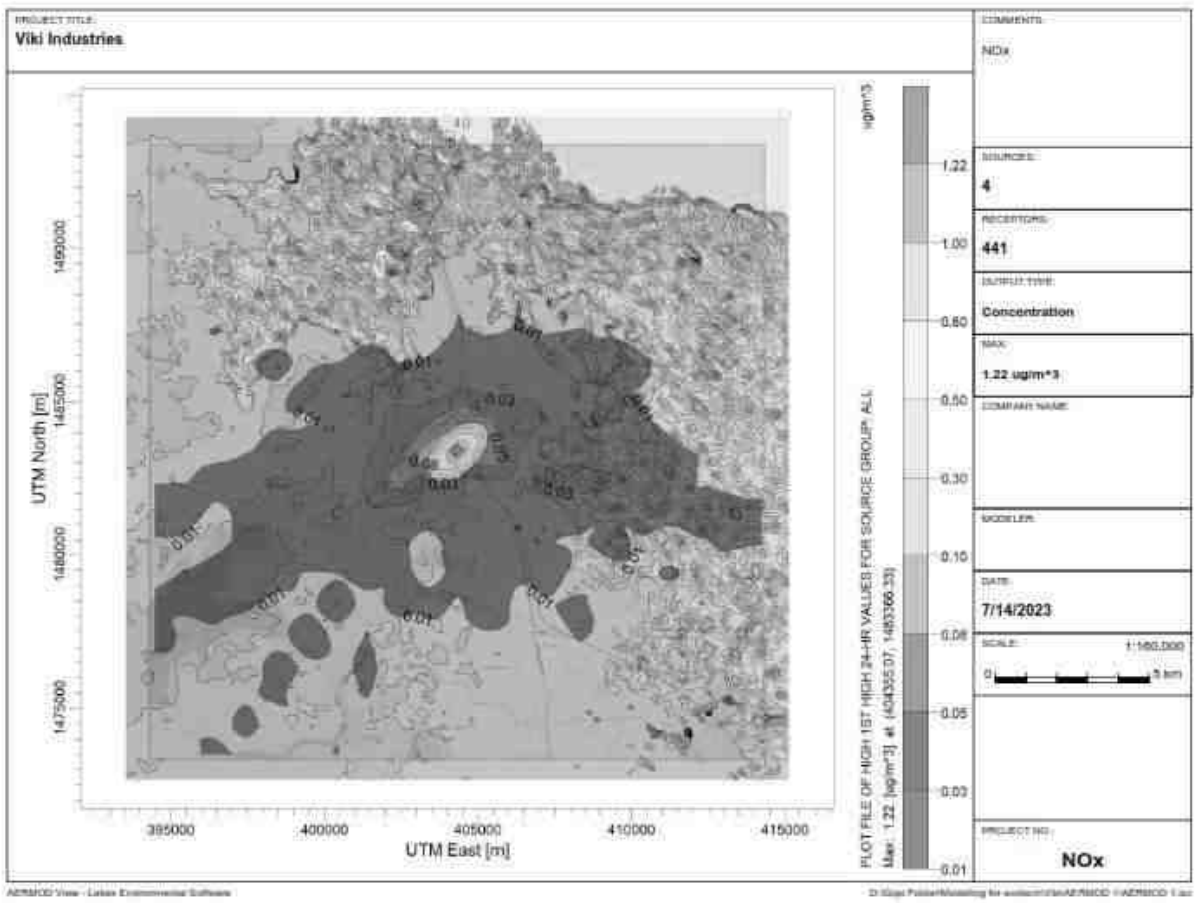


FIGURE 4-4 SHORT TERM 24 HOURLY INCREMENTAL GLCs – NO2

b. <u>Mitigation Measures</u>

Adequate and efficient Air Pollution Control (APC) measures will be installed for the proposed induction furnaces, reheating furnace and DG generator to keep the emissions below the standards prescribed by TNPCB and ambient air quality levels in the surroundings are meeting the prescribed standards.

Major pollutants envisaged from the proposed expansion are Particulate Matter. Minor quantity of gaseous pollutants like Sulphur Dioxide and Nitrogen Dioxide are also envisaged from the induction furnace. It is proposed to provide APC measures as already detailed in Table – 2.7 of Chapter – 2.

4.4.2.4 Fugitive Emissions and Control Measures

Fugitive dust emissions from the proposed expansion project would be significant as there will be air pollution due to activities like transport of raw materials, products, solid waste, unloading of scrap & boring, etc. The impact due to fugitive emissions would be significant.

All the internal roads within the project area will be black topped. Hence, dust arising from the internal roads will be reduced. The proposed greenbelt and regular water sprinkling will help reduction in fugitive emissions.

4.4.3 Noise Quality

a. Impact

Any industry in general consists of several sources of noise in clusters or single. These clusters / single source may be housed in buildings of different dimensions made of different materials or installed in open or under sheds. The noise levels at the source will be in the range of 70 - 90 dB(A). For computing the noise levels at various distances with respect to the plant site, noise levels are predicted using a user-friendly model, Sound Plan.

4.4.3.1 Input for the Model

The prediction of incremental noise levels due to the operation phase of the expansion has been carried out using a mathematical model. Noise levels are mainly generated from Induction Furnaces, unloading of scraps, CCM, Rolling Mill, standby DG sets. The noise sources have been defined with respect to plant and given in Table-2.9 of Chapter-2.

4.4.3.2 Presentation of Results

The model results are discussed below and the predicted model results at plant boundary are tabulated in **Table - 4.5.**

TABLE 4.5 PREDICTED NOISE LEVELS AT PLANT BOUNDARY

S. No.	Plant Boundary	Noise Level, dB(A)
1	North	54
2	South	51
3	East	55

S. No.	Plant Boundary	Noise Level, dB(A)
4	West	64

The damage risk criteria as enforced by OSHA (Occupational Safety and Health Administration) to reduce hearing loss, stipulates that noise level upto 90 dB(A) are acceptable for 8 hour working shift per day. It was observed from the modeling results that high noise levels ranging between 70 – 88 dB(A) are limited to work zone only. At the corners of the plant boundary, noise levels will be varying between 51 dB(A) to 65dB(A).

Day and night sound pressure levels L_{dn} is often used to describe the community noise exposure, which includes 10 dB(A) night time penalty. The predicted noise levels at a distance of 0.5 km and above from the plant boundary would be less than <50.0 dB(A). Most of the human settlements are at a distance greater than 0.5 km from the plant site. Hence, impact on general population would be insignificant.

b. Mitigation Measures

To minimize the impact of noise from the industrial operation within the unit as well as noise impact on the nearby areas from road traffic, following measures would be adopted.

- The specifications for procuring major noise generating machines / equipment such as Exhaust fans, Compressors would include built in design requirements to have minimum noise levels meeting OSHA requirement;
- The impact of noise emission from Generators will be minimized by acoustic enclosures and the noise levels will be limited to 75 dB(A);
- Appropriate noise barriers/shields would be provided on the equipment like motors, compressors etc.;
- Wherever no control equipments are possible, increase the distance between source and receiver and by altering the relative orientation of the source and receiver;
- Noise level at the receiver end reduces in inverse proportion to the square of the distance between the receiver and the source;
- Also, the workers/ operators working near to high noise generating machinery to be provided with ear mufflers/ ear plugs; and
- Provision of thick greenbelt to attenuate the noise levels;

4.4.4 Impact on Water Resources and Water Quality

a. Impact

As the proposed project is operated on the dry process, water is not required in manufacturing process. Water is mainly used only in a stage in the processes like cooling of Induction furnace, Concast and TMT bar process. Nevertheless, no wastewater is generated from the cooling process and there is no cooling blow down too as the entire quantity of the make-up water lost into the atmosphere is due to evaporation and wind.

The estimated water requirement for the proposed project is about 42.0 KLD. The water is being sourced from SIPCOT borewells. It is proposed to develop rainwater harvesting structures to recharge ground water in the project site area to enhance the ground recharge potential in the region.

About 1 KLD of effluent will be generated from the wet scrubbers which will be evaporated in the elevated Solar Evaporation Pan after required treatment. About 8.0 KLD of sewage will also be generated from the domestic uses (drinking and sanitation) in the proposed expansion project, it will be treated in Septic tank. The water balance diagram is already provided in Figure – 2.5 of Chapter – 2.

b. Mitigation Measures

- The entire quantity of the sewage will be treated in the proposed Sewage Treatment Plant and the treated sewage will be reused for greenbelt development.
- The effluent generated from the wet scrubbers will be evaporated in the solar evaporation pan.
- The storm water in the project area will be collected through storm water drains to ensure that this is totally separated from process effluent.
- Rainwater harvesting system is also provided to recharge the ground water by means of percolation pits.

4.4.5 Soil Quality

a. Impact

The impact on soil could be due to the potential contamination of soil, which may happen due to improper handling and storage of solid wastes and hazardous chemicals. No hazardous

chemicals will be stored in the Project area. The solid wastes generated from the plant are furnace slag, steel scraps, mill scale, fly ash and dust from bag filter/scrubber/solar pan. There will be minimum impact on the soil due to the proposed expansion.

b. Mitigation Measures

The furnace slag from the furnaces does not contains any hazardous / heavy metals. Since these wastes are inert, inorganic and non-hazardous, these wastes have no useful application in the plant. These wastes will be disposed to cement plant as alternate raw material or the contractors to reuse it as filing material in road laying along with dust from bag filter / scrubber / solar pan.

Steel scrap and mill scale will be recycled in the melting process. Fly ash from reheating furnace will be sold to brick manufacturers.

4.4.6 Traffic

With the proposed expansion, the transportation is expected to increase on the existing road network during the operational phase on the nearest road. The impact of the traffic is assessed on the basis of adequacy of the existing road network.

4.4.6.1 Traffic due to proposed Project

It has been considered that the peak daily vehicle traffic due to proposed project would be about 100 Two Wheelers, 10 Cars and 100 Trucks i.e. 260 PCU (Passenger Car Unit) during functional phase per day.

4.4.6.2 Adequacy of the Existing Road network

The traffic counts were conducted at SIPCOT Entrance and SIPCOT Internal Road near project site to assess the existing traffic details. The present level of traffic has been converted to Passenger Car Units (PCU). The PCU Factors are considered as 0.5 for 2 wheelers, 1.0 for 3 wheelers / Light Duty Vehicles, 2.0 for trucks/buses/tractors and 3.0 for Multi Axle vehicles like containers as per the conversion factors stipulated by Indian Road

Congress (IRC). The proposed estimated traffic is super imposed on the existing traffic to assess the adequacy of the road.

From the traffic count studies, the present traffic level is found to be on SIPCOT Entrance as 17143 PCUs and SIPCOT Internal Road as 9876 PCUs. Further, it is expected that the additional peak daily vehicle traffic due to proposed activities would be about 1400 PCU (Passenger Car Unit) during functional phase per day. Thus, the cumulative traffic load during the operational phase would be 17143 + 260 = 17403 PCUs in SIPCOT Entrance and 9876 + 260 = 10136 PCUs in SIPCOT Internal Road.

With present level of traffic and the increase in traffic due to the proposed expansion, adequacy of road / highway during operational phase has been estimated by comparison with the recommendations stipulated by Indian Road Congress (IRC). The IRC recommendations on traffic capacity are presented below in **Table - 4.6.**

TABLE 4.6 RECOMMENDATIONS ON TRAFFIC CAPACITY – IRC

S. No.	Category of Road	Maximum (PCU/day)
1	Four Lane Road	30,000
2	Two Land Road	15,000

As per the above standards, SIPCTO Entrance Road and SIPCOT Internal Road are having maximum capacity of 30,000 PCU per day and 15,000 PCU per day. The estimated peak traffic in terms of PCUs is compared with the stipulated standards by IRC for traffic capacity of the existing road network and it can be observed that the existing road will be adequate for the increased traffic also.

4.4.7 Ecology

a. Impacts

The baseline flora and fauna has been depicted in Chapter-3. There are no National Parks present within 10 km radius of the project site. Pulicat Bird Sanctuary is located at a distance of 9.24 km in south direction from the plant site. No migration route to avi-fauna is observed or recorded in study area. Similarly, as per the forest department records, no endangered or

rare species of flora and fauna are reported or observed in the study area. The impact on terrestrial ecology will be due to emission of pollutants like PM, NO_2 and SO_2. However, the incremental concentrations of these pollutants are very less and the impacts on the terrestrial ecology will be insignificant.

Thamarai Eri is flowing in a distance of about 0.68 km from the project site. No treated effluent / sewage will be discharged into any surface water streams. Hence, no impact is envisaged from the proposed expansion on aquatic bodies.

b. Mitigation Measures

- The fugitive emissions from different sources will be suppressed by spraying water.
- Emissions from the proposed induction furnaces, reheating furnace and D.G sets will be maintained well within the standards prescribed by regulatory authorities.
- Adequate heights of stacks are proposed to provide for the Induction furnace, reheating to disperse the SO_2 emission.
- Vehicles emissions will also be minimized by proper maintenance and by avoiding use of adulterant fuels and will be maintained below the standard limits prescribed by competent authority.
- Development of a thick green belt will reduce the pollution loads in the surroundings areas and contain the negative impact on forests and terrestrial ecology.

4.4.8 Socio-Economics

It is obvious to assume that the activities of the proposed expansion will produce some improvements in the socio-economic levels in the study area. The anticipated impact of this project on various aspects is described below.

- The proposed expansion will be carried out within the land area owned by the proponents. Hence no impact due to land acquisition is envisaged.
- This project will not have any major impact on the population growth, as the proposed increase in manpower for the proposed expansion is not major.
- Better literacy rates are possible due to assumed better economic conditions of the people.

- Better literacy means better social status and thereby improved life style. This will be a positive impact due to the proposed expansion project capacity.
- The positive impacts of plant activities on the civic amenities are substantial. With improved transportation facilities, there is always a scope for development.

The impact of industrialization on the economic aspects can be clearly observed. The proposed expansion activities will provide employment to persons of different skills and trades. The local population is the largest beneficiary among the employees. The employment will ameliorate the economic conditions of these families directly and has provided employment to many other families indirectly who are involved in business and service-oriented activities.

4.4.9 Human Health

The impact from the air emissions is not expected to be significant since the stack design and the atmospheric conditions are such that the ambient air quality at present as well as in future after the implementation of the expansion will be well within the prescribed ambient air quality limits set forth by CPCB. The proponents of this facility will adopt effective control systems at all the identified sources of dust generation.

4.5 Impact during Temperature rise and climate change

1. **Waste Heat:** Steel plants release waste heat into the atmosphere, which can contribute to localized temperature increases, especially in the immediate vicinity of the plant.

2. **Urban Heat Island Effect:** Large industrial complexes, including steel plants, can contribute to the urban heat island effect, where urban areas experience higher temperatures than surrounding rural areas due to human activities and built infrastructure.

Climate Change Impacts:

1. **Greenhouse Gas Emissions:** Steel production processes, particularly blast furnaces and coke ovens, release significant amounts of greenhouse gases (GHGs) such as carbon dioxide (CO2). These emissions contribute to global warming and climate change.

2. **Energy Consumption:** High energy consumption in steel production, especially from fossil fuels, contributes to increased carbon emissions and exacerbates climate change.

Control Measures:

1. **Energy Efficiency Improvements:**

- Adopt energy-efficient technologies to reduce overall energy consumption and associated emissions.
- Implement waste heat recovery systems to capture and reuse heat generated during the steelmaking process.

2. **Renewable Energy Integration:**

- Transition to renewable energy sources, such as solar or wind power, to reduce reliance on fossil fuels and lower emissions.

3. **Carbon Capture and Storage (CCS):**

- Implement CCS technology to capture and store CO2 emissions, preventing their release into the atmosphere.

4. **Process Optimization:**

- Optimize production processes to minimize waste and improve overall efficiency, leading to reduced energy consumption and emissions.

5. **Emission Reduction Technologies:**

- Invest in technologies that reduce emissions during steelmaking, such as improving furnace efficiency and adopting cleaner smelting techniques.

6. **Afforestation and Greenery:**

- Create green spaces around the steel plant to mitigate the urban heat island effect and contribute to local cooling.

7. **Community Engagement:**

- Involve local communities and stakeholders in discussions about environmental impacts and potential mitigation strategies.

8. **Environmental Monitoring:**

- Implement comprehensive monitoring systems to measure air quality, temperature changes, and other environmental factors. Use this data to assess the effectiveness of control measures.

9. **Carbon Offsetting:**

- Support carbon offset projects to counterbalance emissions from steel production by investing in initiatives that absorb or reduce CO2 elsewhere.

10. **Circular Economy Practices:**

- Implement recycling and reuse strategies for materials to reduce the need for virgin resource extraction and minimize associated emissions.

5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITES)

5.1 General

Analysis of alternatives for project site as well as process technology and their assessment for selection of the most suitable location and technology as well in terms of environment affability, energy efficient and optimized land utilizing with maximum productivity is a good practice in EIA as a project of any nature comprising of activities involving large number of human-resource, material as well as financial investment.

5.2 Alternatives in Technology

The proposed induction furnaces represent the most contemporary technology with static power supply, proven low loss melting furnaces. The installation will comprise of one number of Induction Furnaces consisting of two numbers of crucibles to function standby mode. Operator's Control Desk shall be provided to facilitate start-up, shutdown, power control, metering and annunciations. Lever operated switches shall be provided with Furnace Crucible for quick selection and changeover. Hence no alternate technology is considered for the proposed expansion.

Similarly, Continuous casting is the process where the molten steel will be solidified into a "Semi finished" billets, bloom or slab for subsequent rolling in the finishing mills. Continuous casting has opted to achieve improved yield, quality and cost efficiency.

5.3 Alternatives in site

The proposed expansion of steel melting plant & rolling mill will be carried out within the existing plant. The project involves installation of components like induction furnaces and concast machine to convert the scrap into MS Billets. Hence naturally no alternative sites are considered. The site has the following additional advantages:

- The necessary infrastructure in terms of land, power, water and personnel are readily available

- There will be no significant or adverse impact on the Environment due to the project.
- There is no adverse factor such as reclassification of land use and pattern, displacement etc.

6 ENVIRONMENT MONITORING PROGRAM

This chapter presents the details of environment monitoring, schedule, arrangements for pollution control, cost for environment protection measures and details of greenbelt development for the proposed expansion project.

6.1 Environment Monitoring

An Environment Monitoring Program provides feedback about the difference between actual environment scenario and the impacts of the project on the environment and helps to judge the adequacy of the mitigation measures in protecting the environment. The purpose of environment monitoring is to evaluate the effectiveness of implementation of Environment Management Plan (EMP) by periodically monitoring the important environment parameters within the impact area, so that any adverse effects are detected and timely action can be taken.

The sampling and analysis of the environment attributes will be as per the guidelines of Central Pollution Control Board/ Tamil Nadu State Pollution Control Board (TNPCB). The frequency of sampling and location of sampling will be as per the directives of CPCB/TNPCB

Environment monitoring will be conducted on regular basis by the Ecotech Private Limited to assess the pollution level in the area. Usually, as in the case of the study, an impact assessment study will be carried over a short period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring program of the environment parameters will be essential to take into account the changes in the environment.

6.2 Objectives of Environment Monitoring

The basic objective of the environment monitoring program is as follows.

- To ensure implementation of mitigation measures during project implementation;
- To provide feedback to the decision makers about the effectiveness of their actions;
- To determine the project's actual environment impacts so that modifications can be made to mitigate the impacts;
- To identify the need for enforcement action before irreversible environment damage occurs;
- To provide scientific information about the response of an ecosystem to a given set of human activities and mitigation measures;
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new installations or through the modification in the operation of existing facilities;
- To check assumptions made with regard to the development and to detect deviations in order to initiate necessary measures;
- To establish a database for future Impact Assessment Studies for Proposed projects.

6.3 Types of Environment Monitoring

The key issues associated with the life cycle of a project are the monitoring of environment parameters. Three types of environment monitoring are associated with the project, which includes.

a) Baseline monitoring
b) Effects/ Impacts monitoring and
c) Compliance monitoring.

a) <u>Baseline monitoring</u> - Baseline monitoring deals with the measurement of environment variables during a pre-project period to determine existing conditions, ranges of variation and process of change;

b) <u>Effects/impacts monitoring</u> – It involves measurements of environment variable during construction and operation phase of the project to assess the impact that may have been caused by the project.

c) **Compliance Monitoring** - It takes the form of periodic sampling and continuous measurements of level of pollutant emissions in the air, waste discharge on land or water, level of noise to ensure that standards are met.

6.4 Environment Monitoring Plan

The environment monitoring plan for the proposed expansion project has been developed in view of the institutional, scientific and fiscal issues pertaining to the project. For developing the monitoring plan, appropriate Value Ecosystem Components (VEC's) which are likely to be affected have been identified. For each component, suitable measurable environment indicators which are appropriate to the impact mechanism and scale of disturbance and have a low natural variability, broad applicability and an existing data series have been defined.

As per the guidelines of MoEF & CC, environment monitoring shall be required during construction and operational phases. The schedule for monitoring ambient air quality, ambient noise quality, source emission monitoring, ground water quality and waste water quality both during the construction and operation phases of the project is given in **Table 6.1.**

TABLE 6.1 ENVIRONMENT MONITORING PLAN

S. No.	Component	Parameter	No of Locations	Frequency/ Duration
1	Ambient Air Quality	PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, Pb, As, Ni, NH3, O_3, C_2H_6 & BAP.	4	Once in a month
2	Fugitive Emission	PM_{10}, $PM_{2.5}$, SO_2, NO_2 & CO	4	Once in a month
3	Stack Emission Monitoring	PM, SO_2, NO_2, CO & HC	4	Once in a month
4	Source Noise	Instantaneous Noise level in dB(A)	6	Once in a month
5	Ambient Noise Quality	Ambient noise level (L_{eq}, L_{Day} & L_{Night})	4	Once in a month
6	Ground water Quality	Parameters specified under IS:10500, 1991	2	Once in 3 months
7	Soil Quality	Parameter for soil quality:	2	Once in 6 months

S. No.	Component	Parameter	No of Locations	Frequency/ Duration
		pH, texture, EC, Organic Matter, N, P, K, Na, Ca & Mg		

As per the guidelines of CPCB / TNPCB, online monitors will also be installed in the stack attached to Induction Furnace & Reheating Furnace for Particulate Matter which will be connected to the Care Air Centre of TNPCB.

6.5 Data Analysis

The monitored data will be analyzed and compared with the baseline levels as established in the EIA study and the regulatory standards specified by different government agencies. The standards against which the different environment components will be compared are as per **Table 6-2.**

TABLE 6.2 APPLICABLE ENVIRONMENT STANDARDS

S. No.	Component	Applicable Standards
1	Ambient Air Quality	National Ambient Air Quality Standards, CPCB
2	Fugitive Emission	Fugitive emission standards for Steel plant, CPCB
3	Source Emission	Industrial specific standards for Induction furnace, Electrical Arc Furnace, Reheating Furnace & DG sets
4	Source Noise Quality	Standards for workers, Insp. of Factories / OSHA
5	Ambient Noise Quality	Ambient Noise Standards, CPCB
6	Ground water quality	IS: 10500 Standards, BIS
7	Soil quality	Standard Soil Classification, ICAR

6.6 Reporting Schedule

The monitoring results of the different environment components will be compiled every six months during the construction as well as operation phase while submitting the six-monthly compliance reports to Regional Office of MoEF & CC, SEIAA, CPCB & TNPCB. The report

will also list the project activities along with the environment mitigation measures and will evaluate the efficacy of the Environment Management Plan.

6.7 Budget provision

The environment monitoring will be done through NABL accredited / MoEF&CC recognized laboratories located in Chennai region. So, no capital cost may be required for the environment monitoring work. The annual recurring cost is required for environment monitoring which will be about Rs. 10 lakhs per annum. But the online monitoring systems will be installed in an estimated cost of about Rs. 25.0 Lakhs.

7 ADDITIONAL STUDIES

This chapter describes the additional studies like Risk Assessment, Disaster Management Plan, Social Impact Assessment and Public Hearing.

7.1 Risk Assessment

Risk is defined as the unwanted consequences of a particular activity. The magnitude of risk varies with the total impact area for different scenarios. The risk assessment will be done for all the hazardous storages that are proposed in the project. The larger the storage, greater is the risk posed by the storage. The impact area increases proportionately with storage.

Risk assessment is a tool that is used to analyze the risk posed by different project activities vis-à-vis the area. The consequence analysis forms part of this assessment and helps in evaluation of different hazards that are to be considered for conducting consequence analysis. The risk assessment basically involves the prediction of the consequence in case there is a fire, explosion or toxic gas release that might occur due to handling, storage or processing of any of the hazardous materials by the industry. The findings of risk assessment are dovetailed into On-site emergency plan also known as Disaster Management Plan.

7.1.1 Approach to the Study

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view;

- Preparation of broad DMP covering On-site and Off-site Emergency Plan.

7.1.2 Hazard Identification

Hazard Identification is a tool that is very useful for conducting a risk assessment as it helps in identification and detailing of hazards that exist in a given proposed plant. The hazard identification will be done prior to the consequence analysis in a proposed plant and serves as the core base of information on which whole risk assessment is based. The basic principle of risk analysis lies in the answer to the questions about risk such as type, causes, consequences and frequency.

The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); and
- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

7.1.3 Classification of Major Hazardous Units

Hazardous substances may be classified into three main classes namely flammable substances and toxic substances. The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345 M. The major hazardous materials to be stored, transported, handled and utilized within the facility have been summarized below. The fuel storage details and properties are given in **Table-7.1** and **Table-7.2** respectively.

Materials Stored, Transported & Handled

High Speed Diesel (HSD), Light Diesel Oil(LDO), Liquid Oxygen (LOx), Liquefied Petroleum Gas (LPG), Nitrogen (N2). Argon (Ar), Hydrogen (H2), Grease, Hydraulic Oil, Engine Oil, Transformer Oil, Gear Oil, EDM, Kerosene(SKO)

TABLE 7.1 DETAILS OF STORAGE

S. No.	Material	Nos	Storage	Capacity (Each)	Total Capacity
1	HSD	2	Tank	6 KL	12 KL
2	LDO	2	Tank	6 KL	12 KL
3	Liquid Oxygen (LOx)	2	Tank	21 + 10 T	31 T
4	LPG	200	Cylinder	19 kg	3.8 T
5	Nitrogen (N2)	1	Tank	1 KL	1 KL
6	Argon (Ar)	1	Tank	1 KL	1 KL
7	Hydrogen (H2)	1	Tank	3 KL	3 KL
8	Grease	12	Barrel	180 kg	2160kg
9	Hydraulic Oil	8	Barrel	120 Lit	960 Lit.
10	Engine Oil	6	Barrel	120 Lit	720 Lit.
11	Transformer Oil	6	Barrel	120 Lit	720 Lit.
12	Gear Oil	6	Barrel	120 Lit	720 Lit.
13	EDM oil	1	Tank	1 KL	1 KL
14	Kerosene(SKO)	1	Tank	1 KL	1 KL

TABLE 7.2 PROPERTIES OF FUELS USED IN THE PLANT

Properties		Products			
		LPG	Kerosene	HSD	LDO
1	Boiling point, (°C) (range)	20- -42	150-300	260-380	240-290
2	Density at 15 °C	0.58	0.78	0.81	0.85
3	Flash point, (°C)	-104	>35	>32	>66
4	Auto ignition temp. (°C)	470	295	380	366
5	LFL (% V/V)	1.8	0.7	1.8	1.8
6	UFL (% V/V)	9.5	5.0	5.6	5.0

7.1.4 Identification of Major Hazard Installations Based on GOI Rules, 1989

Following accidents in the chemical industry in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI Rules 1989. For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals.

A systematic analysis of the fuels/chemicals and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules, 1989 and the applicable rules are identified.

7.1.5 Hazard Assessment and Evaluation

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environment factors, proposed operations, facilities, and safeguards.

❖ ***Preliminary Hazard Analysis (PHA)***

A Preliminary Hazard Analysis will be carried out initially to identify the major hazards associated with storages and the processes of the proposed expansion. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. Preliminary hazard analysis for fuel storage area and whole plant is given in **Table-7.3** and **Table-7.4.**

TABLE 7.3 PRELIMINARY HAZARD ANALYSIS FOR STORAGE AREAS

Unit	Capacity	Hazard Identified
HSD	2 x 6 KL	Fire/Explosion
LPG	200 x 19 kg	Fire/BLEVE
SKO	1 x 1 KL	Fire/Explosion
LDO	2 x 6 KL	Fire/Explosion

TABLE 7.4 PRELIMINARY HAZARD ANALYSIS FOR THE WHOLE PLANT IN GENERAL

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environment factors- Fuel storage	• If there is any leakage and eventuality of source of ignition.	--	• All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
	• Highly inflammable	• A well-designed fire protection	• Fire extinguisher of small size and big

PHA Category	Description of Plausible Hazard	Recommendation	Provision
	nature of the chemicals may cause fire hazard in the storage facility.	including dry powder and CO2 extinguisher should be provided.	size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.
Work Areas and Passageway	• Absence of safety signage • Obstruction in the passage ways • Inadequate environment conditions • Insufficient protection from physiochemical factor	• Appropriate safety signage indicating the passageways and emergency exit are available	• Good Housekeeping of the area • Assessment of environment conditions and provision of adequate protection
Loading and Unloading	• Overhead loads • Falling of loads • Dusty environment • Use of lifting equipment		• Use of authorized personnel • Provision of appropriate maintenance of the lifting equipment • Use of load limiting devices • Routine cleaning of the area

7.1.6 Fire Explosion and Toxicity Index (FE&TI) Approach

Fire, Explosion and Toxicity Indexing (FE & TI) is a rapid ranking method for identifying the degree of hazard. The application of FE & TI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information. The degree of hazard potential is identified based on the numerical value of F&EI as per the criteria given below:

F & EI Range	Degree of Hazard
0-60	Light
61-96	Moderate

97-127	Intermediate
128-158	Heavy
159-up	Severe

By comparing the indices F&EI and TI, the unit in question is classified into one of the following three categories established for the purpose **(Table-7.5).**

TABLE 7.5 FIRE EXPLOSION AND TOXICITY INDEX

Category	Fire and Explosion Index (F&EI)	Toxicity Index (TI)
I	F&EI < 65	TI < 6
II	65 < or = F&EI < 95	6 < or = TI < 10
III	F&EI > or = 95	TI > or = 10

Certain basic minimum preventive and protective measures are recommended for the three hazard categories.

❖ ***Results of FE and TI for Storage/Process Units***

Based on the GOI Rules 1989, the hazardous fuels and chemicals used by the proposed project were identified. Fire and Explosion are the likely hazards, which may occur due to the fuel and chemical storage. Hence, Fire and Explosion index has been calculated for in plant storage. Detailed estimates of FE&TI are given in **Table-7.6.**

TABLE 7.6 FIRE EXPLOSION AND TOXICITY INDEX FOR STORAGE FACILITIES

S. No.	Chemical/ Fuel	Total Capacity (KL)	F&EI	Category	TI	Category
1	HSD	4 x 6	39.9	Light	Nil	-
2	SKO	1 x 1	47.74	Light	Nil	-
3	LPG	200 x 19 kg	57.78	Light	Nil	-

❖ ***Conclusion***

Results of FE & TI analysis show that the storage of HSD falls into ***Light*** category of fire and explosion index with a ***Nil*** toxicity index.

7.1.7 Maximum Credible Accident (MCA) Analysis

Maximum Credible Accident and Consequence Analysis (MCACA) is one of the methodologies evolved to quantify releases of hazardous chemicals. A Maximum Credible Accident can be described as the worst "credible" accident or as an accident with a maximum damage distance, which is still believed to be probable. The selection of
Maximum Credible Accidents is somewhat arbitrary. In practice the selection of accident scenarios are done on the basis of engineering judgment and expertise in the field of risk analysis especially in accident analysis.

The MCACA aims at identifying undesirable and hazardous events causing the maximum damage to human beings and environment in and around the industries under consideration. This exercise is not only important to reduce the risks of existing units in industrial area, but also to provide valuable information for the location of future units for which there is little or only limited operating experience available.

The following steps are followed in the MCACA.

i. Preparation of an inventory of major chemical storages and rank them on the basis of their hazardous properties and storage quantities.
ii. Identification of potentially hazardous areas and representative failure cases from the vessels and pipes.
iii. Visualization of the chemical release scenarios.
iv. Short-listing of maximum credible accident scenarios.
v. Effect and damage calculations from the release cases through mathematical modelling.

Note: Since, there will not be bulk storages of flammable, Toxic, corrosive and reactive material in the facility, there will not be the possibilities of occurrences of catastrophic failures such as fire, toxic dispersion etc.

7.1.8 Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air and ignited would explode. Coal conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns);
- Dust concentrations must be reasonably uniform; and
- Minimum explosive concentration for coal dust (33% volatiles) is 50 gm/m^3.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulkhead fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust. Dust explosions may occur without any warnings with Maximum Explosion Pressure upto 6.4 bars. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times the secondary explosions are more damaging than primary ones.

The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure which may cripple the life line of the CHP plant. Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc.

Except locally control equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc., all other in-line equipment will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc. will be provided for safe and reliable operation of the coal handling plant.

❖ **Control Measures for Coal Yards**

The total quantity of coal will be stored in separate stack piles, with proper drains around to collect washouts during monsoon season. Water sprinkling system will be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire hazards.

The stock geometry will be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction. Temperature monitoring of the stock piles will be done to detect in time any abnormal rise in temperature inside the stock piles to enable prompt control of the same through necessary steps.

❖ **Identification of Hazards, Assessment and their Management**

The various hazards associated, apart from fuel storage with the plant process has been identified and has outlined in **Table 7.7.**

TABLE 7.7 HAZARD ANALYSIS FOR PROCESS IN CHP PLANT

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal storage in open yard	Fire, Spontaneous Combustion
2	Coal Handling Plant	Fire and/or Dust Explosions
3	Reheating furnace	Fire (mainly near burners), Fuel Explosions
4	Switch-yard Control Room	Fire in cable galleries and Switch-gear / Control Room

❖ ***Risk Assessment Summary***

- There will be no significant community impacts or environment damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.

7.2 Disaster Management Plan

A comprehensive DMP is suggested herewith, which is required to be implemented for the proposed industry.

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order

of priorities. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training through rehearsals/drills.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a Disaster Management Plan has to be formulated and this planned emergency document is called "Disaster Management Plan".

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Identify any dead:
- Provide for the needs of relatives;
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area;
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the Emergency.

In effect, it is to optimize operational efficiency to rescue, rehabilitate and render medical help and to restore normalcy.

7.2.1 Specific Emergencies Anticipated

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipelines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard Analysis has provided a basis for consequence estimation.

7.2.2 Emergency Organization

It is recommended to set up an Emergency Organization. A senior executive who has control over the affairs of the proposed plant would be heading the Emergency Organization. He would be designated as Site Controller. Production Manager would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior Executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller, for himself organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency Co-ordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.
In each shift, electrical supervisor, electricians and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of staff members in the plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

7.2.3 Emergency Communication

Whoever notices an emergency situation such as fire, escalation of fire, leakage etc would inform his immediate superior and Emergency Control Center. A place nearer to the security office / Admin Block shall be identified as Emergency Control Center. The person on duty in the Emergency Control Center would appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to all the Incident Controllers, Emergency Co-ordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.2.4 Emergency Responsibilities

The responsibilities of the key personnel are appended below:

❖ ***Site Controller***

On receiving information about emergency he would rush to Emergency Control Center (ECC) and take charge of ECC and the situation and;

- Assesses the magnitude of the situation on the advice of incident Controller and decides;
- Whether the affected area needs to be evacuated;
- Whether personnel who are at assembly points need to be evacuated;
- Declare Emergency and order for operation of emergency siren;
- Organizes announcement by public address system about location of emergency;
- Assesses which areas are likely to be affected, or need to be evacuated or are to be alerted;
- Maintains a continuous review of possible development and assesses the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant required and if evacuation of persons is required;
- Directs personnel for Rescue, rehabilitation, transport, fire, brigade, medical and other designated mutual support systems locally available, for meeting emergencies;
- Controls evacuation of affected areas, if the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, inform the District Emergency Authority, Police, Hospital and seeks their intervention and help;
- Inform the Inspector of Factories, Deputy Chief Inspector of Factories, TNPCB and other statutory authorities;
- Give a public statement if necessary;
- Keep record of chronological events and prepares an investigation report and preserve evidence;
- On completion of on-site Emergency and restoration of normalcy, declares all clear and orders for all clear warning.

❖ ***Incident Controller***

- Assembles the incident control team;
- Directs operations within the affected areas with the priorities for safety to personnel minimize damage to the plant, property and environment and minimize the loss of materials;
- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency;
- Ensure that key personnel help is sought;
- Provides advice and information to the Fire and Security Officer and the Local Fire Services as and when they arrive;
- Ensures that all non-essential workers/staff of the affected areas evacuated to the appropriate assembly points, and the areas are searched for casualties;
- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the cause and circumstances which caused or escalated the emergency;
- Co-ordinates with emergency services at the site;
- Provides tools and safety equipment to the team members;
- Keeps in touch with the team and advise them regarding the method of control to be used;
- Keeps the Site Controller of Emergency informed of the progress being made.

❖ ***Emergency Coordinator – Rescue & Fire Fighting***

- Helps the incident Controller in containment of the emergency;
- Ensure fire pumps in operating conditions and instructs pump house operator to ready for any emergency with standby arrangement;
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff;
- Organizes shifting the fire fighting facilities to the emergency site, if required;
- Takes guidance of the Incident Controller for fire fighting as well as assesses the requirements of outside help;
- Arranges to control the traffic at the gate and the incident area;
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision;

- Evacuates the people in the plant or in the nearby areas as advised by Site Controller;
- Searches for casualties and arranges proper aid for them;
- Assembles search and evacuation team;
- Arranges for safety equipment for the members of this team;
- Decides which paths the evacuated workers should follow;
- Maintains law and order in the area, and if necessary seeks the help of police.

❖ ***Emergency Coordinator - Medical, Mutual Aid, Rehabilitation, Transport & Communication***

- In the event of failure of electric supply and thereby internal telephone, sets up communication point and establishes contact with the ECC;
- Organizes medical treatment to the injured and if necessary will shift the injured to nearby hospitals;
- Mobilizes extra medical help from outside, if necessary;
- Keeps a list of qualified first aid providers of the factory and seek their assistance;
- Maintains first aid and medical emergency requirements;
- Makes sure that all safety equipment is made available to the emergency team;
- Assists Site Controller with necessary data and to coordinate the emergency activities;
- Assists Site Controller in updating emergency plan, organizing mock drills verification of inventory of emergency facilities and furnishing report to Site Controller;
- Maintains liaison with Civil Administration;
- Ensure availability of canteen facilities and maintenance of rehabilitation centre;
- He will be in liaison with Site Controller/Incident Controller;
- Ensure transportation facility;
- Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure;
- Controls rehabilitation of affected areas on discontinuation of emergency;
- Makes available diesel/petrol for transport vehicles engaged in emergency operation.

❖ ***Emergency Coordinator - Essential Services***

- He would assist Site Controller and Incident Controller;
- Maintains essential services like Diesel Generator, Water, Fire Water, Compressed Air/Instrument Air, power supply for lighting;
- He would plan alternate facilities in the event of power failure, to maintain essential services such as lighting, refrigeration plant etc.;
- He would organize separate electrical connections for all utilities and emergency services so that in the event of emergency or fires, essential services and utilities are not affected;
- Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc. to shift in-charge and electricians;
- Ensures availability of adequate quantities of protective equipment and other emergency materials, spares etc.;

❖ ***General Responsibilities of Employees during an Emergency***

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in-charge of process equipment should adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.2.5 Emergency Facilities

❖ ***Emergency Control Center (ECC)***

For the time being Office Block or a place nearer to the security office is identified as Emergency Control Center. It would have external Telephone, Fax and e-mail facility. All the Site Controller / Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place.

The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom Telephone
- P & T Telephone
- Safe contained breathing apparatus
- Fire suit / gas tight goggles / gloves / helmets
- Hand tools, wind direction / velocities indications
- Public address megaphone, hand bell, telephone directories
- Internal P & T factory layout, site plan
- Emergency lamp / torch light / batteries
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes
- Hazard chart
- Emergency shut-down procedures
- Nominal roll of employees
- List of key personnel, list of essential employees, list of Emergency Co-ordinators
- Duties of key personnel
- Address with telephone numbers and key personnel, emergency coordinator, essential employees
- Important address and telephone numbers including Government agencies, neighbouring industries and sources of help, outside experts, chemical fact sheets population details around the factory

❖ ***Assembly Point***

Number of assembly depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized.

In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

❖ ***Fire Fighting Facilities***

Fire fighting equipment suitable for emergency should be maintained in each section in the plant. This would be as per statutory requirements. Fire alarms would be located in the bulk storage areas. Fire officer will be the commanding officer of fire fighting services.

❖ ***Location of Wind Sock***

On the top of the production block windsocks shall be installed to indicate direction of wind for emergency escape.

❖ ***Emergency Medical Facilities***

Stretchers, gas masks and general first aid materials for dealing with fire burns would be maintained in the emergency control room. Medical superintendent of the plant will be the head of the casualty services ward. Private medical practitioners help would also be sought. Government hospital would be approached for emergency help.

Apart from plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities in the area would be prepared and updated. Necessary specific medicines for emergency treatment of Burns Patients and for those affected by toxicity would be maintained.
Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial management in this regard would be taken on mutual support basis.

7.2.6 Emergency Actions

❖ ***Emergency Warning***

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system shall be established.

❖ ***Emergency Shutdown***

There are number of facilities which can be provided to help deal with hazardous conditions, when a tank is on fire. The suggested arrangements are:

1. Stop the production;
2. Dilute contents;
3. Remove heat;
4. Deluge with water; and
5. Transfer contents.

Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of bypass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vapouring liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

❖ ***Evacuation of Personnel***

There could be more number of persons in the storage area and other areas in the vicinity. The area will be provided adequate number of exits, staircases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

❖ ***All Clear Signal***

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

❖ ***Employee Information***

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic

effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees should be given training to emergency response.

❖ ***Public Information and Warning***

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the pool fire effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an offsite emergency. Factories of this size and nature are in existence in our state since long time.

❖ ***Co-ordination with Local Authorities***

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On-Site Emergency, resources within the organization would be mobilized and in the event extreme emergency local authorities help should be sought.

In the event of an emergency developing into an offsite emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off-Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills should be organized.

❖ ***Mutual Aid***

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc should be sought from the neighbouring industrial management.

❖ ***Mock Drills***

Emergency preparedness is important on that of planning in Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency

response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel should be trained in the operations.

❖ ***Important Information***

Important information such names and addresses of key personnel, essential employees, medical personnel, outside the plant, transporters address, address of those connected with Off Site Emergency such as Police, Local Authorities, Fire Services, District Emergency Authority should be prepared and maintained.

7.2.7 Off-Site Emergency Preparedness Plan

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes an off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighbouring population. The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents which have very severe consequences yet have a small probability of occurrence should also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan should be either rest with the works management or with the local authority. Either way, the plan should identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control center should be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they should be evacuated or told to go

indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

a. In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically;
b. If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield them from the fire. This latter case particularly applies if the installation at risk could produce a fireball with very severe thermal radiation effects;
c. For release or potential release of toxic materials, limited evacuation may be appropriate downwind if there is time. The decision would depend partly on the type of housing "at risk". Conventional housing of solid construction with windows closed offers substantial protection from the effects of a toxic cloud, while shanty house, which can exist close to factories, offer little or no protection.

The major difference between releases of toxic and flammable materials is that toxic clouds are generally hazardous down to much lower concentrations and therefore hazardous over greater distances. Also, a toxic cloud drifting at, say 300m per minute covers a large area of land very quickly. Any consideration of evacuation should take this into account. Although the plan will have sufficient flexibility built in to cover the consequences of the range of accidents identified for the on-site plan, it will cover in some detail the handling of the emergency to a particular distance from each major hazard works.

7.2.7.1 Aspects proposed to be considered in the Off-Site Emergency Plan

The main aspects, which should be included in the emergency plan, are:

- **Organization**

Details of command structure, warning systems, implementation procedures, emergency control centres. Names and appointments of incident controller, site main controller, their deputies and other key personnel.

- **Communications**

  Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

- **Specialized knowledge**

  Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized chemical knowledge, laboratories.

- **Voluntary organizations**

  Details of organizers, telephone numbers, resources etc.

- **Chemical Information**

  Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological information**

  Arrangements for obtaining details of weather conditions prevailing at the time and whether forecasts.

- **Humanitarian arrangements**

  Transport, evacuation centres, emergency feeding treatment of injured, first aid, ambulances and temporary mortuaries.

- **Public information**

  Arrangements for dealing with the media press office and informing relatives, etc.

- **Assessment of emergency plan**

Arrangements for:

(a) Collecting information on the causes of the emergency;

(b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.2.7.2 Role of the Emergency Co-ordinating Officer

The various emergency services should be co-ordinated by an Emergency Co-ordinating Officer (ECO), who will be designated by the District Collector. The ECO should liaison closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control should be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

7.2.7.3 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The Emergency Planning Officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO should liaison with the works, to obtain the information to provide the basis for the plan. This liaison should ensure that the plan is continually kept up to date.

It will be the responsibility of the EPO to ensure that all those organizations, which will be involved off site in handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

7.2.7.4 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

Their functions should include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

7.2.7.5 Role of Fire Authorities

The control of a fire should be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region should be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They should be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

7.2.7.6 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, should have a vital part to play following a major accident and they should form an integral part of the emergency plan.

For major fires, injuries should be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals. For major toxic releases, the effects vary according to the chemical in question, and the health authorities should be apprised about the likely toxic releases from the plant, which will enable them in dealing with the aftermath of a toxic release with treatment appropriate to such casualties. Major off-site incidents are likely to require medical equipment and facilities additional to those available locally and a medical "mutual aid" scheme should exist to enable the assistance of neighbouring authorities to be obtained in the event of an emergency.

7.2.7.7 Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well-documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations. In cases where toxic gases may have been released, the factory inspectorate may be the only external agency with equipment and resources to carry out tests.

7.3 Occupational Health and Safety

A few major anticipated occupational health and safety hazards are enlisted below;

- Fire and electrical hazards
- Increased risk of communicable diseases due to water contamination
- Injuries associated with construction activities
    - Dust generation points/places
    - Working in heights
    - Over exertion
    - Moving machinery
    - Smoke by objects

7.3.1 Occupational Health

Occupational health needs attention both during construction and operation phases. However, the problem varies both in magnitude and variety in the above phases.

- **Construction Phase**

The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise. Safety provisions will be made to conform to health/safety requirements by the contractor. Provisions like preventive protection equipments will be provided to workers for their protection and safety.

- **Operation phase**

The problem of occupational health, in the operation phase is due to disorders due to emission, noise and industrial accidents. Suitable personnel protective equipment should be given to the required employees. The working personnel should be given the following appropriate personnel protective equipment.

- Industrial Safety Helmet
- Face shield with replacement acrylic vision
- Zero power plain goggles
- Zero power goggles with blue colour glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Canister Gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Safety belt/line man's safety belt
- Leather hand gloves
- Asbestos hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

A full fledge health centre facilities will be established to attend round the clock for emergency arising out of accidents, if any. All working personnel will be medically examined during employment and at least once in every year and the records will be maintained. The above examination covers Blood Test, Urine Test, Spirometry, Vision Testing, Chest X-ray, Audiometry, Vision Testing (Far & Near vision, colour vision and any other ocular defect) and ECG and opinion by practising Doctor.

7.3.2 Safety

Safety of both men and materials during the construction and operation phase of the industry is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan.

❖ **Safety Plan**

The disaster in plant is possible due to spillage of liquid metal, collapse of induction furnace, collapse of structures, fire/explosion, etc. The details of the fire fighting equipment to be installed are given below:

- Fire Extinguisher - Dry Chemical Powder (DCP) Type
- Fire Extinguisher - CO_2 Type
- Fire Extinguisher - Foam Type
- Fire Extinguisher - Soda Acid Type
- Fire buckets

The fire extinguishers will be located all over the building for immediate use. Fire extinguishers will be provided in DG room, MCC room, Furnace platform, Laboratory, Process area and Storage room. The type of hand appliances provided is such that the fire extinguishers can be directly taken and used for firefighting purpose at any location inside the building.

Keeping in view the safety requirement during construction, operation and maintenance phases at the plant should formulated safety policy with the following regulations:

- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment.
- To ensure that adequate safety instructions are given to all employees.
- To provide wherever necessary protective equipment, safety appliances and clothing, and to ensure their proper use.
- To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health or safety.

- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge.
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work.
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters.
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service.
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees.
- To publish/notify regulations, instructions and notices in the common language of employees.
- To prepare separate safety rules for each type of occupation/processes involved in the project.
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

❖ **Safety Organization**

During the construction and operation of proposed project the posting of safety officer should be in accordance with the requirement of Factories Act and their duties and responsibilities should be as defined thereof.

❖ **Safety Circle**

In order to develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally should meet for about an hour every week.

❖ **Safety Training**

A full-fledged training centre should be set up at the plant. Safety training should be provided by the Safety Officer with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labours should also be provided safety training. To create safety awareness safety films should be shown to workers and leaflets etc. Some precautions and remedial measures proposed to be adopting to prevent fires are:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries.
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and
- Proper fire watching by all concerned would be ensured.

❖ **Health and Safety Monitoring Plan**

All the potential occupational hazardous work places such as induction furnaces, transformers, casting machine, fuel storage areas, etc. should be monitored regularly. The health of employees working in these areas should be monitored once in a year for early detection of any ailment due to exposure to hazardous chemicals.

7.4 Public Hearing

The public hearing for the proposed project of Steel Melting Shop & Rolling Mill will be conducted as per Environment Impact Assessment Notification dated 14th September 2006 and its further amendments.

7.5 Detail about various measures could be adopted during finishing and tapping of a heat.

Steel Rolling Mill: Finishing Stage

1.Rolling Process Optimization:

- computerized models will be used to predict rolling forces, temperatures, and profiles, optimizing the rolling process for desired product properties.

- Automatic gauge control systems will be implemented to ensure consistent thickness across the rolled product.

2.Cooling Strategies:

- Controlled cooling techniques will be employed to achieve the desired microstructure and mechanical properties of the rolled steel.

- Water or air cooling systems is used to rapidly cool and harden the steel, depending on the required characteristics.

3.Quality Control:

- Integrate advanced online monitoring and inspection systems to detect defects and deviations in real-time.

- Automatic surface defect detection and classification systems will be implemented to ensure product quality.

4.Reducing Idle Time:

- Optimize changeover times between different product sizes or grades to minimize downtime.

- Quick-change setups used for rolls and guides to expedite product changes.

5.Energy Efficiency:

- Regenerative braking systems used to recover and reuse energy during the rolling process.

- Energy-efficient motors will be implemented and drives for better overall energy consumption.

Melting Unit: Tapping Stage

1.**Tapping Optimization:**

- Predictive models to determine the optimal tapping time for maximizing yield and minimizing metal loss.

- Sensors will be used and data analysis to monitor and control the chemical composition of the molten metal during tapping.

2.**Slag Management:**

- Optimize slag composition and properties to enhance the separation of impurities from the molten metal.
- Slag control techniques will be implemented to ensure efficient removal and minimal metal loss.

3.**Crucible Design and Maintenance:**

- High-quality refractory materials and proper crucible design to minimize erosion and extend the crucible's lifespan.
- Regularly inspection and maintain crucibles to prevent leaks and maintain operational efficiency.

4.**Safety Measures:**

- Safety protocols will be implemented and personal protective equipment for workers involved in tapping operations.
- Automated tapping systems to minimize human exposure to high-temperature and hazardous environments.

5.**Furnace Lining Inspection:**

- Regularly inspection and repair the furnace lining to prevent leaks and maintain proper heat containment.
- Predictive maintenance techniques will be implemented to schedule lining repairs before significant damage occurs.

6.**Automated Systems:**

- Automated tapping systems will be implemented that can precisely control the pouring process, reducing metal loss and ensuring consistent quality.

7.**Environmental Considerations:**

- Proper emissions control systems will be implemented to minimize the release of pollutants during the tapping process.
- Recycling and reusing by-products like slag for various applications to reduce waste.

7.6 Detail about operational control measures to Minimize and control the refractory wall wearing:

Steel Rolling Mill:

1.**Proper Material Selection:**

- Refractory materials that are suitable for the specific conditions and temperatures encountered in the rolling mill.
- Materials with good thermal shock resistance and high abrasion resistance.

2.**Lining Design and Installation:**

- The lining layout will be adopted to minimize stress concentrations and ensure uniform wear.
- Anchor the refractory linings to prevent shifting during operation.

3.**Regular Inspection:**

- Regular visual inspections of the refractory linings will be performed to detect signs of wear, cracks, or erosion.
- Thermographic imaging or other non-destructive testing methods to identify areas of concern.

4.**Temperature Monitoring:**

- Monitor and control the operating temperature to prevent excessive thermal stresses that can accelerate refractory wear.
- Cooling systems will be implemented to maintain temperature within acceptable limits.

5.**Surface Coatings:**

- Protective coatings will be applied to the refractory surfaces to reduce wear caused by abrasion and chemical reactions.
- Coatings can also improve resistance to slag and other corrosive substances.

6.**Maintenance Practices:**

- Regular maintenance will be scheduled and repairs to address refractory wear before it becomes severe.
- Skilled technicians will be used for repairs to ensure proper installation and extended lining life.

Melting Unit:

1.**Refractory Material Selection:**

- Refractory materials that are compatible with the type of metal being melted and the surrounding conditions.
- Materials with good resistance to thermal shock and corrosion.

2.**Slag Control:**

- Optimize slag composition to minimize its corrosive effects on refractory linings.
- Will maintain a consistent slag composition to reduce wear on the refractory walls.

3.**Lining Thickness:**

- Designing refractory linings with adequate thickness to withstand the mechanical and thermal stresses of the melting process.
- Insulating refractory layers will be used to minimize heat transfer to the lining.

4.**Vibration Control:**

- Measures to reduce mechanical vibrations will be implemented that can contribute to refractory wear.
- Properly balance rotating equipment and use vibration dampening systems.

5.**Lining Repair and Replacement:**

- Schedule timely repairs and replacements for worn refractory linings.
- Use refractory materials with quick curing times for rapid repairs.

6.**Pouring Techniques:**

- Optimize pouring techniques to minimize impacts on the refractory lining during metal transfer.
- Use automated pouring systems for precise and controlled metal delivery.

7.**Slag Removal Techniques:**

- Efficient slag removal techniques will be implemented to prevent excessive mechanical stress on the refractory lining.
- Avoid aggressive slag removal methods that can accelerate lining wear.

7.7 State-of-the-art technology.

1. **Production Process Optimization:**

- **Industry 4.0 Integration:** Smart manufacturing concepts using IoT (Internet of Things), AI (Artificial Intelligence), and data analytics will be implemented to monitor and control various stages of production.
- **Digital Twin:** Create a digital twin of the plant to simulate processes, predict performance, and

optimize operations in real time.

- **Predictive Maintenance:** Sensor data and predictive analytics to identify potential equipment failures and schedule maintenance before breakdowns occur.

2. **Energy Efficiency:**

- **Energy Management Systems:** Advanced energy management systems will be utilized to monitor and optimize energy consumption throughout the plant.

- **Waste Heat Recovery:** Waste heat recovery systems will be implemented to capture and reuse energy from various processes.

- **High-Efficiency Motors and Drives:** Replace older motors and drives with energy-efficient models to reduce power consumption.

3. **Quality Control:**

- **Real-time Inspection:** Integrate automated inspection technologies such as AI-powered vision systems to detect defects and ensure product quality.

- **Online Monitoring:** Continuously monitor critical process parameters to maintain product consistency and quality standards.

4. **Material Handling and Logistics:**

- **Automated Material Handling:** Automated guided vehicles (AGVs) or robotics will be implemented for material movement and storage, reducing human intervention and errors.

- **Supply Chain Integration:** Use advanced inventory management systems and real-time tracking for efficient material procurement and delivery.

5. **Environmental Sustainability:**

- **Emission Control:** Install advanced emission control systems to minimize air and water pollutants generated during the production process.

- **Recycling and Waste Management:** Implement efficient recycling systems to reduce waste and reuse by-products.

6. **Safety and Workforce Management:**

- **Remote Monitoring:** Use remote monitoring technologies to keep workers safe in hazardous areas.

- **Training Simulators:** Train employees using virtual reality (VR) or augmented reality (AR) simulators to enhance safety and skill development.

7. **Research and Development:**

• **Collaboration with Research Institutions:** Partner with research institutions to develop innovative technologies specific to TMT steel production.

8. **Smart Sensors and Instrumentation:**

• **Wireless Sensors:** Wireless sensors will be implemented for real-time data collection on temperature, pressure, and other critical parameters.

• **Remote Control:** Enable remote operation and control of equipment through smart devices.

9. **Efficient Water Management:**

• **Water Recycling and Treatment:** Water recycling systems will be implemented to minimize water consumption and treat effluents before discharge.

10. **Employee Training and Skill Development:** - **Advanced Training Tools:** e-learning platforms, virtual reality, and simulation-based training to enhance workforce skills.

7.8 State-of-the-art technology for induction furnaces to control emissions

1.**Electromagnetic Stirring (EMS) Technology:**

• Electromagnetic stirring technology improves the mixing of metal and slag in the furnace, leading to more efficient heat transfer and reduced energy consumption.

• By enhancing the melting process, EMS reduces the need for prolonged heating, which in turn lowers fuel consumption and emissions.

2.**Scrap Preheating Systems:**

• Preheating scrap materials before they enter the furnace can significantly reduce energy consumption and emissions.

• Innovative systems use burners, hot gases, or electrical heating elements to preheat the scrap, promoting faster melting and reducing the overall furnace load time.

3.**Efficient Burner Design:**

• Advanced burner designs optimize combustion by achieving better fuel-air mixing and reducing excess air supply.

• This leads to improved energy efficiency and reduced emissions of pollutants such as nitrogen oxides (NOx).

4.**Post-Combustion Systems:**

• Afterburners or post-combustion systems can be installed to burn off volatile organic

compounds (VOCs) and other pollutants from off-gas streams.

- These systems help in meeting emissions regulations and improving air quality.

5. **Baghouse Filters and Scrubbers:**

- Baghouse filters and wet scrubbers are used to capture particulate matter and other pollutants from flue gases before they are released into the atmosphere.

- These technologies effectively reduce emissions of dust and certain gases, enhancing air quality.

6. **Waste Heat Recovery Systems:**

- Waste heat recovery systems capture and utilize the heat generated during the melting process to preheat incoming scrap or other materials.

- By utilizing this waste heat, energy efficiency is improved, and fuel consumption is reduced.

7. **Closed-Loop Water Cooling Systems:**

- Closed-loop water cooling systems help minimize water usage by recirculating cooling water within the furnace system.

- This reduces water consumption and minimizes the potential for water pollution.

8. **Advanced Process Control and Automation:**

- Advanced control systems use sensors and real-time data to optimize furnace operations, reducing energy waste and emissions.

- Automation also improves process stability and reduces human error.

9. **Alternative Energy Sources:**

- Some induction furnaces can be powered by electricity generated from renewable sources like solar or wind energy.

- This approach reduces the carbon footprint associated with electricity consumption.

10. **Carbon Capture and Utilization (CCU):**

- Research is ongoing to develop technologies that capture carbon dioxide (CO_2) emissions from furnace exhaust gases and convert them into useful products or store them underground.

7.9 In-House environmental performance and evolution tools to evaluate the impacts of the project on the environment.

1. Environmental Management System (EMS): EMS will be implemented, such as ISO 14001, to establish a structured approach for managing environmental aspects and impacts. This system will help you identify, assess, and manage potential environmental impacts associated with the steel plant's operations.

2. Environmental Performance Indicators: Define key environmental performance indicators (EPIs) related to energy consumption, greenhouse gas emissions, water usage, waste generation, and air quality. These indicators will serve as measurable metrics to track the plant's environmental performance.

3. Real-time Monitoring Systems: Install monitoring systems to collect real-time data on energy consumption, emissions, water usage, and other relevant parameters. These systems can provide insights into immediate operational impacts and enable timely interventions.

4. Environmental Impact Assessment (EIA) Tools: Use specialized software or tools to conduct comprehensive environmental impact assessments. These tools can help model the potential effects of plant operations on air quality, water resources, noise levels, and other environmental factors.

5. Life Cycle Assessment (LCA) Software: Perform life cycle assessments to evaluate the overall environmental impact of the steel plant, from raw material extraction to product end-of-life. LCA software can quantify the environmental burdens associated with different stages of production.

6. Energy Management Software: Implement energy management software to monitor energy consumption patterns, identify energy-saving opportunities, and track progress toward energy efficiency goals.

7. Environmental Monitoring Dashboard: Develop a user-friendly dashboard that consolidates data from various monitoring systems and presents it in a visually appealing format. This allows for easy tracking and analysis of environmental performance trends.

8. Trend Analysis and Reporting: Regularly analyze the collected data and prepare reports that highlight trends, deviations, and areas requiring improvement. These reports can be used to communicate the plant's environmental performance to stakeholders.

9. Environmental Audits: Conduct regular internal environmental audits to assess the effectiveness of implemented measures, identify gaps, and ensure compliance with environmental regulations and standards.

10. Continuous Improvement Initiatives: Establish a culture of continuous improvement by setting achievable environmental performance targets and implementing corrective and preventive actions based on data analysis.

11. Employee Training: Provide training to employees regarding the use of environmental

performance tools, their roles in maintaining environmental standards, and the importance of sustainable practices.

12. Stakeholder Engagement: Involve internal and external stakeholders in discussions about environmental performance and improvement initiatives. This can lead to valuable insights and collaborative efforts.

7.10 Cradle-to-grave approach

1. **Cradle Phase: Raw Material Extraction and Processing**

- Identify the sources of raw materials used in steel production, such as iron ore, coal, limestone, and scrap metal.

- Assess the environmental impacts of mining or harvesting these raw materials, including energy consumption, water usage, habitat disruption, and greenhouse gas emissions.

- Evaluate the processes involved in converting these raw materials into usable inputs for the steel mill, such as iron ore processing and coke production.

2. **Manufacturing Phase: Steel Production and Rolling Mill Operations**

- Evaluate the environmental impacts of the steel production process, including iron smelting, blast furnace operations, and the use of various energy sources (e.g., coal, natural gas, electricity).

- Calculate emissions of pollutants, such as carbon dioxide (CO2), sulfur dioxide (SO2), nitrogen oxides (NOx), particulate matter, and other potential pollutants.

- Assess water consumption, waste generation, and the potential for releases of hazardous substances during steel production and rolling operations.

3. **Transportation and Distribution Phase**

- Analyze the transportation of raw materials to the steel mill and the distribution of finished steel products to customers.

- Consider the energy consumption, emissions, and environmental impacts associated with transportation modes (road, rail, sea) and distances traveled.

4. **Use Phase**

- Evaluate the environmental impacts associated with the use of the steel products produced by the rolling mill. This might include considering the energy consumption and emissions associated with using steel in construction, manufacturing, or other applications.

5. **End-of-Life Phase: Recycling and Disposal**

- Assess the potential for recycling steel products and the environmental benefits of using recycled steel compared to virgin steel.

- Consider the emissions, energy consumption, and environmental impacts associated with steel recycling processes.

- If recycling is not feasible, analyze the environmental impacts of disposing of steel products at the end of their useful life.

6. **Grave Phase: Waste Management and Environmental Impact**

- Evaluate the environmental impacts of waste generated throughout the lifecycle of the steel rolling mill, including solid waste, wastewater, and air emissions.

- Consider the potential for pollution, habitat disruption, and other negative impacts on ecosystems and human health.

8 PROJECT BENEFITS

8.1 Improvement in the Physical Infrastructure

The impacts of the proposed expansion of steel plant on the civic amenities are substantial. The basic requirement of the community needs will be strengthened by extending health care, educational facilities to the community, strengthening of existing roads in the area. Viki Industries Private Limited will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

The road facilities are already available in the plant site for the transportation facilities. With improved transportation facilities there is always a scope for development. Medical facilities will be augmented in dispensaries located near the plant area. These medical facilities would also be available to local people in the surrounding in case of emergencies.

8.2 Improvement in the Social Infrastructure

The proposed expansion project will result in improving the social infrastructure in following manner:

- Generation of employment and improved standard of living;
- Establishment of small-scale ancillary & supply industries;
- Increased revenue to the state by way of royalty, taxes and duties;
- Improved communication and transport facilities etc.

In addition to above, the local community will also get benefits through the following aspects.

- There shall be significant change in the socio-economic scenario of the area.
- The proposed expansion project shall enhance the prospects of direct and in direct employment during construction and in operation phase. Most of the unskilled and semiskilled workers for the proposed expansion are from the nearby villages.

- Overall, the proposed expansion will change the living standards of the people and improve the socio-economic conditions of the area.

8.3 Employment Potential

The impact of proposed expansion on the economic aspects can be clearly observed. The activities of project will provide employment to persons of different skills and trades. The local population is getting preference to get employment. The employment potential is ameliorating economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities.

The employment of local people in proposed expansion shall upgrade the prosperity of the region. This will in turn improve the socio-economic conditions of the area. The total manpower required for the proposed expansion during the operation phase is about 150 persons which would be mainly sourced from local community in and around the industry and few technical persons will be employed from outside area. In addition to the above, direct employment shall be provided to the contractual labour and indirect employment opportunities shall arise after the project.

ENVIRONMENT COST BENEFIT ANALYSIS

The environment cost benefit analysis is not recommended during scoping stage. Hence the same was not carried out.

10 ENVIRONMENT MANAGEMENT PLAN

An Environment Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all contractors and subcontractors, including consultants understand the potential environment risks arising from the proposed expansion project and take appropriate actions to properly manage that risk. EMP also ensures that the project implementation is carried out in accordance with the design and the mitigation measures as recommended in the Environment Impact Assessment study to reduce the adverse impacts during the project's life cycle.

The plan outlines existing and potential problems that may adversely impact the environment and recommends corrective measures where required. Also, the plan outlines roles and responsibility of the key personnel and contractors who are charged with the responsibility to manage the proposed project site and its surroundings.

The EMP is generally:

- Prepared in accordance with the approved ToR issued by MoEF &CC/ SEIAA;
- In compliance with the rules & requirements of Tamilnadu Pollution Control Board;
- To ensure that the project facilities are operated in accordance with the design;
- A process that confirms proper operation through supervision and monitoring;
- A system that addresses public complaints during construction and operation of the facility and take appropriate corrective action plans to overcome those unwanted situations;
- A plan that ensures remedial measures is implemented immediately.

The key benefits of the EMP are that it provides the organization with means of managing and improving its environment performance thereby allowing it to contribute to better environment quality. The other benefits include cost control and improved relations with the stakeholders.

10.1 Elements of EMP

EMP includes four major elements;

- ***Commitment & Policy:*** The proposed project management will strive to provide and implement the Environment Management Plan that incorporates all issues related to environment and social components and will comply with the suggestions given by MoEF &CC/ SEIAA.
- ***Planning:*** This includes identification of environment impacts and setting environment objectives. The various potential impacts are discussed under Chapter – 4.
- ***Implementation:*** This comprises of resources available to the developers, accountability of contractors, training of operational staff associated with environment control facilities and documentation of measures to be taken.
- ***Measurement & Evaluation:*** This includes monitoring of implementation of the mitigation measures, corrective actions and record keeping.

Appropriate mitigation measures have been recommended to minimize the impact on the environment and social parameters.

10.2 Institutional Arrangements for Environment Protection & Conservation

For the effective implementation of the mitigation measures and consistent functioning of the proposed expansion, an Environment Management System (EMS) has been proposed. The EMS will include the following:

- An Environment Management Cell
- Environment Monitoring Program
- Personnel Training
- Regular Environment Audits and Corrective Action Plan
- Documentation – Standard operating procedures of Environment Management
- Plans and other records

10.2.1 Environment Management Cell

A permanent organizational set up will be formed to ensure the effective implementation of mitigation measures and to conduct environment monitoring. The major duties and responsibilities of Environment Management Cell will be as follows:

- To implement the environment management plan;
- To ensure regular operation and maintenance of pollution control devices;
- To assure regulatory compliance with all relevant rules and regulations;
- To minimize environment impacts of operations by strict adherence to the EMP;
- To initiate environment monitoring as per approved schedule;
- Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit;
- Maintain documentation of good environment practices and applicable environment laws as ready reference;
- Maintain environment related records;
- Coordination with regulatory agencies, external consultants and monitoring laboratories;
- Maintaining log of public complaints and the action taken;
- To report the non compliances / violations of the environment norms to the board of directors of the company.

10.2.2 Hierarchical Structure of Environment Management Cell

Normal activities of the EMP cell will be supervised by Vice President of the unit who will report to the Managing Directors of the proposed expansion project. The hierarchical structure of Environment Management Cell is given in following **Figure - 10.1.**

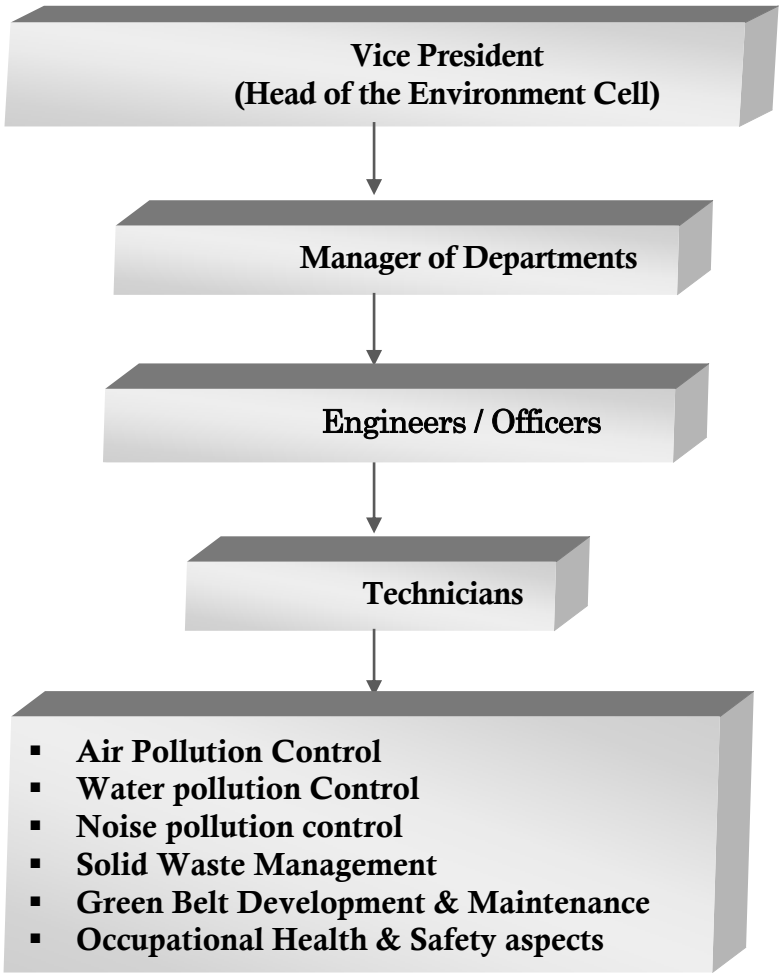


FIGURE 10-1 ENVIRONMENT MANAGEMENT CELL

TABLE 10.1 RECORD KEEPING REQUIREMENTS

Parameter	Particulars
Ambient air quality	Monitoring of air quality parameters
Solid Waste Handling and Disposal	Daily quantity of waste generated, stored, recycled and disposed
Regulatory (Environment) Licenses	Environment Permits / Consents from TNPCB/ MoEF Copy of waste manifests as per requirement
Monitoring and Survey	Records of all monitoring carried out as per the finalized monitoring protocol.

Others	Log book of compliance, Employee's health and safety records, Equipment inspection and calibration records, Vehicle maintenance and inspection records, Maintenance of Corporate Social Responsibilities towards the society even after the completion of the project work and during the operation phase

10.3 Implementation Mechanism for Mitigation Measures

The environment management cell will be developed for the proposed plant will ensure the implementation of mitigation measures suggested for the proposed expansion. The details of the implementation mechanism for the mitigation measures have been discussed below:

10.4 Energy Management

The proposed steel plant requires large amounts of energy for their operation. Many industries have reduced operating expenses by focusing on energy efficiency, considering both energy supply and energy consumption. Use of energy conservation measures as part of design and operations, will be part of the Master Planning and the specifications as part of awarding development work to a private contractor.

❖ **Energy Saving Practices**

- Promoting use of Solar Street Lighting System
- Purchase of Energy efficient appliances
- Constant Monitoring of Energy consumption and defining targets for energy conservation
- Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.
- Use of LED / CFL lamps and low voltage lighting.

❖ **Behavioral Change on Consumption**

- Promoting self awareness on energy conservation
- Training staff on methods energy conservation and to be vigilant to such opportunities

❖ **Energy Management**

Some of the energy saving options will be informed to the staffs,

- Switch off lights / fans / ACs that are not needed
- Make maximum use of daylight
- Don't leave lights on in unoccupied areas
- Fit labels on switches so people know which switches operate particular lights
- Use local desk lights if few people are in the building
- Report faulty lighting promptly – a flickering tube uses more electricity and is a contributing factor to 'sick building syndrome'.
- Don't leave any electrical equipment running overnight or at the weekends unless there is a special reason for doing so
- Keep doors and windows closed in air-conditioned areas
- Don't cool for 24 hours a day when occupancy times are less
- Switch off equipment and lighting where possible to reduce heat gains
- Consider installing a run back timer which switches off a split cooling system after a preset time to prevent it running continuously
- Solar energy will be used for streetlight.

10.5 Development of Greenbelt

One of the most effective, economical and useful remedies for control of environment pollution is tree plantation. Plants purify air by assimilating carbon dioxide and releasing oxygen thus keeps check on the vehicular pollution on road and its surroundings. It also helps in soil and water conservation. The main objectives of green belt development are as follows:

- To reduce the impacts of air and dust pollution
- To reduce the impact of vehicular noise caused due to movement of vehicles
- To arrest soil erosion at the embankment slopes

- Beautification of the project corridor by landscaping and turfing with grasses and shrubs Prevention of glare from the headlight of incoming vehicles

While making choice of the plant species for cultivation in green belts, weightage has to be given to the natural factor of bio- climate. For effective removal of pollutants, it is necessary that.

- Plants grow under conditions of adequate nutritional supply (for health and vigour of growth)
- Absence of water stress (to maintain openness of stomatal apertures and form of epidermal structures)
- Well exposed to atmospheric conditions of light and breeze, to maintain free interaction with gases

10.5.1 Design of Green Development

The greenbelt shall be developed all along the boundaries of the plot and the roads. The green belt acts as a sink for pollutants, attenuation of noise levels and improvement in aesthetic quality of the plant. In any greenbelt development, monoculture is not advisable due to its climatic factor and other environment constraints. Greenbelt with varieties of species is preferred to maintain species diversity, rational utilization and for maintaining health of the trees. The greenbelt coverage area for the proposed expansion project is about 34.1%.

Well-developed greenbelt leads to a favourable micro-climatic to support different micro-organisms in the soil as a result of which soil quality will be improved further. In the proposed expansion greenbelt development will be undertaken in all available areas and also along the roads around plant infrastructure, etc.

Tall and leafy trees like *Azadirachta Indica, Pongamia pinnata, Mimusops elengi*, etc., will be developed in these areas. As far as possible the following guidelines will be considered in greenbelt development. Shrubs and trees will be planted in encircling rows within the plant site. The short trees (5 m height) will be planted in the first two rows and the tall trees (>5 m)

in the outer rows around the project site. Planting of trees in each row will be in staggered pattern.

In the front row, shrubs consisting of Albizia sp., Peltophorum, etc will be grown. Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion. Spacing between the trees will be slightly maintained facilitating effective height of greenbelt.

All tolerant plants are not necessarily good for green belts e.g. Xerophytes with sunken stomata can withstand pollution by avoidance but are poor absorbers of pollutants due to low gaseous exchange capacity. Therefore, selection of plants is very important in green belt development for effective removal of suspended particulate matter and for absorption of gases. About 25 various varieties of tress and 4 varieties of shrub plants will be planted in the project site. The list & no. of trees proposed in the project site are tabulated in **Table - 10.2**.

TABLE 10.2 GREEN BELT TREES

S. No.	Local Name	Botanical Name	No of Trees
TREES			
1.	Neem	*Azadirachta Indica*	20
2.	Ilupai tree	*Madhuca longifolia*	20
3.	Poovarasu	*Thespesia populnea*	20
4.	Punnai	*Calophyllumino phyllum*	20
5.	Magizhamaram	*Mimusops elengi*	20
6.	Pungam	*Pongamia pinnata*	20
7.	Kondrai	*Cassia fistula*	20
8.	Aathi	*Ficus racemose*	20
9.	Sarkarai Palam	*Muntingia Calaburra*	20
10.	Vaaganai	*Albizia lebbeck*	20
11.	Vilvam	*Aegle marmelos*	20
12.	Sengondrai	*Cassia roxbtrghii*	20
13.	Naval tree	*Syzygium cumini*	20

14.	Savukku	*Casuarina equisetifolia*	20
15.	Munkil	*Bambusa bambos*	20
16.	Sorga Maram	*Simarouba glauca*	20
17.	Elilaippalai	*Alstonia scholaris*	20
18.	Nattuvadumai	*Terminalia catappa*	20
19.	Mahogany	*Swietenia macrophylla*	20
20.	Ven Marudhu	*Terminalia Arjuna*	20
21.	Poo Marudhu	*Lagerstoemia speciosa*	20
22.	Kalltchi	*Ficus amplissima*	20
23.	Karungali	*Diospyros Ebenum*	20
24.	Vengai	*Pterocarpus marsupium*	20
25.	Odhiam	*Lannea coromandelica*	20
SHRUBS			
26.	Bougainvillea	*Bougainvillea spectabilis*	30
27.	Cembarutti	*Hibiscus rosa-sinensis*	30
28.	Arali	*Plumeria rubra*	30
29.	Unnichedi	*Lantana camara*	30
Total			**620**

10.6 Rain Water Harvesting System

The rainwater will create surface run-off from the proposed expansion facility during monsoon season. The run-off will be of two types i.e., run-off from the open surface area of the plant site and run-off from the built-up area of the plant.

The run-off from the building area of the plant facilities will be routed through a carefully designed piping network and collected in the rain water collection sump and the excess water will be connected along with the open storm water network.

The run-off from the open surface area will be routed directly to the rainwater harvesting structures constructed at suitable locations as per the contours and routed to rain water sump

in the project site. For augmenting the ground water resources in the plant area, adequate number of rain-water harvesting pits will be constructed and the internal drains where excess rain water flowing in drain will be diverted to these pits. These structures will facilitate percolation of water into the ground and thus augmenting the groundwater sources. This will result in increase in groundwater tables and to some extent the improvement of ground water quality. The size and the locations of rainwater harvesting pits will be decided during detailed engineering of the project.

Run off from the proposed project site is calculated using rational formula:

Q = C * I * A

Where,

Q - Run-off in m^3/hr C - Coefficient of Run-off

I - Max intensity of Rainfall in m/hr A - Catchment Area (m^2)

Run-off co-efficient (C)

- Roof - 0.9
- Hard paved area - 0.8
- Green belt area - 0.3

Intensity of Rainfall (I) - 30.8 mm/hr or 0.03 m/hr

Catchment area (A)

- Roof Area - 14500 Sq.m
- Hard paved area - 1250 Sq.m
- Green belt & open area - 11650 Sq.m

If the rain continues for one hour the total run off expected calculated below.

Roof area

Run off (Q) - 0.9 x 0.03 x 14500 = **391.5 m^3/hr**

Hard paved area

Run off (Q) - 0.8 x 0.03 x 1250 = **30 m^3/hr**

Green belt & open area

Run off (Q) - 0.3 x 0.03 x 11650 = **104.85 m^3/hr**

Hence, total volume of rain water run-off will be about **526.35 m^3/hr**.

Rain harvesting system

Keeping in mind the importance of water and its scarcity it is proposed to conserve water by rainwater harvesting by which the subsoil water condition / moisture content is maintained / improved to a great extent. Also, it is proposed to harness rainwater from the roof area by collecting the same in a rainwater collection tank of suitable capacity and reused for gardening / domestic purposes with the provision of a water treatment plant. Rain water harvesting sumps having capacity of about 550 m^3 will be provided to store the rain water.

Normally, the rain water harvest pit of suitable size is proposed to be constructed. The rain water harvest pit consists of 10 Nos of 9" dia borehole for depth as per site condition. Boreholes are made with casing pipes in position, and then filled up with ¾" – 1" dia riverside pebble and then casing pipe is removed. The pit outer wall is constructed in brick masonry on PCC bed of 1:4:8 ratio. The first layer for 18" thick is filled with pebble of size 1" – 3". The second layer for 18" thick is filled with coarse sand. The third layer for 18" thick is filled with activated charcoal. The fourth layer for 18" thick is filled with course soil. The fifth layer for 18" thick in filled with riverside pebble, of ¾" - 1". Finally, the top of rain harvest pit is covered with RCC precast slab with perforation of (min) 50 mm dia in strip of size 2'0' wide, to allow entry of surface / ground level rainwater.

10.7 Expenditure on Environment Management

The total estimate cost of the expansion project is about Rs. 57.43 crores. It is proposed to invest about Rs. 50 Lakhs on pollution Control, Treatment, Green belt development, Monitoring systems and others. The break-up of the investment is given in **Table - 10.3.**

TABLE 10.3 EXPENDITURE ON ENVIRONMENT MATTERS

S. No.	Description	Capital Cost (Rs. In lakhs)	Operational Cost per annum (Rs. In lakhs)
1	Air Pollution Control measures	12	2.5
2	Water Pollution Control	6	1.5
3	Solid Waste Management	5	1.0
4	Noise Pollution Control	4	1.0
5	Environment Monitoring	12	2.0
6	Occupational Health & Safety	5	1.0
7	Green belt Development	6	1.0
Total		**50**	**10**

10.8 Corporate Environment Responsibility (CER) Activities

Viki Industries Private Limited will implement the CER as per the provisions provided in the Office Memorandum of Ministry of Environment, Forest & Climate Change (MoEF&CC) issued vide letter No. F. No. 22-65/2017-IA.III dated 30.09.2020 and 20.10.2020. An amount of Rs.20 lakhs will be spent towards Corporate Environment Responsibility (CER) and the allocated amount for CER will be effectively utilized for the development activities in the nearby government school. The list of activities proposed along with budget allocated for the same is given in **Table – 10.4**.

TABLE 10.4 PROPOSED CER ACTIVITIES

S. No	CER Activity	Capital cost Allocation (in lakhs)
	Improvement of school infrastructure, sanitation facility, library, Drinking water treatment plant, solar lighting & smart class (LED Projector with computer), furnitures, development of sports facilities, Greenbelt development, additional classrooms for schools mentioned below: 1. Government Girls Higher Sec School – Thervazhi, Theruali	25
Total Cost Allocation		**25**

11 SUMMARY & CONCLUSIONS

This chapter presents the justification for implementation of the project, summary of anticipated impacts and mitigation measures and conclusions.

11.1 Justification for Implementation of the Project

The proposed project will have marginal adverse impacts on the local environment. However, with the implementation of the adequate pollution control and environment management measures, the minor impacts due to construction and operation of the proposed project plan will be mitigated.

There will not be any displacement of population due to the proposed project. The entire land area of 2.74 ha has been owned by project proponent. The proposed project will provide direct employment to about 300 persons and indirect employment to 600 – 900 persons. Apart from the employment and business opportunities for the local people, they will also be benefited in the areas such as education, health care and infrastructure facilities. The Government of Tamilnadu will be benefited in terms of taxes and duties, the railways, ports and industries authorities, etc. will be benefited indirectly.

Thus, this project will lead to overall development of the region in particular and in the state in general. This project will also generate indirect employment to a considerable number of families, who will render their services for the employees of the project. Thus, in view of considerable benefits from the project without any major adverse environment impact, the proposed project is most advantageous to the region as well as to the state.

11.2 Summary of Anticipated Environment Impacts and Mitigation Measures

The summary of anticipated adverse environment impacts due to the proposed project and mitigation measures is given in **Tabe-11.1**.

TABLE 11.1 ANTICIPATED ADVERSE ENVIRONMENT IMPACTS AND MITIGATION MEASURES

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
Constructional Impact				
Water Quality	Increase in suspended solids due to soil run-off during heavy precipitation	Loose soil at construction site	During monsoon season run off from construction site will be routed to a temporary sedimentation tank for settlement of suspended solids.	---
Air Quality	Increase in dust and NO_2 concentration	Leveling activity and Vehicular movement	Sprinkling of water in the construction area and unpaved roads. Proper maintenance of vehicles will be done.	The impact will be low, as the main approach road is tarred.
Noise	Increase in noise level	Construction equipment	Equipment will be kept in good condition to keep the noise level within 85-dB (A).	Workers will be provided with necessary protective equipment *e.g.* ear plug.
Terrestrial Ecology	Depression of plant growth	Dust emission from construction	Landscaping and extensive plantation will be done.	Plantation will be done in consultation with the local forest department.
Operational Impact				
Air Quality	Increase in PM, SO_2 and NO_2 levels in ambient air.	Stack emissions and material handling	Adequate APC measures like Bag filter & wet scrubber system will be provided to reduce the emissions from induction furnaces / electrical arc furnace & reheating furnace.	The resultant air quality will confirm to the stipulated standards.

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
			Adequate stack height will be provided for the proper dispersion of gaseous pollutants. Motorable roads in the plant area will be paved to reduce dust emission. Plantation programs will be undertaken around the plant area. Dust suppression measures will be implemented material handling area.	Particulate emission from the proposed furnaces stack will be kept below 150 mg/Nm^3.
Noise	Increase in noise levels in the plant area.	Equipment in main plant and auxiliaries	Equipment will be designed to conform to noise levels prescribed by regulatory agencies. Providing acoustic enclosure as source control. Provision of green belt and plantation would further help in attenuating noise.	Employees working in high noise areas would be provided earplugs as protective device.
Water Quality	Deterioration of surface water quality.	Discharge from domestic usages.	Adequate capacity of Sewage Treatment Plant is proposed for treatment of sewage. Elevated Solar Evaporation Pan of adequate are will be provided to dispose the effluent.	---

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
Solid waste	Furnace slag, dust from APC measures, Scraps & Fly Ash	Furnaces, Rolling and APC measures	All sort of solid waste will be disposed suitably.	Efforts will be made to utilize the solid waste to the extent possible.
Ecology				
a. Terrestrial	Impact on plant species	Emissions from stack	Emission will be controlled as well as dispersed through appropriate design.	As ambient air quality will be within limits, no active injury to the vegetation is expected.
b. Aquatic	Impact on aquatic life of the water bodies	Domestic Sewage	The domestic wastewater will be provided with adequate treatment facilities (STP)	As the sewage water will be treated properly no significant impact on aquatic life is expected.
Demography and Socio-economics	Strain on existing amenities like housing, water sources and sanitation, medical and infrastructure facilities.	Influx of people due to proposed employees as well as contractor employees/ labourers.	Most the worker requirement will be fulfilled by local people. No significant impact is envisaged	Overall socio-economic status of the area is expected to improve.

11.3 Conclusions

The proposed project will have marginal impacts on the local environment. However, development of this project has certain beneficial impact / effects in terms of providing the employment opportunities that the same will create during the course of its constructional phase as well as during operational phase of the project.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, the proposed project will be beneficial to the society and will help reduce the demand supply gap of steel products and will contribute to the economic development of the region in particular and state in general.

12 DISCLOSURE OF CONSULTANTS

This chapter presents the details the environment consultants engaged, their background and the brief description of the key personnel involved in the project.

12.1 Introduction

Ecotech Labs Pvt. Ltd. offers environmental consultancy & Laboratory services for various residential, commercial & industrial development projects. It is one of the leading solution providers in the field of environmental consultancy comprising of Impact assessment studies, laboratory services & all statutory clearances. Ecotech team has a decadal experience in the field of environmental technical consultancy and have successfully obtained all required statutory clearances from State Level Impact Assessment Authority (SEIAA), Pollution Control Boards in the region of South India & also from Ministry of Environment & Forest (MoEF). The completion of tasks in record time is the key feature of Ecotech. A team of Civil, Architecture & Mechanical Engineering, Environmental Sciences & Engineering, Biotechnology, Chemistry, Microbiology and Socio-Economics apart from environmental media sampling and monitoring experts and management experts, strive hard to serve the clients with up to mark and best services.

Ecotech also provide STP/ETP/WTP project consultancy on turn-key basis apart from Operation and Maintenance of these projects on annual contract basis. Also, having MoEF approved environmental laboratory, Ecotech provide laboratory services for monitoring and analysis of various environmental media like air, water, waste water, stack, noise and meteorological data to its clients all over India and abroad. Copy of the NABET accreditation certificate is shown in **Figure – 12.1.**

QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality

NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Eco Tech Labs Pvt Ltd.,

48, 2nd Main Road, Ram Nagar South Extension, Pallikaranai, Chennai- 600100, T.N.

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - including Open cast only	1	1 (a) (i)	B
2	Thermal power plants	4	1(d)	A
3	Coal washeries	6	2 (a)	B
4	Metallurgical industries - Ferrous only	8	3 (a)	B
5	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	21	5 (f)	A
6	Airports	29	7 (a)	A
7	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
8	Building and construction projects	38	8 (a)	B
9	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Apr. 20, 2021 and supplementary minutes dated Oct.19, 2021 posted on QCI-NABET website

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2217 dated Jan. 19, 2022. The accreditation needs to be renewed before the expiry date by Eco Tech Labs Pvt. Ltd., Chennai following due process of assessment.

NABET

Sr. Director, NABET
Dated: Jan. 19, 2022

Certificate No.
NABET/EIA/2124/SA 0147

Valid up to
Sep. 15, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

FIGURE 12-1 NABET ACCREDITATION CERTIFICATE

12.2 Study Team

The multidisciplinary team included expertise in Environment Impact Assessment, Air pollution & Control measures, Noise Control measures, Ecology and bio-diversity, Land use, Geology, Environment Chemistry and Socio-Economic planner.

TABLE 12.1 EIA TEAM

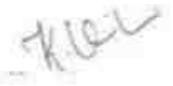
SN	Name of the expert	Area of functional Expert (NABET Accredited)
1	Mr. R. Rajendran	EIA Coordinator
2	Mrs. K. Vijayalakshmi	Air Pollution
3	Dr. A. Dhamodharan	Water Pollution
4	Dr. A. Dhamodharan	Solid Hazardous Waste
5	Dr. A. Dhamodharan	Ecology and Biodiversity
6	Mr. S. Pandian	Socio Economic
7	Dr. T. P. Natesan	Land Use
8	Mr. P. Gopinath	FAA
9	Mrs. K. Amudha	FAA

Functional area experts and assistance to FAE involved in the EIA study for "EIA Report for proposed expansion of Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill by M/s. Viki Industries Private Limited at S.No. 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu are shown in **Table-12.2.**

TABLE 12.2 EIA COORDINATOR AND FUNCTIONAL AREA EXPERTS INVOLVED IN THE EIA

S. No.	Functional areas	Name of the experts	Involvement (period and task)	Signature and date
1	AP	Mrs. K. Vijayalakshmi	1. Selection of Baseline Monitoring stations based on the wind direction 2. Interpretation of Baseline data by comparing it with standards prescribed by CPCB against the type of area 3. Identification of sources of air pollution and suggesting mitigation measures to minimize impact ***Period: March 2023– Till now***	
2	WP	Dr. A. Dhamodharan	1. Selection of baseline Monitoring Locations for Ground water analysis and also identifying nearest surface water to be studied. 2. Interpretation of baseline data collected 3. Identification of impacts based on the baseline study conducted and also to the ground water and nearby surface water due to the proposed project 4. Preparation of suitable and appropriate mitigation plan. ***Period: March 2023– Till now***	
3	SHW	Dr. A. Dhamodharan	1. Identification of nature of solid waste generated 2. Categorization of the generated waste and estimating the quantity of waste to be generated based on the per capita basis. Identification of impacts of SHW on Environment 3. Suggesting suitable mitigation measures by recommending appropriate disposal method for each category of waste generated 4. Top soil and refuse management ***Period: March 2023– Till now***	
4	SE	Mr. S. Pandian	1.Primary data collection through the census questionnaire 2.Obtaining Secondary data from authenticated sources and incorporating the same in EIA report. 3.Impact assessment & proposing suitable mitigation plan	

			4.CSR budget allocation by discussing with the local body and allotting the same for need based activity. ***Period: March 2023– Till now***	
5	EB	Dr. A. Dhamodharan	1. Primary data collection through field survey and sheet observation for ecology and biodiversity 2. Secondary Collection through various authenticated sources 3. Prediction of anticipated impacts and suggesting appropriate mitigation measures. ***Period: March 2023– Till now***	
6	HG	Dr. T. P. Natesan	1. Study of existing surface drainage arrangements in the core and buffer zone, impact due to mining on these drainage courses and suggestion of mitigative measures 2. Determination of groundwater use pattern, development of rainwater harvesting program. Storm water management through garland drainage system. ***Period: March 2023– Till now***	
7	GEO	Dr. T. P. Natesan	1. Field survey for assessing regional and local geology, aquifer distribution, Determination of groundwater use pattern, development of rainwater harvesting program. ***Period: March 2023– Till now***	
8	SC	Dr. A. Dhamodharan	1. Interpretation of baseline report 2. Identification of possible impacts on soil, prediction of soil conservation and suggesting suitable mitigation measures. ***Period: March 2023– Till now***	

9	AQ	Mrs. K. Vijayalakshmi	1. Collection of Meteorological data for the baseline study period 2. Plotting wind rose plot and thereby selecting the monitoring locations based on the wind pattern 3. Estimation of sources of air emissions and air quality modeling is done 4. Interpretation of the results obtained 5. Identification of the impacts and suggesting suitable mitigation measures. ***Period: March 2023– Till now***	
10	NV	Mrs. K. Vijayalakshmi	1. Selection of monitoring locations 2. Interpretation of baseline data 3. Prediction of impacts due to noise pollution and suggestion of appropriate mitigation measures ***Period: March 2023– Till now***	
11	LU	Dr. T. P. Natesan	1. Collection of Remote sensing satellite data to study the land use pattern. 2. Primary field survey and limited field verification for land categorization in the study area 3. Preparation of Land use map using Satellite data for 10km radius around the project site. ***Period: March 2023– Till now***	
12	RH	Mrs. K. Vijayalakshmi	1. Identification of the risk 2. Interpreting consequence contours 3. Suggesting risk mitigation measures ***Period: March 2023– Till now***	

12.3 Laboratory for Analysis

NAME OF LABORATORY	SCOPE OF SERVICES	ACCREDITATION STATUS
M/s. ECOTECH LABS PVT LTD	**Monitoring and Analysis of:** • Ambient Air Monitoring • Ground Water (Analysis) • Surface Water (Analysis) • Soil quality (Analysis) • Noise monitoring	Accredited by NABL Valid up to 23.05.2024

ANNEXURE – I

TOR & ITS COMPLIANCE

सत्यमेव जयते

THIRU.DEEPAK S.BILGI, I.F.S.
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY-TAMILNADU
3rd Floor, PanagalMaaligai,
No.1, Jeenis Road, Saidapet,
Chennai - 600 015.
Phone No. 044-24359973
Fax No. 044-24359975

TERMS OF REFERENCES (ToR)

Lr No. SEIAA-TN/F.No.9790/SEAC/3(a)/ToR-1390/2023 dated:27.03.2023

To

M/s. Viki Industries Private Limited
No. 1, Krishna Street,
Nungambakkam,
Chennai 600034

Sir/Madam,

Sub: SEIAA-TN – Terms of Reference with public hearing for the Proposed Expansion of Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill at S.F.No: 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu– M/s. Viki Industries Private Limited– under Category "B1" and Schedule Sl. No. 3(a) – "Metallurgical Industries (Ferrous & Non-Ferrous)" of EIA Notification 2006. – ToR with public hearing issued – Preparation of EIA Report – Regarding.

Ref:
1. Online Application No. SIA/TN/IND/416741/2023 Dt: 02.02.2023
2. Your application for Terms of Reference dated: 06.02.2023
3. Minutes of the 358th SEAC meeting held on 24.02.2023.
4. Minutes of the 604th meeting of SEIAA held on 27.03.2023.

The proponent M/s. Viki Industries Private Limited has submitted application seeking Terms of Reference with public hearing under Category "B1" and Schedule Sl. No. 3(a) – "Metallurgical Industries (Ferrous & Non - Ferrous)", of EIA Notification 2006 for the Proposed Expansion of

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Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill at S.F.No: 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.

Remarks by SEAC:

Proposed Expansion of Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill at S.F.No: 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu– M/s. Viki Industries Private Limited – for Terms of Reference (SIA/TN/IND/416741/2023 Dt: 02.02.2023)

The proposal was placed in the 358th SEAC Meeting held on 24.02.2023. The details of the project furnished by the proponent are available in thc website (parivesh.nic.in).

The SEAC noted the following:

1. The Proponent M/s. Viki Industries Private Limited has Proposed Expansion of Steel Rolling Mill & inclusion of Steel Melting Shop in the existing Steel Rolling Mill at S.F.No: 629 Part, 631 Part, 630/2 Part, 630/3 Part & 630/4, 632/4 Part, 634 Part, Old Gummidipoondi Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu.
2. The project/activity is covered under Category "B1" of Item 3(a) "Metallurgical industries (ferrous & non-ferrous)" of the Schedule to the EIA Notification,2006.

Based on the presentation made by the proponent and the documents furnished, the **SEAC decided to prescribe TOR for the preparation of Detailed EIA report along with Public Hearing.** The Detailed EIA shall include standard ToR along with the following additional ToR:

1. The PP shall study in detail about various operational measures to reduce the specific energy consumption in induction furnaces.
2. Since the Periods of idling are inherent because of the following activities, the PP shall study in detail and the same shall be included in the EIA report.
   i. Charging
   ii. Slagging
   iii. Sampling
   iv. Charge material
   v. Molten Heel Practice
   vi. Furnace Cover Losses

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3. The PP shall study in detail about Charging and operation of Melting for better and efficient operation of induction furnaces.
4. The proponent shall study in detail about various measures could be adopted during finishing and tapping of a heat.
5. The proponent shall study in detail about operational control measures to Minimize and control the refractory wall wearing.
6. The proponent shall explore the possibilities to Change from mains frequency to medium frequency furnaces.
7. The PP shall obtain NBWL clearance for Pulicat Bird Sanctuary, vide, MoEF&CC Office Memorandum no. FC-11/119/2020-FC dated 17th May, 2022.
8. The proponent shall explore the possibilities of utilizing state of the art technology with best global practice.
9. The proponent shall explore the possibilities of utilizing the industrial wastewater instead of fresh water.
10. The proponent shall elaborate on the state-of-the-art technology for induction furnace to control emissions (Fumes).
11. The proponent shall submit the Certified Compliance Report for existing plant.
12. The proponent must increase the solar and Wind Energy and must explore the possibilities of achieving Net Zero energy consumption.
13. The proponent shall submit the video and photograph of the operational details with particular reference to points of pollution in the existing plant.
14. Material balance and Water balance shall be furnished in accordance with MoEF&CC guidelines.
15. A detailed report on Solid waste management, hazardous waste shall be furnished.
16. Report on AAQ survey and proposed air pollution prevention and control measures shall be furnished in the EIA report.
17. The project proponent shall do the stoichiometric analysis of all the involved reactions to assess the possible emission of air pollutants in addition to the criteria pollutants, from the proposed project.
18. Adequacy report for ETP &STP for the proposed project obtained from any reputed Government institution such as IIT, Anna University, NIT shall be furnished.
19. Land use classification shall be obtained from the DTCP for the Survey Numbers of this

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project. Further, the project proponent shall submit the planning permission obtained from the DTCP, if any.

20. The proponent shall conduct the EIA study and submit the EIA report for the entire campus along with layout and necessary documents such as "A" register and village map.
21. Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Memorandum of MoEF& CC accordingly.
22. The Public hearing advertisement shall be published in one major National daily and one most circulated Tamil daily.
23. The PP shall produce/display the EIA report, executive summery and other related information with respect to public hearing in Tamil.
24. The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non- forest purpose involved in the project.
25. The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.
26. The project proponent shall explore the possibilities of treating and utilizing the trade effluent and sewage within the premises to achieve Zero liquid discharge.
27. The layout plan shall be furnished for the greenbelt area earmarked with GPS coordinates by the project proponent on the periphery of the site and the same shall be submitted for CMDA/DTCP approval. The green belt width should be at least 3m wide all along the boundaries of the project site. The green belt area should be not less than 15 % of the total land area of the project.
28. As the plant operation involves the sensitive processing, the medical officer and the supporting staff involved in the health centre activities shall be trained in occupational health surveillance (OHS) aspects through the outsourced training from the experts available in the field of OHS for ensuring the health standard of persons employed.
29. The proposal for Roof Top solar panel shall be included in the EIA Report.
30. As per the MoEF&CC Office Memorandum F.No. 22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall furnish the detailed EMP.

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Remarks by SEIAA:

The proposal was placed in the 604th Authority meeting held on 27.03.2023. The Authority noted that this proposal was placed for appraisal in this 358th meeting of SEAC held on 24.02.2023. After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant **Terms of Reference (ToR) along with Public Hearing** for preparation of detailed EIA report subject to the conditions as recommended by SEAC & normal conditions.

1. The proponent shall submit the green technologies deployed in the production to reduce carbon footprint, Green House Gas (GHG), CO_2 and rise in temperature.
2. Details regarding strategies adopted for occupational health safety and energy efficiency standards shall be submitted.
3. The proponent shall submit detailed report regarding temperature rise and climate change impacts due to the proposed project and control measures.
4. The PP shall study fugitive emission and regular emission monitoring strategy to prevent escape.
5. Details regarding the transparency and accountability system in place during the operation period of the project.
6. Details regarding the In-House environmental performance and evolution tools to evaluate the impacts of the project on the environment.
7. Detailed study to be made on material flow analysis and Life Cycle Assessment (LCA) in the process of production and the report shall be submitted.
8. Through a chart Illustration, clarify the cradle to grave approach for anticipated emissions and environmental threats in every stage and mitigation strategy at every stage shall be submitted.
9. Project Proponent to submit the action plan to study the impacts on human health viz respiratory impacts, toxicity impacts and radiation impacts.
10. The proponent shall submit a detailed study report regarding the chemical exposures and risks anticipated to environmental and human health.
11. The proponent shall strictly adhere to the mitigation measures as committed regarding the emission of Green House Gas (GHG) and other gas emissions.
12. The proponent shall submit a detailed study report regarding the terrestrial and aquatic toxicity due to the proposed project.

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13. The green belt area should be not less than 15% of the total land area of the project.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

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

A. STANDARD TERMS OF REFERENCE (TOR)

1) Executive Summary
2) Introduction
   i. Details of the EIA Consultant including NABET accreditation
   ii. Information about the project proponent
   iii. Importance and benefits of the project
3) Project Description
   i. Cost of project and time of completion.
   ii. Products with capacities for the proposed project.
   iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.
   iv. List of raw materials required and their source along with mode of transportation.
   v. Other chemicals and materials required with quantities and storage capacities
   vi. Details of Emission, effluents, hazardous waste generation and their management.
   vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)
   viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided
   ix. Hazard identification and details of proposed safety systems.
   x. Expansion/modernization proposals:
      a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of

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compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB shall be attached with the EIA-EMP report.

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

4) Site Details

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

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

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

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

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

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

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

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

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

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

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1

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

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

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

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

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

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

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

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

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

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

6) Environmental Status

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

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

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given

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

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

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

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

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

viii. Soil Characteristic as per CPCB guidelines.

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

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

xi. Socio-economic status of the study area.

7) Impact and Environment Management Plan

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

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

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

iv. A note on treatment of wastewater from different plant operations, extent recycled and

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reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

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

vi. Measures for fugitive emission control

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

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

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

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

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

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

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

8) Occupational health

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

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre

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placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

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

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

9) Corporate Environment Policy

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

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

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

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

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

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

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

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and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

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

B. SPECIFIC TERMS OF REFERENCE FOR EIA STUDIES FOR METALLURGICAL INDUSTRIES (FERROUS &NON-FERROUS)

1) Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs & outputs (material and energy balance).
2) Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.
3) Details on installation/activation of opacity meters with recording with proper calibration system
4) Details on toxic metals including mercury, arsenic and fluoride emissions
5) Details on stack height requirement for integrated steel
6) Details on ash disposal and management -Non-ferrous metal
7) Complete process flow diagram describing production of lead/zinc/copper/ aluminium, etc.
8) Raw materials substitution or elimination
9) Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation
10) Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium
11) Details on solvent recycling
12) Details on precious metals recovery
13) Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.
14) Details on toxic metal content in the waste material and its composition and end use (particularly of slag).
15) Trace metals Mercury, arsenic and fluoride emissions in the raw material.
16) Trace metals in waste material especially slag.
17) Plan for trace metal recovery
18) Trace metals in water

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C. ADDITIONAL TOR FOR INTEGRATED STEEL PLANT

1) Iron ore/coal linkage documents along with the status of environmental clearance of iron ore and coal mines.
2) Quantum of production of coal and iron ore from coal & iron ore mines and the project they cater to. Mode of transportation to the plant and its impact
3) For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
4) Recent land-use map based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.
5) Respirable Suspended particulate matter (RSPM) present in the ambient air must be analysed for source analysis - natural dust/RSPM generated from plant operations (trace elements). The RSPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e., Benzene soluble fraction, where applicable. Chemical characterization of RSPM and incorporating of RSPM data.
6) All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.
7) Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.
8) Plan for slag utilization
9) Plan for utilization of energy in off gases (coke oven, blast furnace)
10) System of coke quenching adopted with justification.

In addition to the above, the following shall be furnished: -

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1) Project name and location (Village, District, State, Industrial Estate (if applicable).
2) Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)
4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and

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solid and hazardous wastes.

5) Measures for mitigating the impact on the environment and mode of discharge or disposal.
6) Capital cost of the project, estimated time of completion.
7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt/ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
10) Likely impact of the project on air, water, land, flora-fauna and nearby population
11) Emergency preparedness plan in case of natural or in plant emergencies
12) Issues raised during public hearing (if applicable) and response given
13) CSR plan with proposed expenditure.
14) Occupational Health Measures
15) Post project monitoring plan

The following general points shall be noted:

All documents shall be properly indexed, page numbered. Period/date of data collection shall be clearly indicated.

1. Authenticated English translation of all material provided in Regional languages.
2. The letter/application for EC shall quote the SEIAA. File No. and also attach a copy of the letter.
3. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report.
4. Certificate of Accreditation issued by the QCI to the environmental consultant shall be included.
5. The prescribed TORs would be valid for a period of Three years for submission of the EIA/EMP reports, as per the O.M. No. J- 11013/41/2006-IA. II(I) dated 22.08.2014. As per the Ministry of Environment, Forest and Climate Change Impact Assessment Division, Government of India, Circular Memo No. J-11013/41/2006-Ia-II (I) (Part) dated 7th November, 2015.

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6. After preparing the draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006. The final EIA / EMP shall be submitted to the SEIAA – Tamil Nadu for obtaining Environmental Clearance.
7. The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
8. The TORs prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August 2017.

The receipt of this letter may be acknowledged.

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Copy to:

1. 1.The Additional Chief Secretary to Government, Environment & Forests Dept, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
3. The Member Secretary, TNPCBoard, 76, Mount Salai, Guindy, Chennai - 600 032.
4. The APCCF (C), Regional Office, Ministry of Environment & Forest (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
5. Monitoring Cell, I A Division, Ministry of Environment & Forests, Paryavaran Bhavan, CGO Complex, New Delhi - 110 003.
6. The District Collector, Tiruvallur District.
7. Stock File.

The Detailed EIA shall include standard ToR along with the following additional ToR:

S.No.	Conditions	compliance
1.	The PP shall study in detail about various operational measures to reduce the specific energy consumption in induction furnaces.	The details of induction furnace and its energy mesures is discussed in Chapter 2, Section 2.7.1
2.	Since the Periods of idling are inherent because of the following activities, the PP shall study in detail and the same shall be included in the EIA report: i. Charging ii. Slagging iii. SamPling iv. Charge material v. Molten Heel Practice vi. Furnace Cover Losses	The details of Charging, Slagging SamPling, Charge material, Molten Heel Practic, Furnace Cover Losses are incorporated in Chapter 2, Section 2.6
3.	The PP shall study in detail about Charging and operation of Melting forbetter and efficient operation of induction furnaces.	The details of Charging and operation of Melting forbetter and efficient operation of induction furnaces is discussed in Chapter 2, Section 2.6.3.1
4.	The proponent shall study in detail about various measures could be adopted during finishing and tapping of a heat.	Detail about various measures could be adopted during finishing and tapping of a heat are incorporated in Chapter 7, Section 7.5
5.	The proponent shall study in detail about operational control measures to Minimize and control the refractory wall wearing.	Detail about operational control measures to Minimize and control the refractory wall wearing are incorporated in Chapter 7, Section 7.6
6.	The proponent shall explore the possibilities to Change from mains frequency to medium frequency furnaces.	We are yet to steup the furnace. We will adopt medium frequency furnaces in future.
7.	The PP shall obtain NBWL clearance for Pulicat Bird Sanctuary, vide, MoEF&CC Office Memorandum no. FC-11/1 lgl2020-Fc dated May 2022.	We are in the process of obtaining NBWL Clearance, we will obtain NBWL clearance before submitting final EIA report.
8.	The proponent shall explore the possibilities of utilizing state-of-the-art technology with the best global practice.	State-of-the-art technology is discussed in Chapter 7, section 7.7

9.	The proponent shall explore the possibilities of utilizing industrial wastewater instead of fresh water.	We will utilize the industrial wastewater to a maximum extent as possible. The wastewater from rolling mill will be utilized within the site
10.	The proponent shall elaborate on the state-of-the-art technology for induction furnaces to control emissions (Fumes).	State-of-the-art technology is discussed in Chapter 7, section 7.7
11.	The proponent shall submit the Certified Compliance Report for the existing plant.	We don't have existing EC for this project.
12.	The proponent must increase solar and Wind Energy and must explore the possibilities of achieving Net Zero energy consumption.	The solar energy will be utilized to maximum extent as possible.
13.	The proponent shall submit the video and photographs of the operational details with particular reference to points of pollution in the existing plant.	The photos of the operational plant has been attached as Annexure.
14.	Material balance and Water balance shall be furnished following MoEF&CC guidelines.	Material balance and Water balance is discussed in Chapter 2, Section 2.4.2 and 2.4.5.
15.	A detailed report on Solid waste management, hazardous waste shall be furnished.	Solid waste management, hazardous waste is discussed in Chapter 2, section 2.7.3.
16.	Report on the AAQ survey and proposed air pollution prevention and control measures shall be furnished in the EIA report.	AAQ results are discussed in Chapter 3, Section 3.3. Air quality impact and mitigation measures are discussed in Chapter 4, Section 4.3.6.
17.	The project proponent shall do the stoichiometric analysis of all the involved reactions to assess the possible emission of air pollutants in addition to the criteria pollutants, from the proposed project.	Noted and will be complied.
18.	Adequacy report for ETP & STP for the proposed project obtained from any reputed Government institution such as IIT, Anna University, or NIT shall be furnished.	There is no STP proposed for this project.

19.	Land use classification shall be obtained from the DTCP for the Survey Numbers of this project. Further, the project proponent shall submit the planning permission obtained from the DTCP, if any.	The land is classified in Industrial Zone. The project is located in SIPCOT land.
20.	The proponent shall conduct the EIA study and submit the EIA report for the entire campus along with layout and necessary documents such as "A" register and village map'	Complied. The EIA report is prepared and the land documents is attached as annexure.
21.	Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC concerning the Office Memorandum of MoEF& CC accordingly.	Noted. Public hearing points will be incorporate in final EIA report.
22.	The public hearing advertisement shall be published in one major National daily and one most circulated Tamil daily.	Noted and will be complied.
23.	The PP shall produce/display the EIA report, executive summary and other related information concerning public hearings in Tamil.	Noted and complied.
24.	The project proponent shall obtain forest clearance under the provisions of the Forest (Conservation) Act, 1986, in case of the diversion of forest land for non- forest purpose involved in the project.	The project is located in SIPCOT land. Hence forest clearance is not required for this project.
25.	The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.	We are in the process of obtaining NBWL Clearance, we will obtain NBWL clearance before submitting final EIA report.
26.	.The project proponent shall explore the possibilities of treating and utilizing the trade effluent and sewage within the premises to achieve Zero liquid discharge.	We will utilize the industrial wastewater to a maximum extent as possible. The wastewater from rolling mill will be utilized within the site

27.	The layout plan shall be furnished for the greenbelt area earmarked with GPS coordinates by the project proponent on the periphery of the site and the same shall be submitted for CMDA/DTCP approval. The green belt width should be at least 3m wide all along the boundaries of the project site. The green belt area should be not less than 15%of the total land area ofthe project.	The greenbelt plan is attached a Annexure.
28.	As the plant operation involves the sensitive processing, the medical officer and the supporting staff involved in the health centre activities shall be trained in occupational health surveillance (OHS) aspects through the outsourced training from the experts available in the field of OHS for ensuring the health standard of persons employed.	The occupational health and safety is discussed in Chapter 7, Section 7.3.
29.	Theproposal for Roof Top solar panel shall be included in the EIA Report.	The industrial area roof will not be suitable for installation of solar panels. So solar panels will be installed on the top of non-industrial buildings like office, stores, etc.
30.	As per the MoEF&CC Office Memorandum F.No. 22-6512017-14.III dated: 30.09.2020 and 20.10.2020 the proponent shall furnish the detailed EMP.	Noted.

Part-B. for preparation of detailed EIA report subject to the conditions as recommended by SEAC & normal conditions:

S.No.	Conditions	compliance
1.	The proponent shall submit the green technologies deployed in the production to reduce carbon footprint, Green House Gas (GHG), COz and rise in temperature.	The green technologies deployed in the production to reduce carbon footprint, Green House Gas (GHG), COz and rise in temperature is attached as Annexure of Draft EIA report.
2.	Details regarding strategies adopted for occupational health safety and energy efficiency standards shall be submitted.	The occupational health and safety is discussed in Chapter 7, Section 7.3.

3.	The proponent shall submit a detailed report regarding temperature rise and climate change impacts due to the proposed project and control measures.	The impact and mitigation due to temperature rise and climate change is discussed in Chapter 4, Section 4.4.10.
4.	The PP shall study fugitive emissions and regular emission monitoring strategies to prevent escape.	Noted and complied.
5.	Details regarding the transparency and accountability system in place during the operation period of the project.	We will communicate openly and frequently with your employees, leaders, and stakeholders. Share your vision, mission, values, and objectives, and explain how they align with your actions, decisions, and results. Provide updates, information, and feedback on a regular basis, and invite questions, comments, and suggestions. We will listen actively, acknowledge different views, and address any concerns or issues. Use various channels and formats to communicate effectively and inclusively.
6.	Details regarding the In-House environmental performance and evolution tools to evaluate the impacts of the project on the environment.	In-House environmental performance and evolution tools is discussed in Chapter 7, Section 7.8.
7.	A detailed study is to be made on material flow analysis and Life Cycle Assessment (LCA) in the process of production and the report shall be submitted.	Material flow analysis and Life Cycle Assessment (LCA) has been attached as annexure.
8.	Through a chart Illustration, clarify the cradle-to-grave approach for anticipated emissions and environmental threats in every stage and mitigation strategy at every stage shall be submitted.	Cradle-to-grave approach is discussed in Chapter 7, Section 7.9.
9.	Project Proponent to submit the action plan to study the impacts on human health viz respiratory impacts, toxicity impacts and radiation impacts	The occupational health and safety is discussed in Chapter 7, Section 7.3. There is no respiratory impacts, toxicity impacts and radiation impacts due to project site.

10.	The proponent shall submit a detailed study report regarding the chemical exposures and risks anticipated to environmental and human health.	There is no chemical exposures and hence there will not be any risk to environment and human health.
11.	The proponent shall strictly adhere to the mitigation measures as committed regarding the emission of Green House Gas (GHG) and other gas emissions	We will strictly adhere to the mitigation measures as committed regarding the emission of Green House Gas (GHG) and other gas emissions
12.	The proponent shall submit a detailed study report regarding the terrestrial and aquatic toxicity due to the proposed project.	We ensure there is no terrestrial and aquatic toxicity due to the proposed project.
13.	The green belt area should be not less than 15% of the total land area of the project.	Noted. We will provide 15% of total land area for greenbelt.

A	**STANDARD TERMS OF REFERENCE (TOR)**	
1	Executive Summary	Enclosed as separate item in EIA report.
2	Introduction (i) Details of the EIA Consultant including NABET accreditation. (ii)Information about the project proponent. (iii) Importance and benefits of the project.	EIA Consultant & NABET Accreditation details are given in Figure-12.1 of Chapter-12, Page no - 174. Project proponent details are given in Section 1.2.2 of Chapter - 1, Page no: 2. Importance and benefits of the project are given in Section 1.3.4 of Chapter - 1, Page no: 7.
3	Project Description	
i	Cost of project and time of completion.	Cost of project – Rs. 1 Crores Completion of project - December 2024
ii	Products with capacities for the proposed project.	Production capacity details are given in Section 1.3.2 of Chapter – 1, Page no: 2.
iii	If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	The expansion of existing Steel Rolling Mill from 1,20,000 TPA to 2,16,000 TPA and inclusion of Steel Melting Shop having capacity of 1,80,000 TPA
iv	List of raw materials required and their source along with mode of transportation.	Raw material details are provided in Section 2.4.2 of Chapter – 2, Page no: 15.
v	Other chemicals and materials required with quantities and storage capacities.	Other Chemical & material requirement details are provided in Section - 2.4.2 &

		Table-2.2 & 2.3 of Chapter – 2, Page no: 15 & 16.
vi	Details of emission, effluents, hazardous waste generation and their management.	Emission, waste generation details are provided in Section - 2.8, Chapter – 2, Page no: 32-36.
vii	Requirement of water, power, with source of supply, status of approval, water balance diagram, Man power requirement (regular and contract).	Water, power requirement with source and approval status, water balance, man power requirement details are provided Section - 2.4.3 – 2.4.5 of Chapter – 2, Page –16-21. Water balance diagram is given in Figure – 2.4 & 2.5 - of Chapter – 2, Page no: 19 & 20.
viii	Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided.	Process description is covered under Section 2.6 & 2.7 of Chapter – 2, Page no: 20 to 30.
ix	Hazard identification and details of proposed safety systems.	Hazard identification details are covered under Section - 7.1.2 of Chapter – 7, Page no: 133-136.
x	Expansion/modernization proposals:	
a.	Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Not applicable.

b.	In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	As per EIA Notification 2006, EC is not mandatory for The rolling mill. The CTO copy is attached as Annexure.
4)	Site Details	
i	Location of the project site covering village, Taluka/Tehsil, District and State. Justification for selecting the site, whether other sites were considered.	Location details of the project site is provided in Section – 2.3 of Chapter -2, Page no: 12. No alternate sites are considered.
ii	A topo sheet of the study area of radius of 10 km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (Including all eco-sensitive areas and environmentally sensitive places)	A topo sheet of the study area provided in Figure - 1.3 of Chapter -1, Page no: 6.
iii	Details w.r.t. option analysis for selection of site.	Alternate site consideration details are covered in Chapter -5, Page no: 107-108.
iv	Co-ordinates (lat-long) of all four corners of the site.	The co-ordinates of all four corners of the site are given in Table-1.1 & Figure -1.2 of Chapter - 1, Page no: 3 & 5.
v	Google map - Earth downloaded of the project site.	The Google Earth Map of the project site is given in Figure- 1.2 of Chapter-1, Page no: 5.
vi	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area / Estate / Complex, layout of Industrial Area indicating location of unit within the Industrial area / Estate.	Layout map showing proposed unit indicating the storage area, plant area, greenbelt area, utilities etc. are given in Figure -2.1 of Chapter – 2, Page no: 14.
Vii	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	Photographs of the proposed plant site are enclosed in **Annexure**.

viii	Land use break-up of total land of the project site (identified and acquired), government / private - agricultural, forest, wasteland, water bodies, settlements, etc. shall be included. (Not required for industrial area).	The land use breakup of the total project site is detailed in Section-2.4.1 & Table-2.1 of Chapter -2, Page no– 13.
ix	A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area.	The project is located within SIPCOT land. The SIPCOT mainly consists of only industries.
x	Geological features and Geo-hydrological status of the study area shall be included.	The Geological features and Geo-hydrological status of the study area is detailed Section-3.9 of Chapter-3, Page no: 70.
xi	Details of Drainage of the project up to 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)	The drainage detail of the study area is given in Section – 3.9.5 & Figure-3.8 of Chapter-3, Page no – 73.
xii	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	Land already under possession of proponent. The land ownership document is enclosed as **Annexure .**
xiii	R&R details in respect of land in line with state Government policy.	Not Applicable.
5	Forest and wildlife related issues (if applicable):	
i	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)	Not Applicable as no forest land is propose to use.
ii	Land use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha)	Not Applicable as no forest land is propose to use.
iii	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted	Not Applicable as no forest land is propose to use.

iv	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon	There are no National Parks, wild life sanctuaries are present within 10 km radius of the project site.
v	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area	There is no Schedule 1 fauna found in the study area.
vi	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.	Not applicable as no eco sensitive locations are present within 10 km radius of the project site.
6)	Environmental Status	
i	Determination of atmospheric inversion level at the project site and site-specific micro meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	The site specific micro-meteorological data is provided in Section-3.2 of Chapter -3, Page no– 36-39.
ii	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	AAQ locations, parameters & results are detailed in Section-3.3 of Chapter-3, Page no – 39-45.
iii	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Raw data of all AAQ measurement for 12 weeks of all stations are enclosed as **Annexure**.
iv	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	Two (2) surface water samples were collected as grab samples and analyzed for various parameters to compare with the standards for drinking water as per IS: 10500:2012. The details of Surface water

		quality have been given in Table-3.10 of chapter-3, page no:53-54.
v	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.	The site does not fall near to polluted stretch of river.
vi	Ground water monitoring at minimum at 8 locations shall be included	The ground water monitoring details are given in Section-3.5 of Chapter-3, Page no– 53. The details of Ground water quality have been given in Table-3.9 of chapter-3, page no: 51 to 55.
vii	Noise levels monitoring at 8 locations within the study area	The noise level monitoring details are given in Section-3.4, Table-3.6 of Chapter 3, Page no – 48.
viii	Soil Characteristic as per CPCB guidelines	The soil characteristics are detailed in Section -3.6 of Chapter-3, Page no– 55 to 60.
ix	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	The traffic circulation details are given in Section-3.8 of Chapter-3, Page no – 66-70.
x	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule- I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	The flora & fauna of the study area is detailed in Section-3.7 of Chapter-3, Page no: 60-66.
xi	Socio-economic status of the study area.	The socio-economic status of the study area is given in Section - 3.11 of Chapter-3, Page no: 77-79.
7)	Impact and Environment Management Plan	

i	Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	The air quality modeling details are given Section-4.4.2 of Chapter-4, Page no: 88-98.
ii	Water Quality modelling - in case of discharge in water body	Not Applicable as no wastewater is proposed to discharge into water body.
iii	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor cum-rail transport shall be examined.	The impact of proposed transport on surrounding environment is given in Section-4.4.6 of Chapter-4, Page no: 101.
iv	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E (P) Rules.	The wastewater treatment details are provided in Section-2.7.2 of Chapter-2, Page no: 34. No trade effluent is generating in the plant.
v	Details of stack emission and action plan for control of emissions to meet standards.	The stack emission details are given in Section-2.7.1, Table-2.7 of Chapter – 2, Page no: 33.
vi	Measures for fugitive emission control.	The fugitive emission control measures are detailed in sub section -4.4.2. of Chapter - 4 Page no: 88.

vii	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle / reuse / recover techniques, Energy conservation, and natural resource conservation.	Noted and will be complied. MoU will be made with waste handling plants before start of the operations.
viii	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	The fly ash management details are given in Section- 2.8.3, Table-2.8 of Chapter - 2, Page no: 34 & 35.
ix	Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	The greenbelt area details are given in section-10.5, Table-10.2 of Chapter - 10, Page no: 161-164.
x	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources	The Rain water harvesting details are given in Section-10.6 of Chapte-10, Page no– 164-166.
xi	Total capital cost and recurring cost / annum for environmental pollution control measures shall be included.	The Environmental pollution control measures cost details are given Section-10.7, Table-10.3 of Chapter- 10, Page no:167.
xii	Action plan for post project environmental monitoring shall be submitted.	The environmental monitoring program is detailed in Chapter-6, Page no: 113.
xiii	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	The Disaster Management Plan details are given Section-7.2 of Chapter-7, Page no: 122.
8	Occupational Health	

i	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	Plan on occupational health & safety details are covered in Section -7.3.1 of Chapter -7, Page no: 158.
ii	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	The health status of workers is covered in Section – 7.3.1 of Chapter - 7, Page no:138.
iii	Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL)? If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.	The Occupational & Safety Hazards details are covered in Section – 7.3.1 of Chapter - 7, Page no: 138.
iv	Annual report of health status of workers with special reference to Occupational Health and Safety.	The Occupational & Safety Hazards details are covered in Section-7.3.1 of Chapter - 7, Page no: 138.
9	Corporate Environment Policy	
i	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Detail of Environmental management cell has been in Figure-10.1 of Chapter -10, Page no: 159.
ii	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	
iii	What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	Hierarchical Structure to deals with Environmental issues is detailed in Figure-10.1 of Chapter-10, Page no: 159.

iv	Does the company have system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	Hierarchical Structure to deals with Environmental issues is detailed in Figure-10.1 of Chapter-10, Page no: 159.
10	Details regarding infrastructure facilities such as sanitation, fuel, restroom, etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	Details about infrastructure facilities to be provided to the labor force are covered in Section – 2.4.6 of Chapter -2, Page no: 21.
11	Enterprise Social Commitment (ESC)	
i	Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	Details about CER are provided in Section – 10.8, Table-10.4 of Chapter – 10, Page no: 167.
12	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.	No litigation pending against the project.
13	A tabular chart with index for points wise compliance of above TOR.	TOR Compliance Report is enclosed.
B	**SPECIFIC TERMS OF REFERENCE FOR EIA STUDIES FOR METALLURGICAL INDUSTRIES (FERROUS & NON-FERROUS)**	
1	Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs & outputs (material and energy balance).	Process flow diagram is provided in Section-2.6 , Figure- 2.6 & 2.7 of Chapter -2, Page no: 23 & 25. Mass balancing chart is given in Figure 2.2 & 2.3, Page No.16
2	Details on blast furnace / open hearth furnace / basic oxygen furnace / ladle refining, casting and rolling plants etc.	Detail about proposed furnace is provided in Section – 2.6.1 of Chapter -2, Page no: 21.

3	Details on installation / activation of opacity meters with recording with proper calibration system.	Noted and will be complied.
4	Details on toxic metals including mercury, arsenic and fluoride emissions.	Not envisaged as it is re-melting of MS scrap and sponge iron.
5	Details on stack height requirement for integrated steel.	Not Applicable as it is not an integrated steel plant
6	Details on ash disposal and management -Non-ferrous metal.	Not Applicable
7	Complete process flow diagram describing production of lead / zinc / copper / aluminium, etc.	Not Applicable
8	Raw materials substitution or elimination.	Not Applicable
9	Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation.	Not Applicable
10	Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium.	Not Applicable
11	Details on solvent recycling.	Not Applicable
12	Details on precious metals recovery.	Not Applicable
13	Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.	Not Applicable
14	Details on toxic metal content in the waste material and its composition and end use (particularly of slag).	Slag disposal details has been given in section-2.8.3, Table-2.8 of chapter-2, page no:34.
15	Trace metals Mercury, arsenic and fluoride emissions in the raw material.	No trace metals emissions in the raw material.
16	Trace metals in waste material especially slag.	Slag disposal details has been given in section-2.7.3,Table-2.8 of chapter-2, page no:34.
17	Plan for trace metal recovery.	Not Applicable.
18	Trace metals in water.	Trace metals in water is BDL only. The details are given section-3.5.2, Table-3.9 & 3.10 of chapter-3, Page no: 51 -55

ANNEXURE – II

SITE LAYOUT

192900

STORM WATER DRAIN

15000

COMPOUND WALL

EB SUBSTATION YARD

MAIN GATE

ADMIN BLOCK

COAL SHED

SPARES STORE

CENTRAL STORES

QUALITY LAB

TEMPLE

CAR SHED

SECURITY OFFICE

TIME OFFICE

BIKE STAND

CONCRETE ROAD

CONCRETE ROAD

BILLET YARD

CUT & BEND UNIT

FINISHED STOCK YARD

FINISHED STOCK YARD

FINISHED STOCK YARD

17470

WEIGH BRIDGE

148100

COMPOUND WALL

SUBSTATION YARD

EB CONTROL ROOM

COMPRESSOR ROOM

QUALITY CONTROL

TRANSFORMER

ELECT PANEL ROOM

1000HP MOTOR

LUB TANK

280mm MILL

PLC CONTROL ROOM

COLD SHEAR

ROAD

110500

'C' ROW

'B' ROW

LOOP SCANNER

1500

8000

1500

6000

1500

15500

FLY.SHEAR

COOLING BED

ROAD

TMT BOX-1

TMT-HMD LINE

TMT BOX-2

PINCHROLL

CON.SHEAR

FUTURE MILL WATER TANK

SCRAP YARD

SCRAP YARD

SCRAP YARD

TANK-3

TANK-2

TMT WATER TANK-1

NEW COOLING TOWER

81900

COMPOUND WALL

117000

VIKI INDUSTRIES PRIVATE LTD GUMMIDIPOONDI						
DATE	15. 12. 2022	FACTORY LAYOUT DRAWING				
SCALE	1 : 350					
DRAWN BY	SP.KALAISELVAN	DESIGNATION	WORKS MANAGER		DRAWING APPROVED	SIGNATURE
SHEET-1		DRAWING NO	D.0001	REV:0	S.CHANDRASEKARAN	

EXISTING

PROPOSED

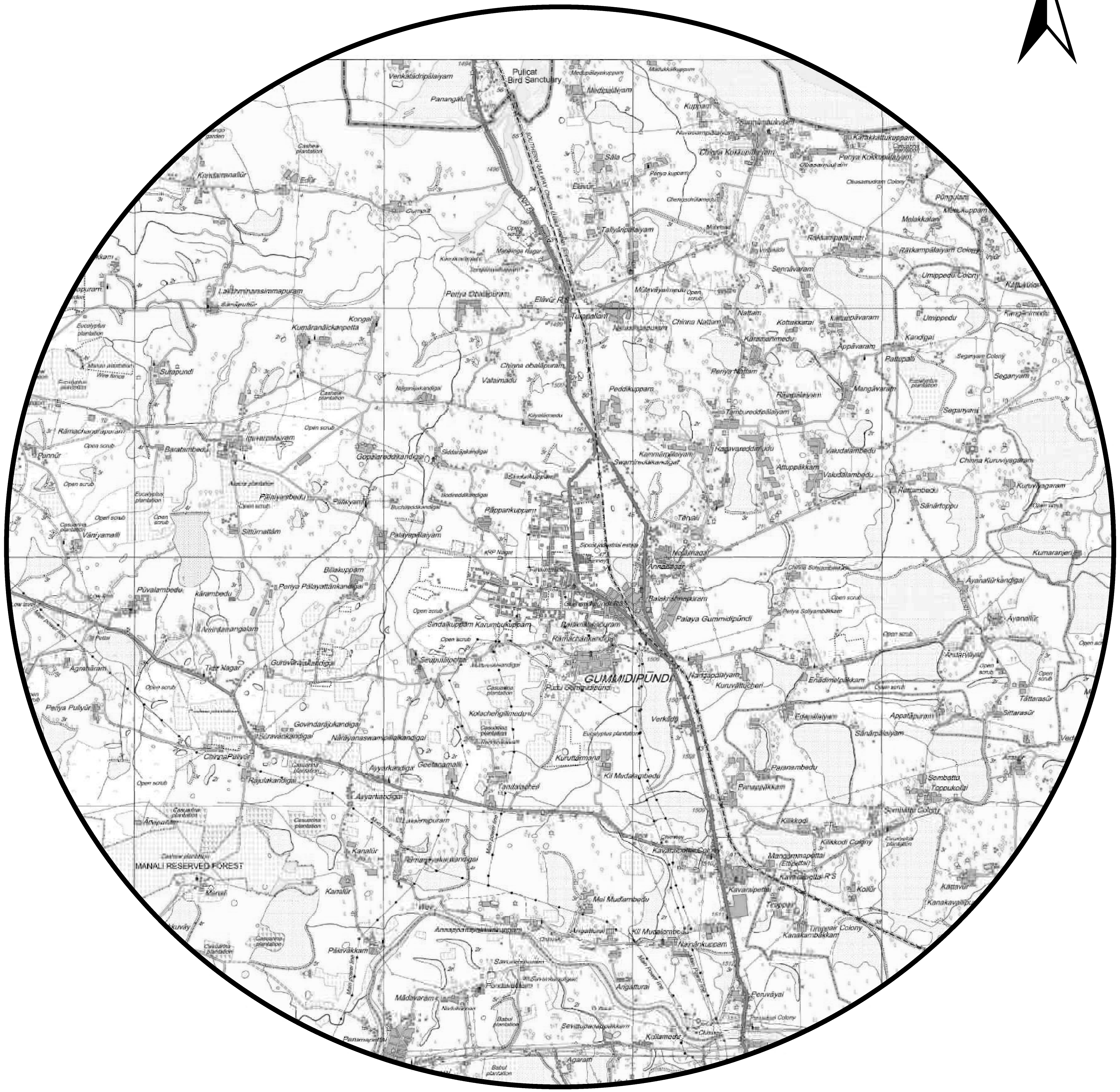
GREENARY AREA

ANNEXURE – III

TOPO IMAGE –10 KM RADIUS

Toposheet No: 66C/3

N



4 2 0 4 Kilometers

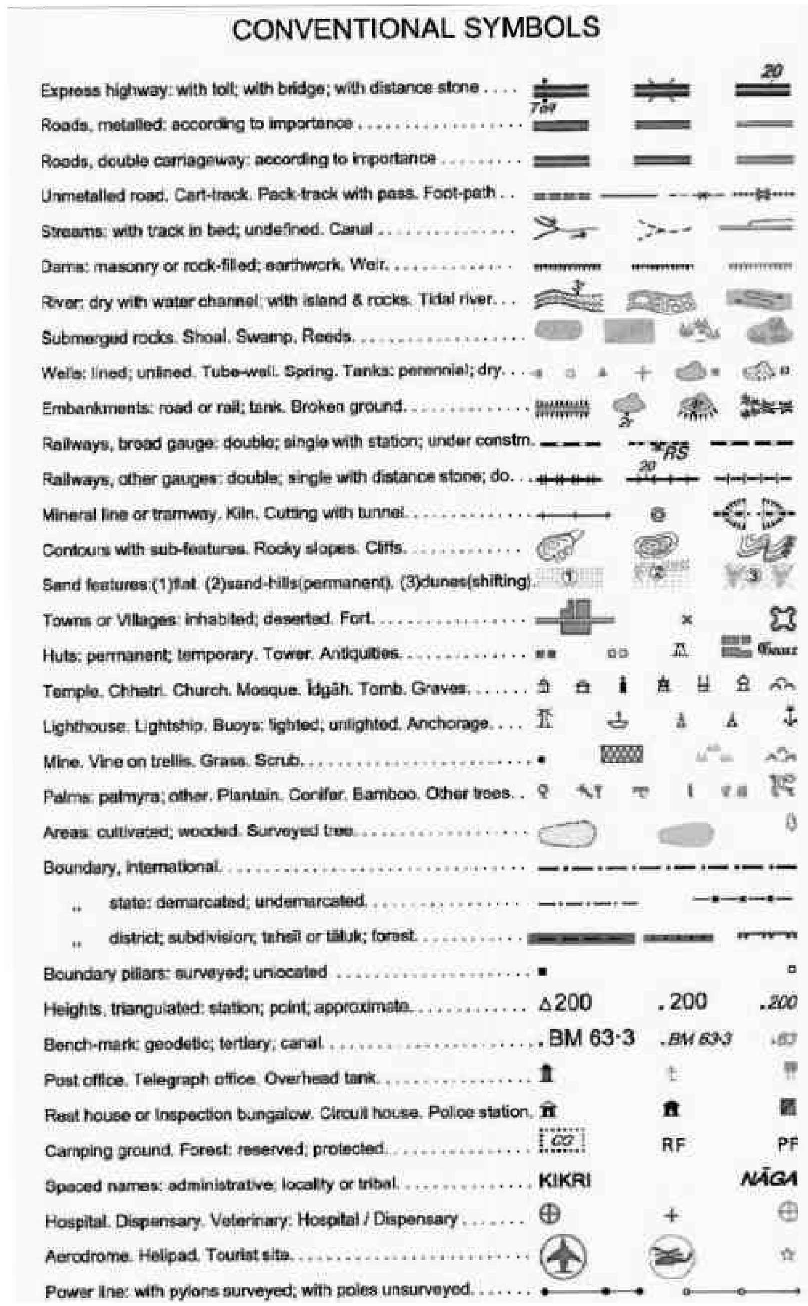
M/s. Viki Industries Pvt Ltd

10 km Topographic Map

Legend

■ Project Site

☐ 10 km Radius


CONVENTIONAL SYMBOLS

Express highway: with toll; with bridge; with distance stone
Roads, metalled: according to importance
Roads, double carriageway: according to importance
Unmetalled road. Cart-track. Pack-track with pass. Foot-path
Streams: with track in bed; undefined. Canal
Dams: masonry or rock-filled; earthwork. Weir.
River: dry with water channel; with island & rocks. Tidal river.
Submerged rocks. Shoal. Swamp. Reeds.
Wells: lined; unlined. Tube-well. Spring. Tanks: perennial; dry.
Embankments: road or rail; tank. Broken ground.
Railways, broad gauge: double; single with station; under constrn.
Railways, other gauges: double; single with distance stone; do.
Mineral line or tramway. Kiln. Cutting with tunnel.
Contours with sub-features. Rocky slopes. Cliffs.
Sand features:(1)flat (2)sand-hills(permanent). (3)dunes(shifting).
Towns or Villages: inhabited; deserted. Fort.
Huts: permanent; temporary. Tower. Antiquities.
Temple. Chhatri. Church. Mosque. Īdgāh. Tomb. Graves.
Lighthouse. Lightship. Buoys: lighted; unlighted. Anchorage.
Mine. Vine on trellis. Grass. Scrub.
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees.
Areas: cultivated; wooded. Surveyed tree.
Boundary, international.
" state: demarcated; undemarcated.
" district; subdivision; tahsil or tāluk; forest.
Boundary pillars: surveyed; unlocated
Heights, triangulated: station; point; approximate. △200 .200 .200
Bench-mark: geodetic; tertiary; canal. BM 63·3 BM 63·3
Post office. Telegraph office. Overhead tank.
Rest house or Inspection bungalow. Circuit house. Police station.
Camping ground. Forest: reserved; protected. CG RF PF
Spaced names: administrative; locality or tribal. KIKRI NĀGA
Hospital. Dispensary. Veterinary: Hospital / Dispensary
Aerodrome. Helipad. Tourist site.
Power line: with pylons surveyed; with poles unsurveyed.

Data Source: Survey of India Toposheets

ANNEXURE – IV

LAND DOCUMENT

10 Rs

5977
30-12-93

Viki Steel Pvt Ltd.

S.S. CHANDRAN
AMBATTUR

LEASE DEED

MEMORANDUM OF LEASE DEED entered into at Gummidipoondi on this 21st day of January, 1994 BETWEEN State Industries Promotion Corporation of Tamilnadu Limited (SIPCOT), a company registered under the Companies Act, 1956 and having its Registered Office at No.19A, Rukmani Lakshmipathy Road, Madras, represented by Thiru V Padmanabhan, Son of Thiru M S Viswanathan, Project Officer, Gummidipoondi Industrial Complex of SIPCOT and hereinafter referred to as the Party of the First Part, which term shall, unless the context otherwise requires mean and include its representatives, administrators, successors and assigns on the one part AND

Viki Steel Private Limited having their Registered Office at Nafeez Manzil, 112/1, Broadway, Madras - 600 108, represented by their Director, Thiru P V Prasanna Reddy, Son of Janadhana Reddy whereinafter referred to as the Party of the Second Part, which term shall, unless the context otherwise requires, mean and include their representatives, administrators and assigns on the other part witnesseth.

for VIKI STEEL (P) LTD.

Director

Project Officer
SIPCOT, G.I.D.

HERE BY CERTIFY THAT ON THE PRODUCTION OF THE ORIGINAL INSTRUMENT I HAVE SATISFIED MY SELF THE STAMP DUTY OF RS. 10/= HAS BEEN PAID HERE FOR
(S. R. O. GUMMUDI POONDI)
Dt. 21-1-1994

DOC. 22 OF 1994
COPIES

SUB-REGISTRAR

SUB-REGISTRAR

Presented in the office of the Sub Registrar of Gummidipoondi and Fees of 37265.00 paid between the hours of 12 Noon & 1 P.M. on 21st January 1994 day.

Execution Admitted by

Son of M. S. ...
Project Officer
SIPCOT LTD.
Gummidipoondi

Son of Janardhana Reddy
112/1. Broadway Madras 1

For VIKI STEEL. (P) LTD.

Director

Identified by:

S/o SYED DAWOOD ALi
22/6HH Fatwa Street
NELLORE 524001.
(SYED MAHABOOB ALI)

B. Ganesh. s/o B. BALAKRISHNAN.
9, BALULLAH ROAD MADRAS - 600 017
(B. GANESH)

21st January 1994

Sub-Registrar

1. WHEREAS the Party of the First Part has been incorporated as a Limited Company having as one of its principal objects the promotion and encouragement of industrialisation of the State of Tamilnadu.

WHEREAS the Party of the First Part has acquired the property more fully described in the Sehedule 'A' hereunder and hereinafter referred to as the said property.

WHEREAS for the due fulfilment of its principal object, Party of the First Part has laid out the said property into various plots, besides setting apart land for the purpose of laying roads, drains and for other common works for the benefit of the occupants of the plots so laid out and WHEREAS it also proposes to effect improvements and betterment schemes for the benefit of all the units of the Industrial Complex.

WHEREAS the Party of the Fisrt Part proposes to allot the land on a long lease of 99 years in as much as it is felt that the characteristics and homogeneity of the Industrial Complex should not be destroyed and WHEREAS the Party of the FIRST Part should have control over the amenities such as Water, Road, Street lights, Drainage, so that these facilities should be made available to the Industrialists in a reasonable and equitable manner.

WHEREAS the Party of the First Part has decided to make available to entrepreneurs, developed plots in the said property on terms and conditions mentioned hereunder, for the

For VIKI STEEL (P) LTD.,

Director

Project Officer
SIPCOT LTD.

purpose of their locating any approved industry or other business or activity in the plots in the said property under the terms of the lease deed;

WHEREAS the Party of the Second Part made an application to the Party of the First Part for allotment of a plot in the Industrial Complex at Gummidipoondi for the purpose of putting up the project for the manufacture of other bars & rods of iron or non-alloy steel.

WHEREAS the Party of the First Part alloted the Plot No. D19 in the said Industrial Complex more fully described in Schedule 'B' hereunder and shown distinctly in the plan attached hereto and hereunder referred to as the alloted plot by the Order of Allotment dated 29/11/93, subject to the terms and conditions contained therein. The Party of the Second Part has accepted the Order of Allotment.

WHEREAS the property described in the Schedule 'A' is intended to be utilised only for the purpose of locating an Industrial Complex and the restrictions and conditions stipulated in this deed are intended only to preserve the character of the said property as an Industrial Complex and for the benefit of the other plots of land held by the Party of the First Part or alloted or intended to be alloted by it to other parties similarly situated as the Party of the Second Part :

For VIKI STEEL (P) LTD.
P.V. [signature]
Director

[signature]
Project Office
SIPCOT LTD
Gummidipoondi

NOW THIS AGREEMENT WITNESSETH :

2. That in consideration of the allotment of Plot made by the Party of the First Part, the Party of the Second Part has paid a sum of Rs.18,61,750 (Eighteen Lakhs Sixty One Thousand Seven Hundred and Fifty Only) being 50% of the plot deposit.

3. The Second instalment of 25% of the plot deposit of Rs.9,30,875 (Nine Lakhs Thirty Thousand Eight Hundred and Seventy Five Only) shall be paid within six months from the date of allotment order.

4a. The Third instalment of 25% of the plot deposit of Rs.9,30,875 (Nine Lakhs Thirty Thousand Eight Hundred and Seventy Five Only) less Rs.100/- shall be paid within 12 months from the date of allotment order.

4b. The party of the first part shall not pay any interest for the plot deposit remitted by the party of the second part.

5. Interest will be levied at 16.5% or at such other rate as may be fixed from time to time on the balance plot deposit (second and third instalments) from the date of allotment. Non-payment on the due date will automatically entail an enhanced rate of interest of 20% or such other rate as may be prescribed from time to time on the defaulted amount for the defaulted period. Subsequent to payment of 50% of plot cost if the allotment is cancelled for non-compliance or any of the terms and conditions of this lease deed, enhanced rate of interest of 25% or at such other rate as may be fixed from

STEEL LTD.
P.V. Rao
Director

Senior Officer
LTD.
Hyderabad

time to time shall be paid from the date of cancellation till the land is handed back to SIPCOT or till the date of revocation of cancellation.

6. The party of the Second Part agrees that in case of availing any term loan for financing the plot deposit from any financial institution/Banks, the amount of plot deposit due from the Party of the second part as on that date shall be paid in one lump sum without availing the facility of instalments as stipulated above. In case Party of the Second Part fails to make such remittance Party of the Second Part shall be liable to pay enhanced interest on such amount at the highest rate of interest on the term loans received by the Party of the Second Part plus two percent subject to a minimum of the enhanced rate as given in para 10 above whichever is higher.

7. Failure to pay the second and third instalment on due dates will entail cancellation of the allotment order and forfeiture of initial deposit paid for the extent allotted.

8. That the Party of the Second Part shall pay the annual Lease Rent of Re.One for the first 98 years and Rs.2/- for the 99th year and the same shall be paid before the end of the respective calendar year.

9. WHEREAS the Party of the First Part leases the property bearing Plot No.D19 mentioned in para five above and more fully described in Schedule 'B' to the Party of the Second

For VIKI STEEL (P) LTD.,
D.V. Rao
Director

Project Officer
SIPCOT LTD.
Summidipoondi

Part and the Party of the Second Part takes the property aforesaid on lease for a period of 99 (ninety nine) years, AND the Party of the Second Part also agress to strictly abide by the conditions stipulated in the Lease Deed and also the terms and conditions of allotment order, a copy of which is enclosed with this deed.

10. The Party of the Second Part enters upon and takes possession as lessee of the said alloted plot as it is, in consideration whereof the Party of the Second Part has paid 50% of plot deposit as referred to in Para seven above.

11. That the Party of the Second Part shall pay punctually without committing any default of the balance of plot deposit as mentioned above. In the event of default, the lease shall stand cancelled.

12. The Lessee should take possession of the demised property within 75 days from the date of allotment order. Failure to do so will entitle the Party of the First Part to cancel the allotment and the lease.

13. It shall be open to the Party of the First Part to initiate proceedings under the provisions of the Tamil Nadu Public Premises (Eviction of Unauthorised Occupants) Act, 1975 or under any Statute for the time being in force for eviction as well as for the recovery of the amount due under this deed from the Party of the Second Part without prejudice to resort to any other mode of recovery that may be available.

For [illegible] STEEL [illegible] LTD.,

P.V. Rao

Director

Project Officer
SIPCOT LTD.
Gummidipoondi

14. It shall be open to the Party of the First Part, in the event of additional development facilities being taken up in future, to collect the pro-rata expenses and charges as additional plot deposit and the Party of the Second Part is liable to pay the amount as demanded by the Party of the First Part.

15. The Party of the First Part reserves the right to cancel the allotment, disconnect the water supply and forfeit the amount depoisted for the plot alloted for the following reasons.

Non-compliance of the terms and conditions of the allotment order or of this lease deed including non-payment of the instalments as per the Schedule. On such cancellation the Party of the Second Part shall have no right to claim the plot deposit or the interest already paid by it.

16. The plot deposit prescribed in the allotment order is only tentative. The Party of the First Part reserves the right to revise the plot deposit as fixed in the allotment order, in the event of the Party of the First Part having to pay enhanced compensation for the lands acquired or for any other reason and such revised plot deposit shall be paid by the Party of the Second Part. The party of the Second part shall also pay the cost of trees, wells and structures, if any, as prescribed by the party of the First Part. This amount is not refundable by the party of the First part, at any time for any reason.

For VIKI STEEL (P) LTD.,

D V Rajasekhar

Director

Joint Collector

17. Annual maintenance charges for the common amenities and facilities like roads, street lighting, sanitation, drainage, sewerage, common buildings, gardens, avenue plants, parks, etc., will from time to time be apportioned among the allottees in the Industrial Complex in which the above plot is situated. The Party of the Second Part shall pay the same within the period prescribed.

18. (i) It shall be open to the Party of the First Part to determine the lease during the currency of the lease and take possession of the said alloted plot together with the factory and other buildings and fixtures located on the same, for any violation of any conditions of this deed or the terms and conditions of allotment, provided that in such event, the Party of the Second Part shall not be entitled to any compensation for any of the constructions on the alloted plot or any refund of any amount that may have been paid by the Party of the Second Part to the Party of the First Part by virtue of this deed.

(ii) That the interest of the Party of the Second Part in the land shall not be sold or attached and sold in satisfaction of attachement of any debt(s) and if it so happens or is likely to happen, the Party of the First Part shall be entitled to determine the lease and take possession of the land with all the consequences mentioned in the para 23(i),

For VIKI STEEL (P) LTD.
D.V. Rao
Director

19. It shall be open to the Party of the First Part to deal with the property taken by it under the rights conferred on it as per clauses 17 and 18 in any manner it likes either by retaining or by leasing it to any other person, without any let or any hindrance or claim whatsoever to the Party of the Second Part to compensation and the Party of the Second Part has no right to interdict the same.

20a. If, in the opinion of the Party of the First Part, it is found that the land allotted to the Party of the Second Part is not put to use for the purpose for which it was allotted or is in excess of the actual requirements of the Party of the Second Part for the purpose for which it was allotted, the Party of the First Part shall at any time have the right to cancel the allotment in respect of such land or excess land, as the case may be, and resume the same. In that event, the plot deposit payable by the Party of the Second Part will be suitably modified and refund, if any, due to the Party of the Second Part will be made. Interest and enhanced interest, if any already paid or due, will not be subject to any refund or modification in such an event.

20b. The plot deposit shall be refunded by the party of the first part to the party of the second part on the expiry of the period of lease and on compliance with all the terms of the lease. In the event of surrender or resumption of the lease premises, the refund of the plot cost will be made after adjusting of the interest or enhanced interest or other dues

For VIKI STEEL (P) LTD.
P V Rao
Director

2/Shri Ramesh

if any, without any compansation for the improvement or for the buildings or other structures etc. erected on the plot.

21. The Party of the Second Part will take possession of the plot in "as is where is" condition and no further demand for any development, such as earth filling, raising the level etc., shall be entertained. Any other imporvement or developments inside the alloted plot is purely at the discretion of the Party of the Second Part.

22. The Party of the Second Part shall utilise the allotted plot only for the purpose for which it was allotted.

23. Construction of buildings will have to be commenced within six months from the date of allotment order and be completed within 24 months from the date of allotment order. Before commencing such construction of works on the allotted plot, the allottee should strictly follow the following building regulations prescribed, among others.

'23a. The allottee shall commence commercial production/trail production within 30 months from the date of allotment order. Failure will entail cancellation of allotment and forfeiture of initial deposit paid towards the extent allotted.

(i) All buildings to be constructed should be in conformity with the bye-laws of the local body and regulations in force from time to time as well as any other laws, rules and regulations in force relating to the construction and use of premises. No construction work shall be commenced until the building plans and elevations are cleared by

P.V. Rajesh

Project Officer
SIPCOT LTD.
Cuddalore

25

the various authorities, like the Directorate of Town and Country Planning, the Local Authority, Public Health Authorities, Inspectorate of factories, Pollution Control Board and such other agencies whose clearances may be required under any law or procedure in force from time to time. The Party of the First Part reserves the right to suggest such modifications or alterations as may be in the common interest.

(ii) All survery and other marks demarcating the boundaries of the plots, structures and installations shall be properly preserved and kept in good repair by the Party of the Second Part, at all times. Where more than one allottee is concerned with the same boundary marks and structures the Party of the First Part shall allocate this obligation suitably.

(iii) No temporary or semi-permanent structure shall be built on the plot except during the period of construction or re-construction in future.

(iv) No construction with katcha or inflammable materials will be permitted on the site allotted.

(v) A strip of not less than five metres shall be left open to the sky, within the periphery of the plot on all sides.

(vi) The provision of any culvert across common drains must be got approved by the Party of the First Part.

(vii) Basement level of the buildings should be above the road level as provided by the Party of First Part.

For VIKI STEEL (P) LTD.,
P.V. Rassal
Director

Project Officer
SIPCOT LTD.
Gummidipoondi

(viii) Sewerlines and water lines should be designed in such a way that they are connected to the common lines of the Party of the First Part which will serve the plot.

(ix) The Party of Second Part should make its own arrangements to drain the rain water from its plot into the common road drain provided by the Party of the First Part.

(x) The Party of Second Part has to make its own arrangements to treat the effluents solid/liquid to the required standards of the Tamil Nadu Pollution Control Board and to regulate dust, smoke, gas, noise, vibrations and prevent fire hazards and comply with the regulations in this regard.

24. The Party of the Second Part shall, at its own cost, construct and maintain access roads leading from the Industrial Complex to the said plot in strict accordance with the specifications and details prescribed by the Party of the First Part.

25. The Party of the Second Part shall insure all the buildings erected now or to be erected in future on the said land and keep the insurance alive at all times.

26. The Party of the Second Part shall keep the Party of the First Part indemnified against any and all claims for damages which may be caused to any adjoining buildings or other premises as a consequence of the erection of the buildings and industrial installations by the Party of the Second Part. The Party of the Second Part shall also keep the Party of the

For [illegible] STEEL [illegible] LTD.
D.V. [illegible]
Director

First Part indemnified against all payments whatsoever which, during the progress of work, may become payable or be demanded by the Local Authority in respect of the said works, or of anything done under the authority herein contained.

27. The Party of the First Part shall have the right of access into and utilising any portion of the allotted plot, as required at all times, for the purpose of laying pipe lines, cables, underground drainages, channels, or providing such other common facility. The Party of the First Part shall have further right within the area of the allotted plot including the building standing thereon as and when felt necessary by the Party of the First Part, to lay down, place, maintain, alter, remove or repair any pipes, pipe lines, conduits for service lines, posts, or other appliances or apparatus in, on, under, over, along or across the land in such area for the purposes of providing any common amenities or services for the Industrial Complex and the same may be done either directly by any person either generally or specially authorised by the Party of the First Part in this behalf and the Party of the Second Part agrees for the same.

28. The Party of the Second Part shall not, at any time during the currency of the lease, cause or permit any nuisance in or upon the said land and in particular shall not use or permit the said land to be used for any purpose, which may be obnoxious or injurious or offensive by reason of deposits of solid matter or emission of odour, liquid, dust, smoke, gas,

For VIKI STEEL (P) LTD.

Director

noise vibrations or fire hazards or which may cause permanent damage to the land. The Party of the Fisrt Part shall have full right to prohibit or regulate these matters at all times.

29. During the period of lease and thereafter the Party of the Second Part at its expense will keep the buildings, premises and other structures clean, free from defect and in good repair.

30. (i) The Party of the Second Part shall pay all existing and future rates and taxes, charges, claims, assessment and outgoings of every description, chargeable against he owner or occupier in respect of the allotted plot and any building erected thereon or services received.

(ii) The Party of the Second Part shall bear all expenses in connection with the drawing of power from the main lines to the plot and for the supply of electricity.

(iii) The Party of the Second Part shall execute an agreement for water supply at the time of taking possession of the plot and comply with all the terms and conditions of the agreement.

(iv) The Party of the Second Part along with the allottess of the other plots shall bear the maintenance charges for the common amenities and facilities like roads, drainage, sewerage, street lighting etc., at the rates which may be fixed by the Party of the First Part from time to time.

For VIKI STEEL (P. LTD.

Director

31. The Party of the Second Part shall not directly or indirectly transfer, assign, sell, encumber or part with its interest, either in part or in whole, in any manner whatsoever without the previous approval of the Party of the First Part in writing. It shall be open to the Party of the First Part to grant or refuse approval or to impose any conditions it considers necessary.

32. The Party of the First Part or persons authorised by it shall have the right to enter upon and inspect the said premises, during the currency of the lease at all times.

33. The Party of the First Part shall have the powers to direct removal or alteration of any building or structure erected or used contrary to the conditions of the plan or cause the same to be carried out at the cost of the Party of the Second Part.

34. The Party of the Second Part shall not sub-let or transfer or in any other manner permit the occupation of any other person of the whole or part of the plot.

35. The Party of the Second Part shall not sink any well, borewell or tubewell within the site allotted. If any such well exists already in the plot it shall be closed when the Party of the First Part supplies water from a common source. If any borewell exists already it shall be kept under the control of the Party of the First Part.

For VE[illegible] (P) LTD.

Project Officer
SIPCOT LTD.
Gummidipoondi

36. Ten percent of the jobs in the Industrial Units coming up in the Industrial Complex, shall be reserved to the members of the families of land owners whose lands have been acquired for the Industrial Complex, subject to eligibility as per qualifications prescribed for the jobs.

37. The Party of the First Part shall have the power to grant extension of time, subject to such conditions as may be imposed to the Party of the Second Part in all matters which are required to be done or completed within the prescribed time, under this deed.

38a. Any change in the constitution of the Party of the Second Part shall have the prior approval of the Party of the First Part.

38b. Any change in the name or the address of the Regd. Office or Administrative Office of the Party of the second part should be intimated to the Party of the first part then and there.

39. The death of the Party of the Second Part, where it is an individual, should be communicated to the Party of the First Part within a reasonable time. The heir or legal representative should give notice of his claim to the Party of the First Part within three months of the event.

40. During the currency of the lease, any question of dispute or difference in relation to or in connection with the terms of the lease deed shall not be raised by the Party of the Second Part and, if at all raised, such question of dispute

For VIKI STEEL (P) LTD.

Director

Asstt. Collector
for COT LTD.
Bhiwadi/Khoondli

or difference shall be referred to the Managing Director of the Party of the First Part whose decision shall be final and binding.

41. Only the Courts situate in the City of Madras shall have jurisdiction to decide upon any dispute or litigation between the parties to this lease deed.

42. The Party of the First Part reserves the right to impose any further conditions and stipulations, or alterations in the regulations necessary at any time for the establishment of Industrial Complex, to implement the conditions of this deed and for the benefit of the Industrial Complex, as a whole.

43. The Party of the First Part reserves to itself the right to sell, lease, or otherwise deal with any land unleased or unsold, in any manner it deems suitable. It reserves the right to release, waive, modify either wholly or in part, alter any stipulations, obligations and restrictions contained in this deed regarding any plot or other area in the property. The exercise of this right by the Party of the First Part in relation to any such plot or area shall not release the lessee or / purchaser (s) of any other plot in this property from any of the stipulations, obligations and restrictions, affecting and imposed upon the said allotted plot, nor give rise in favour of any lessee or puchaser to any right of action against the Party of the First Part or its successors.

For V[illegible]
Director

16. The Party of the Second Part shall implement and conform to the various conditions in this deed in relation to the allotted plot at all times.

17. It shall be open to the Party of the Second Part to ask for in writing and the party of the First Part to grant a "No Objection" certificate, with or without conditions, to enable the Party of the Second Part to mortgage its interests in the said allotted plot, at any time after taking possession for obtaining financial assistance from financial institutions and banks for creation of fixed assets only.

18. During the currency of the lease, the ownership of the property which is vested in the Party of the First Part shall not be liable to be questioned in any manner and if at all any such question is raised by the Party of the Second Part, the lease will be terminated forthwith and the Party of the First Part will enter the land including the buildings and other appurtenances situated thereon and resume possession of the plot at any time.

19. The Party of the First Part, at the request and cost of the Party of the Second Part at the end of the said term of 99 years may execute a new lease of the schedule mentioned plot by way of renewal for a similar period of ninety nine years on such covenants and provisions as may be mutually agreed to.

For VIKI STEEL (P) LTD.,

Director

Project Officer
SIPCOT LTD.
Gummidipoondi

48. The Party of the Second Part shall not sink any well / borewell or tubewell within the schedule mentioned plot. The borewells bearing Nos. BW 58 & BW 70, which already exist in the schedule mentioned plot shall be kept under the control of the Party of the First Part and the Party of the First Part shall be provided access for operation inspection of the said borewells at any time by the Party of the Second Part.

IN WITNESS WHEREOF Thiru V Padmanabhan acting for and on behalf of the Party of the First Part and Thiru P V Prasanna Reddy acting for and on behalf of the Party of the Second Part have hereunto set their hands on the day, month year first above written.

SCHEDULE - A
(Description of the Industrial Complex)

All that piece and parcel of land known as the Industrial Complex Gummidipoondi comprising of about 804 acres of land situated in Revenue Villages of New Gummidipoondi, Palaya Gummidipoondi, Karumbukuppam, Pappankuppam, Peddikuppam and Sinthalakuppam villages. But in compact block within the Taluk of Gummidipoondi.

Sub-registration District of Gummidipoondi of Chengalattu Revenue District. The Industrial Complex is bounded.

On the South By

Survey Nos. 35, 36, 37, 12, 9, 46, 79, 78, 75, 73, 94, 96, and 97 of Sinthalakuppam village. 44, 49, 50, 53, 56, 54, 62, 64, 75, 77, 83 of Karumbukuppam village. 30, 31, 32, 43, 44, of New Gummidipoondi village.

For VIKI STEEL (P) LTD.
P.V. Reddy
Director

Authorised Officer
SIPCOT LTD.
Gummidipoondi

On the North By

257, 256, 270, 271, 350, 351, 353, 323, 322, 321, 320 and 330 part of Pappankuppam village, 297, 300 part 301 part, 316, 317 part and 257-A part of Pathikuppam.

On the East By

307 part, 311 part, 312, 314 part, 316 of pathikuppam village and Railway line 613 part 614 part 604, 605, 613, 612, 608 part, 607 part 598, 597 of Palaya Gummidipoondi and Survey No.1 part, 2 and 53 of New Gummidipoondi.

On the West By

324, 283, 282, 281, 275, 274, 348, 353, 258, and 261 of Pappankuppam. Survey No.15, 12, 9, 45, 46, 75, 73, 97, of Sinthalakuppam village. Survey Nos. 83 and 84 of Karumbukuppam village.

SCHEDULE - B
(Description of the properly concerned in this lease)
(Value of the property Rs.37,23,500/-)

All that piece and parcel of land known as plot No. D19 in the SIPCOT's Industrial Complex at Gummidipoondi within the Village limits of Old Gummidipoondi Taluk of Gummidipoondi Sub-Registration District of Chengai MGR in Revenue District containing by admeasurement 6.77 acres/metres or thereabouts and marked by green coloured boundary lines on the Plan annexed hereto, bearing Survey Nos. 630/2pt, 3pt and 4, 632/4Bpt, 631-pt. 634pt and 629 Part of Old Gummidipoondi village/Gummidipoondi Taluk and bounded by

On the North by - Plot No. B-73
On the South by - Channel.
On the East by - Plot No - A-14 & B-71
On the West by - Stormwater drain & G.N.T. By pass road.

For VIKI STEEL (P) LTD.,

D.V. Rao

2/Vice Chairman

LTD.

LINEAR MEASUREMENTS :

East to West on the North - 148.10 M.
East to West on the South - 125.50 M.
North to South on the East - 198.90 M.
North to South on the West - 192.90 M.

Singature of Lessor
(Party of the First Part)

WITNESS :

1. G. Ramesh (G. RAMESH)
ADI/ST
2. G. Jayachandran
JAIST,
SIPCOT/GPD.

Signature of Lessee
(Party of the Second Part)

Signed and delivered in the presence of:

WITNESSESS :

1. B. Ganesh. (B. GANESH)
2. (SYED MAHABOOBALI)

IN WITNESS WHEREOF THE common Seal of Viki Steel Private Limited (the Party of the Second Part) has hereunto been affixed on this 21st day of January One thousand nine hundred and ninety four pursuant to the Resolution of the Board dated 6th January 1994.

IN THE PRESENCE OF :

1.
2. (P.S REDDY)

SHECOT INDUSTRIAL COMPLEX, GWAGWALADA

SITE AT: 6.77 ACRES

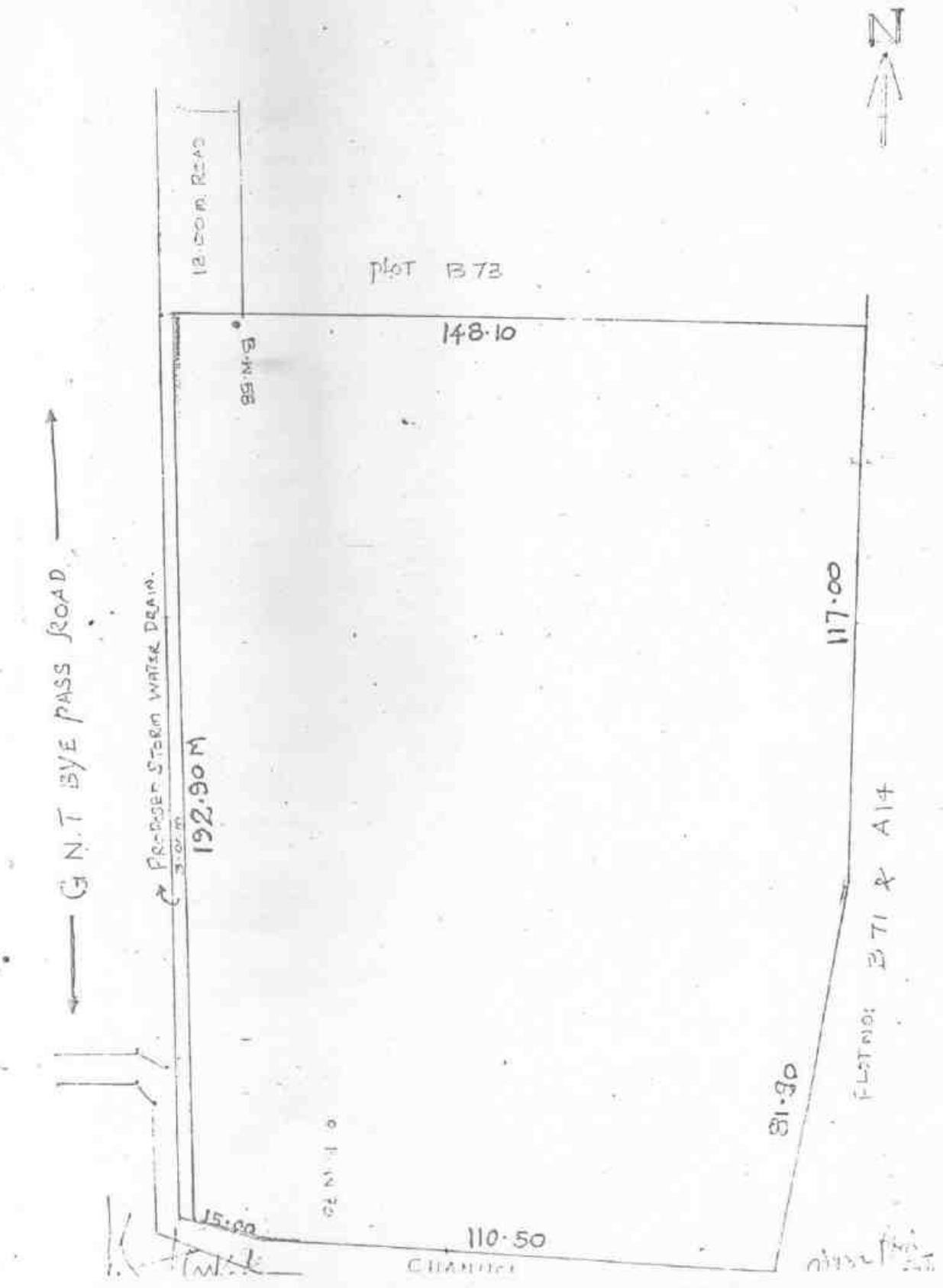
PLOT NO: D.N

SCALE: 1: 1000

VILLAGE: [illegible]

SURVEY NO: 630/2Pt, 630/3Pt, 630/4, 632/1BPt, 631Pt, 634Pt, & 629Pt

ALL DIMENSIONS ARE IN METERS ONLY



ANNEXURE – V

PROJECT COST CERTIFICATE

SRISPOORTHI & ASSOCIATES
CHARTERED ACCOUNTANTS

Office :
Ist Floor, C.S. Towers, New No.34 (Old No.76)
Bazullah Road, T.Nagar, Chennai 600 017.
Ph : 9176655958
e-mail : srispoorthiassociates@gmail.com

TO WHOMSOEVER IT MAY CONCERN

Project Cost Estimation Certificate

Based on the verification of the financial statements, relevant documents and the management representation provided to us, we certify the estimated cost (Gross Fixed Assets Value) of the Existing Steel Rolling Mill (Shed, Machinery) and Proposed Construction of Steel Melting Shop (Shed, Plant and Machinery) in the Same Land.

The Existing Factory is Situated at No. D-19, Sipcot Industrial Complex, Thiruvallur District in Tamil Nadu, in the Name M/s Viki Industries Pvt Ltd.

Cost Details:

S.No.	Gross Fixed Assets	Existing Rolling Mill	Proposed Expansion in Rolling Mill	Proposed Steel Melting Shop	Estimated Value
1	Land	91,31,042	Nil	Nil	91,31,042
2	Building	4,14,05,981	Nil	3,00,00,000	7,14,05,981
3	Plant & Machinery	17,85,22,484	5,50,00,000	26,02,00,000	49,37,22,484
Total					**57,42,59,507**

Place: Chennai
Date: 28.12.2022
UDIN: 22240795BGHLEV6012

For SRISPOORTHI & ASSOCIATES
Chartered Accountants
FRN: 01[illegible]S

SRISPOORTHI & ASSOCIATES * CHARTERED ACCOUNTANTS *

SRISPOORTHI V
Proprietor
M No. 240795

Annexure I

Cost For Expansion of Rolling Mill Machinery's

S.No	Description	No's	Cost in Lakhs
1	Housing less stands, Gear Boxes	2	100
2	Flying Shear	1	50
3	Automatic rack type cooling bed	1	250
4	Bar handling equipment's	1	50
5	Electrical Motor drivers etc	1	100
Total Cost			**550**

Annexure II
PROPOSED STEEL MELTING SHOP PROJECT COST

SI.No	Description	No's	Cost in lakhs
1	15 Ton 7500KW furnace		411
2	33/600V Transformer 8000Kva	1	109
3	4/7 Radius CCM	1	377
4	Auxiliary Transformers	3	20
5	EOT Cranes (40 Mt =1 no's,15 Mt = 3no's)	4	250
6	Ladle Car	1	50
7	Air Pollution Control equipment's	1	200
8	33kva Substation	1	125
9	Shed(100m*20m)	1	300
10	Electrical breakers		150
11	EB deposit		180
12	Dedicated feeder cable and breaker		180
13	Scrap bundling and Shearing Machine		200
14	DOG house, Poking Equipment		50
	Total Cost		**2602**

SRISPOORTHI & ASSOCIATES * CHARTERED ACCOUNTANTS *

ANNEXURE –VI

CTO CONSENT ORDER

TAMIL NADU POLLUTION CONTROL BOARD

Category of the Industry :

ORANGE

CONSENT ORDER NO. 2108237825690 DATED: 28/04/2021.

PROCEEDINGS NO.F.0019GMP/OL/DEE/TNPCB/GMP/A/2021 DATED: 28/04/2021

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT –M/s. VIKI INDUSTRIES PRIVATE LIMITED , S.F.No. Plot No. D-19,SIPCOT INDUSTRIAL COMPLEX, GUMMIDIPOONDI. in S.No. 630/2 PART,3 PART& 4, 632/4 PART,631 PART,634 PART & 629 PART, OLD GUMMIDIPOONDI village, Gummidipoondi Taluk and Tiruvallur District - Renewal of Consent for the operation of the plant and discharge of emissions under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) –Issued- Reg.

REF: 1.RCO Proc.No F.0019GMP/OL/DEE/TNPCB/GMP/W&A/2019 DATED: 06/07/2019
2.Unit's Application dated 27-03-2021
3.IR.No : F.0019GMP/OL/AEE/GMP/2021 dated 23/04/2021
4.Minutes of 63rd DLCCC meeting held on 27/04/2021 vide agenda item no 63-014

RENEWAL OF CONSENT is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) (hereinafter referred to as “The Act”) and the rules and orders made there under to

The Director
M/s.VIKI INDUSTRIES PRIVATE LIMITED,
S.F.No. Plot No. D-19,SIPCOT INDUSTRIAL COMPLEX, GUMMIDIPOONDI. in S.No. 630/2 PART,3 PART& 4, 632/4 PART,631 PART,634 PART & 629 PART,
OLD GUMMIDIPOONDI village,
Gummidipoondi Taluk,
Tiruvallur District.

Authorizing the occupier to operate the industrial plant in the Air Pollution Control Area as notified by the Government and to make discharge of emission from the stacks/chimneys.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2023

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
GUMMIDIPOONDI

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	TMT Bars of Various Sizes	10000	T/month

2. This renewal of consent is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.

I	**Point source emission with stack :**			
Stack No.	**Point Emission Source**	**Air pollution Control measures**	**Stack height from Ground Level in m**	**Gaseous Discharge in Nm3/hr**
01	Coal fired Reheating Furnace	Cyclone filter followed by Wet scrubber with stack	30	
02	Coal Crusher	Blower attached to Reheating furnace		
II	**Fugitive/Noise emission :**			
Sl. No.	**Fugitive or Noise Emission sources**	**Type of emission**	**Control measures**	

Special Additional Conditions:

The unit shall install the approved retrofit emission control device/equipment with at least 70% Particulate matter reduction efficiency on all DG sets with capacity of 125 KVA and above or otherwise the unit shall be shift to gas based generators within the time frame prescribed in the notification No. TNPCB/Labs/DD(L)02151/2019 dated 10.06.2020 issued by TNPCB.

Additional Conditions:

1. The unit shall operate and maintain the air pollution control measures continuously and efficiently so as to achieve AAQ/emission the standards prescribed by the Board.

2. The unit shall maintain the energy meter provided for the operation of air pollution control measures so as to assess the continuous operation of the air pollution control measures provided.

3. The unit shall conduct AAQ/SM/ANL survey through Board lab and furnish the report to the Board every year.

4. The unit shall ensure that the unit's activity shall not give rise to any complaints from the nearby public.

5. The unit shall continue to develop green belt by planting 2m tall trees all around the compound wall.

6. In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit the consent fee, this consent order will be withdrawn without any notice and further action will be initiated against the unit as per law

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
GUMMIDIPOONDI

To
The Director,
M/s.VIKI INDUSTRIES PRIVATE LIMITED,
NO 1, KRISHNA STREET,
NUNGAMBAKKAM,
CHENNAI.,
Pin: 600034

Copy to:

1.The Commissioner, GUMMUDIPOONDI-Panchayat Union, Gummidipoondi Taluk, Tiruvallur District .
2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
3. Copy submitted to the JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
4. File

** This consent order is computer generated by OCMMS of TNPCB and no signature is needed**

TAMIL NADU POLLUTION CONTROL BOARD

Category of the Industry :

ORANGE

CONSENT ORDER NO. 2108137825690 DATED: 28/04/2021.

PROCEEDINGS NO.F.0019GMP/OL/DEE/TNPCB/GMP/W/2021 DATED: 28/04/2021

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT – M/s. VIKI INDUSTRIES PRIVATE LIMITED , S.F.No. Plot No. D-19,SIPCOT INDUSTRIAL COMPLEX, GUMMIDIPOONDI. in S.No. 630/2 PART,3 PART& 4, 632/4 PART,631 PART,634 PART & 629 PART, OLD GUMMIDIPOONDI village, Gummidipoondi Taluk and Tiruvallur District - Renewal of Consent for the operation of the plant and discharge of sewage and/or trade effluent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act 6 of 1974) – Issued- Reg.

REF: 1.RCO Proc.No F.0019GMP/OL/DEE/TNPCB/GMP/W&A/2019 DATED: 06/07/2019
2.Unit's Application dated 27-03-2021
3.IR.No : F.0019GMP/OL/AEE/GMP/2021 dated 23/04/2021
4.Minutes of 63rd DLCCC meeting held on 27/04/2021 vide agenda item no 63-014

RENEWAL OF CONSENT is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act, 6 of 1974) (hereinafter referred to as “The Act”) and the rules and orders made there under to

The Director
M/s.VIKI INDUSTRIES PRIVATE LIMITED,
S.F.No. Plot No. D-19,SIPCOT INDUSTRIAL COMPLEX, GUMMIDIPOONDI. in S.No. 630/2 PART,3 PART& 4, 632/4 PART,631 PART,634 PART & 629 PART,
OLD GUMMIDIPOONDI village,
Gummidipoondi Taluk,
Tiruvallur District.

Authorising the occupier to make discharge of sewage and /or trade effluent.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2023

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
GUMMIDIPOONDI

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	TMT Bars of Various Sizes	10000	T/month

2. This renewal of consent is valid for operating the facility with the below mentioned outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Sewage	3.5	On Industrys own land
Effluent Type : Trade Effluent			
1.	Trade Effluent	1.0	Recycling to Wet scrubber

Additional Conditions:

1. The unit shall ensure that no trade effluent is generated except wet scrubber and the unit shall ensure that wet scrubber is under recycling after settling without any discharge.

2. The unit shall ensure that cooling water is under closed circuit system without any discharge.

3. The unit shall ensure that no treated/untreated sewage shall gain access to the drain/water source at any point of time.

4. The unit shall not use 'use and throwaway plastics' such as plastic sheets used for food wrapping, spreading on dining table etc., plastic plates, plastic coated tea cups, plastic tumbler, water pouches and packets, plastic straw, plastic carry bag and plastic flags irrespective of thickness, within the industry premises. Instead it shall encourage use of eco friendly alternative such as banana leaf, areca nut palm plate, stainless steel, glass, porcelain plates/cups, cloth bag, Jute bag etc

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
GUMMIDIPOONDI

To

The Director,

M/s.VIKI INDUSTRIES PRIVATE LIMITED,

NO 1, KRISHNA STREET,

NUNGAMBAKKAM,

CHENNAI.,

Pin: 600034

Copy to:

1.The Commissioner, GUMMUDIPOONDI-Panchayat Union, Gummidipoondi Taluk, Tiruvallur District .

2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.

3. Copy submitted to the JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.

4. File

** This consent order is computer generated by OCMMS of TNPCB and no signature is needed**

ANNEXURE – VII

WATER BILLS

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Park Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

IRN : af5dd5ce65fce31385940545286557ce4edd9f746872f946d862c703053b63d | Ack No : 152213425302794 | Ack Date : 08-12-2022 18:08:00

To, Viki Industries Private Limited
Plot No : D19,
Gummidipoondi Industrial Park and EPIP,
Gummidipoondi.

GSTIN : 33AAACV2003P1ZI

TAX INVOICE

INVOICE NO: POGD2022INTW2174

PLACE OF SUPPLY : Gummidipoondi Industrial Park and EPIP

INVOICE DATE : 05-12-2022

DUE DATE : 20-12-2022

SL NO.	DESCRIPTION	SAC	TAXABLE VALUE (Rs.)		Total Rs.
1	Water Bill	996921	100675.00		100675.00
			SUB TOTAL		100675.00
			SGST	9%	9061.00
			CGST	9%	9061.00
			TOTAL		118797.00
	TOTAL INVOICE VALUE	(In Words)	Rupees One Lakh Eighteen Thousand Seven Hundred & Ninty Seven Only		

This is a system generated invoice. No signature is required

e-mail : Website : www.sipcot.tn.gov.in

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Park Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

IRN : 74d05897c0ef20ee4e9f1666ba8b2e52d55273106b93841b18c58dee8b4a549c	Ack No 152213428000718	Ack Date : 09-12-2022 10:38:00

To, Viki Industries Private Limited
Plot No : D19,
Gummidipoondi Industrial Park and EPIP,
Gummidipoondi.

GSTIN : 33AAACV2003P1ZI

TAX INVOICE

INVOICE NO: POGD2022INTA4197

PLACE OF SUPPLY : Gummidipoondi Industrial Park and EPIP

INVOICE DATE : 08-12-2022

DUE DATE : 23-12-2022

SL NO	DESCRIPTION	SAC	TAXABLE VALUE (Rs.)		Total Rs.
1	Maintenance Charges 2021-22 (Monthly	995429	14894.00		14894.00
			SUB TOTAL		14894.00
			SGST	9%	1340.00
			CGST	9%	1340.00
			TOTAL		17574.00
	TOTAL INVOICE VALUE	(In Words)	Rupees Seventeen Thousand Five Hundred & Seventy Four Only		

This is a system generated invoice. No signature is required

e-mail : Website : www.sipcot.tn.gov.in

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Park Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

IRN : 10f38692a3dee2263cab4c86a0d45714c8850e023d0fcbb8362ff3488fd68a10	Ack No : 152213399512748	Ack Date : 05-12-2022 16:38:00

To, Viki Industries Private Limited
Plot No : D19,
Gummidipoondi Industrial Park and EPIP,
Gummidipoondi.

GSTIN : 33AAACV2003P1ZI

TAX INVOICE

INVOICE NO: POGD2022INTW2032

PLACE OF SUPPLY : Gummidipoondi Industrial Park and EPIP

INVOICE DATE : 05-12-2022

DUE DATE : 20-12-2022

SL NO.	DESCRIPTION	SAC	TAXABLE VALUE (Rs.)		Total Rs.
1	Water Bill	996921	200.00		200.00
			SUB TOTAL		200.00
			SGST	9%	18.00
			CGST	9%	18.00
			TOTAL		236.00
	TOTAL INVOICE VALUE	(In Words)	Rupees Two Hundred & Thirty Six Only		

This is a system generated invoice. No signature is required

e-mail : Website : www.sipcot.tn.gov.in

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Complex Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

Receipt No : POGD2022RCPT3005	Date : 26-12-2022
Received From **Viki Industries Private Limited** the sum of Rupees Seventeen Thousand Five Hundred & Ninty Six Only towards **Maintenance Charges** (Invoice No.POGD2022INTA4197) - Payment Date (26-12-2022)	Rs : 17596.00
Mode of Payment: Online	

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e-mail : Website : www.sipcot.tn.gov.in

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Complex Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

Receipt No : POGD2022RCPT3006	Date : 26-12-2022
Received From **Viki Industries Private Limited** the sum of Rupees Two Hundred & Thirty Eight Only towards **Water Bill** (Invoice No.POGD2022INTW2032) - Payment Date (26-12-2022)	Rs : 238.00
Mode of Payment: Online	

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e-mail : Website : www.sipcot.tn.gov.in

State Industries Promotion Corporation of Tamil Nadu Limited

(A GOVERNMENT OF TAMILNADU UNDERTAKING)

Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No.7223, Egmore, Chennai - 600 008.

GST Reg. No. 33AAACS4643J1ZF

SIPCOT Industrial Complex Administrative Office Block, Gummidipoondi-601 201. Ph.: 044-27922242/355 Fax: 044-27922242

Receipt No : POGD2022RCPT3004	Date : 26-12-2022
Received From **Viki Industries Private Limited** the sum of Rupees One Lakh Nineteen Thousand Seventy Five Only towards **Water Bill** (Invoice No.POGD2022INTW2174) - Payment Date (26-12-2022)	Rs : 119075.00
Mode of Payment: Online	

This is a system generated receipt. No signature is required

e-mail : Website : www.sipcot.tn.gov.in

ANNEXURE – VIII

DETAILS OF ENVIRONMENTAL CONSULTANT

QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Eco Tech Labs Pvt Ltd.,

48, 2nd Main Road, Ram Nagar South Extension, Pallikaranai, Chennai- 600100, T.N.

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - including Open cast only	1	1 (a) (i)	B
2	Thermal power plants	4	1(d)	A
3	Coal washeries	6	2 (a)	B
4	Metallurgical industries - Ferrous only	8	3 (a)	B
5	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	21	5 (f)	A
6	Airports	29	7 (a)	A
7	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
8	Building and construction projects	38	8 (a)	B
9	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Apr. 20, 2021 and supplementary minutes dated Oct.19, 2021 posted on QCI-NABET website

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2217 dated Jan. 19, 2022. The accreditation needs to be renewed before the expiry date by Eco Tech Labs Pvt. Ltd., Chennai following due process of assessment.

Sr. Director, NABET
Dated: Jan. 19, 2022

Certificate No.
NABET/EIA/2124/SA 0147

Valid up to
Sep. 15, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

ANNEXURE – IX

GHG EMISSIONS

INITIATIVES FOR REDUCING GHG EMISSION

Green House Effect

Some atmospheric gases absorb and re-emit infrared energy from the atmosphere down to the Earth's surface. This process, the greenhouse effect, leads to a mean surface temperature that is 33 °C greater than it would be in its absence. If it were not for the greenhouse gas effect, Earth's average temperature would be a chilly -18 °C.

The Earth has a natural greenhouse effect due to trace amounts of water vapour (H2O), carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) in the atmosphere. These gases let the solar radiation reach the Earth's surface, but they absorb infrared radiation emitted by the Earth and thereby lead to the heating of the surface of the planet. One needs to distinguish between the natural greenhouse effect and the enhanced greenhouse effect. The natural greenhouse effect is caused by the natural amounts of greenhouse gases, and is vital to life. In the absence of the natural greenhouse effect the surface of the Earth would be approximately 33 °C cooler. The enhanced greenhouse effect refers to the additional radiative forcing resulting from increased concentrations of greenhouse gases induced by human activities. The main greenhouse gases whose concentrations are rising are carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons (HCFCs), hydrofluoro-carbons (HFCs) and ozone in the lower atmosphere.

Carbon Dioxide Emissions

Carbon dioxide (CO2) is the primary greenhouse gas emitted through human activities. In 2020, CO2 accounted for about 79% of all U.S. greenhouse gas emissions from human activities. Carbon dioxide is naturally present in the atmosphere as part of the Earth's carbon cycle (the natural circulation of carbon among the atmosphere, oceans, soil, plants, and animals). Human activities are altering the carbon cycle–both by adding more CO2 to the atmosphere and by influencing the ability of natural sinks, like forests and soils, to remove and store CO2 from the atmosphere. The main human activity that emits CO2 is the combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation. Certain industrial processes and land-use changes also emit CO2.

Greenhouse gas emissions from industry (24% of 2020 greenhouse gas emissions) primarily come from burning fossil fuels for energy, as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials.

Currently the steel industry is among the three biggest producers of carbon dioxide, with emissions being produced by a limited number of locations; steel plants are therefore a good candidate for decarbonization. Every ton of steel produced in 2018 emitted on average 1.85 tons of carbon dioxide, equating to about 8 percent of global carbon dioxide emissions.

Recent studies estimate that the global steel industry may find approximately 14 percent of steel companies' potential value is at risk if they are unable to decrease their environmental impact.3 Consequently, decarbonization should be a top priority for remaining economically competitive and retaining the industry's license to operate. Moreover, long investment cycles of 10 to 15 years, multibillion financing needs, and limited supplier capacities make this issue even more relevant and lock in significant lead times for addressing the decarbonization challenge.

GHG Emission Reduction Opportunities

1. **Using renewable energy sources rather than fossil fuel to generate electricity**: Increasing the share of total electricity generated from wind, solar, hydro, and geothermal sources, as well as certain biofuel sources, through the addition of new renewable energy generating capacity.

2. **Carbon Capture and Sequestration (CCS):** Capturing CO2 as a byproduct of fossil fuel combustion before it enters the atmosphere, transporting the CO2, injecting the CO2 deep underground at a carefully selected and suitable subsurface geologic formation where it is securely stored.

3. **Fuel Switching:** Using fuels that emit less CO2 than fuels currently being used. Alternative sources can include biofuels; hydrogen; electricity from renewable sources, such as wind and solar; or fossil fuels that are less CO2-intensive than the fuels that they replace. For example:
    - Using electric or hybrid automobiles, provided that the energy is generated from lower-carbon or non-fossil fuels.
    - Adopting Car pooling technology- On a global average, cars carry 1.57 persons per trip. Increasing occupancy can decrease the amount of fossil fuels needed for transportation and so, greenhouse gas emissions.

4. **Upgrading to more efficient industrial technology. EPA's ENERGY STAR® program helps industries become more energy-efficient:** Identifying ways that manufacturers can use less energy to light and heat factories or to run equipment.

5. **Paris Agreement:** The production of steel remains a CO2 and energy-intensive activity. The steel industry should be committed to reduce the footprint from its operations and the use of its products. The industry should provide full support to the aims of Paris Agreement.

   The Paris Agreement:

   The Paris Agreement was adopted in 2015. The agreement's central aim is to limit global temperature rise to well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

   The agreement aims to reach a balance between anthropogenic emissions and removals by sinks in the second half of the century.

6. **Using natural gas instead of coal to run machinery**

7. **Recycling**: Producing industrial products from materials that are recycled or renewable, rather than producing new products from raw materials. For example, Using scrap steel and scrap aluminium as opposed to smelting new aluminium or forging new steel.

8. **Training and Awareness:** Making companies and workers aware of the steps to reduce or prevent emissions leaks from equipment. EPA has a variety of voluntary programs that provide resources for training and other steps for reducing emissions. For example, Instituting handling policies and procedures for perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF6) that reduce occurrences of accidental releases and leaks from containers and equipment.

9. **Change in Uses of Land: Increasing carbon storage by using land differently or maintaining carbon storage by avoiding land degradation.** For example,

- Afforestation and minimizing the conversion of forest land to other land uses, such as settlements, croplands, or grasslands.
- Increasing the green cover area within the industry premises.

10. Adopting the 4Rs in steel manufacturing industry

- Reduce – reducing the amount of material energy and other resource used to create steel and reducing the weight of steel used in products
- Reuse
- Remanufacture
- Recycle – Melting steel products at the end of their useful life to create new steels.

ANNEXURE – X

LIFE CYCLE ASSESSMENT

LIFE CYCLE ASSESSMENT AND STEEL SUSTAINABILITY

1.0 Introduction

The steel industry is the second largest industry in the world after oil and gas industry. Steel is used in almost every sector which ranges from building and construction, packaging, transportation industry, and power and renewable energy sector. Use of steel is found everywhere in the present-day society. There are practically no materials or products where steel is not present or has not played a role in their production.

Crude Steel production has more than doubled, over the last three decades, with the 2020 production amounting to 1,864 million tons and the 2019 production amounting to 1,869 million tons. Steel continues to be the backbone and enabler of evolution and progress of the society. It makes the world a better place to live. The smart cities of the future are to be built on steel. Steel being an infinitely recyclable and reusable asset, its use helps in reducing the burden on the resources of the earth.

Steel has a combination of properties which are to be considered in the decision-making process at the design state. These properties include,

(i) Chemical, Metallurgical, And Mechanical Properties
(ii) Corrosion Resistance Properties
(iii) Fire Resistance Properties
(iv) Recyclability
(v) Long Life
(vi) Maintenance Requirements
(vii) Hygienic Requirements
(viii) Aesthetics
(ix) Environmental Influence.

1.1 Life cycle of steel

Steels can be recycled without loss of quality. Since metallic bonds are restored upon resolidification, steels continually recover their original performance properties, even after multiple recycling loops. This allows them to be used again and again for the same

application. By contrast, the performance characteristics of most non-metallic materials degrade after recycling.

Typically, steel products made over the integrated route have a returned process scrap content limited to a value ranging from 10 % to 20 % whereas the steel products at end-of-life are recycled at rates ranging from 85 % to 95 %. The 'recycled content' method only incorporates the environmental benefits realized today, in contrast with the 'end-of-life' method which additionally accounts for the future environmental benefits emerging from scrap which is generated at end-of-life. For steel industry, the 'end-of-life recycling rate' is the most appropriate indicator, while available volumes of end-of-life scrap are insufficient to match the present demand.

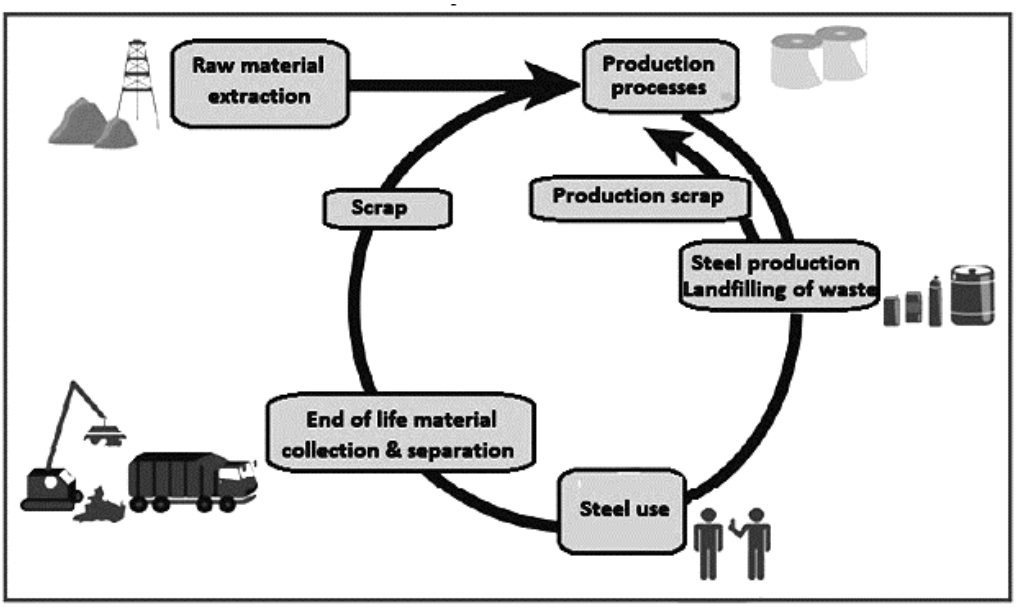

Figure -1 Life Cycle of Steel

1.2 Principle for Life Cycle Assessment

The production of primary (virgin) steel typically includes ore mining and concentrating, smelting, and refining to obtain the steel of the specified chemistry, with a number of processing routes available. In each stage, impurities and byproducts are separated and the concentration of the iron in the final product increases. The refining of steel to sufficient purities frequently needs energy-intensive and precisely-controlled melting stages, which are normally based on the use of fossil-fuel inputs directly as a reductant or indirectly for heat and electricity. Iron and steel production accounts for a substantial global industrial carbon dioxide (CO2) emissions.

In the mining and beneficiation area, there are processes which consist of treating ores in liquid solution to concentrate ore by separating it from the associated minerals. In some processes, very high temperatures are not normally needed and the treatment can take place at high pressures which needs energy to maintain the pressures

Pyro-metallurgy involves treatment of ore concentrates at high temperatures, in order to strip the iron from its associated mineral constituents. This, in turn, necessitates use of fossil fuels in heating furnaces or electricity to power the furnaces. Further, steel industry produces different types of steel products. These different types of steel products can be made in the same steel plant and from the same primary production processes. Each of these products needs different processing routes for the production of the products used by the end consumers.

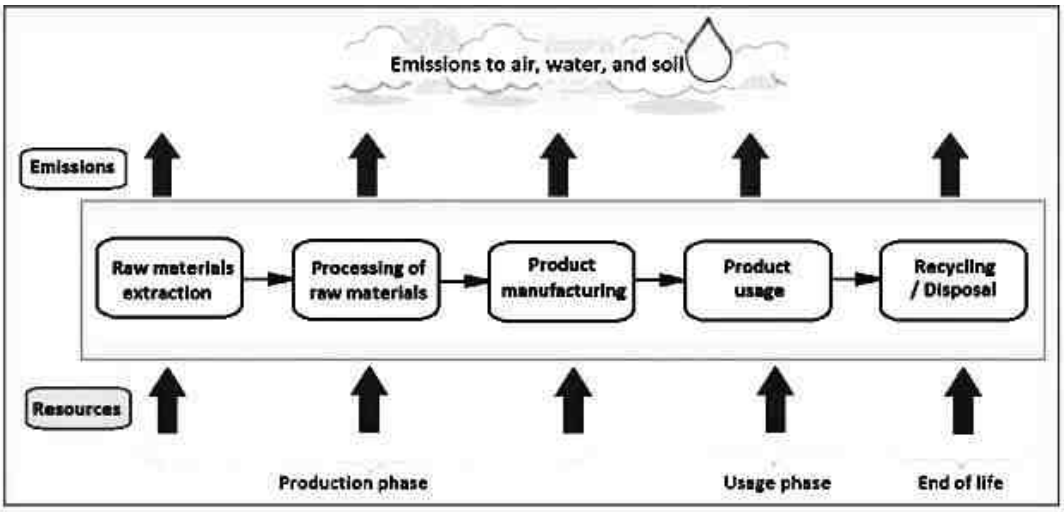

Figure -2 Principle for Life Cycle Assessment (LCA)

1.3 Components of Steel Sustainability

Human activities which need material and energy to develop have irreversible effects on ecological systems and environment such as climate change, the depletion of natural resources, waste generation, and pollution etc. Most of these impacts have hazardous consequences for human health and survival and most of these effects have long-termed results. Climate change and the sustainable use of natural resources are among the main challenges for society today.

Sustainability concerns the whole cycle of a product production i.e. from raw material acquisition, through planning, design, construction and operations, to the its use and end of

life waste management. It is a big and important challenge for the future in the steel industry. Several efforts have been made by the steel industry to reduce its carbon footprint by increasing recyclability and improving the processes.

In the sustained development, there is encouragement for the development of methods which are economically and environmentally healthy. The production and distribution of the materials are carried out with the minimum of transportation. Also, those materials are used which are available as close as possible.

Steel sustainability consists of three components:

(i) Environmental
(ii) Social
(iii) Economic

Life cycle analysis of steel is done for determining environmental impact. Three aspects which determine the environmental impact are,

(i) Production of Steel Product
(ii) Use of The Steel Product
(iii) Recycling of The End of The Life Material.

The materials efficiency of the steel product is determined by three criteria namely (i) reduce, (ii) reuse, and (iii) recycle. The quantities of raw materials to produce steel are to be reduced by improving process efficiencies for the reduction of the CO2 emissions. After the life of a steel product is over, part of the steel content of the product can be reused without any loss of steel basic properties. This makes the reuse of steel very important. Steel is 100 % recyclable. All the steel scrap is reused in making fresh steel.

The social impact of steel is quite substantial. The social impact is influenced by (i) standards of living, (ii) education of the people, (iii) community, and (iv) equal opportunity for everyone.

A sustainable material does not harm the people working to produce it, or who handle it during its use, recycling, and ultimate disposal. The safety, like injury-free and healthy workplace of the employees, is the key priority for the steel industry. Steel also improves the quality of life by making technical advances possible.

The economic component of steel sustainability is very important. The factors influencing the economics include (i) production cost, (ii) profit, (iii) cost savings, (iv) economic growth, and (v) generation of revenues for investments is research and development activities.

Life cycle cost (LCC) is an important criterion for the economic component of steel sustainability. It is the sum of all cost related to a product incurred during the life cycle which consists of (i) conception, (ii) production / fabrication, (iii) its use / operation, and (iv) end-of-life. Besides environmental, social, and economic aspects for steel sustainability, there are three overlapping areas such as (i) environmental-social, (ii) social-economic, and (iii) economic-environmental. The economic-environmental area includes operational efficiency, energy efficiency, and use of renewable resources.

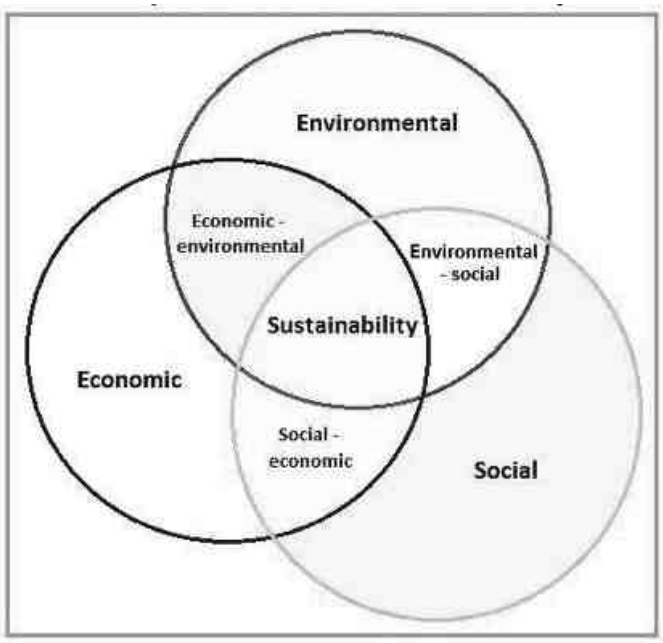

Figure -3 The Components of Steel Sustainability

1.4 Life Cycle Assessment Framework

Steel is a highly durable material used in many qualified applications. Like all materials, its production and use affect the environment in many different ways. The evaluation of the sustainability of the projects can be conducted with the help of a number of tools which have been developed over a period of last few years.

LCA can assist in identifying opportunities to improve the environmental performance of the projects at various points in their life cycle. The objective of a LCA is to create the

complete environmental profile of a product over its entire life cycle, showing the results with the aid of environmental indicators in a more understandable way.

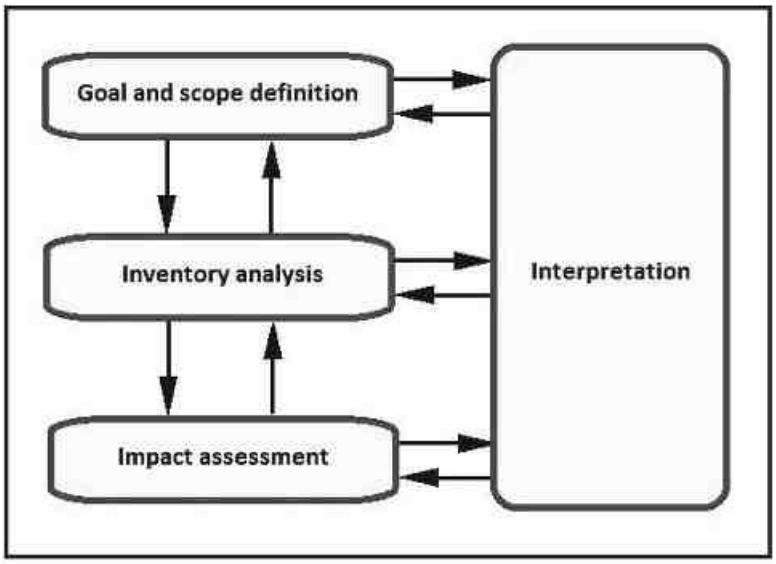

Figure- 4 Life Cycle Assessment Framework

1.5 Recyclability

The recyclability and recycling potential of a product, i.e. reduction potential of environmental impacts by recycling, is also important in LCA, in addition to the environmental impacts in the production and use phases. Because steel scrap can be easily recovered and sorted magnetically, almost all the end-of-life steel products are recovered as scrap. It can be recycled again and again in any steel products. Therefore, steel products achieve closed-loop recycling.

Meanwhile, the recovery rates of other materials are generally low, because they are difficult to sort, and removing impurities is difficult. As a result, the number of materials that achieve closed-loop recycling like steel is small.