

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for

"PROPOSED EXPANSION IN SALEABLE CASTING PRODUCTS FROM 27500 TPA TO 95040 TPA WITHIN THE EXISTING PLOT AREA"

at

S.F No 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu-601202

TOR Letter No:

IA-J-11011/279/2024-IA-II(IND - I)

Dated 03.07.2025

Existing Project Area: 8.0937 ha
Total Area After Expansion: 8.0937ha

Existing Production:

Saleable casting: 27,500 TPA

Total Production After Expansion:

Saleable casting 95,040 TPA

Total Cost After Expansion:

INR 285.73 Cr.

Baseline Season: April 2025 to June 2025,
Summer season

Laboratory Assigned:

M/s. Perfact Researchers Pvt Ltd. (PRPL)
(An ISO/IEC 17025:2017 certified lab

under NABL Accreditation Certificate Number:TC-6993Valid upto-03/04/2029)

Activity and Category As per EIA Notification, 2006: 3(a) Category 'A' (Appraised as Category 'A' due to GC applicability) and Industrial sheds & other building 8(a) Category 'B'

Project Proponent:

M/s. BAETTR INDIA PRIVATE LIMITED

Registered Address: S.F No 32/2, Plot No: A-3/1, SIPCOT Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu-601202

Email: baskar.radhakrishnan@baettr.com

Environmental Consultant:

M/s. Perfact Enviro Solutions Pvt. Ltd.,
(PESPL)

NABET Registered List of Accredited Consultant Organizations/ NABET/EIA/ 2225/RA 0284 (Rev.01) Valid Up to 26/11/2027

Registered Address: Perfact House, A-14, Shubham Enclave, Paschim Vihar, New Delhi-110063.

Regional Office Address: 4th Floor, Kochar Bliss, Thiru. V. Ka. Industrial Estate, Guindy, Chennai - 60003

AUGUST 2025

Declaration by EIA Coordinator & Experts Contributing to the EIA "Proposed Expansion in Saleable Castings products from 27,500 TPA to 95,040 TPA within the existing project area" by M/s. Baettr India Private Limited, located at S.F No 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu - 601202.

I hereby declare that I was involved in the following EIA Report submitted to MoEFCC, as EIA Coordinator. I further certify that the data given in this report is true and correct to the best of my knowledge.

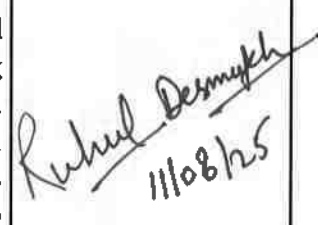
EIA Coordinator:

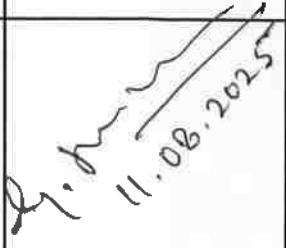
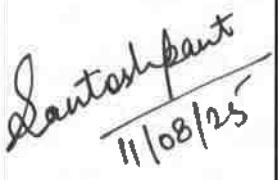
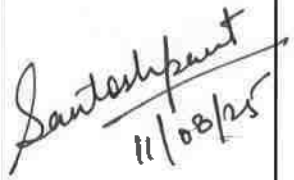
Name	Mr. Partho Mukherjee	Mr. Muthukumaran Ganpathi Narayanan
	3(a) Metallurgical Industries (Ferrous), Category A (General conditions applicable)	8(a) Building and Construction projects
Signature & Date	<i>Partho Sarathi Mukherjee</i> 11/08/25	<i>[Signature]</i> 11.08.2025
Task & Period of Involvement	I had visited the site along with the FAEs to understand the project site and the study area. Coordinated with the experts and prepared the impact assessment methodology. Identification and Prediction of the impact assessment, Formulation of the Environment Management Plan, Technical Review. Period of Involvement: January 2025 to August 2025	I had visited the site along with the FAEs to understand the project site and the study area. Coordinated with the experts and prepared the impact assessment methodology. Identification and Prediction of the impact assessment, Formulation of the Environment Management Plan, Technical Review. Period of Involvement: January 2025 to August 2025
Office Address	Perfact Enviro Solutions Pvt. Ltd. A 14, Shubham Enclave (Outer Ring Road), Paschim Vihar, New Delhi 110063	Perfact Enviro Solutions Pvt. Ltd. A 14, Shubham Enclave (Outer Ring Road), Paschim Vihar, New Delhi 110063

Name of Assistants to EIA Coordinator	Mrs. Sadaf Akhtar
Signature & Date	Sadaf. 11-08-2025
Task & Period of Involvement	I had understood the project site and the study area. Coordinated with the experts and prepared the impact assessment methodology. Identification and Prediction of the impact assessment, Formulation of the Environment Management Plan, Technical Review. Period of Involvement: January 2025 to August 2025
Office Address	Perfact Enviro Solutions Pvt. Ltd. A 14, Shubham Enclave (Outer Ring Road), Paschim Vihar, New Delhi 110063

List of FAEs Involved (Cat A)

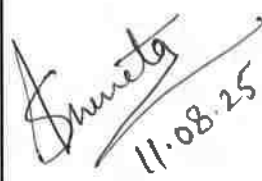
S.No	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
1	AP	Dr. Nipun Bhargava	I had visited the site to assess the site conditions in the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained , I have prepared the Impact Mitigation measures Period of Involvement: January 2025 to August 2025	Nipun 11/08/25
2	AQ	Dr. Nipun Bhargava	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: January 2025 to August 2025	Nipun 11/08/25

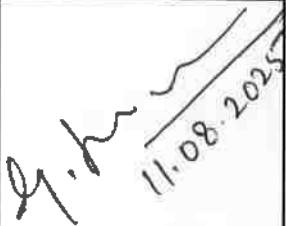
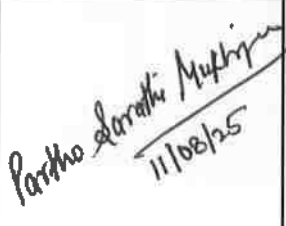
S.No	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
3	RH	Dr. Nipun Bhargava	I had visited the site to assess the site conditions in the surrounding area and identified hazards. After assessing the risk and hazard, I prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11/08/25
4	WP	Mr. Muthukumaran Ganpathi Narayanan	I had visited the site to assess the water sources and its water quality in the study area. After studying the Water pollution sources have prepared Sampling plan & collected samples ; based on the results from the lab and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11.08.2025
5.	SE	Dr. Rahul Deshmukh	I had visited the site to collect the baseline status of socio-economic conditions and studied Villages in study areas using Topographical maps and extracted Secondary data from Census of India. Then was involved in preparing a socio economic study report using the primary survey and secondary data which includes impact and mitigation measures. Period of Involvement: January 2025 to August 2025	 11/08/25

S.No	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
6.	NV	Mr. Muthukumaran Ganpathi Narayanan	I had visited the site to assess the site conditions in the surrounding area. After assessing the Noise pollution sources have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11.08.2025
7.	SHW	Mr. Praveen Bhargava	I had visited the site to assess the Solid waste sources and status in the study area. After studying the sources have prepared the Impact report and suggested Mitigation measures and development of EMP. Period of Involvement: January 2025 to August 2025	 P. Bhargava
8.	HG	Mr. Santosh Pant	The physical observation of the study area including Ground water sources and its water quality was made. After studying the Water pollution sources, the Impact report was prepared and Mitigation measures were suggested. Period of Involvement: January 2025 to August 2025	 Santosh Pant 11/08/25
9.	GEO	Mr. Santosh Pant	I had visited the site to assess the geology of the study area. After studying I have prepared the Impact report and suggested mitigation measures. Period of Involvement: January 2025 to August 2025	 Santosh Pant 11/08/25

S.No	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
10	SC	Mrs. Rachna Dogra	I had visited the site to assess the site conditions in the surrounding area. After assessing the type of soil and need of Soil Conservation, Prepared the Impact Mitigation measures accordingly. Period of Involvement: January 2025 to August 2025	<i>Rachna</i> 11/8/25
11.	LU	Mr. Rajneesh Maurya	I was involved in preparing a Land Use map using Satellite Imagery, Google maps after primary survey. Period of Involvement: January 2025 to August 2025	<i>Rajneesh</i> 11/8/25
12.	EB	Mrs. Tulika Rawat	I had visited the site to assess the various forest areas, Ecological and Biodiversity sources in the study area. After studying the various floral and faunal species, assisted FAE in preparing the Impact report and suggested Mitigation measures Period of Involvement: January 2025 to August 2025	<i>Tulika</i> 11/8/25

List of Category-B FAEs Involved

S.No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
1	AP	Mr. Muthukumaran Ganpathi Narayanan	I had visited the site to assess the site conditions in the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11.08.2025
2	AQ	Mrs. Shweta Rajput	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: January 2025 to August 2025	 11.08.25
3	WP	Mrs. Shweta Rajput	I had visited the site to assess the water sources and its water quality in the study area. After studying the Water pollution sources have prepared Sampling plan & collected samples ; based on the results from the lab and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11.08.25

S.No.	Functiona l Areas	Name of Expert(s)	Involvement (Period & Task)	Signature & Date
4	RH	Mr. Muthukumaran Ganpathi Narayanan	I had visited the site to assess the site conditions in the surrounding area and identified hazards. After assessing the risk and hazard, I prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11.08.2025
5	NV	Mr. Partho Sarathi Mukherjee	I had visited the site to assess the site conditions in the surrounding area. After assessing the Noise pollution sources have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025	 11/08/25
6	GEO	Mrs. Saloni Sharma	I had visited the site to assess the physical observation of the study area. After studying the site, an Impact & mitigation report is prepared. Period of Involvement: January 2025 to August 2025	 11.08.25

List of FAA

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature
1.	AP	Mrs. Tanya Thakur	I had visited the site to assess the site conditions in the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained , I have prepared the Impact Mitigation measures. Period of Involvement: June 2025 to August 2025	Tanya Thakur 11.08.25
2.	AQ	Mrs. Tanya Thakur	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: June 2025 to August 2025	Tanya Thakur 11.08.25
3.	SHW	Ms. Navneet Kaur	I had visited the site to assess the Solid waste sources and status in the study area. After studying the sources have prepared the Impact report and suggested Mitigation measures and development of EMP. Period of Involvement: June 2025 to August 2025	Navneet Kaur 11.08.25

List of Team Members

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)	Signature
1.	AP	Mrs. Sadaf Akhtar	I had visited the site to assess the site conditions in the surrounding area. After studying the various AP sources, assisted FAE in preparing the impact report and suggested mitigation measures. Period of Involvement: June 2025 to August 2025	<i>Sadaf</i> 11-08-2025
2.	WP	Mrs. Sadaf Akhtar	I had visited the site to assess the water sources and its water quality in the study area. After studying the various WP sources, assisted FAE in preparing the impact report and suggested mitigation measures. Period of Involvement: June 2025 to August 2025	<i>Sadaf</i> 11-08-2025
3.	LU	Mr. Deepak Kumar	I was involved in preparing a Land Use map using Satellite Imagery, Google maps after primary survey. Period of Involvement: June 2025 to August 2025	<i>Deepak Kumar</i> 07-08-25
4.	EB	Mrs. Disha Patel	I had visited the site to assess the various forest areas, Ecological and Biodiversity sources in the study area. After studying the various floral and faunal species, assisted FAE in preparing the Impact report and suggested Mitigation measures Period of Involvement: January 2025 to August 2025	<i>Disha</i> 08-08-25
5.	HG	Mr. Deepak Kumar	I have visited the site and assessed the hydrology of the area. After studying the hydrology and pollution sources the impact and mitigation have been identified. Period of Involvement: June 2025 to August 2025	<i>Deepak Kumar</i> 07-08-25

Plagiarism/ QMS Certificate

Title of EIA Report:	"Proposed Expansion in Saleable Castings products from 27,500 TPA to 95,040 TPA within the existing project area" by M/s. Baettr India Private Limited , located at S.F No 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu - 601202
Name of Accredited Organization:	M/s Perfact Enviro Solutions Pvt Ltd
Unique Identification Number:	PE263362-E-04
Name of EIA Coordinator (EC):	Mr. Partho Mukherjee, Mr. Muthukumaran Ganpathi Narayanan
Name of the Software:	Plagiarism Checker X
Date of Check:	
Time of Check:	

I hereby certify that this EIA Report has been evaluated using online/In-house software Duplichecker. The report produced has been analyzed by the system and based on it, I certify that the EIA report produced in accordance with good scientific practice.

Partho Mukherjee
11/08/25
Date and Sign of EIA Coordinator:

Signature and Date:
Name: **Mr. Partho Mukherjee**

M. Muthukumaran Ganpathi Narayanan
11.08.2025
Signature and Date:
Name: **Mr. Muthukumaran Ganpathi Narayanan**

Rachna Bhargava
11/8/2025
Date and Sign of Head of Accredited Organisation:

(Mrs. Rachna Bhargava)

Name of the EIA consultant organisation: M/s Perfact Enviro Solutions Pvt Ltd

NABET Certificate No. & Issue Date: NABET/EIA/2225/RA 0284 (Rev.01), issue date:- 20/10/2023
valid up to 26/11/2025



PERFACT ENVIROSOLUTIONS PVT LTD

Undertaking by Head of EIA Consultant

I, Rachna Bhargava, Director & CEO of M/s Perfact Enviro Solutions Pvt. Ltd., A 14, Shubham Enclave (Outer Ring Road), Paschim Vihar, New Delhi 110063 authorize **Mr. Partho Mukherjee, Mr. Muthukumaran Ganpathi Narayanan** (EIA Coordinators) for the preparation and conducting the Environment Impact Assessment for project "Proposed Expansion in Saleable Castings products from 27,500 TPA to 95,040 TPA within the existing project area" at S.F No 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu - 601202.


Rachna Bhargava, Director & CEO

M/s Perfact Enviro Solutions Pvt. Ltd.

A 14, Shubham Enclave (Outer Ring Road),
Paschim Vihar, New Delhi 110063

Undertaking By EIA Coordinator

I, **Partho Mukherjee, Muthukumaran Ganpathi Narayanan** EIA Coordinator from Environmental Consultant M/s Perfact Enviro Solutions Pvt. Ltd., A 14, Shubham Enclave (Outer Ring Road), Paschim Vihar, New Delhi 110063 for project "Proposed Expansion in Saleable Castings products from 27,500 TPA to 95,040 TPA within the existing project area" at S.F No 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu - 601202 by M/s. Baettr India Private Limited hereby undertake that the report is prepared in accordance with a robust quality management system adopted by EIA consulting organization for the EIA process and the prescribed ToR have been complied with and that the data submitted is factually correct.

Partho Sarathi Mukherjee
11/08/25

Signature and Date:

Name: **Mr. Partho Mukherjee**

M. N.
11.08.2025

Signature and Date:

Name: **Mr. Muthukumaran Ganpathi Narayanan**

EIA Coordinator

M/s Perfact Enviro Solutions Pvt. Ltd.

A 14, Shubham Enclave (Outer Ring Road),
Paschim Vihar, New Delhi 110063

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1 . Introduction

M/s. BAETTR INDIA PRIVATE LIMITED, established in 2020, with its registered office at S.F No. 32/2, Plot No A-3/1, SIPCOT's Industrial Park, Gummidipoondi, Thervoy kandigai, Thiruvallur, Tamil Nadu-601202 is operating a Saleable casting unit mainly for wind turbine components, including design, casting, machining, surface treatment, and assembly solutions. The Manufacturing unit at Thervoy kandigai stands out for its focus on energy efficiency, logistical optimization, and sustainable practices.

The existing unit was established with its first Consent to Establish (CTE) vide Letter No. F.0969GMP/OL/DEE/TNPCB/GMP/A&W/2020, dated December 10, 2020 with validity upto March 31, 2025, and made operational with the Consent to Operate (CTO) vide Letter No. F.0969GMP /OL /DEE /TNPCB /GMP /A&W /2022 on April 23, 2022 and renewed .Vide CTO Letter No. F.0969GMP/OL/DEE/TNPCB/GMP/A&W/2024 on February 15, 2024 with validity upto March 31, 2026. This renewal extended the operation with an increased panel board capacity of 5000 KVA with the production capacity 27,500 TPA.

The existing project involves a non-toxic secondary metallurgical processing industrial unit involving operation of Electric Induction Furnace of capacity up to 30,000 TPA, and the project is located within Notified Industrial Park - SIPCOT Thervoy kandigai ,Tiruvallur district. The existing project does not attract Environmental Clearance because the threshold limit of the melting capacity is less than 30,000 TPA and is operating with valid consent orders. Now, the M/s BAETTR INDIA PRIVATE LIMITED is "Proposed expansion in Saleable casting products from 27500 TPA to 95040 TPA within the existing project area."

Hence, as per EIA Notification 2006 and its amendment thereafter the proposed expansion of foundry facility Projects termed under **Schedule No. 3 (a)** Metallurgical industries (ferrous & non-ferrous) Secondary Metallurgical processing units & **Category 'A'** and minor activity Industrial sheds & other building under **Schedule No.8 (a) Category 'B'**, Since the project site is attracting General condition i.e. inter-state boundary of Tamil Nadu - Andhra Pradesh is located at distance of 3.82 km towards WNW direction.

Hence the project is treated as category A and the project will be appraised by Expert Appraisal Committee, New Delhi for obtaining the Environmental Clearance (EC) with exemption of Public Hearing (PH) as per the EIA Notification 2006 & its further amendments, as the project site is located within the notified Industrial Area (SIPCOT).

The total Project area is 20 acres; there is no acquisition of additional land for the proposed expansion project. The proposed project cost for expansion will be ₹72.68 crore. Total cost after expansion will be ₹287.59 crore.

1.1 Purpose of the Report

Based on the proposal submitted vide Proposal No. IA/TN/IND1/479517/2024, the project for the expansion of Saleable casting production capacity from 27,500 TPA to 95,040 TPA and enhancement of Furnace Panel Board capacity from 5,000 kW to 8,000 kW was granted

Terms of Reference (ToR) from MoEF&CC vide letter No. IA-J-11011/279/2024-IA-II(IND-I), dated [03.07.2025 Date of ToR Grant].

The Environmental Impact Assessment (EIA) study was undertaken in compliance with the ToR conditions and as per the EIA Notification, 2006 and its subsequent amendments. The objective of the EIA is to assess potential environmental impacts of the proposed expansion and to suggest appropriate environmental management and mitigation measures.

This EIA report is now being submitted to MoEF&CC for the purpose of obtaining Environmental Clearance (EC), along with ToR compliance statements, public hearing details, and other requisite forms.

Demand–Supply Gap

India has committed to reducing carbon intensity by 45% by 2030, achieving 500 GW of renewable energy capacity, and reaching net-zero emissions by 2070. As of April 2024, the country has installed 191.67 GW of renewable energy, with onshore wind contributing 46.16 GW (24%). India also targets 30 GW of offshore wind capacity by 2030, with potential sites already identified.

These developments highlight the growing market potential for wind turbines and their components. The proposed project is well-positioned to cater to this demand, supporting India's clean energy transition.

Source: <https://www.investindia.gov.in/sector/renewable-energy>

Imports vs. Indigenous Production

India is undergoing a transformation in domestic manufacturing, driven by initiatives like *Make in India* and *Atmanirbhar Bharat*. As the world's fourth-largest country in renewable energy capacity—with 42% of its total installed capacity derived from non-fossil fuel sources—India has positioned itself as a global leader in clean energy transition. The proposed project will strengthen the nation's manufacturing capabilities and support its progress toward global leadership in the transition to sustainable and clean energy.

Export Possibility

India is poised to become a key player in the global wind energy supply chain. To achieve this, the sector must address challenges related to technology alignment, cost efficiency, and supportive government policies that enhance competitiveness. The proposed project is geared towards manufacturing technologically advanced and cost-effective wind turbine components for both domestic and international markets.

BAETTR's vision supports the wind energy industry's broader objective of reducing the total cost of ownership and positioning green energy as the most affordable and preferred global energy source.

1.2 Identification of the Project and Project Proponent

1.2.1 Identification of the Project:

Table 0.1 Identification of the Project

Name of Project	Activity & Category	Remark
Proposed Expansion in Saleable casting products from 27500 TPA to 95040 TPA within the existing project area.	Activity: 3(a) & Category: A	As per Environment Impact Assessment Notification 14.09.2006 and its subsequent amendments, the project falls under Activity 3(a) Metallurgical Industries (Ferrous), Category "B". Since the project is located within 3.8 km WNW of interstate Boundary (TN-AP), General conditions is applicable. Hence, the project will be appraised at Central level by the Expert Appraisal Committee as Category A .
Industrial Sheds & Buildings - 46451.108 sq.m	Activity 8(a): Category 'B'	Industrial sheds & other building exceeding 20000 sq.m but within 150000 sq.m

1.2.2 Identification of the Proponent

Table 0.2. Identification of Project proponent

Particulars	Details
Name of the Proponent	M/s. BAETTR India Private Limited
Name of the Applicant	Shri. Baskar Radhakrishnan
Designation	The Managing Director
Registered Office Address	S.F No 32/2, Plot No A-3/1, SIPCOT's Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Tiruvallur District, Tamil Nadu-601202

Nature of the Organization	Private Limited Company
Core Activity	Manufacturing of large-scale cast components, primarily for wind turbine hubs, mainframes, and other structural parts
Email	Baskar.radhakrishnan@baettr.com

M/s. BAETTR India Private Limited, a subsidiary of the BAETTR Group which has been a significant player in the wind energy sector for over ten years. Headquartered in Lem, Denmark, the company's Board of Directors includes CEO Mr. Peter Pallishoj, CFO Mr. Thomas Rahbek, and Mr. Baskar Radhakrishnan as the Managing Director of the Indian branch.

1.3 Brief description of the Project

Description of activities and importance to the region:

BAETTR INDIA PRIVATE LIMITED, established in 2020, is situated at S.F No 32/2, Plot No A-3/1, SIPCOT's Industrial Park, Thervoykandigai Gummidipoondi, Thiruvallur, Tamil Nadu-601202. The company specializes in a comprehensive range of services for wind turbine components, including design, casting, machining, surface treatment, and assembly solutions. The Chennai foundry stands out for its focus on energy efficiency, logistical optimization, and sustainable practices.

As per EIA Notification 2006 and its amendment thereafter, the proposed expansion project of foundry facility is categorized under Category B2 Projects in the Schedule to EIA Notification 2006 under S. No. 3 (a) Metallurgical industries (ferrous & non-ferrous), sub-category Secondary Metallurgical processing (non-toxic metals) units. However, since the project site is attracting "General Condition" i.e. the inter-state boundary of Tamil Nadu - Andhra Pradesh is located at distance of ~3.82 km towards WNW direction, the project is categorized under Category "A" and will be appraised at MoEFCC, New Delhi for Environmental Appraisal. And as per recent Directions, Industrial Sheds and buildings more than 20000 sq.m but within 150000 sq.m requires Environmental Clearance under Schedule Activity 8 (a), Category "B" also.

Despite being located within Notified Industrial Park, the project will have to undergo Public Hearing as per MoEFCC OM dated 27.04.2018.

Table 1.3. Brief description of site

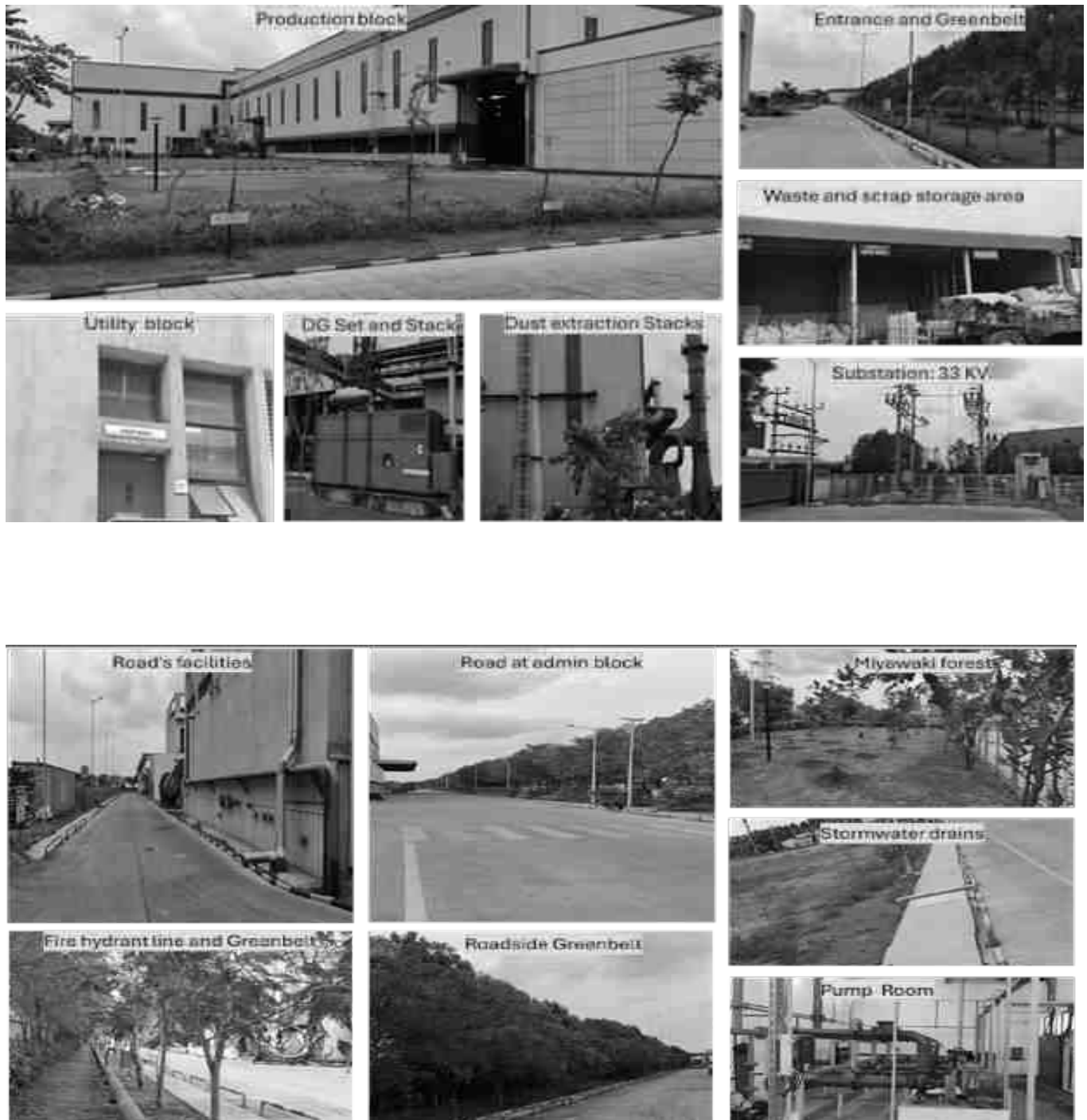
Sr. No.	Particulars	Details			
1.	Location	S.F No 32/2, Plot No A-3/1, SIPCOT's Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu - 601202.			
2.	Project Coordinates	Latitude: 13°21'45.76"N Longitude: 79°59'27.05"E			
3.	Total Plot Area	Unit	Existing	Proposed	Total After Expansion
		ha	80,937.12	0	80,937.12
		Acres	20	0	20
4.	Total Build Up Area	Sq.m	18,471.82	27,979.288	46,451.108
5.	Project Cost	Unit	Existing	Proposed	Total After Expansion
		INR Cr.	213.05	72.68	285.73
6.	Approach Road	Thervoy Kandigai Sipcot Road Road (0.02 km, south)			

Employment Generation:

The proposed project is expected to generate approximately 453,224 man-days during the construction phase. In the operational phase, it will provide employment to 250 permanent and 459 contractual personnel, amounting to 78,250 man-days and 143,667 man-days respectively.

1.4 Status of the Project Site

The existing plot accommodates a saleable casting manufacturing unit with supporting infrastructure, including induction furnaces, DG set, and captive STP and ETP. A greenbelt has been developed as per norm. The proposed expansion will take place within the existing SIPCOT-allotted industrial land. The additional built-up area is planned on open, undeveloped land within the premises, free from any structures or ongoing activities.



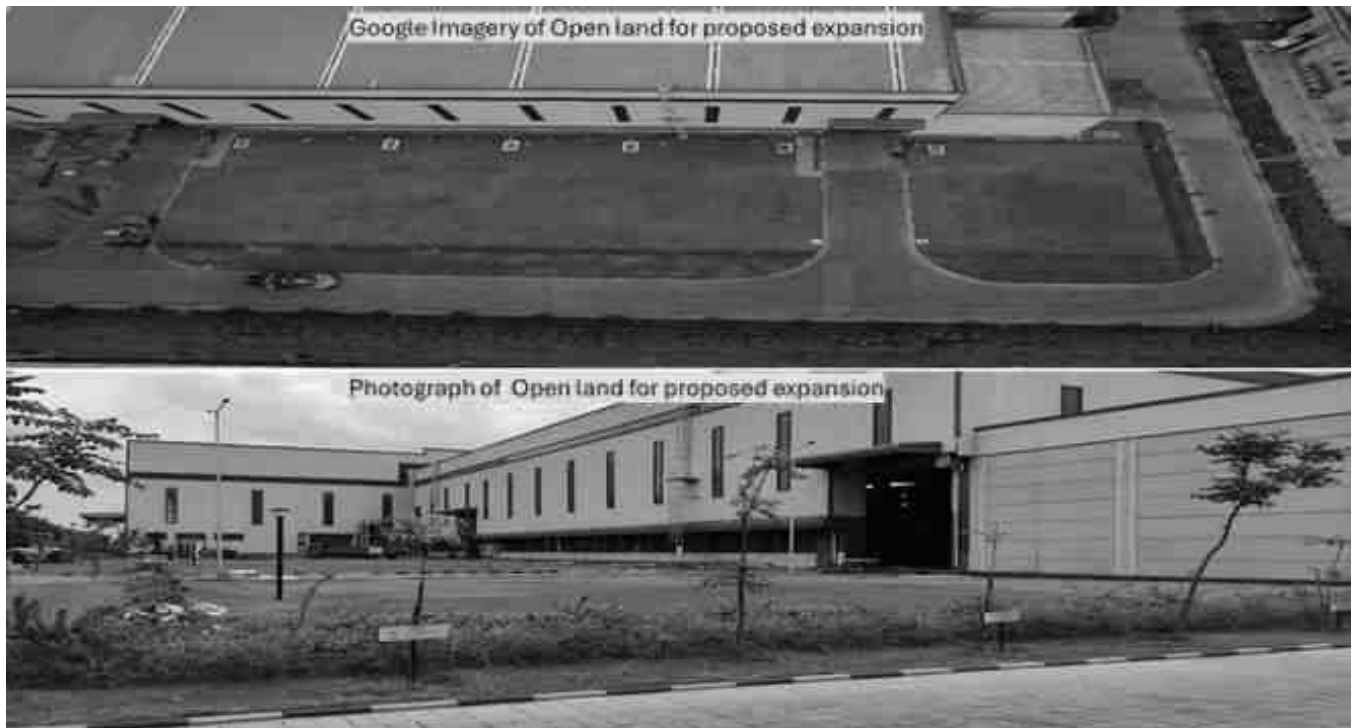


Figure 1. Site Photographs

1.5 The Assignment & Scope of the Study

Assessment of Existing Environmental Conditions:

The study assesses the existing environment, including air, water, soil, noise, weather, land use, ecology, and socio-economic conditions. Baseline data was collected from the project site and a 10 km surrounding area, as per the ToR and MoEF&CC guidelines.

Prediction and Evaluation of Environmental Impacts:

A systematic assessment was conducted to predict and evaluate potential environmental impacts of the proposed expansion. It considered alternatives, baseline conditions, and public concerns, with impacts identified, quantified, and prioritized for mitigation.

Formulation of Environmental Management Plan (EMP):

A detailed EMP has been prepared, outlining mitigation, monitoring, and compliance measures using best practices and technologies. It covers air, water, soil, noise, waste, greenbelt, and occupational health, along with an O&M plan and budget.

Risk Assessment and Safety Planning:

A detailed risk assessment was carried out to identify potential project-related hazards. Based on the results, mitigation measures and an on-site emergency plan were formulated to ensure safe and sustainable operations.

1.6 Scope of EIA Study - Details of Regulatory Scoping Carried Out

Under the provision of the EIA Notification 2006 as amended till date, Standard TOR for the purpose of preparing environment impact assessment report for obtaining Environment Clearance has been issued vide File No.IA-J-11011/279/2024-IA-II(IND-I) dated 03/107/2025. TOR letter is attached in Section - B.

- **Existing Environmental Clearance:** Not Applicable. The existing facility did not require Environmental Clearance, as its melting capacity was below the 30,000 TPA threshold under the EIA Notification, 2006. It was established with SIPCOT's approval and operates with valid Consent to Establish and Consent to Operate from TNPCB.

Details of CTE issued: (Annexure-5)

1. Proceedings No. F.0969GMP/OL/DEE/TNPCB/GMP/A/2020
 2. Proceedings No. F.0969GMP/OL/DEE/TNPCB/GMP/W/2020
- **Certified Compliance Report (CCR):** Applicable, as per the existing CTO conditions from TNPCB
 - **Coastal Regulation Zone (CRZ):** Not Applicable. The project site is located inland and does not fall within a CRZ notified area.
 - **Wildlife Clearance:** Not Applicable.
 - **Other Permissions:** Authentication from the Archaeological Survey of India (ASI) will be obtained regarding the status and extent of archaeological sites relative to the project area.

The consent chronology for the industry is mentioned in the table below.

Table 0.4. EC/ CTE/CTO Chronology

Chronology of Consent to Operate (CTOs) orders.								
S. N o.	Order No.	Cons ent	Issue d Date	Validi ty	Description of Product and Permitted Production Capacity	Actual Producti on Capacity (TPA)	Implementatio n Details	Violation (if any)
1	PROCEEDIN GS NO. F.0969GMP /OL/DEE/ TNPCB/GM P/A/2020 (Annexure 5)	CTE	10/1 2/ 2020	31/0 3/ 2025	Producing Casting Products (Primarily for Wind Turbine Components)	27,500	-	Nil

	PROCEEDIN GS NO.F.0969G MP/OL/DEE /T NPCB/GMP /W/2020							
2	PROCEEDIN GS NO. F.0969GMP /OL/DEE/T NPCB/GMP /A/2022 (Annexure - 6A)	CTO	23/0 4/ 2022	31/0 3/ 2024	Saleable Casting using Induction Furnace (24 Tons) with Panel Board Capacity: 4500 KWA and Melting Capacity: 29700 TPA	27,500	Implemented	Nil
	PROCEEDIN GS NO.F.0969G MP/OL/DEE /T NPCB/GMP /W/2022 (Annexure - 6B)							
3	PROCEEDIN GS NO. F.0969GMP /OL/DEE/T NPCB/GMP /A/2024 (Annexure - 6C)	CTO	15/0 2/ 2024	31/0 3/ 2026	Saleable Casting using Induction Furnace (24 Tons) with Panel Board Capacity: 5000 KWA and Melting Capacity: 30000 TPA	27,500	Implemented	Nil
	PROCEEDIN GS NO.F.0969G MP/OL/DEE /TNPGB/G MP/W/2024 (Annexure - 6D)							

The list of statutory provisions as applicable to the project is given in Table 4.

Table 0.5. Identified Applicable Statutory

S. No.	Acts/Rules	Publishing Year	Project Relevance	Objective of Legislation
1.	The Environment (Protection) Act	1986, amended 1991	All types of environmental pollutants	Protection and Improvement of the Environment.
1.1	Environmental (Protection) Rules	1986 (Amendments in 1999, 2001, 2002, 2002, 2002, 2003, 2004)	All types of Environmental Pollutants	Protection and Improvement of the Environment.
1.2	Hazardous Waste Management Rules	1989 amendment 2000 and 2003	Hazardous Wastes generated from industries using hazardous chemicals	Safe handling, generation, processing, treatment, package, storage, transportation, use, reprocessing, collection, conversion, and offering for sale, destruction and disposal of Hazardous Waste
1.2.1	Hazardous Waste (Management, Handling and Transboundary Movement) Rules	2008, Amendment in 2009, 2010		
1.2.2	Hazardous and other Wastes (Management & Transboundary Movement) Rules	2016, Amendment in 2016, 2017, 2018, 2019, 2020, 2021, 2022		
1.3	Manufacture Storage and Import of Hazardous Chemicals Rules	1989 amended 2000	Hazardous Chemicals Toxic, Explosive, Flammable, Reactive	Regulate the manufacture, storage and import of Hazardous Chemicals.
1.4	Chemical Accidents (Emergency Planning, Preparedness and Response) Rules	1996	Hazardous Chemicals Toxic, Explosive,	Emergency Planning Preparedness and Response to chemical accidents.

S. No.	Acts/Rules	Publishing Year	Project Relevance	Objective of Legislation
	Response) Rules		Flammable, Reactive	
2	Factories Act	1948	All the Chemicals specified in the chapter 2	Control of the workplace environment and providing for good health and safety of workers.
3	The Petroleum Act	1934	Class B and C as defined in the rules are present	Regulate the import, transport, storage, production, refining and blending of petroleum.
3.1	The Petroleum Rules	2002	Class B and C as defined in the rules are present	Regulate the import, transport, storage, production, refining and blending of petroleum.
4	The Explosives Act	1884	Explosive substances as defined under the Act like Boiler, Flammable Hazardous material	To regulate the manufacture, possession, use, sale, transport, export and import of explosives with a view to prevent accidents.
4.1	The Explosive Rules	1983	Explosive substances as defined under the Act	To regulate the manufacture, possession, use, sale, transport, export and import of explosives with a view to prevent accidents.
4.2	The Gas Cylinder Rules	2004	Gases (Toxic, non-toxic and non-flammable, non-toxic and flammable, Dissolved Acetylene Gas, Non-toxic and flammable liquefiable gas other than LPG,	Regulate the import, storage, handling and transportation of gas cylinders with a view to prevent accidents.

S. No.	Acts/Rules	Publishing Year	Project Relevance	Objective of Legislation
			LPG	
4.3	The Static and Mobile Pressure Vessels (Unfired) Rules	1981	Gases (Toxic, non-toxic and non-flammable, non-toxic and flammable, Dissolved Acetylene Gas, Non-toxic and flammable liquefiable gas other than LPG, LPG	Regulate the import, manufacture, design, installation , transportation, handling, use and testing of mobile and static pressure vessels (unfired) with a view to prevent accidents.
5	Air (Prevention and Control of Pollution) Act	1981 amended 1987	Air pollutants from chemical industries.	The prevention, control and abatement of air pollution.
6	EIA Notification	2006	For all the identified developmental activities in the notification	Requirement of environmental clearance before establishment of or modernization / expansion of identified developmental projects.
7	Water (Prevention and Control of Pollution) Act	1974 amended 1988	Water Pollutants from water polluting industries	The prevention and control of water pollution and also maintaining or restoring the wholesomeness of water.
8	Public Liability Insurance Act	1991 amended 1992	Hazardous Substances	To provide immediate relief to persons affected by accidents involving hazardous substances.

S. No.	Acts/Rules	Publishing Year	Project Relevance	Objective of Legislation
8.1	Public Liability Insurance Rules	1991 amended 1993	Hazardous Substances	To provide immediate relief to persons affected by accidents involving hazardous substances and also for establishing an Environmental Relief fund.
9	The Motor Vehicle Act	1988	Hazardous and Dangerous Goods	To consolidate and amend the law relating to motor vehicles.
9.1	The Central Motor Vehicle Rules	1989	Hazardous and Dangerous Goods	To consolidate and amend the law relating to motor vehicles including to regulate the transportation of dangerous goods with a view.
10	Fire Safety and Prevention Act	2007	Flammable and Explosive Substances/Chemical	To make more effective provisions for the prevention and safety measures in various buildings
11	Solid Waste Management Rules	2016	Solid Waste (Municipal, Residential, Commercial)	To manage segregation, storage, collection, transportation, processing, and disposal of municipal solid waste in an environmentally sound manner.
12	Plastic Waste and (Management Handling) Rules	2016 Amended 2021, 2022	Plastic Waste	Plastic waste minimization, source segregation, recycling
13	Battery Waste Management Rules	2022	Used Batteries (Lead Acid, Lithium, etc.)	Collection, segregation, transportation, refurbishment and recycling of Waste Battery.

S. No.	Acts/Rules	Publishing Year	Project Relevance	Objective of Legislation
14	E-Waste (Management) Rules	2022 Amended 2023, 2024	Electrical and Electronic Equipment Waste	Manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment

1.7 ToR Compliance

Specific and Standard Terms of Reference for (Metallurgical Industries (Ferrous and Non Ferrous)).

Table 0.6. ToR Compliance and Standard Terms of Reference

STANDARD TOR COMPLIANCE			
S. No.	ToR Points	Compliances	Citations in EIA Report
1	Executive Summary	-	Chapter 11 of EIA Report
2	Introduction		Chapter 1 of EIA Report
i	Details of the EIA Consultant including NABET accreditation.	All the mentioned points QCI/NABET norms are given in the initial pages of the EIA Report.	Chapter 12 of EIA Report
ii	Information about the project proponent		Section 1.2.2 in Chapter 1 of EIA Report
iii	Importance and benefits of the project		Chapter 8 of EIA Report

3	Project Description		Chapter 2 of EIA Report
i	Cost of project and time of completion.		Section 2.4.3 & 2.4.4 in chapter 2
ii	Products with capacities for the proposed project.		Section 2.4.2 & 2.4.4 in chapter 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.		Section 2.4 & 2.8 in chapter 2
iv	List of raw materials required and their source along with mode of Transportation.		Section 2.8 in chapter 2
v	Other chemicals and materials required with quantities and storage capacities		Section 2.8 in chapter 2
vi	Details of Emission, effluents, hazardous waste generation and their management.		Section 2.11 ,2.12 and 2.15 in chapter 2
vii	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)		Section 2.7 and 2.9 in chapter 2
viii	Process description along with major equipment's and machineries, process flow sheet (quantitative) from raw material to products to be provided		Section 2.10 in chapter 2
ix	Hazard identification and details of		Section 7.3 in

	proposed safety systems.		chapter 7
x	Expansion/modernization proposals:		Section 2.2 in Chapter 2
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.	No forest land was involved. Hence, Not Applicable.	NA
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		Section 1.6 in Chapter 1

	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.		Section 5.1 in Chapter 5
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)		Section 2.3.2 in Chapter 2
iii	Details w.r.t. option analysis for selection of site		Section 5.1 in Chapter 5
iv	Co-ordinates (lat-long) of all four corners of the site.		Section 2.3.1 in Chapter 2
v	Google map-Earth downloaded from the project site.		Section 2.3.1 in Chapter 2
vi	Layout maps indicating existing units 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.		Section 2.3.1 in Chapter 2
vii	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.		Section 1.4 in Chapter 1

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)	NA, land of the project site in industrial area	Section 1.3 in Chapter 1
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		Section 2.3.6 in Chapter 2
x	Geological features and Geo-hydrological status of the study area shall be included.		Section 3.7 in Chapter 3
xi	Details of Drainage of the project up to 5km radius of study area. If the site is within 1 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)		Section 3.7 in Chapter 3
xii	Status of acquisition of land. If acquisition is not complete, stage the acquisition process and expected time of complete possession of the land.	NA	-
xiii	R&R details in respect of land in line with state Government policy	There is no need for R&R activities for the proposed unit, the additional land required for further construction is abutting the existing plot area.	Section 7.6 in Chapter 7

5	Forest and wildlife related issues (if applicable):	No forest land was involved. Hence, Not Applicable.	Section 6.4.5 in Chapter 6
i	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)	NA	
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)	NA	
iii	Status of Application submitted for obtaining stage I forestry clearance along with latest status shall be submitted.	NA	
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	NA	
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 studyarea		
vi	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing	NA	

	Committee of the National Board for Wildlife		
6	Environmental Status		
i	Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.		Section 3.4 of Chapter 3
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 on CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.		Section 3.5 of Chapter 3
iii	Raw data of all AAQ measurements 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.		Section 3.5.6 of Chapter 3
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.		Section 3.8 of Chapter 3
v	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.	NA	

vi	Ground water monitoring at minimum at 8 locations shall be included.		Section 3.8 of Chapter 3
vii	Noise levels monitoring at 8 locations within the study area.		Section 3.6 of Chapter 3
viii	Soil Characteristic as per CPCB guidelines.		Section 3.10 of Chapter 3
ix	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed projects, parking arrangements etc.		Section 3.13 of Chapter 3
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.		Section 3.11 of Chapter 3
xi	Socio-economic status of the study area.		Section 3.12 of Chapter 3
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 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)		AERMOD

	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		The project will be a ZLD project with 100% treated water reused within the project site
iii	Impact of the transport of 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 convey or cum- rail transport shall be examined.		Section 4.4.9 of Chapter 4
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.		Section 4.4.2 of Chapter 4
v	Details of stack emission and action plan for control of emissions to meet standards.		Section 4.4.1 of Chapter 4

vi	Measures for fugitive emission control		Section 4.4.1 of Chapter 4
vii	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plants shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.		Section 4.4.8 of Chapter 4 and Section 7.3 of Chapter 7
viii	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	NA	
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.	25%	25 % inside the plot and 10% in the SIPCOT greenbelt development
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.	Complied – Plan includes 48 percolation/recharge pits (~21.64 m ³ each), stormwater drains with total holding capacity of 832.44 KL, overall storage capacity 1,885.22 KL. Estimated runoff from 70 mm rainfall = 3,296.30 KL, with	Chapter 2.37–2.40 – Rainwater Harvesting & Stormwater Management – “Recharge pits, stormwater drains, storage capacity vs rainfall, surplus

		surplus 1,411.08 KL; rooftop collection integrated with recharge pits and reuse for non-potable purposes.	runoff."
xi	Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.		Section 10.10 in Chapter 10
xii	An action plan for post-project environmental monitoring shall be submitted.		Chapter 4 of EIA Report
xiii	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management . The plan should be linked with the District Disaster Management Plan.		Section 7.4 in Chapter 7
8.	Occupational health		
i	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers		Section 7.7 in Chapter 7
ii	Details of exposure specific health status evaluation of workers. 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	Before recruitment, the employee will pass through medical test covering chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, color vision and any other	

	analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	ocular defect) ECG. This data will be updated once a year.	
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	CBFS and HSD are the hazardous materials used within the plant and within the PEL. Other water treatment chemicals like Potassium Nitrate / Potassium Carbonate/ Hydrochloric Acid/ Caustic Soda are used and they are maintained as per MSDS.	
iv	Annual report of health status of workers with special reference to Occupational Health and Safety.		Annexure
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.		Annexure
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.	Yes	
iii	What is the hierarchical system or Administrative order of the company to		Section 10.2 in

	deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.		Chapter 10
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		Section 10.2.4 in Chapter 10
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 the operation phase.		Section 2.9.1 in Chapter 2
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.		Section 8.3 in Chapter 8 and Section 10.12 in Chapter 10
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	No litigation against the proposed project.	

	Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.		
13	A tabular chart with index for points wise compliance of above TOR.	Compiled	
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).	Complied – Process steps and Flow Chart provided; Material balance (existing & post-expansion) tabulated; Water balance (existing & proposed) shown; Utilities/energy covered under equipment/power sections.	Chapter 2.10 – Manufacturing Process & Flow Diagram – Figure 2.10 (process flow) & stepwise description. Chapter 2.8 – Raw Material Requirement – Table 2.17 (material balance for 27,500 TPA & 95,040 TPA). Chapter 2 – Figures 2.13 & 2.14 (water balance, existing & proposed). Chapter 2.4.5/2.5 (equipment/power) – utilities/energy inputs referenced alongside

			process.
2	Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.	NA	-
3	Details on installation/activation of opacity meters with recording with proper calibration system	Complied – Continuous emission monitoring systems (CEMS) installed on stacks with online connectivity to TNPCB; includes opacity/dust monitoring with regular calibration as per regulatory requirements.	Chapter 2.11 – Details of Process Gas Stack – Table 2.20 & description – “CEMS with online monitoring to TNPCB; opacity measurement and calibration maintained.”
4	Details on toxic metals including mercury, arsenic and fluoride emissions	Complied – Raw materials do not contain significant levels of mercury, arsenic, or fluorides, emissions primarily particulates. Regular stack monitoring ensures compliance with limits; no exceedance of toxic metal parameters observed.	Chapter 4.4.1 – Air Environment – “Emissions mainly particulate matter; raw materials free from significant Hg, As, F; stack monitoring confirms compliance.”
5	Details on stack height requirement for integrated steel	NA	-
6	Details on ash disposal and management -Non-ferrous metal	NA	
7	Complete process flow diagram of production	NA	

	lead/zinc/copper/ aluminium, etc.		
8	Raw materials substitution or elimination	Complied – The process uses pig iron, steel scrap, return scrap, ferro alloys, and bentonite; potential substitution with higher-quality scrap and low-impurity ferro alloys is planned to reduce emissions and improve product quality.	Chapter 2.8 – Raw Material Requirement – Table 2.17 – “Pig iron, steel scrap, return scrap, ferro alloys, bentonite; substitution with low-impurity materials proposed.”
9	Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation	Not Applicable – The project uses induction furnaces for ferrous casting; no smelting, thermal refining, slag fuming, or Waelz kiln operations are involved.	-
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 – The facility does not handle aluminium (primary or secondary); process is limited to ferrous casting using induction furnaces, so holding/de-gassing of molten aluminium is not relevant.	-
11	Details on solvent recycling	Not Applicable – No solvents are used in the manufacturing process for ferrous casting; hence,	

		solvent recycling is not applicable.	
12	Details on precious metals recovery	Not Applicable – The process does not involve precious metals; no recovery operations are carried out.	
13	Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.	Not Applicable – The facility does not operate a coke oven plant; no waste/fuel gases of this type are generated, and thus no utilization plan is required.	
14	Details on toxic metal content in the waste material and its composition and end use (particularly of slag).	Complied – Slag from the induction furnace tested; no significant toxic metals detected beyond regulatory limits. Slag stored on impervious flooring and sent to authorized recyclers for use in road construction and cement manufacturing.	Chapter 4.4.8 – Solid and Hazardous Waste – “Slag analysed; toxic metals within limits; end use in construction/cement; impervious storage.”
15	Trace metals Mercury, arsenic and fluoride emissions in the raw material.	Complied – Raw materials (pig iron, steel scrap, return scrap, ferro alloys, bentonite) tested; mercury, arsenic, and fluoride content found to be negligible and within permissible	Chapter 4.4.1 – Air Environment – “Raw materials analysed; Hg, As, F negligible; within regulatory

		limits.	limits.”
16	Trace metals in waste material especially slag.	Complied – Slag samples analysed; trace metals present within permissible limits. Managed by storage on impervious flooring and disposal to authorized recyclers for use in construction/cement industries.	Chapter 4.4.8 – Solid and Hazardous Waste – “Slag trace metals within limits; stored on impervious floor; sent to authorized recyclers.”
17	Plan for trace metal recovery	Not Applicable – Trace metals in raw materials and slag are negligible and within permissible limits; no dedicated recovery process is required.	-
18	Trace metals in water	Complied – Groundwater and surface water samples analysed for trace metals; all parameters, including heavy metals, were within permissible limits of IS 10500:2012 and CPCB guidelines.	Chapter 3.8.3– 3.8.5 – Water Quality Results & Interpretation – “Trace/heavy metals within limits in groundwater and surface water.”
C	ADDITIONAL TOR FOR INTEGRATED STEEL PLANT		
1	Iron ore/coal linkage documents along with the status of environmental clearance of iron ore and coal mines	NA	-

2	Quantum of production of coal and iron ore from coal & iron ore mines and the projects they cater to. Mode of transportation to the plant and its impact	NA	-
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.	NA	-
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.	Complied – Land use/land cover mapping within 10 km radius prepared using recent satellite imagery (IRS-P6, Bhuvan & NRSC data). Figures 3.26 and 3.27 show LULC classification and mapping for the study area.	Chapter 3.9 – Interpretation of Satellite Image – Figures 3.26 & 3.27 – “LULC mapping within 10 km radius based on IRS-P6 & Bhuvan/NRSC data”
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.	Complied – Ambient air quality monitoring for PM ₁₀ and PM _{2.5} conducted at 8 locations; trace parameters including hydrocarbons, VOCs, and benzene measured. Data interpreted in Sections 3.5.5–3.5.7 with chemical characterization presented in Tables 3.9–3.14.	Chapter 3.5 – Ambient Air Quality Results & Interpretation – Tables 3.9–3.14, Sections 3.5.5–3.5.7 – “PM ₁₀ /PM _{2.5} , VOCs, HC, benzene, AQI and interpretation”

6	All stockpiles will have to be on top of a stable liner to avoid leaching of materials to ground water.	Complied – Raw material and waste storage areas are designed with impervious flooring and proper drainage to prevent leachate percolation; covered storage provided for dust-generating materials.	Chapter 4.4.3 – Soil Environment – “Stockyard with impervious flooring and drainage to avoid contamination”
7	Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.	Complied – CREP actions adopted: specific water consumption maintained < 8 m ³ /t, online monitoring provided, waste management systems implemented, and ≥10% reduction in freshwater via reuse of treated sewage/effluent.	Chapter 2.18 – Compliances for CREP Recommendation – “Specific water consumption <8 m ³ /t; online monitoring; waste management; 10% freshwater reduction through reuse.”
8	Plan for slag utilization	Complied – Slag generated from the induction furnace is proposed to be sent to authorized recyclers for use in road construction and cement manufacturing; storage provided on impervious flooring to prevent leaching.	Chapter 4.4.8 – Solid and Hazardous Waste – “Furnace slag stored on impervious floor; sent to authorized recyclers for construction/cement use.”
9	Plan for utilization of energy in off gases (coke oven, blast furnace)	NA	-

10	System of coke quenching adopted with justification.	NA	-

Committee Recommendation			
S. No.	ToR Points	Compliances	Citations in EIA Report
I	Thervoy Kandigai village and other sensitive areas are within the study area. Environmental safeguard measures must be included.	Complied – EMP includes measures for air, water, soil, noise, waste, biodiversity, and traffic; sensitive receptors identified with mitigation.	Chapter 4.4 – Summary of Impact and Mitigation – “Mitigation for air, water, soil, biodiversity; sensitive receptors addressed.”
II	Water bodies within the study area– include conservation plan, contouring, runoff, drainage, and soil conservation measures.	Complied –Runoff calculations, stormwater drain design, storage capacity vs rainfall, and soil conservation covered.	Chapter 2.37–2.40 – Rainwater harvesting & stormwater management – “Runoff volume, drainage plan, soil conservation.”
III	Water requirement: 110 m ³ /day; 72 m ³ /day from SIPCOT and 38m ³ /day from treated water. Obtain necessary permissions.	Complied – Water balance shows 110 m ³ /day total; SIPCOT supply & treated water reuse; permission from SIPCOT to be obtained.	Chapter 2.16 – Water Requirement – Table 2.16 – “72 m ³ /day SIPCOT, 38 m ³ /day treated water.”

IV	Socio-economic development action plan as per MoEFCC OM dated 30.09.2020. Include plans for education, vulnerable groups, monitoring mechanisms, etc.	Complied – CER & CSR plan includes education support, skill development, health camps, infrastructure for vulnerable groups, with monitoring.	Chapter 8.3 – Social Benefits; Chapter 10.11–10.12 – CER Budget – “Education, vulnerable groups, monitoring plan.”
V	Obtain ASI authentication for archaeological sites and submit mitigation plans.	Complied / In Progress – ASI authentication to be obtained; archaeological sites within study area identified; mitigation plan prepared.	Chapter 1.6 – Regulatory Scoping – “ASI authentication to be obtained for archaeological site proximity.”
VI	Prepare annual wind rose diagrams using secondary data.	Complied – Annual and seasonal wind rose diagrams prepared from MERRA-2 secondary data for baseline season.	Chapter 3.4.6 – Wind Direction – Figure 3.9 – “Annual wind rose from secondary data.”
VII	Report unambiguously the make-up water required during operation.	Complied – Makeup water requirement clearly stated as 110 m ³ /day; breakdown provided.	Chapter 2.16 – Water Requirement – Table 2.16 – “Make-up water 110 m ³ /day.”
VIII	Report maximum solar power that can be generated within plant premises.	Complied – Rooftop solar PV potential assessed; maximum capacity estimated for available roof area.	Chapter 2.5 – Power Requirement – “Rooftop solar potential estimated for plant buildings.”

IX	Action plan for maximum rainwater harvesting.	Complied – Detailed plan includes 48 recharge pits, stormwater drains, storage of 1,885.22 KL; surplus runoff calculated.	Chapter 2.37–2.40 – Rainwater Harvesting – “Recharge pits, storage, runoff vs capacity.”
X	Report input parameters used in AAQ modelling.	Complied – AERMOD modelling inputs (emission rates, stack parameters, meteorology) provided.	Chapter 4.4.1 – Air Environment – “AERMOD input parameters tabulated.”
XI	Report inversion height and mixing height without ambiguity.	Complied – Site-specific micrometeorological data includes mixing height and inversion level.	Chapter 3.4 – Meteorology – “Mixing height and inversion height from baseline data.”

2.0 Project Details

2.1 Type of Project

- 1) Type:- Activity: 3(a), Category-B (Apprised as Category A due to GC applicability) - Metallurgical Industry; Minor Activity: 8(a) Category – B (Industrial sheds and other buildings)
- 2) New / expansion / change in product mix: - **Expansion**

2.2 Need of the Project

India is witnessing a rapid transition towards renewable energy, aiming to achieve 500 GW of installed capacity from non-fossil fuel sources by 2030 and net-zero emissions by 2070. Wind energy is a key pillar in this transition, with onshore installations already exceeding 46 GW as of April 2024. However, to meet future targets, there is a significant demand-supply gap in the domestic production of wind turbine components.

Baettr India Pvt. Ltd., as part of the global Baettr Group, proposes to expand its manufacturing facility to meet the growing need for technologically advanced, reliable, and cost-effective wind turbine components. This project will support India's national objectives under initiatives such as "Make in India" and "Atmanirbhar Bharat", reduce dependence on imports, and strengthen indigenous capabilities in the renewable energy sector.

The expansion is expected to generate direct and indirect employment opportunities in the region, enhance local infrastructure through CER and CSR activities, and support the growth of ancillary industries. It will also contribute to increased state revenue through taxes and duties. From a global perspective, the project will position India as a competitive supplier of wind energy components in the international market, especially with strategic collaborations and export potential.

In addition to its economic and social benefits, the project embodies strong environmental stewardship through adherence to HSEQ (Health, Safety, Environment, and Quality) principles, promoting sustainability, legal compliance, and reduced environmental impact. Overall, the proposed expansion by Baettr India Pvt. Ltd. is a critical step towards achieving energy security, climate commitments, and industrial growth, making wind energy more

2.3. Project Location

Table 0.1 Coordinates of the Project

Location Details	
Address	S.F No 32/2, Plot No A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Thiruvallur, Tamil Nadu-601202
Latitude	13°21'45.76"N

Longitude	79°59'27.05"E
Elevation	69 - 67 m(MSL)

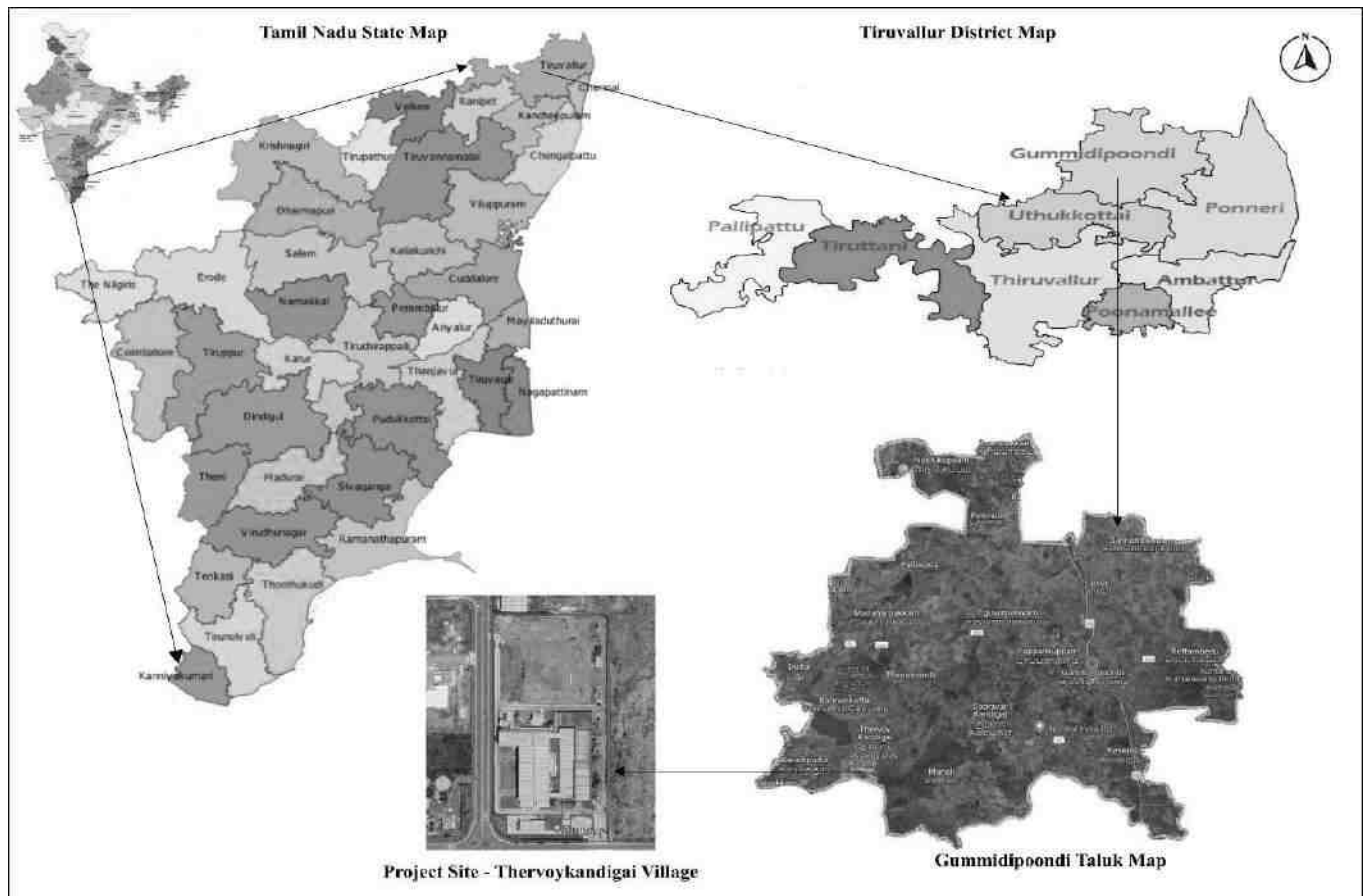


Figure 0.1 Site Location

Table 0.2. Coordinates of the Project

S. No	Latitude	Longitude	Mean Sea Level (MSL)m
1	13°21'52.48"N	79°59'23.73"E	60 - 67m
2	13°21'52.52"N	79°59'30.34"E	
3	13°21'39.14"N	79°59'30.31"E	

4	13°21'39.20"N	79°59'25.06"E	
5	13°21'39.49"N	79°59'24.24"E	
6	13°21'40.73"N	79°59'23.69"E	

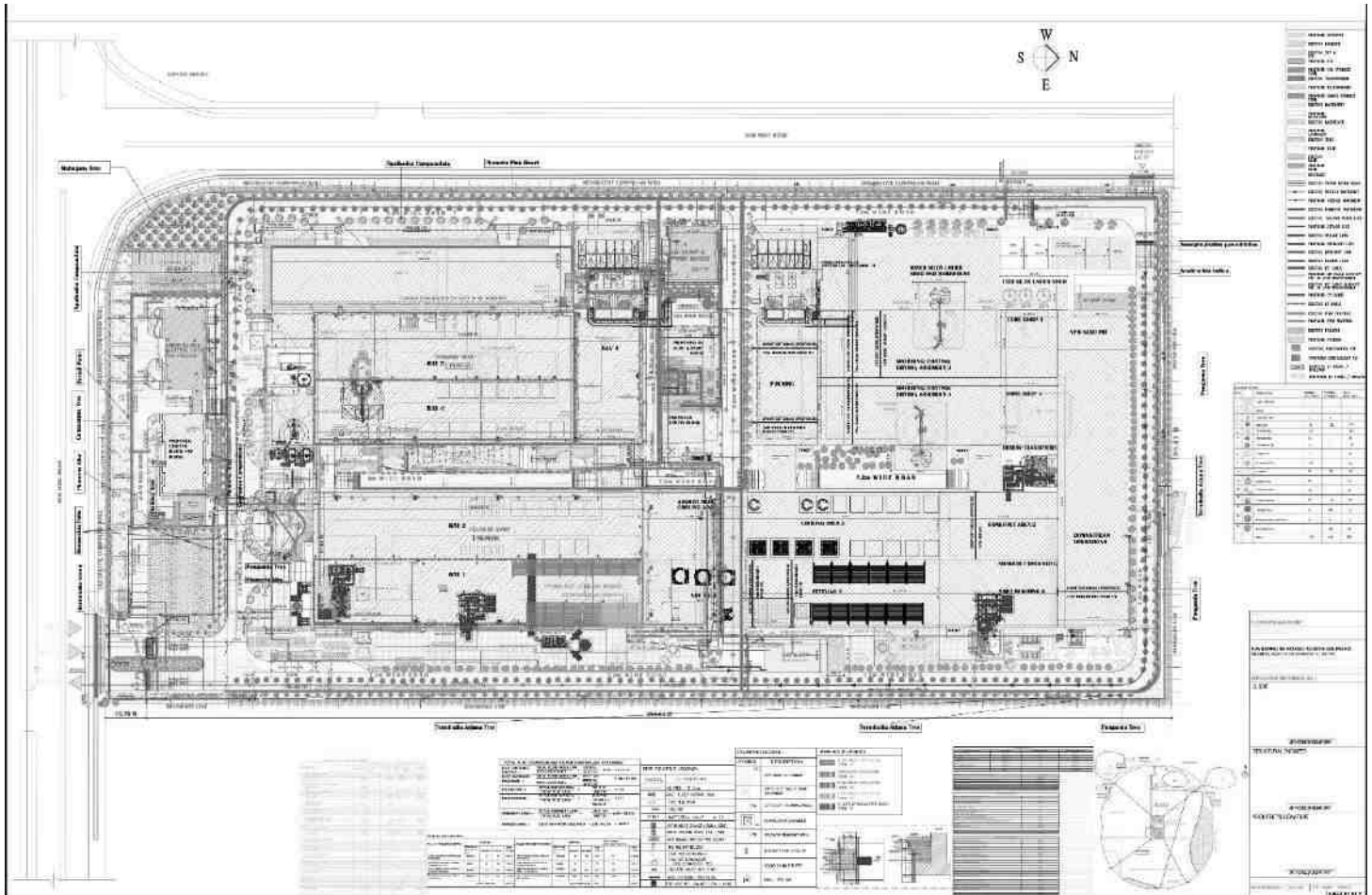
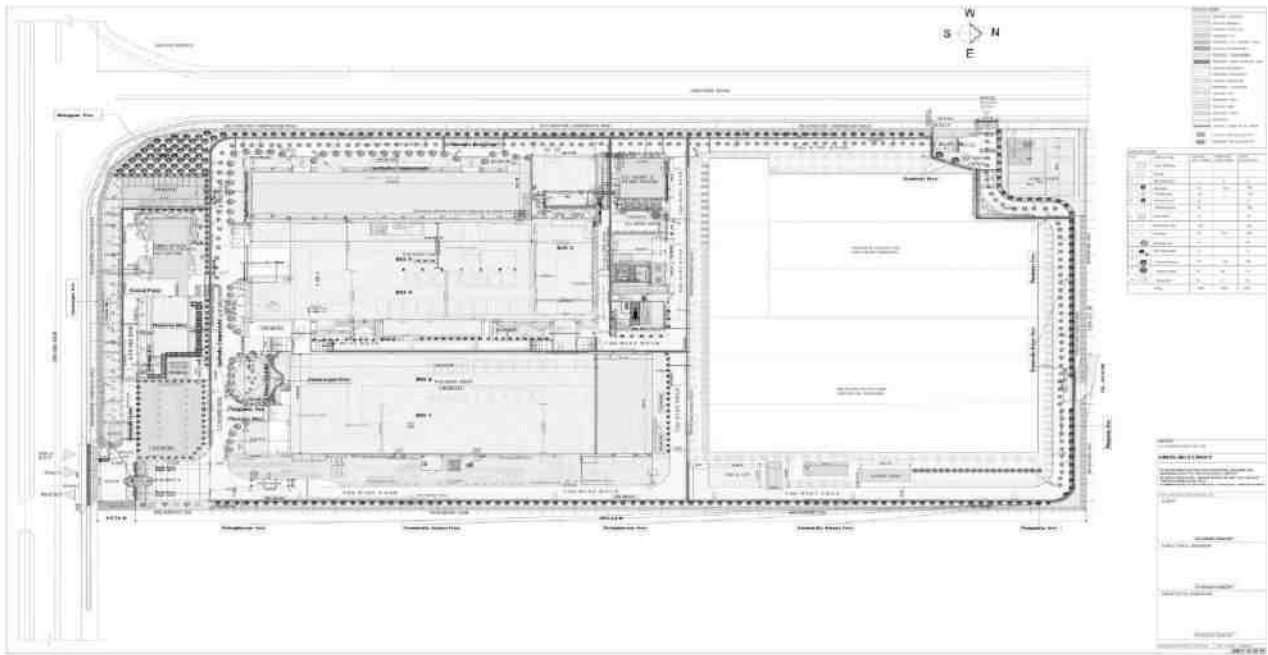


Figure 0.2. Layout Plan



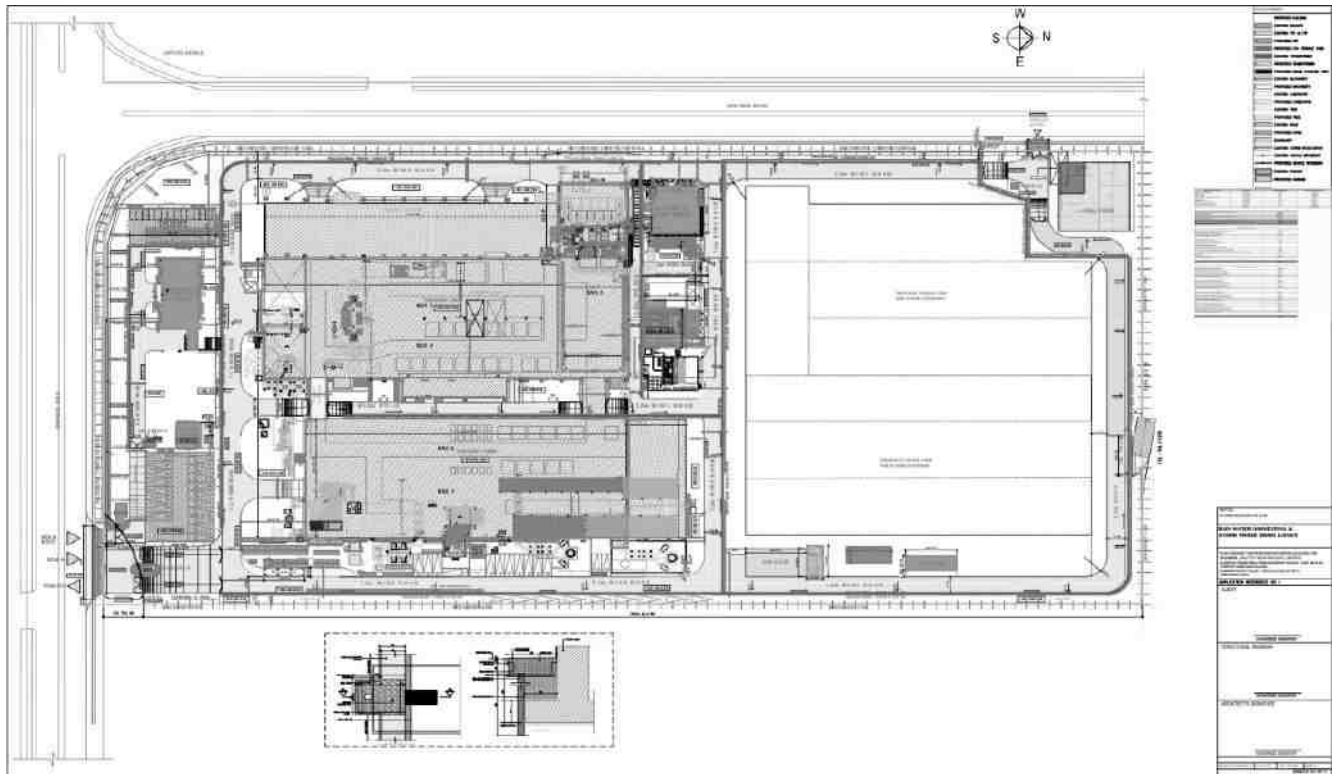


Figure 0.4. Rainwater and Stormwater - Layout Plan

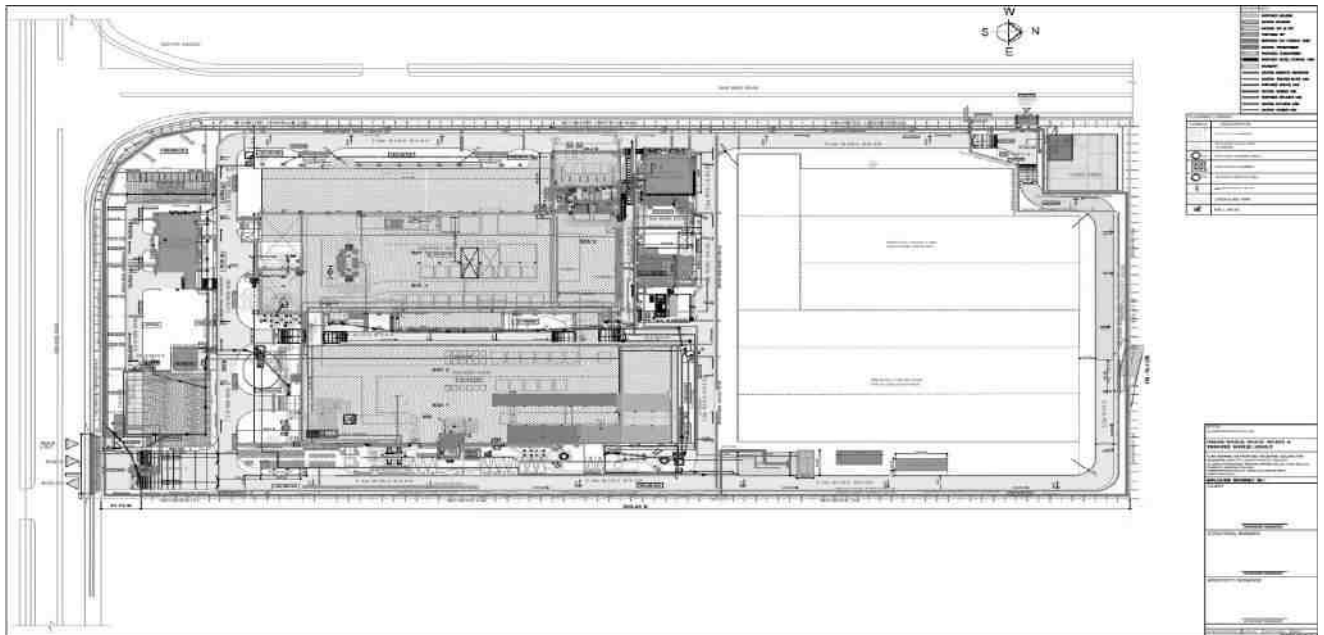


Figure 0.5. Water and Wastewater - Layout Plan

2.3.1. Topographical Map

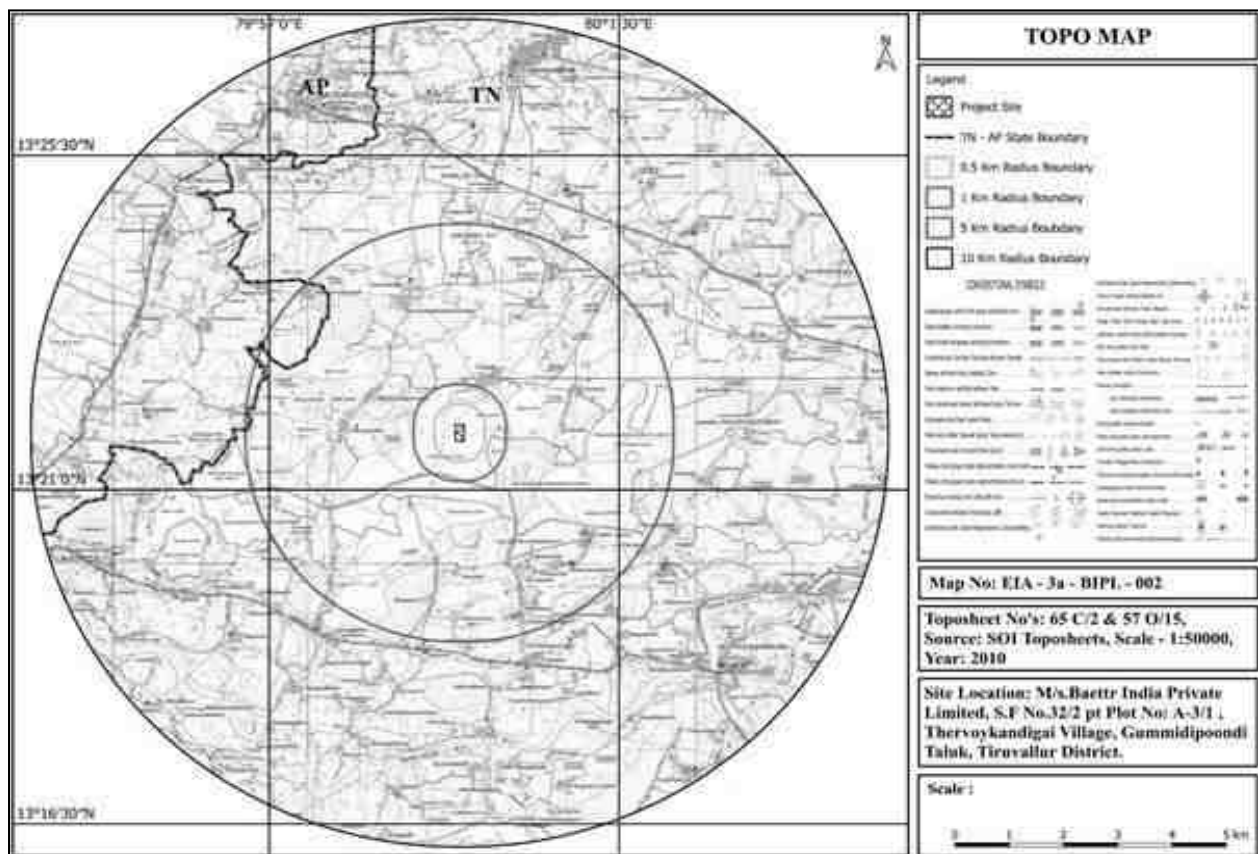


Figure 0.6. Topographical Map showing study area (10 Km radius)

Table 0.3. Project Site Specific Environmental Sensitivity Details

S. No	Description	Distance (Km)	Direction
Water Bodies			
1	Lake near Site	0.54	N
2	Lake near Gopalareddikandigai	1.15	NNW
3	Lake near Teruvai	1.16	NNE
4	Canal	2.04	SSE
5	Lake near Karadiputtur	2.44	W
6	Lake near Tambunaidupalaiyam	2.68	SSE
7	Lake near Kollanur	2.77	E

8	Sulameni Eri	3.05	S
9	Lake near Irukulam	3.58	N
10	Lake near Kannakottai	3.93	NW
11	Lake near Periyapuliyur	4.42	ENE
12	Lake near Kakkavakkam	5.81	S
13	Lake near Errukuvay	5.99	E
14	Lake near Pettai	6.05	NE
15	Sathya Sai Canal / Telugu Ganga Canal	6.07	W
16	Arani River	6.85	SSE
17	Lake near Palavakkam	7.58	E
18	Lake near Kadarvedu	7.65	NNW
19	Uttukkottai Eri	7.89	WSW
20	Lake near Puvalambedu	8.11	NE
21	Canal	8.19	NW
22	Lake near Budur	8.52	NNW
23	Lake near Madarpakkam	8.64	N
24	Lake near Sengattakolam	8.74	SSE
25	Lake near Rajugunta	9.38	NW
26	Lake near Pallapadi	9.44	ESE
27	Lake near Mambakkam	9.65	SW
Forests			
1	Malandur RF	0.48	SSW
2	Palavakkam RF	0.61	ESE
3	Manali RF	2.53	ESE
4	Palavakkam RF	2.92	E

5	Siruvadu RF	3.54	N
6	Panchali RF	3.62	N
7	Nemalur RF	5.23	N
8	Senjiyagaram RF	6.19	WSW
9	Ambakkam RF	7.84	WNW
10	Rajugunta RF	7.88	WNW
11	Sathyaveed RF	8.63	NW
Archaeological Areas			
1	Cairn site Sengarai	2.99	SSW
2	Megalithic cists and cairns Siruvadu	3.22	N
3	Megalithic cists and cairns Panchali	4.23	NNE
4	Urn burials Palavakkam	5.49	SSE
5	Megalithic cists and cairns Amirthanayagam	7.68	ENE
6	Megalithic cists and cairns w/ bounding stones Vanmalli	7.80	NE
Nearest Habitats			
1	Thandalam	5.49	SSE
2	Periyapalayam	7.80	SE
3	Satyaveedu	8.02	NNW

Table 0.4. Site Specific Social Infrastructure Details

S. No.	Description	Distance (km)	Direction
Common Places/Public Utility Centers			
1	Uthukkottai Police Station	0.59	WSW
2	Uthukkottai Taluk Office	0.64	WSW
3	Fire Station	0.94	N

4	Soolaimeni Panchayat Office	5.26	S
5	Library	6.14	SE
6	Perandur Post Office (PO)	7.22	SW
7	Nemalur Panchayat Office	7.44	N
8	Panchayat Union Office	7.80	SE
9	Enambakkam Post Office (PO)	7.97	S
10	Periyapalayam Police Station	8.03	SE
11	Satyaveedu Mini Stadium	8.12	NNW
12	Arani Town PanchayatOffice	9.87	SSW
13	Arani Branch Library	9.88	SSW
Religious Places			
1	Arulmigu Kattu Selli Amman Temple	0.78	SW
2	CSI St Marks Church	0.96	NNE
3	Pitchaleeshwarar Temple	1.43	WSW
4	Perumal Kovil	1.46	NNE
5	C.S.I Yesu Anbar Aalayam	2.55	W
6	Karadiputhur Vinayagar Temple	2.62	W
7	Sri Rukmani Sametha Venugopala Temple	2.83	ENE
8	ECI Church	3.61	NNW
9	Bethel Church of Christ	4.96	S
10	Sri Kalahasti Sivan Temple	6.79	SW
11	Srinivasa Perumal Temple	7.03	NE
12	Sri Shakthi Amman Temple	7.14	SW
13	Shri Lakshmi Narayan Temple	7.23	SSW
14	Periyapalayam Amman Temple	7.86	SE

15	Sai Baba Temple	7.88	ENE
16	Sri Kalabhairavar Temple	8.25	WSW
17	Venugopalaswamy Temple	8.36	NNE
18	Ankamma Temple	8.42	NW
19	Sri Saibaba Temple	8.42	ESE
20	Shivan Temple	8.49	SE
21	West Madharpakkam Church of Christ	8.50	N
22	Sri Angala Parameswari Amman Temple	8.57	NNE
23	Masjid-E-Mohamed	8.63	N
24	Venkateshwara Swamy Temple	8.63	NNW
25	Sri Anjathamman Temple	8.78	ESE
26	Venkaya Swamy Temple	8.88	ENE
27	Sri Ramalinga Chowdeswari Temple	9.05	N
28	Avinasiyappar Temple	9.11	E
29	Church of Christ Madarapakkam	9.39	NNE
30	Jamia Masjid	9.87	WSW
31	Chinna Malayanore Kovil	9.90	E
32	Shri Sundara Vinayakar Temple	9.99	N
Hospitals			
1	PHC	3.59	NNW
2	PHC Kannakottai	3.68	NNW
3	PHC Perambur Kandigai	5.93	SSW
4	GPHC Periyapalayam	7.74	SE
5	PHC Enambakkam	7.97	S
6	Nalam Clinic	8.83	N

7	MMC	9.08	N
8	GH Madarpakkam	9.20	N
9	GH (Sub)	9.48	N
Schools & Colleges			
1	Thervoi Kandigai Anganwadi	0.91	NNE
2	Govt ADW High School	1.03	NE
3	PUMS GR Kandigai	2.09	WNW
4	GHSS Kannankottai	3.38	NNW
5	Sri Sankara Mat School	5.59	S
6	PUMS Nelvoy	5.59	SE
7	GHSS Palavakkam	5.68	SW
8	Sri Lakshmi Vidyalaya Matriculation School	5.87	SW
9	CAAD - Chennai Academy of Architecture and Design	6.12	SSE
10	Govt Middle School	6.22	NNE
11	GHS Poovalambedu	6.88	NE
12	Govt. School	7.17	SSW
13	GHSS	7.57	SE
14	Maharishi Vidya Mandir	7.60	N
15	GHSS Periyapalayam	7.85	SE
16	GHSS	7.87	ENE
17	GHSS	8.00	NW
18	Victoria Matric Hr Sec School	8.04	SE
19	Sri C Dass Arts & Science College	8.25	NNW
20	ZPHS	8.29	WNW
21	Don Bosco Matriculation School	8.33	N

22	Govt College	8.42	NW
23	Govt Junior College	8.44	NNW
24	St. Joseph Mat. HSS	8.57	SE
25	ZPHS Pudupakkam	9.25	W
26	GGHSS Madharpakkam	9.34	NNE
27	Don Bosco Mat.HSS	9.36	WSW
28	GBHSS Madharpakkam	9.43	NNE
29	APSWREIS School	9.54	NNW
30	Govt Polytechnic College	9.63	NNW
31	GHS Mambakkam	9.68	SW
32	Venkateshwara Mat. School	9.89	WSW
33	PUP School	9.96	E
34	Govt PS	9.92	ESE

2.3.2. Accessibility & Connectivity

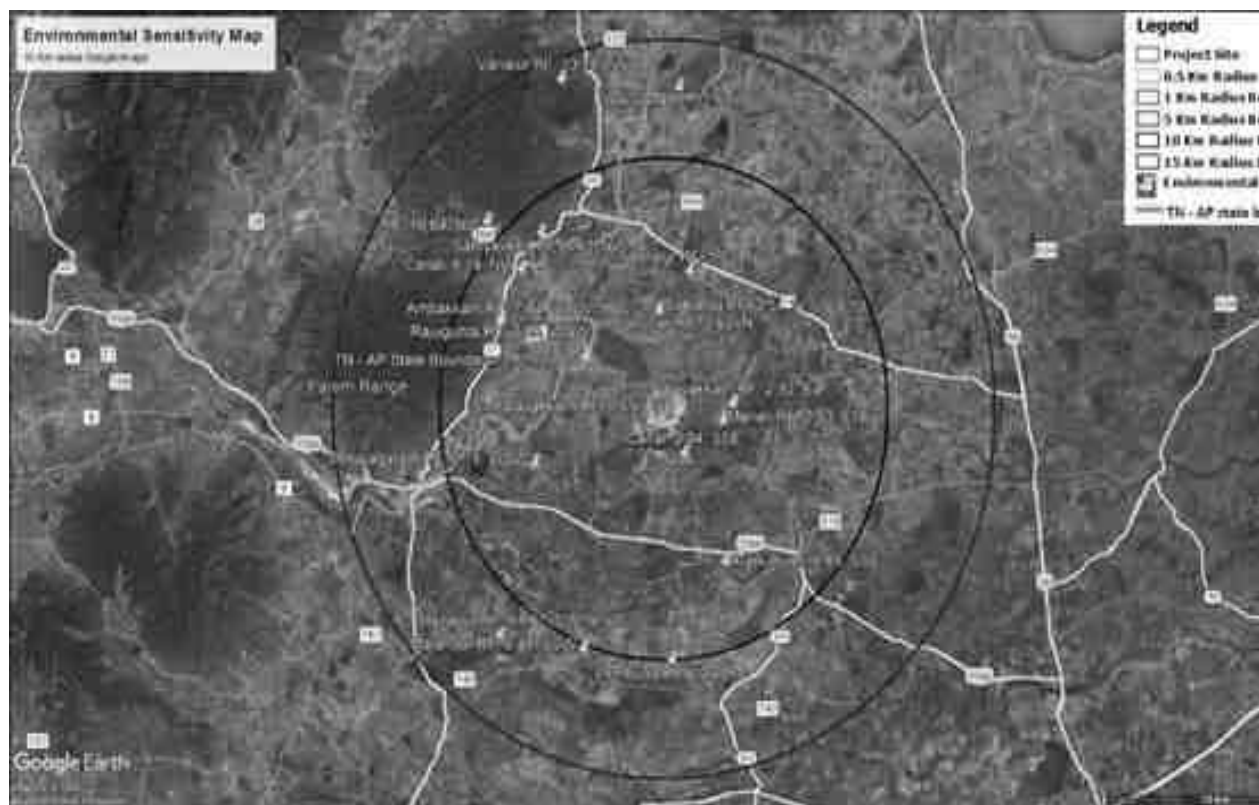


Figure 0.7 Project Site Specific Environmental Sensitivity Map.



Figure 0.8. Google image with 0.5 & 1 km radius from the site

2.3.3 Major Connectivity Near the Project

Table 0.5. Project Site Specific Infrastructure Details

S. No	Description	Distance (Km)	Direction
Railway Connectivity			
1	Gummidipoondi Railway Station	~15.09	NNE
2	Chennai International Airport	~42.86	SE
Nearest Town, City, and District Headquarters			
1	Town: Periyapalayam	~7.80	SE
2	City: Chennai	~25.34	SE
3	District HQ: Tiruvallur	~23.42	SSW
Road Connectivity			
1	NH 716A: Tirupathi Road (NH 16 near Chennai, TN – NH 40 near Kadapa, AP)	~5.25	S
2	SH 52: Kavarapettai –Sathiyavedu	5.92	NNE

2.3.4 Major Industries in Buffer area with 10 km Radius

Table 0.6. List of Major Industries in 10 km radius

S. No	Description	Distance (Km)	Direction
1	Michelin India Private Limited	0.03	S
2	Pon Pure Speciality Chemical Private Limited	0.04	W
3	Sheng Long Bio-Tech (India) Pvt. Ltd	0.07	NW
4	Pandian Chemicals Ltd	0.20	NNE
5	Star Industries	0.21	W
6	Real Glass	0.22	W
7	Blasto Metal Spray Processors Pvt Ltd	0.26	W
8	Jesons Industries Ltd	0.30	N

9	MGM Edible Oils Pvt Ltd	0.31	N
10	Sovereign Star Speciality Products PvtLtd	0.36	N
11	Spergas Filling Plant	0.38	NW
12	Harsha Éxito Engineering Private Limited	0.40	E
13	SLB Ethanol PvtLtd	0.47	E
14	PCBL (TN) LIMITED	0.48	W
15	Mepcrete AAC Blocks	0.49	W
16	Tropical Breweries Private Ltd	0.52	WSW
17	Antolin India	0.60	W
18	Brakes India Private Ltd	0.72	SW
19	Sundaram Clayton Limited	0.72	SW
20	GMS Elegant Builders P. Ltd.	0.76	E
21	Honda Motor India Pvt Ltd	0.76	SE
22	Kaleesuwari Techbio Refinery Private Ltd	0.81	S
23	Laulagun Bearings India Pvt Ltd	0.85	W
24	Wheels India Limited	0.86	W
25	Mahaveer Surfactants International Pvt Ltd	1.06	W
26	TCP Limited	2.89	E
27	Aachi Masala Foods Pvt Ltd	4.50	ENE
28	Sri Venkatachalapathy Alloys Pvt Ltd	5.40	NNE
29	Balsara Engineering Products Limited	5.65	NNE
30	Chetna Steel Tubes Pvt.Ltd.	5.67	NNE
31	Pashupati Metallics	5.74	NE
32	Prakash Ferrous Industries Private Limited	6.05	N
33	Mico Plast Industries Pvt. Ltd. - U2	7.23	ENE

34	Shalimar Paints	7.27	ENE
35	SMR Foods Mill	8.41	ENE
36	Caplin PSterile Limited	8.53	ENE
37	Sivanesan Company	8.74	ENE
38	Vamshadhara Paper Mills Factory	8.69	ENE
39	Adhitya Precast Products	8.89	S
40	Tulsyan NEC Limited	8.90	NE
41	Konkan Speciality PolyProducts	9.12	S
42	KEVIN Steels PvtLtd	9.14	NNE
43	Cauvery Power Plant	9.26	ENE
44	Oren Hydrocarbons PvtLtd	9.30	ENE
45	Tinna Rubber and Infrastructure Limited	9.44	NE
46	ADS PRO-SHIELD	9.54	NE
47	Aqua Terrace & Energy Limited	9.53	ENE
48	Srinivasa Fashions Pvt. Ltd.	9.58	NNE
49	BT Industrial Park	9.60	E
50	Apollo Distilleries PvtLtd	9.72	ENE

2.3.5 Seismicity

The project area falls in Seismic Zone- III. Suitable seismic coefficients in horizontal and vertical directions respectively, will be adopted while designing the structure. The chimneys within the premises should be strengthened.

Earthquake: It can happen at any time of the year. It can damage property as well as life. They can inflict tremendous damage within seconds and without warning at any time of day, on any day of the year. Ground shaking and surface faulting are often just the forerunners of secondary damage, such as fires, floods (caused by dam bursts), landslides, quick soil and tsunami (seismic sea waves).

- The area falls under zone III (Moderate Damage Risk Zone).
- The construction agency would use appropriate structural codes for construction of this building.

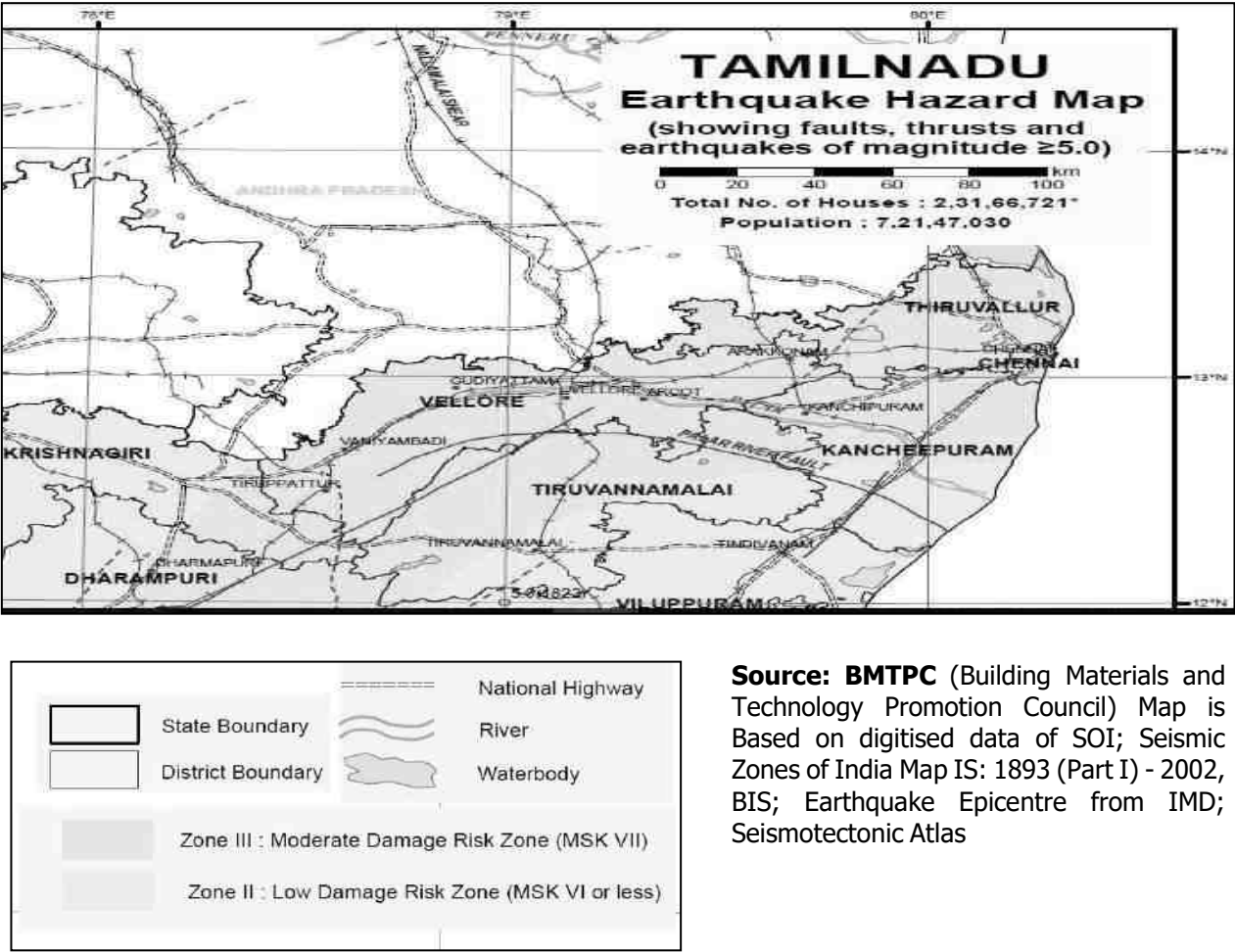


Figure 0.9. Earthquake Hazard Map – BMTPC

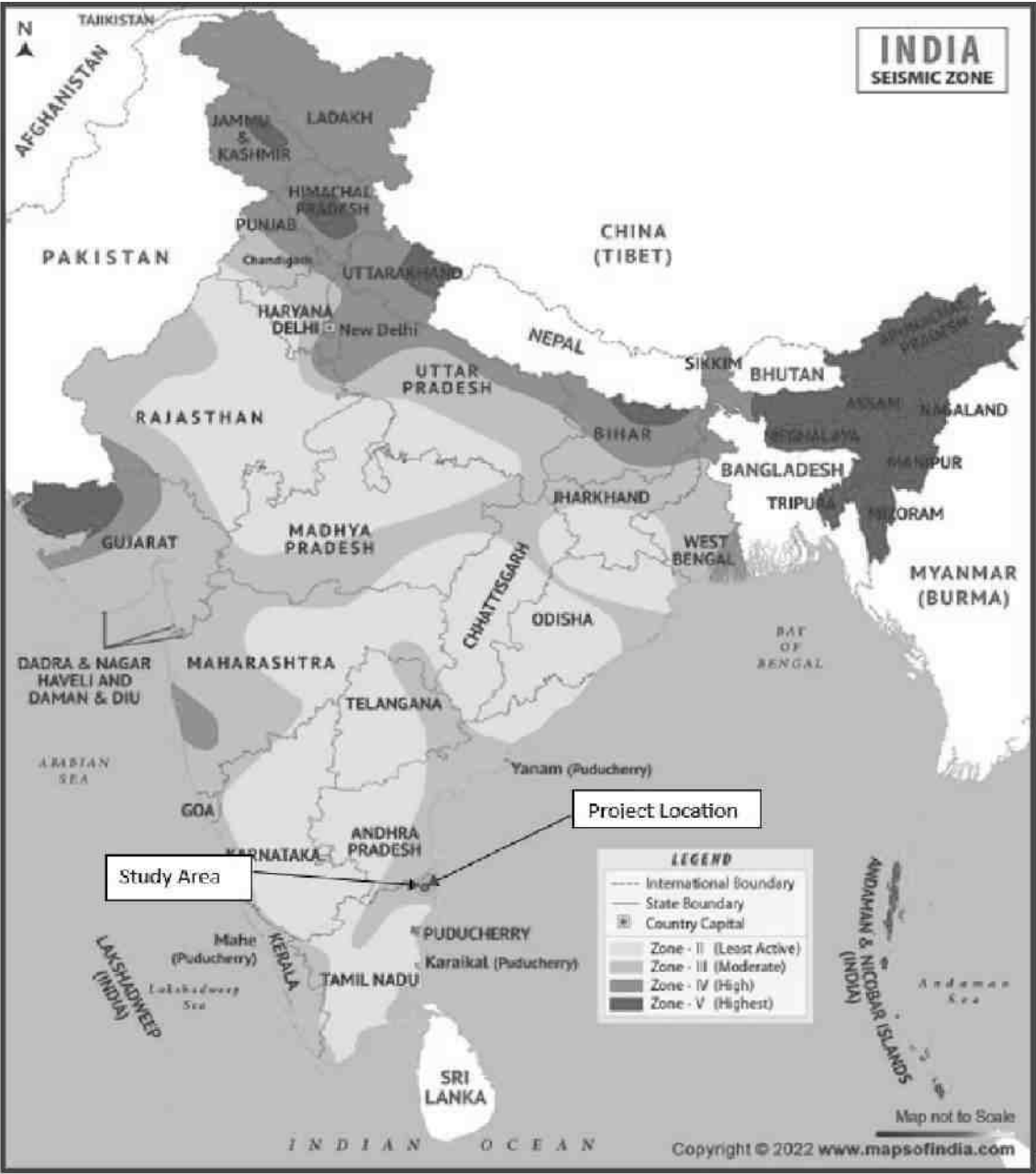


Figure 0.10. Map Showing Seismicity of the Area

2.4 Size and Magnitude of Operation

Table 0.7. Project Details

S. No.	Particulars	Unit	Project Details		
			Existing	Proposed	Total After Expansion
1	Plot Area				
1.1	Plot Area	Sq.m	809371	0.00	809371
1.2	Total Build UpArea	Sq.m	18,471.82	27,979.29	46,451.11
1.3	Green Area*	%	25.02	-	25.02
		Sq.m	20253.58	0.00	20253.58
		Acres	5.003	0.00	5.003
		%	25.02	0.00	25.02
2.	Products				
2.1	Saleable casting product (mainly used for wind turbine)	TPA	27,500	67,540	95,040
2.2	Furnace Panel BoardCapacity	KW	5000	3000	8000
2.3	Industrial Sheds & Buildings	Sq.m	18471.82	27979.288	46451.108
3.	Cost				
3.1	Project Cost	INR Cr.	213.05	72.68	285.73
3.2	EMP Capital Cost	INR Lakhs	1198.13	247.74	1445.87
3.3	EMP Recurring Cost	INR Lakhs	57.96		

*Note: The greenbelt plan includes 25% coverage within the project site and 10% within the SIPCOT greenbelt zone.

2.4.1 Plot Area Distribution

The existing project land area is **80,937.1 m² (20 acres)**. The proposed expansion will be carried out within the existing open area Therefore, the total land area after expansion will remain the same at **80,937.1 m²**.

Table 0.8. Land Break-up Details

S. No	Area Description	Unit	Plot Details			
			Existing Area	Proposed Area	After Expansion	Percentage (%)
1	Plinth Area	Sq.m	17089.93	4473.83	21563.76	26.64
2	Green belt Area*	Sq.m	20253.58	0.00	20253.58	25.02
3	Parking Area	Sq.m	2301.70	506.80	2808.50	3.47
4	Road/Pavement Area	Sq.m	12155.55	856.39	13011.94	16.08
5	Utility Area (EB Yard)	Sq.m	137.33	702.72	840.05	1.04
6	Open Area	Sq.m	28999.01	22459.27	22459.27	27.75
Total		Sq.m	80937.1	28999.01	80937.1	100%

Table 0.9. Proposed Built-up Area Details

S.No.	Description		Unit	Existing	Proposed	Total after Expansion
1.	Block Admin & Canteen	Ground Floor	sq.m	504.37	468.645	973.015
		First Floor	sq.m	458.16	468.645	926.805
2.	Block First & Aid Doctor's Room	Ground Floor	sq.m	98.3	-	98.3
3.	Block Main Foundry Plant	Ground Floor	sq.m	15728.5	25008.37	40,736.87
		First Floor	sq.m	689.61	335.94	1,025.55
4.	Block Scrap Yard	Ground Floor	sq.m	140.11	-	140.11
5.	Block Security	Ground Floor	sq.m	40.05	-	40.05

	Cabin-2					
6.	Block Sump & Pump Room	Ground Floor (Pump Room)	sq.m	175.05	253.668	428.718
		First Floor	sq.m	42.02	127.59	169.61
7.	Block Utility Building	Ground Floor	sq.m	270.6	200.69	471.29
		First Floor	sq.m	270.6	200.69	471.29
8.	Block Stp & Etp Pump Room	Ground Floor	sq.m	19.95	315.05	335.00
9.	Block Security Cabin-1	Ground Floor	sq.m	9.6	-	9.6
10.	Block Security Cabin-3		sq.m	sq.m	-	9.6
11.	Block Security Cabin-4		sq.m	sq.m	-	7.8
12.	Block Weigh Bridge Cabin		sq.m	sq.m	-	7.5
13.	Gis Area	Ground Floor	sq.m	-	360	360.00
		First Floor	sq.m	-	240	240.00
Total Area			sq.m	18471.82	sq.m	46451.108

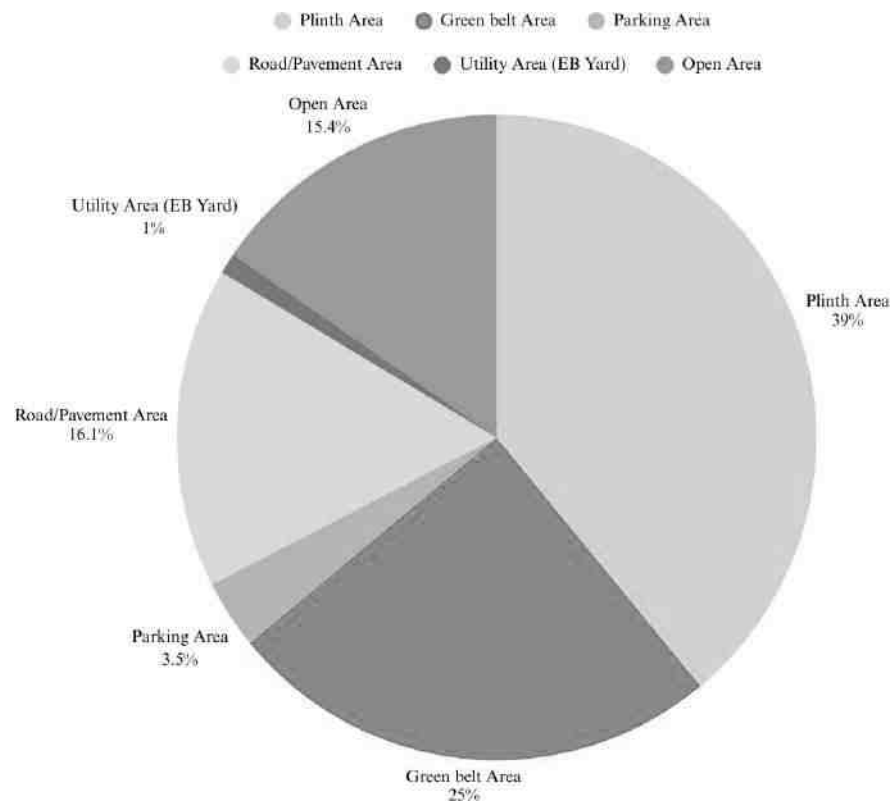


Figure 0.11. Area Distribution Chart

2.4.2 Product Details

Details of existing & proposed products are Tabulated in Table.

Table 0.10. Production Capacity

S. No.	Name or Unit	Unit	Capacity			End use of Product
			Existing	Proposed	After Expansion	
1.	Saleable casting	TPA	27500	67540	95040	Components are mainly used for wind turbine.
2	Industrial Sheds & Buildings	Sq. m	18471.82	27979.288	46,451.108	Mainly for Industrial Sheds, Admin

						Building, RM & FM storage

2.4.3 Project Cost

The project cost of the existing facility is INR 213.05 Crores. The proposed project cost is INR 72.68 crore. Therefore, the total project cost after expansion will be INR 285.73 Crores.

The CER cost is calculated as 1% of the additional project cost, which amounts to INR 72.68 lakhs.

Details of proposed project cost bifurcation is provided in Table below:

Table 0.11. Proposed Cost Details

S. No.	Particulars	Existing (INR Crores)	Proposed (INR Crores)	After Expansion (INR Crores)
1.	Land	13.59	0	13.59
2.	Building	71.50	23.1	94.60
3.	Land & Building improvements	21.60	1.46	23.06
4.	Plant and Machinery	52.22	28.37	80.59
5.	Moulds & Pallets	19.30	8.92	28.22
6.	Material Handling Equipment's	18.54	9.00	27.54
7.	ETP/ STP/ APC	11.29	1.83	13.12
8.	Others	5.01	0	5.01
Total		213.05	72.68	285.73

2.4.4 Project Schedule and Completion Timeline

The project is being submitted for Environmental Clearance (EC) for the proposed expansion. The tentative timeline of the project is as follows:

1. Public Consultation – September 2025
2. EIA Appraisal – October 2025
3. Obtaining EC combined with CTE – November 2025

4. Start of Construction for Expansion – November 2025
5. Consent to Operate (CTO) – December 2025

2.4.5 Equipment's & Utilities

Table 2.12. List of Equipment's & Utilities

S. No.	Name of the Machineries/ Equipment's	Unit	Specifications	Capacities		
				Existing	Proposed	After Expansion
1	Melting Induction furnace	Nos.	1x 24 Ton	1	0	1
2	Panel Board	KW	8000	5000	3000	8000
3	Sand mixers	TPH	Existing 10+60tTPH Proposed 10+100TPH	2	2	4
4	Sand silos	T	100 to 200t	6	5	11
5	Didion drum	TPH	60	1	0	1
6	Cooling classifiers	TPH	2 x 30	1	1	2
7	New sand classifier	TPH	12	1	0	1
8	Thermal reclamation	TPH	5	0	1	1
9	Coating station	Nos.	-	0	1	1
10	Drying oven	Mould/day	2x12	1	1	2
11	Compressors	kW	4 x 110 kW	3	1	4
12	Cranes	T	From 10 to 150	12	3	15
13	Shot blasting	T	40	1	0	1
14	DG Set	kVA	Existing 1500 Proposed 1500	1	1	2
15	Scrap charger	T	10	1	1	2

Table 0.13. Technical Specifications of the Induction Furnace

S. No	Description of Items	Specifications
1.	General	
	Melting Charge	Steel Scraps + Pig Iron + Foundry returns
	Melting Rate	2 kg/hr. per 1 kW @ 1 min
	Energy Consumption	1.8 kg (with 90% Yield and 100% utilization factor)
	Furnace Crucible	1 x 24 T (1 crucibles);
	Type of Furnace	Induction Furnace
	Mode of Tilting	Hydraulic
	Coil Design	Electrolytic Grade copper tube, duly taped & inter-turn class F insulated
	Coil Cooling mode	Water Cooled
2.	Static Frequency Panel	
	Rated output kW	8000 kW
	Rated output Voltage	575 V (From Transformer)
	Rated input Voltage	33 KV
	Rated Frequency	50 Hz
	Mains Power Factor	0.99
	Maximum input kW	5000 kW
	Medium for cooling	Water cooled Furnace
3.	Remote Control Desk	Melt Master Plus
4.	Plant Cooling System	
	Water Reservoir	Soft water 170 KL, Raw Water 220 KL, Emergency tank 50 KL
	Primary cooling pump	Soft water for Coil
	Head	4.5 Mts

	Pump	Soft water – 4000 LPM
	Water quality	DM Water – Conductivity Less than 10 Micro MHOS/CM, PH value 7
		Soft water – Hardness: Less than 50 PPM, Conductivity – Less than 350 MHOS/CM, PH value 7.2 to 7.8

2.5 Power Requirement

Demand & Source of Power Supply:

The required power requirement for production will be sourced from Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO). The sanctioned power by TANGEDCO for the existing plant is about 7000 KVA (33KV Substation). After the proposed expansion it will be increased by 6000 KVA (110 KV Substation) and the same will be sourced from TANGEDCO through a dedicated line. The total power requirement after expansion will be 13,000 KVA.

To meet the emergency power requirement during grid failure a DG set having capacity of 1500 KVA is available and proposed 1x 1500KVA during expansion. HSD is the only fuel used for DG sets. Power requirement and source details are provided.

Table 0.14. Power Requirement

S. No.	Description	Existing Capacity	Proposed Capacity	After Expansion Capacity	Source
1	Total Power requirement	7,000 KVA	6,000 KVA	13,000 KVA	TANGEDCO
	Substation	33KV Substation	110 KV Substation		
2	Backup (KVA) DG Set	1 x 1500	1 x 1500	2 x 1500	Diesel Gen Set

2.6 Fuel Requirement

HSD is the only fuel used for DG sets. HSD is used for DG sets; its requirement will only occur during power failure from TANGEDCO. The maximum requirement for the existing project will increase from 990 L/Day after expansion is 1980 L/Day. Grease is being used as lubricant

for machinery. The quantity of fuel is provided.

Table 0.15. Fuel Requirement and source

S. No.	Fuel Type	Capacity			Source
		Existing	Proposed	After Expansion	
1	HSD for DG Sets (L/Day)	990	990	1980	Fuel Station
2	Grease (Kg/Month)	180	20	200	Oil Companies
3	Furnace oil (Lt/Day)	—	566	566	Oil Companies
4	LPG (Tons/day)	-	2.5	2.5	Super company gas at SIPCOT
Note: There is no LPG usage existing, it will be used for thermal reclamation and will be stored in a cylinder.					

2.7 Water Requirement

Water is a critical resource for both the construction and operational phases of the proposed project. The total water requirement accounts for both freshwater demand and recycled water utilization, supporting various processes and domestic needs.

For the existing operations, the total water requirement is 90.5 KLD, of which 63 KLD is met through freshwater and 27.5 KLD through recycled water. During the proposed expansion, the total water requirement will increase to 122.5 KLD, comprising 88.5 KLD of freshwater and 34 KLD of recycled water.

The detailed breakup of water requirement for existing, proposed, and post-expansion scenarios is presented in the following table:

Table 0.16. Water Requirement

S. No.	Description	Unit	Capacity		
			Existing	Proposed	After Expansion
1	Source (Freshwater)	SIPCOT Industrial Park, Thervoykandigai			
2	Fresh water	KLD	63.0	25.5	72.0

	requirement				
3	Recycled water	KLD	27.5	6.5	38.0
Total water requirement		KLD	90.5	32	122.5

The freshwater component is primarily required for domestic use, industrial processes, and cooling systems, whereas recycled water will be utilized for non-critical applications such as gardening, flushing, and other secondary uses.

The existing water supply agreement is enclosed as Annexure-8, which outlines the supply terms from the designated source. In light of the expansion, a revised water supply agreement will be obtained to ensure adequate water availability for the enhanced operational scale.

2.8 Raw Material Requirement

The material balance for the existing and proposed casting products production is given, respectively.

Table 0.17. Raw Material Requirement

S. No.	Description	Unit	Material Balance for existing - 27500 TPA		Output (Product + Waste)	Material Balance for After expansion production - 95,040 TPA	
			Existing	After Expansion		Existing	After Expansion
1	Pig Iron	TPA	12366	44000	casting	27500	95040
2	Steel Scrap	TPA	13912	49500	Foundry sand	4640	30000
3	Alloys	TPA	1546	5500	Sweep waste	490	5,000
4	New Sand	TPA	5869	38000	Dust	2565	7165
5	Resin	TPA	1320	4600	Shot blasting Waste	37	500
6	Hardener	TPA	461	1600	Slag	440	6000
7	Chamotte	TPA	94	325	Linings	92	500

8	Water-based Zirconium Coating	TPA	150	520	-	-	-
9	Shot (Abrasives)	TPA	46	160	-	-	-
Total		TPA	35,764	144205	Total	35,764	144205

Table 24. Details of Raw Materials Source & Mode of Transportation

Details of Raw materials Source & Transportation						
S .No	Name of the Raw Material	Process Involved	Principle Use	Source	Mode of Transportation	Mode of storage plant
1	Pig Iron	Melting Process	Casting Products	Domestic	Road	PIT Storage
2	Steel Scrap		Casting Products	Domestic	Road	PIT Storage
3	Alloys		Casting Products	Domestic	Road	Warehouse
4	New Sand	Moulding	Casting Products	Domestic	Road	PIT Storage
5	Resin		Casting Products	Domestic	Road	Chemical room
6	Hardener		Casting Products	Domestic	Road	Chemical room

7	Chamotte		Casting Products	Domestic	Road	Warehouse
8	Water-based Zirconium Coating	Coating Process	Casting Products	Domestic	Road	Warehouse
9	Shot (Abrasives)	Shot Blasting Process	Casting Products	Domestic	Road	Warehouse se

2.9 Manpower Requirement

The existing manpower of 424 will increase to 709 after the proposed expansion. The construction phase will generate 9,390 man-days, while the operational phase will result in 443,834 man-days annually through a mix of permanent and contractual employment. The project will create employment across various skill levels, enhancing local livelihoods. The majority of the workforce is expected to be sourced from nearby areas within a 10–15 km radius, thereby supporting regional economic development and ensuring maximum engagement of the local workforce.

Table 0.18. Details of manpower requirement (Construction)

Employment Generation during Construction Phase			
Permanent Employment [X]		Temporary / Contractual Employment [Y]	
Nos. of Permanent Employment [Apc]	5	No.s of Temporary / Contractual Employment [Acc]	25
Period of Employment (No. of days) [Bpc]	313	Period of Employment (No. of days) [Bcc]	313
No. of Man Days – Xc, [Apc]* [Bpc]	1565	No. of Man Days – Yc [Acc]* [Bcc]	7825
Total C = [Xc] + [Yc] = 9390			

Table 0.19. Details of manpower requirement (Operation)

Employment Generation during Operational Phase	

Particulars	Existing	Proposed	Total After Expansion
Permanent Employment [X]			
Nos. of Permanent Employment [Apc]	154	96	250
Period of Employment (No. of days) [Bpc]	313	313	313
No. of Man Days - Xc [Apc]* [Bpc]	48202	30048	78250
Total Mandays [Xc] = 156500			
Temporary / Contractual Employment[Y]			
Nos. of Temporary / Contractual Employment [Acc]	270	189	459
Period of Employment (No. of days) [Bcc]	313	313	313
No. of Man Days- Yc [Acc]* [Bcc]	84510	59157	143667
Total Mandays [Yc] =287334			
Total O = [Xc] + [Yc] = 443834			
Grand Total = C+O = 453224			

2.9.1 Facilities and Amenities

Amenities:

- Good drinking water facility
- Canteen Facility
- Restrooms and waiting lounge
- Parking facility: Truck parking, car parking, parking for differently abled
- Retiring rooms for truck drivers
- First aid kits at all prominent places.
- OHS centre with a first Aid facility

Facilities:

Water Supply and Treatment:

Water for the facility is sourced from SIPCOT and used for domestic, process, and utility requirements. The water will be treated as necessary to meet operational and domestic

standards. Measures are in place to ensure efficient water use and reduction in freshwater dependency.

Sewage Treatment Plant (STP):

The facility is equipped with a sewage treatment system to manage domestic wastewater. With the proposed expansion, the STP capacity will be augmented. Treated sewage will be reused within the premises for greenbelt development, dust suppression, and firefighting purposes.

Effluent Treatment Plant (ETP):

Trade effluent generated from industrial processes such as furnace cooling and utilities is collected and treated in the existing effluent treatment plant. Treated effluent is reused within the plant for non-potable purposes, ensuring minimal environmental discharge.

Rainwater Harvesting:

Rooftop rainwater harvesting is in place to collect and store rainwater. The collected water is treated and reused within the facility, supporting freshwater conservation. Maintenance of the existing system and its extension to new structures is planned as part of the expansion.

Stormwater Management:

A stormwater drainage system is already established around the existing facility and will be extended to the new project area. Percolation pits are installed to facilitate groundwater recharge. Excess stormwater will be directed to a designated collection pond to prevent runoff and support water sustainability.

Fire and Safety Measures:\

Designated fire and safety assembly points are established within the premises. Firefighting systems, safety equipment, and emergency response procedures are in place and will be maintained and enhanced as per industry safety standards post-expansion.

2.10 Manufacturing Process and Process Flow Diagram

The manufacturing process of casting involves the following steps in sequence. The details of each step are described below:

Platform	Component Type	L [mm]	W [mm]	H [mm]	Casting Weight [kg]
2–5 MW	HUB	2842	2842	2217	17300
2–5 MW	HUB	2842	2842	2217	17300
2–5 MW	HUB	3120	3120	2505	21400

3 MW	HUB	3260	3260	2470	24000
3 MW	HUB	3260	3260	2470	24000

Components of the Manufacturing Process:

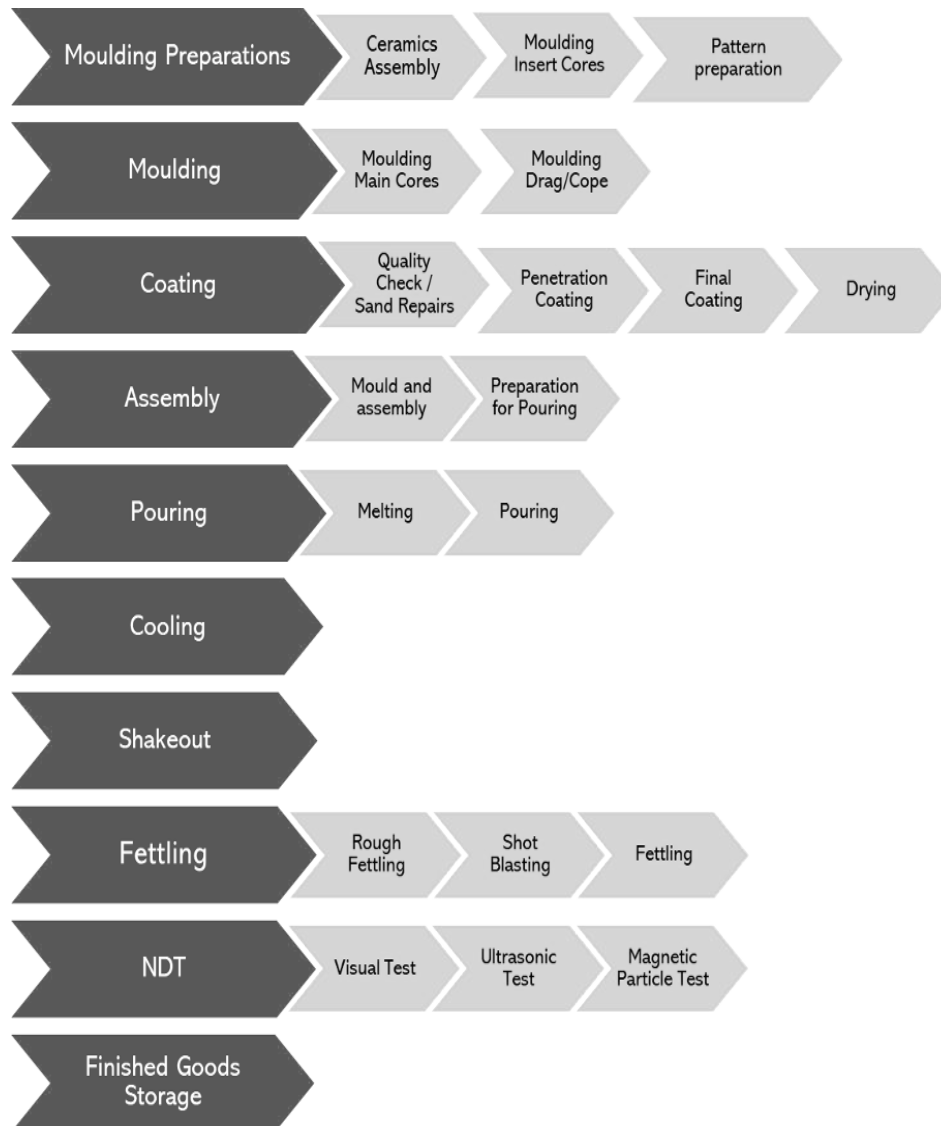


Figure 0.12. Flow chart of manufacturing process

All different parts will go through the same process steps; hence the process flow chart is generic. For different parts variation is expected in...

- Tools and Equipment
- Handling
- Parameters in the process (e.g. cooling time, melt composition, quality control requirements)

Moulding Preparations

The patterns are prepared as per the engineering drawings to meet the required shape and dimensions of casting. The patterns are prepared in accordance with the customer's needs.

- As preparation for the moulding process, ceramic pipes are assembled, and small insert cores are moulded.
- They are assembled in a pattern.
- A mould box is placed over the pattern.

Sand Preparation

Sand moulds are prepared under a green sand moulding process. In the green sand process, the required quantity of washed, dried and graded sand procured from outside is mixed with bentonite (clay), which acts as a binding material, and water and thoroughly mixed in Intensive Mixer. Certain other additives like coal dust are added to get the right condition of sand. Sand properties of mixed sand are tested before moulding and maintained to get quality casting without sand defects like sand drops, blow holes etc. Proper metal to sand ratios will be adopted and the requisite quantity of fresh sand will be added as required. Similarly, the unwanted sand in each cycle will be discarded also. Specifications of Existing and Proposed Sand Mixer are given

Moulding

- The prepared patterns and core boxes are moved to a sand mixer, which mixes sand with resin and hardener.
- Mould boxes and cores are filled with mixed sand and are manually compacted along the filling process.
- After filling, the sands need to be cured before the sand can be stripped from the pattern and core box.
- The produced sand part carries the negative geometry of the part to be produced.

Coating

- Single half moulds and cores are coated to prevent penetration of metal into the moulding sand and vice versa.
- Coatings are mainly applied by spray process, in special areas also with a brush.
- After coating application, drying process takes place in the Electrical Oven.

Assembly

- All mould and core parts are assembled.
- All gaps are closed with sealing rope and the parting

lines are clamped.

- Installation of pouring basin and venting system on top of the mould
- The cavity with the part geometry is now fully created and the mould is ready for pouring.

Pouring and Cooling

- Raw materials such as pig iron, steel scrap, internally recycled iron and alloys are charged and melted in an induction furnace. Medium frequency melting has been chosen as there is more flexibility, comparatively less installation cost and no heel metal is required in the crucible before switching on to melt. Similarly, while tapping, the entire crucible can be emptied, fresh charge added without loss of time for each cycle of melting.
- When the correct composition and temperature is reached, the hot liquid metal is tapped into a ladle.
- The ladle then is moved to the mould and finally poured into the cavity.
- The poured mould then cools down for several days.

Shakeout

- Once the part is solidified and reaches the shakeout temperature, it is moved to the shake out station.
- The mould is disassembled.
- The part and the mould box halves are separated from sand with the help of an excavator.
- The remaining mould sand is fed into a sand reclamation system, which breaks it into fine grains and moves it into storage silos for re-use.

Fettling & NDT (Non-Destructive Testing)

- Once the part reaches a suitable temperature, an automatic shot blasting process is started in order to remove remaining sand and coating from the part. Specifications of Shot Blasting Machine are given.
- After removal of runner and raiser the casting will be sent to the fettling shop for shot blasting and fettling. Shot blasting is the most efficient and mechanical method of removing unwanted particles. Casting is hung from hooks in a moving conveyor inside a chamber. The particles of shot or grit are thrown at the casting by means of centrifugal force and steel balls are placed through the conveyor bucket on the rotating vanes and blasted into the chamber and hanging casting

are cleaned. This method has a peeling effect on the surface, and it makes the surface bright and shiny. Grinding is usually performed using portable or stationary pedestal grinders. After the shot blast, the excess materials and joint chips are removed by grinding then the casting are sent for further process and in fettling – burrs, flashes, and all other metal parts that do not belong to the original part geometry are cut off with disc grinder.

- Finally, the parts are checked for defects – visually, with ultrasonic and/or magnetic particle testing.

Finished Goods Storage

- After passing the quality test, the parts are transported to the outside storage area with a forklift. Off-spec casting are returned to the melting section of remelt.
- Until dispatch, parts can be stored outside without any further packing.
- Dispatch to further process is being done by truck.

2.11 Air Pollutant Emission

2.11.1 Details of Process Gas Stack

Table 0.20. Process Gas Stack Details (Existing and Proposed)

S. No	Description of item	No's	APC Measures	Stack Height (m)	Stack Dia (mm)	Velocity (m/s)	Flow rate (Nm ³ /hr.)	Particulate Matter (mg/Nm ³)
Existing								
1	New Sand Storage Area	1	Dust collector with stack	20	1200	17	19260	Less than 20
2	New Sand Cooler Classifier Area Silo	1	Vent Filters with Stack	4.5	1200	42	48150	Less than 20

3	60 T Mixer Silo	1	Vent Filters with Stack	4.5	2400	70	14150	Less than 20
4	10 T Mixer Silo	1	Vent Filters with Stack	4.5	300	14	2830	Less than 20
5	Sand Reclamation Storage Silo	2	Vent Filters with Stack	4.5	300	14	2830	Less than 20
6	Sand Reclamation System - 60 Ton/Hr	1	Bag Filters with stack	20	1709	85	136245	Less than 20
7	Fettling Cabins	1	Bag Filters with stack	30	400	16	6140	
8	Shot blasting	1	Vent Filters with Stack	-	600	50	48150	Less than 20
9	Induction Furnace – 1x 24 Ton (with one Crucibles)	1	Wet scrubber with stack	30	1709	73	117165	Less than 20
10	Shakeout	1	Dust collector with stack	30	2400	70	14150	Less than 20

Proposed								
11.	100 T Mixer Silo	1	Vent Filters with Stack	4.5	2400	70	14150	Less than 20
12.	10 T Mixer Silo	1	Vent Filters with Stack	4.5	300	14	2830	Less than 20

2.11.2 Details of Flue Gas Stack

Table 0.21. Flue Gas Stack Details (Existing and Proposed)

S. No.	Description of item	No's	APC Measures	Stack Height (m)	Stack Dia (mm)	Velocity (m/s)	Flow rate (Nm ³ /hr)	Particulate Matter (mg/Nm ³)
Existing								
1.	DG Set 1500 KVA	1	Acoustic Enclosures and adequate stack height	30	-	-	-	Less than 20
Proposed								
2.	DG Set 1500 KVA	1	Acoustic Enclosures and adequate stack height	30	-	-	-	Less than 20

2.12 Water Consumption

The project's actual water consumption during its life cycle involves both construction and operational phases. Measures have been taken to optimize water use and ensure sustainable sourcing in line with environmental norms.

Construction Phase:

During the construction phase, water consumption is estimated at approximately 12.35 KLD, which will be sourced through private water tankers. This water will primarily be used for construction activities such as curing, site cleaning, and workers' domestic needs. Care will be taken to minimize wastage through on-site conservation practices.

Operational Phase:

In the operational phase, the project's total freshwater consumption will be 88.5 KLD, which will be entirely met through supply from the SIPCOT Industrial Estate, Thervoykandigai. A formal commitment letter from SIPCOT, confirming their capacity to meet this demand, is enclosed as Annexure.

In addition to freshwater, 34 KLD of recycled water will be consumed, which will be generated through on-site wastewater treatment and reuse mechanisms. This approach promotes water conservation and reduces the demand for external freshwater sources.

Summary of Water Consumption:

- Construction Phase Water Source: Private Water Tankers
- **Operational Phase Freshwater Source:** SIPCOT Industrial Estate, Thervoykandigai
- **Recycled Water Source:** On-site treatment and reuse
- **Total Operational Water Consumption:** 122.5 KLD
- Freshwater: 88.5 KLD
- Recycled Water: 34 KLD

To support this plan, a water balance flow chart has been prepared, showing the intake, usage, treatment, and recycling routes. The flow chart is provided in the subsequent section of this report.

Existing Water requirement

The Fresh water requirement for existing 63 KLD and after the proposed expansion will be increased from 72 KLD. The water requirement and break up for existing is provided.

Table 0.22. Water requirement and breakup for existing

S. No.	Water requirement	Total Input (KLD)	Fresh (KLD)	Recycled (KLD)	Output (KLD)	Remarks
1	Domestic Usage	23.0	23.0	0	4.6 (STP Loss 0.4 KLD)	18 (Total Domestic Wastewater generation is treated in existing)

						20 KLD ofSTP)
2	Cooling & Boiler feed	30.0	30	0	20.0 (ETP loss 0.5 KLD)	9.5 (Recycled for Fire hydrant and Plant area washings)
3	Chiller & Heat Recovery Unit Make Up	10.0	10.0	-	10.0	- (Process water consumption)
4	Greenbelt	18.0	-	18.0	18.0	- (Percolation)
5	Fire Hydrant tank make up and Plant area washing	9.5	-	9.5	9.5	- (Evaporation Loss)
Total		90.5	63.0	27.5	63.0	-

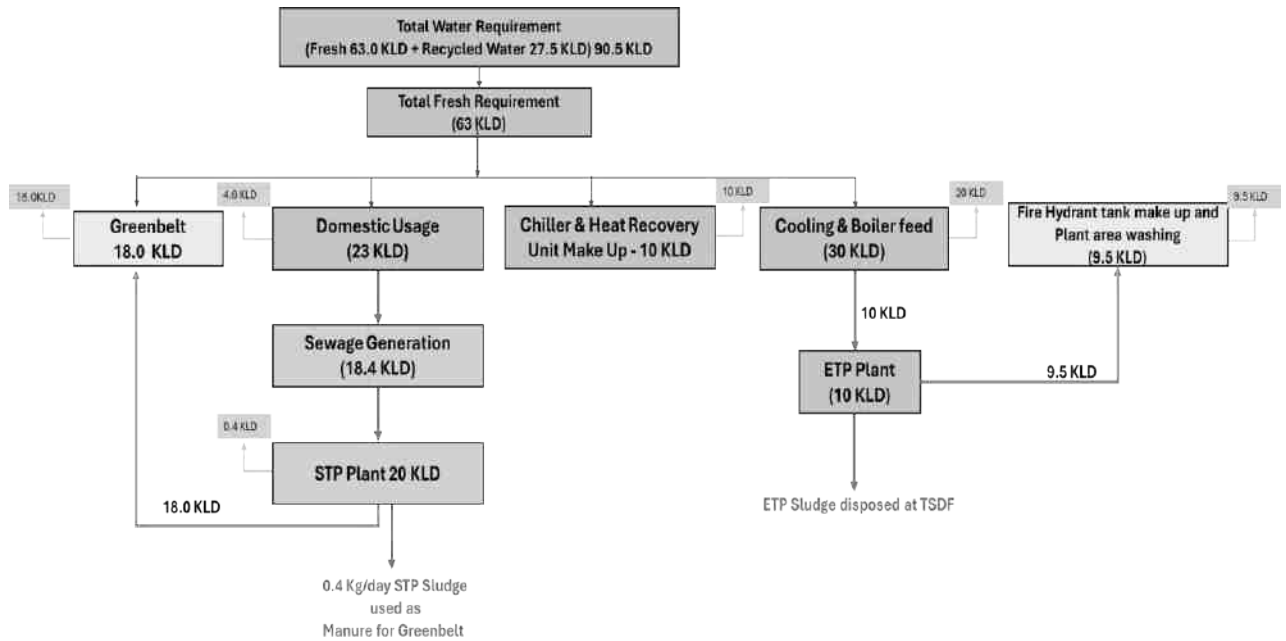


Figure 0.13. Water Balance for Existing

Water Requirement Proposed.

After expansion, the total water requirement will be 122.5 KLD, comprising 88.5 KLD of freshwater and 34.0 KLD of recycled water. Freshwater will be supplied by the SIPCOT Industrial Estate, Thervoykandigai, while recycled water will be generated through on-site wastewater treatment and reuse systems. During the construction phase, the water requirement is estimated at 12.5 KLD, which will be sourced from private tankers. The detailed breakup of water input and output is provided below.

Table 30. Water requirement and breakup proposed.

S. No.	Water Requirement	Total Input (KLD)	Fresh (KLD)	Recycled (KLD)	Output (KLD)	Remarks
1	Domestic Usage	32.0	32.0	0	3.0 (STP Loss: 0.5 KLD)	28.5 KLD treated in existing + proposed 20 KLD STPs
2	Cooling & Boiler Feed	30.0	30.0	0	20.0 (ETP Loss: 0.5 KLD)	9.5 KLD recycled for fire hydrant & plant wash
3	Chiller & Heat Recovery Makeup	10.0	10.0	0	10.0	Process consumption

4	Greenbelt	28.5	0	28.5	28.5	Percolation
5	Fire Hydrant Tank Makeup & Plant Area Washing	22.0	16.5	5.5	22.0	Evaporation loss
	Total	122.5	88.5	34.0	83.5	—

Note: Construction phase water requirement is approximately 12.5 KLD.

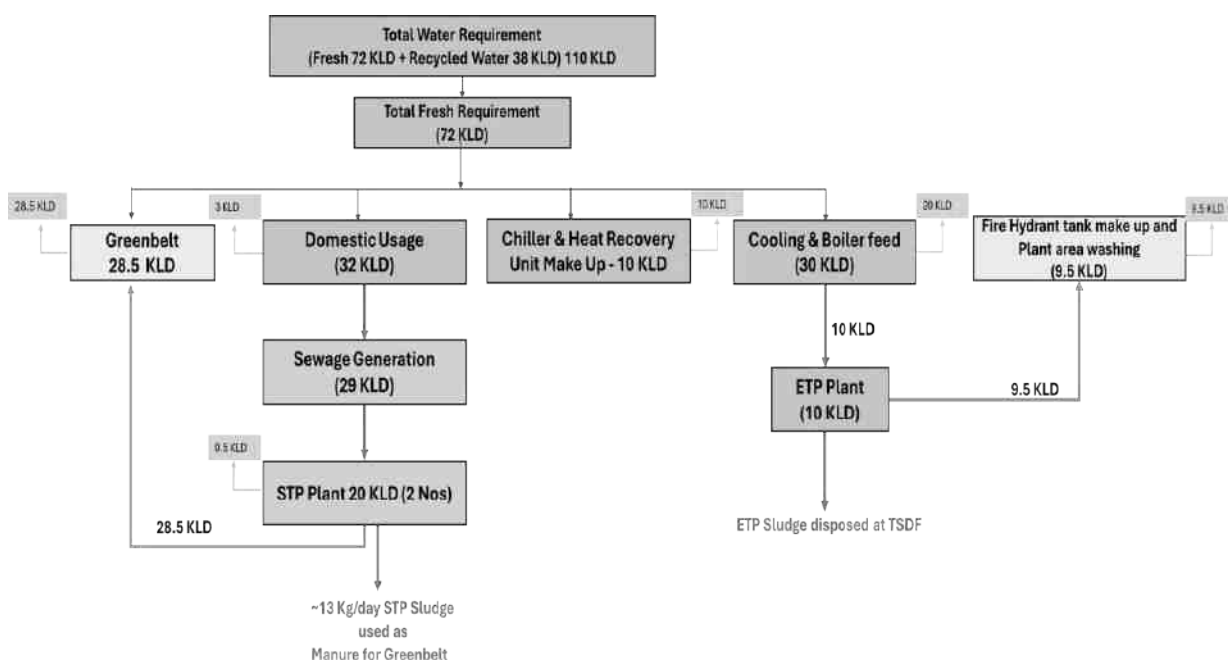


Figure 0.14. Water Balance for proposed.

Drinking Water Management (Source & Supply of Water)

The existing unit requires 23 KLD of water for domestic use, including drinking. With the proposed expansion, this requirement will increase to 32 KLD during the operational phase. The entire domestic and drinking water demand will be met through the SIPCOT water supply system, which will be distributed across various service areas via an internal piped network connected to designated tapping points.

2.13 Wastewater Generation and its Management

Liquid Waste Management

The wastewater from cooling and boiler feed blowdown, generated from both existing and proposed operations, is approximately 10 KLD and is treated in the existing 10 KLD Effluent Treatment Plant (ETP). Domestic wastewater generation from the existing unit is around 18.0 KLD, which is currently treated in the existing 20 KLD Sewage Treatment Plant (STP). Post-

expansion, domestic wastewater generation is estimated to be 28.8 KLD, which will be treated using both the existing 20 KLD STP and a proposed 20 KLD STP. The treated sewage will be reused for greenbelt development, plant road cleaning, and dust suppression at the raw material yard.

Wastewater Management

Wastewater from furnace cooling and other utility cooling systems, estimated at 10 KLD, is being treated and will continue to be treated in the existing 10 KLD ETP. The treated effluent is reused for fire hydrant makeup, plant area washing, and other utility purposes.

Domestic sewage generation from the existing facility is around 18.0 KLD, and post-expansion it is estimated at 28.8 KLD. The domestic sewage will be treated in STP (2Nos X 20KLD). The treated domestic wastewater will be reused for greenbelt maintenance and dust suppression activities within the plant premises.

Sewerage System

After the proposed expansion, the total domestic wastewater generation will be approximately 28.8 KLD, which will be treated 2x20 KLD STPs. The treated sewage will be reused for non-potable applications, including greenbelt irrigation, plant road dust suppression, and yard maintenance.

Detailed waste water generation break-up of proposed project is provided.

Table 0.23. Wastewater Management

Sr. No.	Particulars	Total Wastewater Generation		
	Area/Process	Existing	Proposed	Total After Expansion
1.	Domestic	18	10.8	28.8
2.	Process	9.5	0.5	10
	Total	27.5	11.3	38.8

Table 0.24. Details of Wastewater Treatment System

Particulars	Unit	Existing Capacity	Proposed Capacity	Total Capacity After Expansion
ETP	KLD	10	-	10
STP	KLD	20	20	40



Figure 0.15. Images of STP & ETP

2.13.1 Details of Proposed Trade Effluent Treatment Plant

To ensure environmentally responsible management of industrial wastewater, BAETTR India Pvt. Ltd. has proposed a compact and efficient Effluent Treatment Plant (ETP) with a capacity of 10 KLD. The ETP is designed to treat process effluents using a combination of physical, chemical, and biological treatment methods to meet discharge norms prescribed by the Pollution Control Board. The detailed treatment flow is as follows:

1. Screening (Bar Screen Chamber)

The raw effluent first enters a bar screen chamber where coarse solids such as plastics, paper, cloth, and other floating materials are removed. This is the first line of defense to protect downstream equipment from clogging or damage. Proper screening improves the efficiency of subsequent treatment processes and reduces maintenance requirements.

2. Oil and Grease Separation (Oil Skimmer)

After screening, the effluent is routed to an oil skimmer unit designed to remove free-floating oils, grease, and hydrocarbons. These substances can hinder biological treatment and must be separated early in the process. The skimming mechanism collects the floating oil, which is then stored and disposed of appropriately.

3. Equalization and Flow Homogenization (Collection Tank)

The collection or equalization tank serves to balance the fluctuations in flow and pollutant

concentration. It provides a consistent influent load to the ETP, thereby optimizing the performance of subsequent chemical and biological treatment processes. The tank also allows for initial settling of suspended matter.

4. pH Correction

The effluent then undergoes pH adjustment in a dedicated pH correction tank. Here, acidic or alkaline effluents are neutralized by dosing appropriate chemicals such as lime or acid to bring the pH within the desired range (typically 6.5 to 8.5). Maintaining optimal pH is critical for the effectiveness of chemical coagulation and biological degradation processes.

5. Chemical Coagulation (Flash Mixer Tank)

In the flash mixer, coagulants such as alum or ferric chloride are rapidly mixed with the effluent. The purpose is to destabilize colloidal and finely suspended particles by neutralizing their surface charges, allowing them to come together in the next stage.

6. Flocculation (Flocculator Tank)

The effluent then flows into the flocculator tank, where gentle agitation promotes the formation of larger and denser flocs from the destabilized particles. These flocs are easier to settle and separate in the sedimentation tank. This step significantly improves the clarity of the effluent.

7. Primary Settling (Primary Settling Tank)

In the primary settling tank, the flocs formed during flocculation settle by gravity, allowing for the separation of solid particles from the liquid. This step removes a significant portion of total suspended solids (TSS) and helps reduce the organic load (BOD/COD) in the effluent.

8. Biological Treatment (Aeration Tank)

The partially treated effluent is then directed to the aeration tank, where it undergoes aerobic biological treatment using the activated sludge process. In this tank, air is diffused into the effluent to promote the growth of microorganisms that degrade organic pollutants. This process significantly reduces BOD and COD levels, making the effluent suitable for discharge or reuse.

9. Secondary Settling (Secondary Settling Tank)

After aeration, the effluent enters the secondary settling tank, where biological solids (activated sludge) are allowed to settle. The clear supernatant (treated water) is separated, while a portion of the settled biomass is recirculated back to the aeration tank, and the excess sludge is collected for further disposal.

10. Tertiary Treatment (Filtration Units)

The clarified effluent is then passed through tertiary treatment units comprising:

- **Pressure Sand Filter (PSF):** Removes residual suspended solids and turbidity.
- **Activated Carbon Filter (ACF):** Adsorbs organic compounds, odors, and color from the effluent.

This stage ensures that the treated effluent meets the stringent discharge norms and is aesthetically acceptable for reuse, if/where required.

11. Treated Water Storage (Treated Water Tank)

The final treated water is stored in a treated water tank. This water can be reused for secondary applications such as floor washing, landscaping, or process reuse, depending on the quality. If not reused, it is safely discharged in compliance with regulatory standards.

12. Sludge Management

Sludge generated from the primary and secondary settling units is periodically removed and transferred to sludge drying beds or dewatering units. The dried sludge is then handled and disposed of as per the norms prescribed by the regulatory authorities to avoid secondary pollution.

The proposed ETP ensures effective treatment of the entire 10 KLD effluent generated from the unit. By integrating mechanical, chemical, and biological treatment processes, the system guarantees compliance with prescribed environmental standards, contributing to sustainable industrial operations and resource conservation.

Table 0.25. Inlet and Outlet Characteristics of Process Wastewater Stream (Refer TNPCB issued CTO/CTE)

Parameter	Unit	Inlet	Outlet	Standard as per CPCB
pH	–	9.0–10.0	7.0–8.0	5.5–9.0
TDS	mg/l	1800–2500	<2100	2100
TSS	mg/l	100–150	<100	100
BOD	mg/l	<20	<10	30
Temperature	°C	+7–10°C above ambient	<5°C above ambient	Shall not exceed 5°C above receiving water temp
Chlorides (as Cl)	mg/l	400–600	<1000	1000
Oil & Grease	mg/l	<10	<10	10

ETP Flow Chart

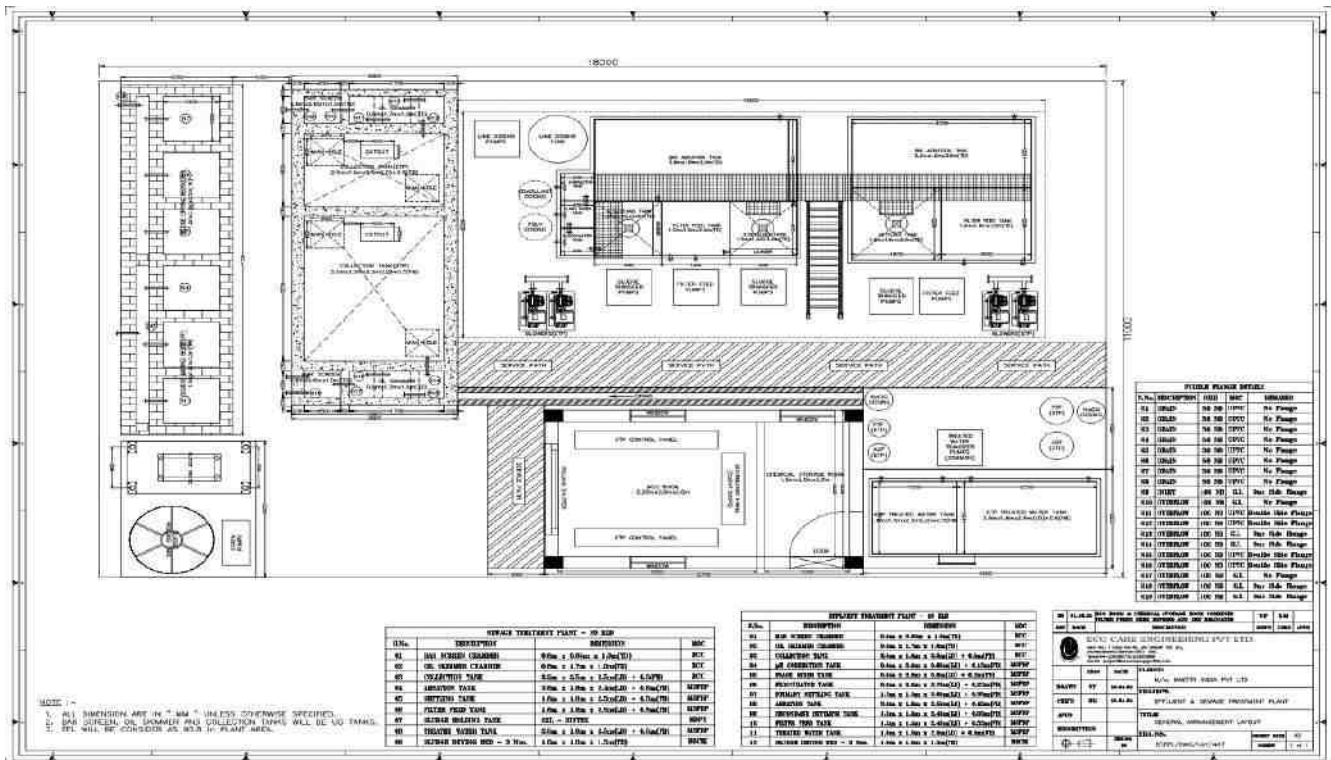


Figure 0.16. ETP Flow Diagram

2.13.2 Details of Sewage Treatment Plant

The proposed sewage treatment plant (STP) of 20 KLD capacity is designed to handle domestic wastewater generated from staff facilities, utilities, and sanitation infrastructure. The treatment system ensures that the sewage is effectively treated to meet the applicable disposal standards prescribed by the Central/State Pollution Control Board.

The STP follows a sequential treatment process combining physical removal, biological treatment, and tertiary polishing, as outlined below:

1. Screening (Bar Screen Chamber)

The sewage first enters the bar screen chamber, where coarse solids such as paper, rags, and floating materials are removed. This preliminary treatment prevents clogging and protects mechanical equipment downstream.

2. Equalization and Collection (Collection Tank)

The screened sewage is then conveyed to a collection tank, which serves to equalize flow and load variations. This tank helps maintain a steady flow for efficient performance of biological and filtration units. It also allows initial settling of grit and inert solids.

3. Biological Treatment (Bio-Aeration Tank)

From the collection tank, the sewage flows into the bio-aeration tank, where it undergoes aerobic biological treatment. Air is diffused into the tank to promote microbial activity that breaks down organic pollutants (mainly BOD and COD). This stage significantly improves effluent quality and reduces the organic load.

4. Secondary Clarification (Settling Tank)

The aerated sewage then passes into the settling tank (also called the secondary clarifier), where the biomass (biological sludge) settles by gravity. Clear supernatant overflows from the top, while settled sludge is collected at the bottom for periodic removal.

5. Intermediate Storage (Filter Feed Tank)

The clarified water is collected in a filter feed tank, which acts as a buffer before tertiary treatment. This ensures a consistent flow to the filtration units and provides additional retention time for residual solids.

6. Tertiary Treatment – Filtration Units

The tertiary stage involves dual filtration to ensure high-quality treated water:

- **Pressure Sand Filter (PSF):** Removes fine suspended particles and turbidity.
- **Activated Carbon Filter (ACF):** Adsorbs organic compounds, color, and odor to further polish the treated water.

These units improve the aesthetic and physico-chemical properties of the effluent.

7. Treated Water Storage (Treated Water Tank)

The final treated water is stored in a treated water tank, typically a 5 KL Syntex-type tank. The treated water can be reused for non-potable applications such as toilet flushing, gardening, floor washing, or can be safely discharged in compliance with environmental norms.

8. Sludge Handling

Sludge generated from the biological and settling processes is periodically removed and may be dewatered using drying beds or other suitable methods. The dried sludge is disposed of as per regulatory guidelines.

The 20 KLD STP, ensures sustainable and effective treatment of domestic wastewater through a combination of physical, biological, and tertiary processes. The treated sewage will meet disposal/reuse standards, contributing to water conservation and minimizing environmental impacts.

Table 0.26. Inlet and Outlet Characteristics of Sewage Treatment Plant

Parameters	Units	STP Inlet	STP Outlet	As Per CPCB Standard
pH	–	6.5 – 8.5	7.0 – 8.0	5.5 – 9.0
Suspended Solids	mg/l	200 – 350	<30	30
BOD	mg/l	250 – 350	<20	20
COD	mg/l	400 – 500	<100	<100
Oil & Grease	mg/l	10 – 20	<10	10

STP Flow Chart

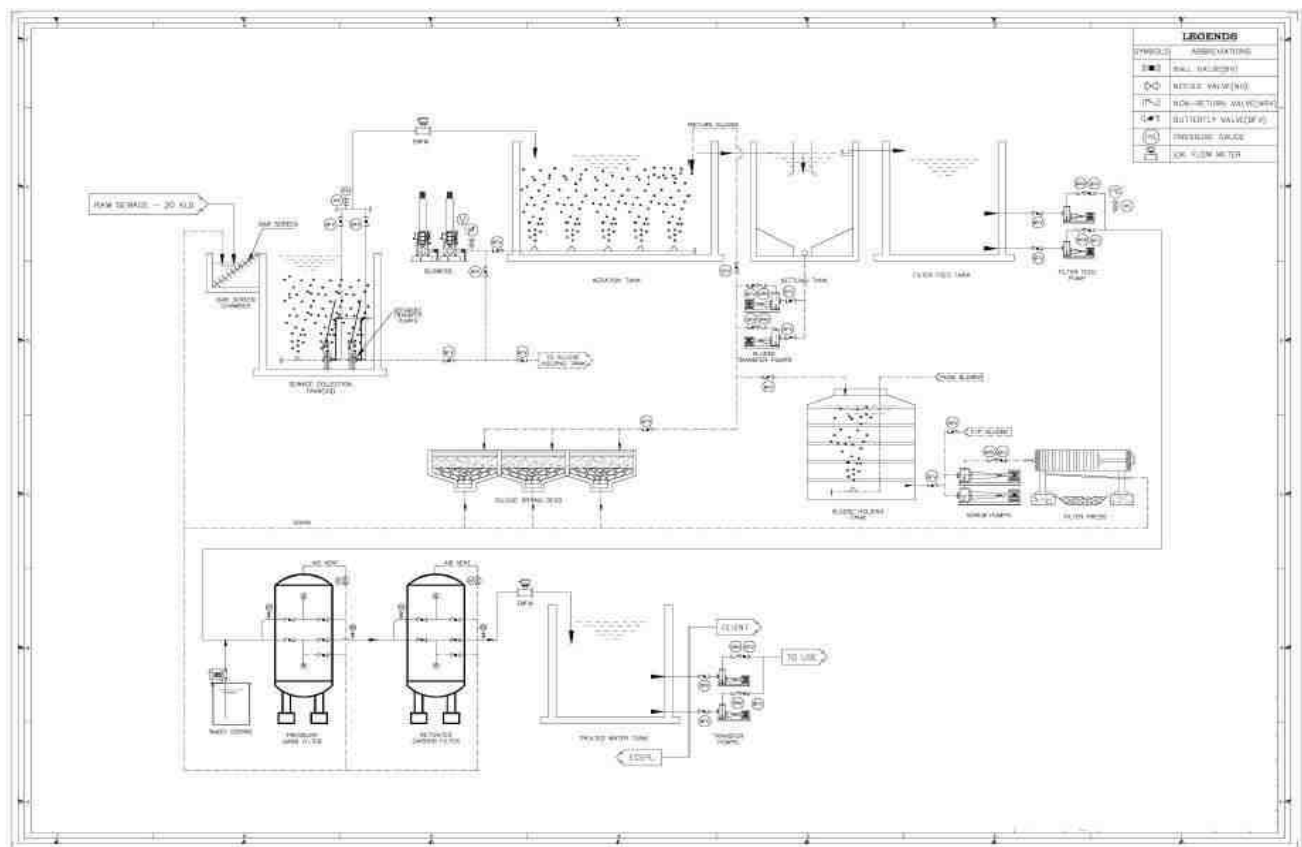


Figure 0.17. STP Flow Diagram

2.14 Noise Management

- There is noise generation due to the movement of vehicles carrying construction materials and as this is only a temporary phenomenon, it will be managed by properly regulating the movement of vehicular traffic so that the ambient noise quality is not getting adversely affected.
- All the machinery and equipment will be regularly maintained to reduce the noise level.
- DG set having capacity of 1500 KVA is available and proposed 1x 1500KVA during expansion it will be installed acoustically enclosed.
- Barricading of 3 m will be provided in order to reduce noise impacts outside the project boundary.

2.15 Solid and Hazardous Waste Management

2.15.1 Municipal Solid Waste

The municipal solid waste management and management is given.

Table 0.27. Municipal Solid Waste Generation and Management

S. No.	Description	Unit	Quantity of Waste*				Disposal
			Existing	Proposed	After Expansion	Total	
1	Biodegradable	Kg/Day	13.5	115	76	191	Used as a manure after Composting
2	Non-Biodegradable	Kg/Day	9.0	76	52	128	Disposed through TNPCB Authorized agencies
Total		Kg/Day	22.5	191	128	319	

*Note: 0.45 kg/day is considered as per CPHEEO manual.

2.15.2 Hazardous and Non-Hazardous waste Generation and Management

Used or spent oil, Wastes or residues containing oil, Empty barrels/containers/liners contaminated with hazardous chemicals /wastes and ETP Sludge are the major hazardous wastes generated by the project. Hazardous waste generation and Disposal Details are provided. Non-Hazardous waste generation and Management details are provided.

Table 0.28. Hazardous waste generation and Management

S. No.	Description	Unit	Quantity*			Activities for which Authorization is issued	Disposal
			Existing	Proposed	After Expansion		
1	5.1-Used or spent oil	TPA	5	15	20	Generation, Collection, Storage and Disposal	Sent to Authorized Recycler
2	5.2-Wastes or residues containing oil	TPA	5	15	20	Generation, Collection, Storage and Disposal	Sent to Authorized Recycler

* Note: As per HWM Rules, 2016

2.15.3 Other Wastes

Construction Waste

Table 0.29. Details of Construction Waste Generation

Particulars	Unit	Existing	Proposed	Total	Disposal
Construction Waste	TPA	-	150	150	Disposal will be carried out as per construction and demolition waste management rules 2016

Battery Waste

Table 0.30. Details of Battery Waste Generation

Particulars	Unit	Existing	Proposed	Total	Disposal
Lead Acid Battery	TPA	0.10	0.05	0.15	Authorized recyclers and vendors

E-Waste

Table 0.31. Details of E-Waste Generated

Particulars	Unit	Existing	Proposed	Total	Disposal
Electronic items	TPA	1.08	1.44	2.52	Authorized recyclers and vendors

Bio-Medical Waste

Table 0.32. Details of Bio-Medical Waste Generated

Particulars	Unit	Existing	Proposed	Total	Disposal
Waste from First Aid Activities	TPA	0.3	0.2	0.5	Disposal to authorized bio medical waste disposal facility.

2.16 Green Belt Development

The project area is a total of 8.094 ha. (20 Acres), the green belt developed is 2.023 ha (5acres) making it 25% of the total project area. An additional 10% of the project area is developed in the OSR area (area within the SIPCOT Zone) thus making a total of 35% of the project area. Presently about 1393 number of plants have been planted along the project boundary. About 1650 numbers of trees are required to be planted within the saplings and will be planted in phase wise manner within a year. An Amount of Rs. 4,50,000 Lakhs are earmarked for the proposed greenbelt under capitalcost.



Figure 0.18. Green Belt Photographs (Existing)

Greenbelt Development was developed with 1393 Nos around the boundary of the project site. Approximately 1650 Number of trees are required to be planted within the premises, as per CPCB Norms 1500/ Hectares. The remaining trees (1650 Nos) will be planted in phase manner within a year. The existing greenbelt details are shown. Proposed Greenbelt details are provided.

Table 0.33. Details of Existing & Proposed Greenbelt

S. No.	Description Scientific Name	Common name	Unit	No. of Trees Existing	No. of Trees Proposed	No. of Trees After Expansion
1.	Plumeria Alba	White Champa	Nos	100	0	100
2.	Plumeria dwarf	Chameli	Nos	60	0	60
3.	Conocarpus big	Buttonwood Mangrove	Nos	50	0	50
4.	Foxtail	German millet	Nos	40	0	40
5.	Terminaliya	Green Metallic Silver Tree	Nos	10	0	10
6.	Bismarkea Palm	Bismarck Palm	Nos	3	0	3
7.	Conocarpus	Silver Buttonwood	Nos	830	0	830
8.	Tabebuia Rosea	Trumpet Tree	Nos	60	0	60
9.	Spathodia	African tulip tree	Nos	60	0	60
10.	Mahogany	Honduran mahogany	Nos	60	0	60
11.	Pungamia	Indian beech	Nos	60	0	60
12.	Terminalia arjuna	Arjun tree	Nos	60	0	60

13.	Amorphophallus paeoniifolius	Elephant foot yam	Nos	60	0	60
14	Azadirachta indica	Neem	Nos	0	550	550
15	Thespesia populnea	Puvarasu	Nos	0	350	0
16	Ficus religiosa	Arasa maram	Nos	0	40	0
17	Madhuca longifolia	Elupai	Nos	0	350	0
18	Calophyllum inophyllum	Punnai	Nos	0	350	0
19	Albizia lebbeck	Vagai	Nos	0	250	
20	Lannea coromandelica	Odhiya maram	Nos	0	100	0
Total			Nos	1393	1690	3083

2.17 Rainwater Harvesting & Storm Water Management

Objectives:

- To maximize the roof water collection into large sumps and to reuse within the facility to the maximum extent, thereby reducing the freshwater withdrawal from underground sources.
- To channelize excess rooftop water, rainwater falling over paved & road areas through a garland network to maximize recharging the under-groundwater aquifer.
- To ensure maximum percolation in the undeveloped areas and excess if any, to be collected and disposed/percolated as much as possible.
- In the event of high intensity rainfall, to have a designed storm water collection and disposal mechanism to prevent water logging within the plant area.

Parameters of Rainwater Harvesting Potential-

1. Average rainfall: 1330.61mm
2. Peak intensity: 10.42 mm/hr
3. Average no. of rainy days: 140 days
4. **Soil type:** Lateritic Soil (rocky, sandy with gravel stones)
5. **Soil infiltration rate:** 3.72 - 9.47 inches per hour

Scheme for Ground Water Recharging

A rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and tanks for ground water recharge. As the proposed facility will comprise only the roof top rain water for ground water recharge. The runoff from the first spell of rain carries a relatively larger amount of pollutants from the air and catchments surface so the system will be provided with a filtration pit consists of the layers of sand, gravel and pebbles of relevant sizes to remove the removable impurities from the runoff water from the rooftop.

Benefits of Rainwater Harvesting

- Rainwater harvesting from the roof -top provides an avenue for collection & reuse with lighter filtration which in turn will reduce the consumption of fresh water
- Rainwater on the paved areas and other developed areas can be channelised and recharge through online Recharge pits
- Structured garland Storm water drain will be avoiding the flooding of low-lying areas in the factory premises.

Rainwater may be charged into the groundwater aquifers through any suitable structures like recharge pits. The size of the Percolation pit and Recharge trench are made to meet the recharging capacity designed based on soil infiltration and Groundwater level at site, and complying with the conditions of Ground water permission.

A rainwater harvesting system comprises components for transporting rainwater through pipes or drains, filtration, and pits for groundwater recharge. The proposed facility will comprise the roof top rainwater for collection and reuse; the runoff from the first spell of rain carries a relatively larger amount of solid particle over the catchments surface, and dust from air; hence, rooftop rainwater will be subjected to filtration through layers of a series of sand, gravels and pebble (mixed Grain) of relevant sizes to remove the removable impurities.

Groundwater Recharge: Excess Roof top rainwater after harvesting and recharging the aquifer can be diverted to the existing open / bore well after filtration. Along with this, rainwater available in the open spaces around the building may be recharged into the ground through the simple effective methods such as Percolation pits or Recharge Trench.

Meteorological Data :

The average annual rainfall in Tiruvallur District is 1330.61 mm, influenced predominantly by seasonal monsoon activity. The rainfall distribution across different seasons is as follows:

Summer Season (January – February): The district receives approximately 41.00 mm of rainfall, accounting for 3.1% of the total annual rainfall.

Summer Season (March – May): Rainfall during this period is around 59.80 mm, contributing 4.5% to the annual total.

Southwest Monsoon (June – September): This season brings about 493.43 mm of rainfall, which constitutes 37.1% of the total.

Northeast Monsoon (October – December): The major share of rainfall occurs during this period, with 736.38 mm, amounting to 55.3% of the yearly precipitation.

This data clearly indicates that the northeast monsoon is the primary contributor to rainfall in Tiruvallur District, followed by the southwest monsoon, highlighting a typical bimodal monsoon pattern prevalent in the region.

Estimation of Rainwater Harvested:

Estimation of harvestable rainwater can be done in many methods. Use of run-off coefficient is one of the simplest methods to assess the quantity of rain water harvested within the area. The effective rainfall is such that the amount of rainfall which can build up surface runoff after satisfying the soil moisture requirement and evaporation loss. It is assumed that about 85% total rainfall is considered to be the effective rainfall.

The details of the incremental run offs on account of the proposed development and the rain water harvesting measures are detailed in the subsequent pages.

The average rainfall for last 18 years of Tiruvallur District is 1330.61mm (Source: Tiruvallur District Statistical Handbook –2023-24)

Table 0.34. Average Rainfall of Tiruvallur District

S.No	Season	Normal Rainfall (mm)	Percentage (%)
1.	Winter (Jan – Feb)	41.00	3.1
2.	Summer (March – May)	59.80	4.5
3.	Southwest Monsoon	493.43	37.1
4.	Northeast monsoon	736.38	55.3
Total Rainfall		1330.61	100%

The maximum rainfall in a day was recorded around 25 cm. Most of the year, the Tiruvallur District is dry & sunny.

According to the above table & dry weather, most of the rainwater will be absorbed by the soil itself & no runoff. The only rainwater runoff that takes place during Northeast monsoon that too maximum rainfall in a day reaches above 25 cm will observe most of the rainwater.

From the above the rainfall in winter, summer & south west monsoon rain water will be

absorbed into soil due to dry weather conditions so there will not be any run-off.

During North East monsoon there will be a run off so the rain fall quantity is calculated below :

Total Site Area (A): 80,937.10m²=8.0937 hectares

Land Use Classification (Surface Types)

The site is categorized into various surface types, each with a specific runoff coefficient (C) that determines the proportion of rainfall that becomes runoff. The effective area for runoff calculation is derived by multiplying the surface area by its respective coefficient

Table 0.35. Runoff calculation for site

Surface Type	Area (m ²)	Coefficient (C)	Effective Area (C × A) (m ²)
Conventional Roof	-	0.95	1,511.02
Metal Roof	19,687.80	1.00	19,687.80
Roads & Pavement (Asphalt)	14,543.38	0.95	13,816.21
Vegetation Area	25,810.84	0.20	5,162.17
Future Expansion Area	14,459.33	0.20	2,891.87
Utility Areas (ETP, STP)	8,445.20	0.95	8,020.94
Total	80,937.10		47,090.01

General Runoff Estimation (Based on 2-day Rainfall)

This section estimates the total volume of runoff generated from an average 2-day rainfall event.

Average Rainfall (2 days): 70mm=0.07m

Total Rainfall Volume(V):

$V = \text{Rainfall (m)} \times \text{Area (m}^2\text{)}$

$V = 0.07 \times 80,937.10$

$$=5,665.60\text{KL}$$

Runoff Volume using Coefficient Method (Q):

$$Q=\Sigma(C_i \times A_i) \times \text{Rainfall}$$

$$Q=47,090.01 \times 0.07$$

$$=3,296.30\text{m}^3$$

$$\approx 3,296.30\text{KL}$$

Peak Runoff (Rational Method – CPHEEO)

The Rational Method is used to calculate the peak runoff rate, which is crucial for designing drainage systems.

Formula:

$$Q=360C \times I \times A$$

Where:

- Q = Runoff in m^3/sec
- C = Weighted Runoff Coefficient
- I = Intensity of rainfall in mm/hr
- A = Drainage area in hectares

Weighted Runoff Coefficient (C):

$$C=47,090.01\text{m}^3/280,937.10\text{m}^2$$

$$=0.582$$

Rainfall Intensity (I): 10.42mm/hr

Area (A): 8.0937 hectares

Peak Runoff (Q):

$$Q=0.582 \times 10.42 \times 8.0937 / 360$$

$$=1.361\text{m}^3/\text{sec}$$

Runoff per hour ($Q_{1\text{hr}}$):

$$Q_{1\text{hr}}=1.361 \times 3600$$

$$=4,899.60\text{m}^3/\text{hr}$$

First Flush Loss (15%):

$$=0.15 \times 4,899.60. = 734.94\text{m}^3$$

Net Available Runoff for Collection:

$$=4,899.60 - 734.94. =4,164.66\text{m}^3/\text{hr}$$

Rainwater Harvesting Infrastructure

The project incorporates various structures for rainwater harvesting and management.

Percolation/Recharge Pits

These pits are designed to collect and infiltrate rainwater back into the ground, recharging the groundwater

Table 0.36. Runoff volume calculation for site

Parameter	Value
No. of Pits	48
Effective Volume per Pit	~21.64m ³
Total Volume	1,038.72m ³ ≈1,052.78KL

Stormwater Drains with Holding Capacity

The stormwater drainage system is designed not only to convey water but also to provide a temporary holding capacity, reducing immediate discharge.

Table 0.37.Details of Storm water Drains with holding Capacity

Drain Type	Dimensions (L × W × D in m)	Volume (m ³)
Red	328×0.60×0.55	108.24
Blue	518×0.75×0.70	271.95
Purple	418×0.90×0.85	319.77
Brown	96×1.20×1.15	132.48
Total		832.44KL

Summary of Storage Capacity vs. Rainfall Volume

This section compares the total available storage capacity of the proposed infrastructure with the estimated runoff volume from a 70 mm rainfall event.

Table 0.38. Details of Storage Capacity vs Rainfall volume

Component	Capacity (KL)
Percolation Pits (48 Nos)	1,052.78
Stormwater Drains	832.44
Total Storage Available	1,885.22

Total Runoff from 70 mm Rainfall: 3,296.30KL

Surplus Capacity: $3,296.30 - 1,885.22 = 1,411.08\text{KL}$

Rainwater Harvesting Efficiency

The efficiency of the rainwater harvesting system is calculated as the ratio of the available storage capacity to the estimated runoff volume.

Efficiency = $(\text{Runoff Storage}) \times 100$

Using the values provided:

- Storage: 1,885.22KL
- Runoff: 3,296.30KL

Efficiency = $(1885.22 / 3296.30) \times 100 \approx 57.2\%$

Flood Mitigation

The design and implementation of the rainwater harvesting and stormwater management systems are intended to ensure effective flood mitigation and sustainable water management on-site.

- Rainfall events exceeding 70mm are rare, typically occurring only 2–3 times a year, primarily during the Northeast monsoon season.
- The total designed storage capacity of the rainwater harvesting infrastructure is strategically planned to manage the projected runoff volumes.
- The project is committed to a zero discharge policy for rainwater. This is achieved through a combination of on-site storage and infiltration mechanisms.
- This comprehensive approach ensures that there will be no waterlogging or flooding within the unit site or in the adjacent areas, contributing to environmental sustainability and operational efficiency.

2.18 Compliances for CREP Recommendation

CREP recommendations are being implemented and summarized below:

Specific water consumption is less than 8 m³/t.

- Online monitoring facilities provided.
- Waste management systems are implemented.

10% reduction in freshwater requirement with the reuse of treated sewage and treated effluent

3.1. Introduction

To cover environmental baseline studies, following aspects have been covered :-

The baseline data is generated through field study within the impact zone (Core Zone and Buffer Zone) for various components of the environment viz. Air, Noise, Soil, Water, Land, Ecology and Socioeconomic. The baseline environmental studies have been done from **April 2025 to June 2025** by M/s Perfect Researchers Pvt. Ltd. in a study area of 10 km radius from the project site. While generating the baseline status of the physical and biological environment of the study area, the concept of impact zone has been considered. The impact zone selection is based on preliminary screening and modeling studies. The data collection during Field Survey and Site Visit had been done as given below:

- Primary monitoring of key environmental parameters like Air, Noise, Soil, Water, Land, Ecology and Socio-Economic survey during the post monsoon season.
- Consultation with local people, government departments such as the Forest department, Panchayats etc.
- Literature review on secondary information available for the study area.

3.2. Base Maps of the Area

3.2.1. Google Image of the Project Site

Map showing Study area & Close view of the study area with 0.5 km Buffer radius is given below.



Figure 0.1. Study Area Map (0.5 km radius)

3.2.2. Topographical Map

Topographical Map with 10 km radius is already given at Section No. 2.3.2.

3.2.3. Accessibility Map for Environmental Monitoring



Figure 0.2. Accessibility Map 1 km

Proposed Expansion in Saleable casting products from 27,500 TPA to 95,040 TPA within the existing plot area
at S.F No 32/2, Plot No A-3/1, SIPCOT Industrial Park, Thervoykandigai, Gummidipoondi, Tiruvallur,
Tamil Nadu-601202



Figure 0.3. Accessibility Map 2 km

3.2.4. Village Map

Village Map with 10 km radius is given below:



Figure 0.4. Village Map of the Study Area

3.3. Methodology of Baseline Data Collection

Table 0.1. Methodology of Baseline Data Collection

Sr. No.	Functional Area	Methodology
1.	Micro-Meteorological Data	Site specific Micro-Meteorological Data has been used for the study. The important parameters considered are temperature, humidity & wind speed.
2.	Ambient Air Quality	The ambient air quality monitoring was done to assess the ambient air quality in the April 2025 to June 2025. The guidelines for selections of ambient air monitoring stations given in IS – 5182(part 14), 2000 were followed.
3.	Water Quality	To assess the water quality of the proposed area, Grab, Composite sampling done for water sample collection. Water samples were taken as per the Standard Methods (IS & APHA, 23 rd Edition 2017). Necessary precautions were taken for the preservation of samples. The physical parameters

		viz. pH, temperature and conductivity were measured at site using a portable water analyser.
4.	Ambient Noise Quality	At each station noise level was monitored for 24-hours. For each measurement, dB (A) readings were taken for every 15 minutes for 24 hrs once in a season to get Leq values.
5.	Soil Quality	Augur method was used for soil sampling and samples were collected at 15 cm depth after removing the upper crust.
6.	Topography, Land-form and Land Use	The land use/ land cover map has been generated on a 1:50,000 scale using Satellite imagery, topographical maps, Survey of India and ground truth information.
7.	Biological Environment	Primary and secondary data collection has been done by the Ecology and Biodiversity team for the study of flora and fauna in the core and Buffer Zone.
8.	Socio Economic Environment	For demography and socioeconomics, block wise data has been collected and used for the assessment of impacts.

3.4. Meteorology

Before dwelling on the various aspects of air quality, it would be in the fitness of things to discuss the meteorological status of the area as the dispersion of fugitive emission depends largely on the meteorological conditions of the area. The selection of sampling stations is mainly guided by the predominant wind direction during the monitoring season in the area.

3.4.1 Climatic Conditions (As per Indian Meteorology Department Data at Chennai)

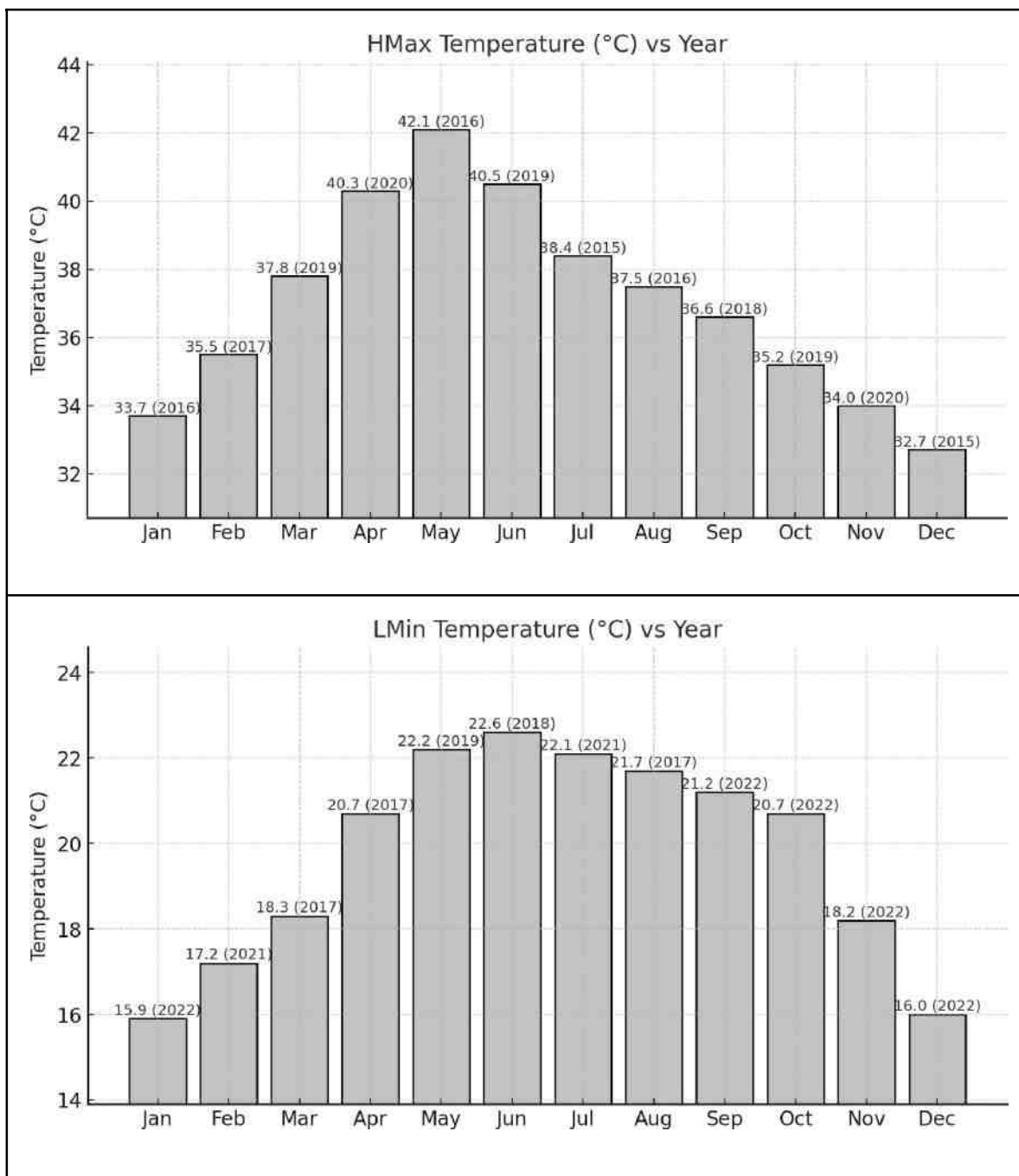
The Important parameters considered are temperature, Humidity, Wind Speed, Wind Direction and Rainfall. The extract of Maximum, Minimum values (month wise) of above said parameters from MERRA-2 meteorological data, Tamil Nadu of the last twelve years (2015-2022) are given in the below table,

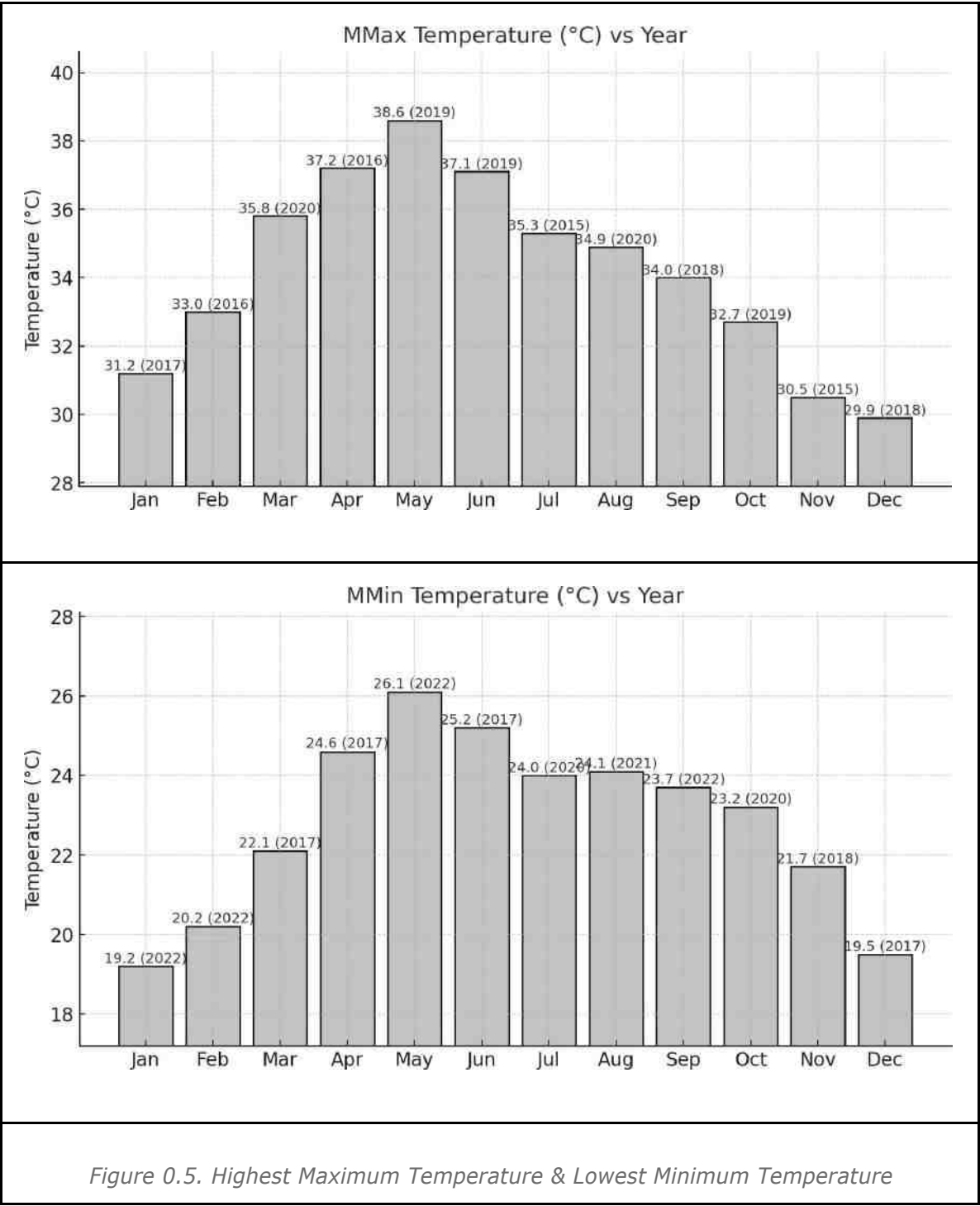
3.4.2 Temperature

The maximum temperature of the area was recorded as 42.1 °C whereas the minimum temperature of the area was recorded as 17.2 °C. Data of the maximum and minimum temperature are given below.

Table 0.2. Temperature

Month	Temperature (°C)							
	Year	HMax	Year	LMin	Year	MMax	Year	MMin
January	2016	33.7	2022	17.9	2017	31.2	2022	21.2
February	2017	35.5	2021	17.2	2016	33.0	2022	20.2
March	2019	37.8	2017	18.3	2020	35.8	2017	22.1
April	2020	40.3	2017	20.7	2016	37.2	2017	24.6
May	2016	42.1	2019	22.2	2019	38.6	2022	26.1
June	2019	40.5	2018	22.6	2019	37.1	2017	25.2
July	2015	38.4	2021	22.1	2015	35.3	2020	24.0
August	2016	37.5	2017	21.7	2020	34.9	2021	24.1
September	2018	36.6	2022	21.2	2018	34.0	2022	23.7
October	2019	35.2	2022	20.7	2019	32.7	2020	23.2
November	2020	34.0	2022	18.2	2015	30.5	2018	21.7
December	2015	32.7	2022	16.0	2018	29.9	2017	19.5



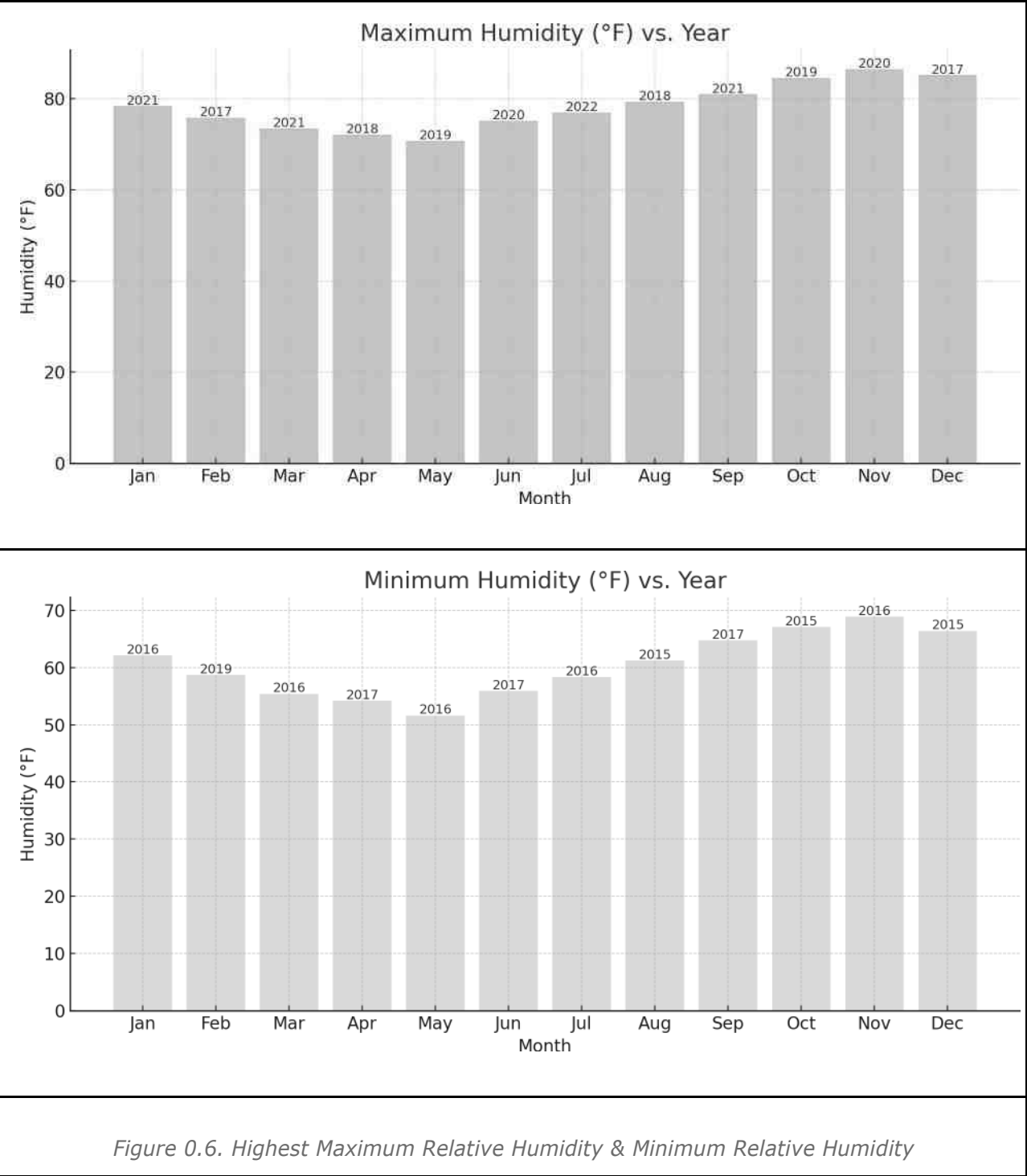


3.4.3 Relative Humidity

The Maximum relative humidity was recorded as 86.5 %. Minimum relative humidity was recorded as 51.6 %.

Table 0.3. Relative Humidity

Month	Humidity (%)			
	Year	Max	Year	Min
January	2021	78.4	2016	62.1
February	2017	75.9	2019	58.7
March	2021	73.5	2016	55.4
April	2018	72.1	2017	54.2
May	2019	70.8	2016	51.6
June	2020	75.2	2017	55.9
July	2022	77.0	2016	58.3
August	2018	79.4	2015	61.2
September	2021	81.0	2017	64.7
October	2019	84.6	2015	67.1
November	2020	86.5	2016	68.9
December	2017	85.2	2015	66.4

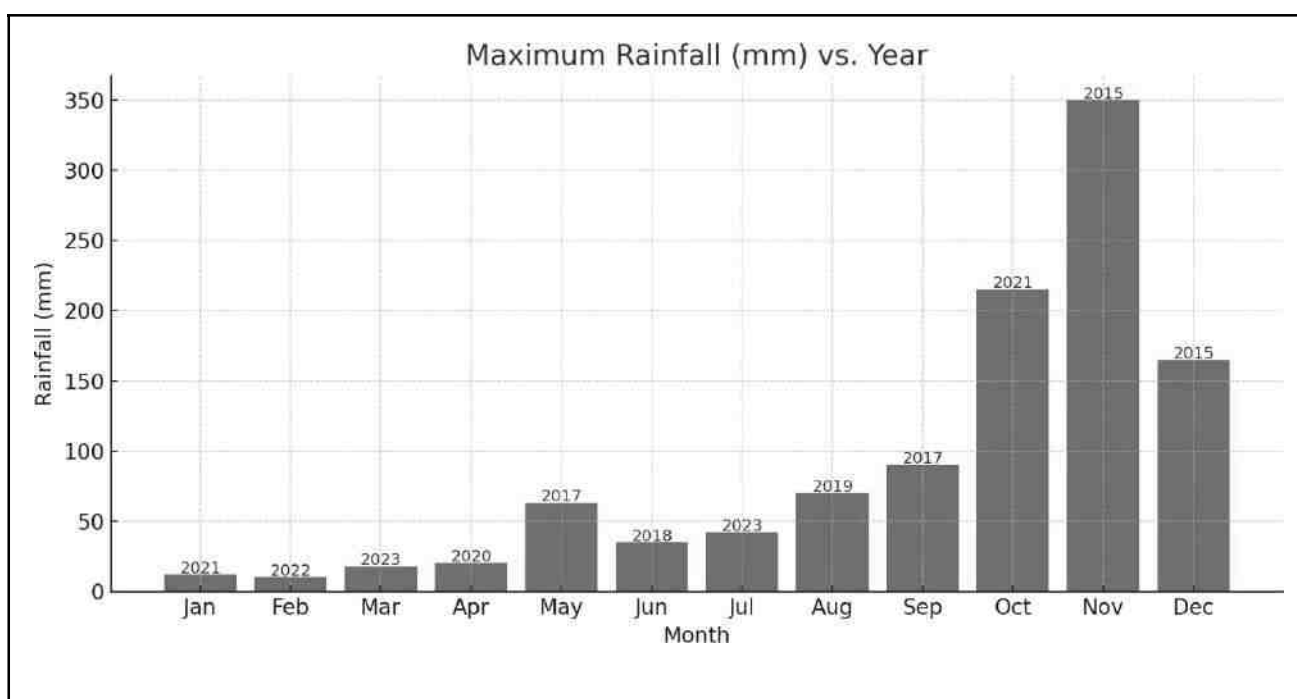


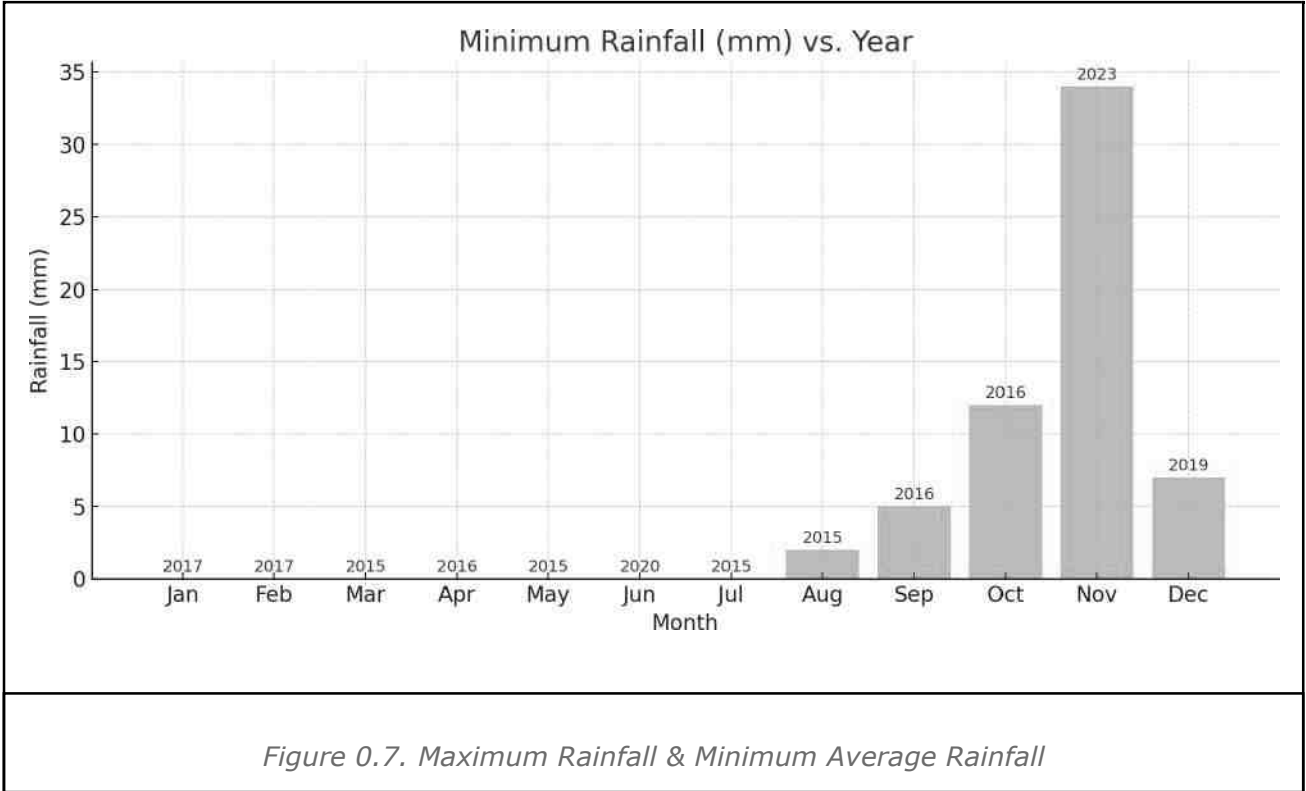
3.4.4 Rainfall

The maximum rainfall was recorded in November /December. From data it is clear that the maximum time of year remains Monsoon months, July to December are the wettest months and are considered the monsoon season. The Average Annual Rainfall is 1102.69 mm/annum.

Table 52. Rainfall

Month	Rainfall (mm)				
	Year	Max	Year	Min	Average
January	2021	12	2017	0	4
February	2022	10	2017	0	3
March	2023	18	2015	0	5
April	2020	20	2016	0	8
May	2017	63	2015	0	17
June	2018	35	2020	0	12
July	2023	42	2015	0	15
August	2019	70	2015	2	24
September	2017	90	2016	5	28
October	2021	215	2016	12	76
November	2015	350	2023	34	124
December	2015	165	2019	7	55





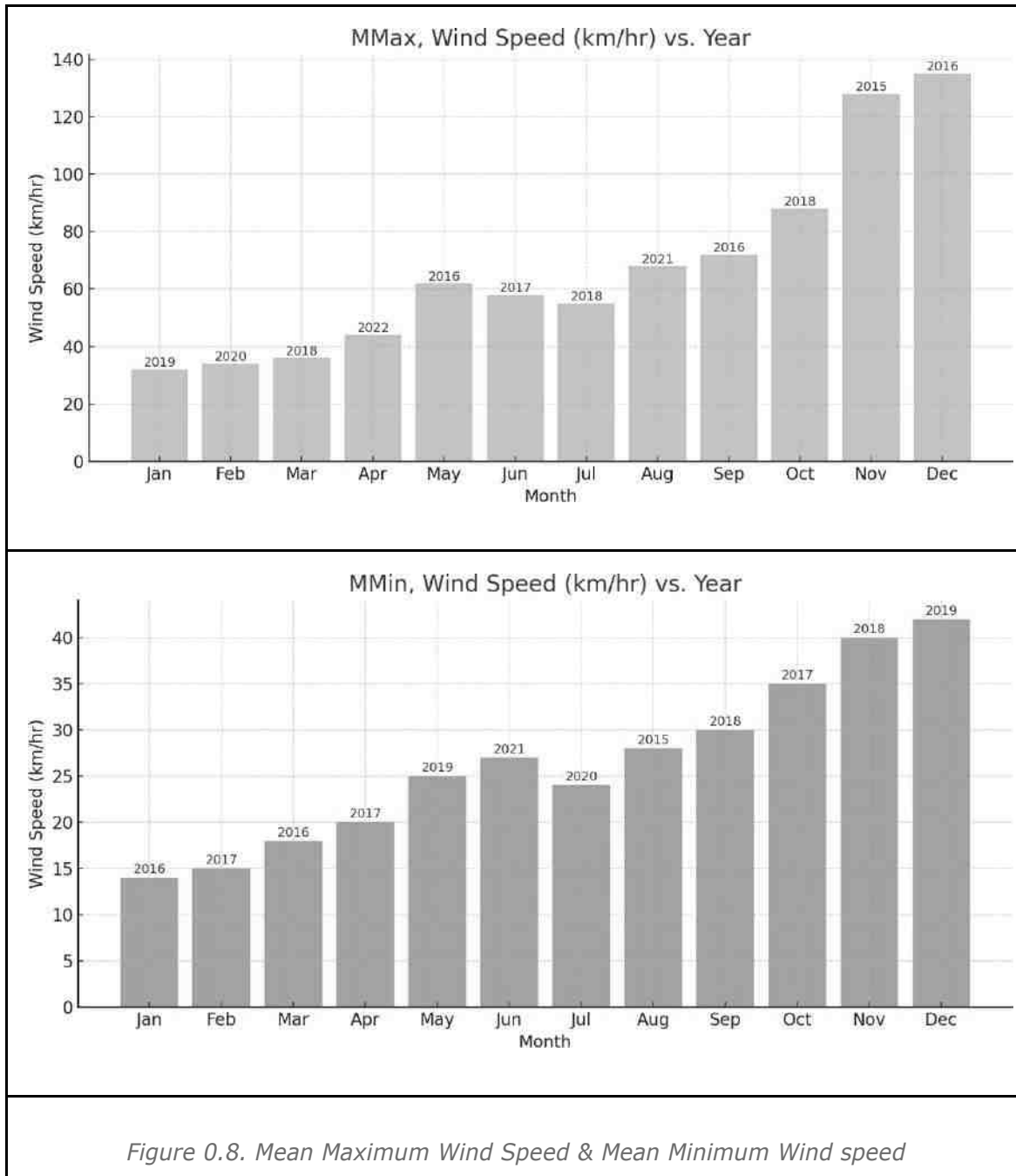
3.4.5 Wind Speed

The maximum wind speed was recorded up to 50 kmph and minimum wind speed was recorded up to 14 kmph in Summer .

Table 0.4. Wind Speed

Month	Wind speed (km/hr)			
	Year	MMax	Year	MMin
January	2017	20	2017	14
February	2017	22	2016	15
March	2018	25	2015	16
April	2019	30	2017	18
May	2017	40	2016	20
June	2018	45	2017	21
July	2018	42	2020	22
August	2019	48	2015	24

September	2017	50	2018	26
October	2017	48	2015	28
November	2017	25	2018	35
December	2017	35	2016	38



3.4.6 Wind Direction

Table 0.5. Wind Direction

Month	Wind Direction	
	Direction	Calm
January	WNW	18
February	WNW	15
March	E	12
April	SE	9
May	SW	6
June	SW	5
July	SW	4
August	SW	5
September	SW	7
October	WNW	10
November	WNW	14
December	WNW	17

The predominant wind direction is from NW. The season wise predominant wind directions are given below:

Table 0.6. Seasonal Direction

Season	Predominant Wind Direction
Winter	West -NorthWest
Summer	South-East
Post Monsoon	West-NorthWest

3.4.7 Onsite Season Specific Measured Micro-Meteorological Data

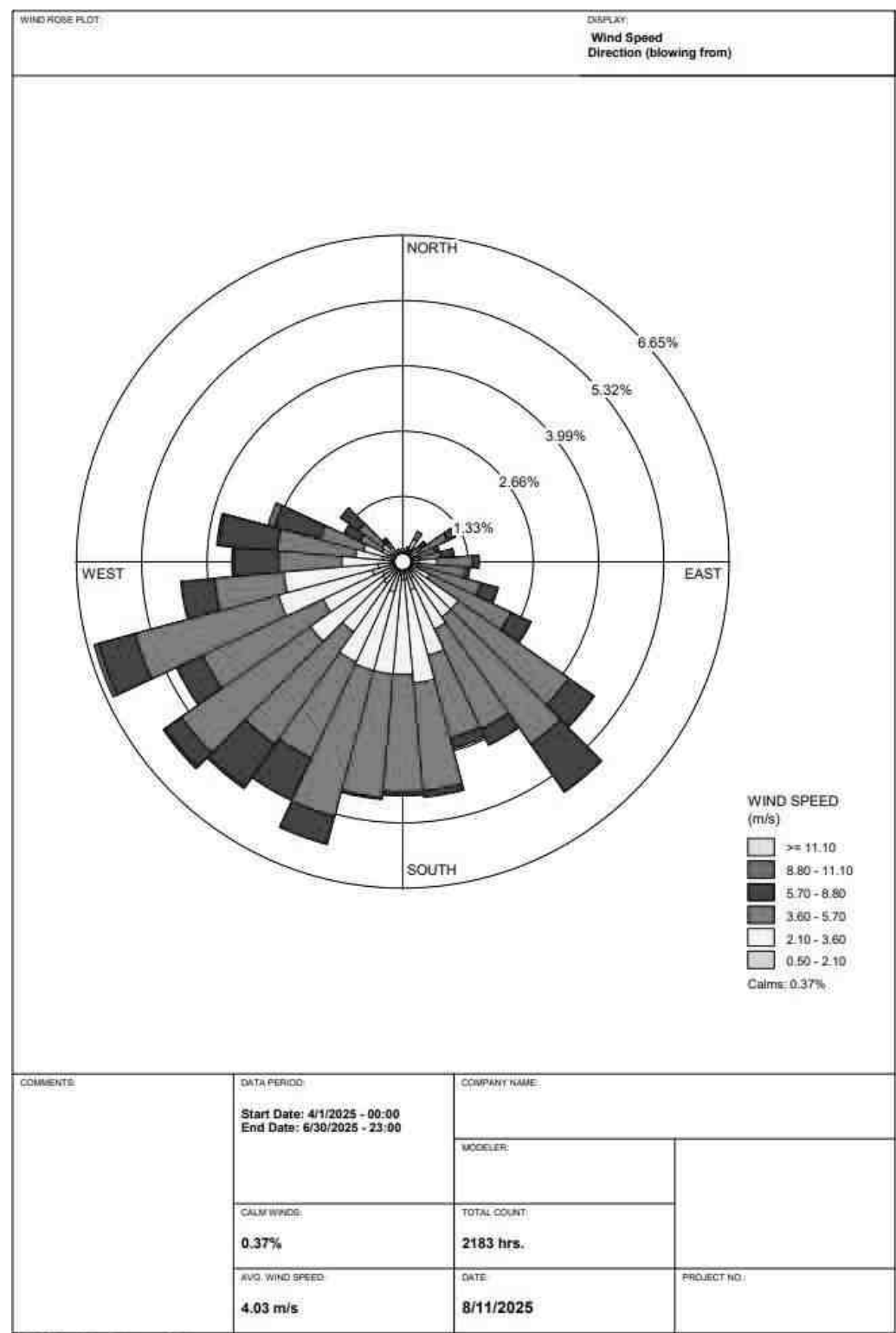


Table 0.7. Micro-Meteorological Data

Month	Temperature(C)			Relative Humidity (%)			Wind speed (m/s)		
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
1st April 2025 - 30th April 2025	38.8	23.3	30.5	92.5	27.7	65.2	6.9	0.1	3.9
1st May 2025 - 31st May 2025	38	26.3	30.8	93.1	34.5	66.5	10.1	0.3	3.9
1st June 2025 - 30th June 2025	38.2	25.4	30.5	91.3	25.5	64.4	8.8	0.2	4.3

3.5. Ambient Air Quality

The ambient air quality monitoring was done to assess the ambient air quality. Monitoring was carried out at Nine stations for the month of April 2025 to June 2025. The guidelines for selections of ambient air monitoring stations given in IS - 5182 parts 14, 2000 were followed. These guidelines state that, "when the objective of air sampling is to identify the contribution from specific sources of pollution, the sampling locations should be located in upwind and the downwind direction of such sources".

3.5.1. Sampling Location Selection

The guidelines for the selection of ambient air monitoring stations given in IS – 5182 parts 14, 2000 were followed. These guidelines state that, "when the objective of air sampling is to identify the contribution from specific sources of pollution, the sampling locations should be located in upwind and the downwind direction of such sources".

Criteria for site selections: The selection of the ambient air quality monitoring sites in the core zone and buffer zone (around the project area) was based on screening the region for such important factors as meteorological conditions, sensitive environmental locations, human settlement and the surrounding geographical features.

- The meteorological features considered were wind speed and direction.
- Environmental sensitivity was considered with regards to the proximity and density of human settlements to the project site and location of such sensitive places as schools and hospitals around the project site.
- The desktop study was conducted to critically analyze the above factors using wind rose map, topographical map, and land use map to check for the correct representation of the locations around the project site.

- Based on the above factors, the location of Air sampling stations for (April 2025 to June 2025) monitoring season is shown below:

3.5.2. Ambient Air Sampling Locations

Table 0.8. Ambient Air Sampling Locations

Location No.	Sampling Location	Latitude & Longitude	Distance & direction from the project boundary	Type of Area	Environmental Significance
A1	Onsite, West	13.363315 79.990368	Within site	Industrial Area	Core Zone
A2	Onsite, East	13.361967 79.990137	Within site		
A3	Periyapuliyur	13.390865° 80.036956°	5.8 km NE	Residential Area	Buffer Zone
A4	Aramani	13.362946° 80.013172°	2.33 km E		
A5	Manali	13.363469° 80.05383°	6.73 km E		
A6	Nelvay	13.332413° 80.0348°	5.65 km SE		
A7	Lachivakkam (Palavakkam)	13.319439° 79.95798°	5.77 km SW		
A8	Taratshi	13.327359° 79.929848°	7.56 km SW		
A9	Karadiputtur	13.364718° 79.966044°	2.63 km W		

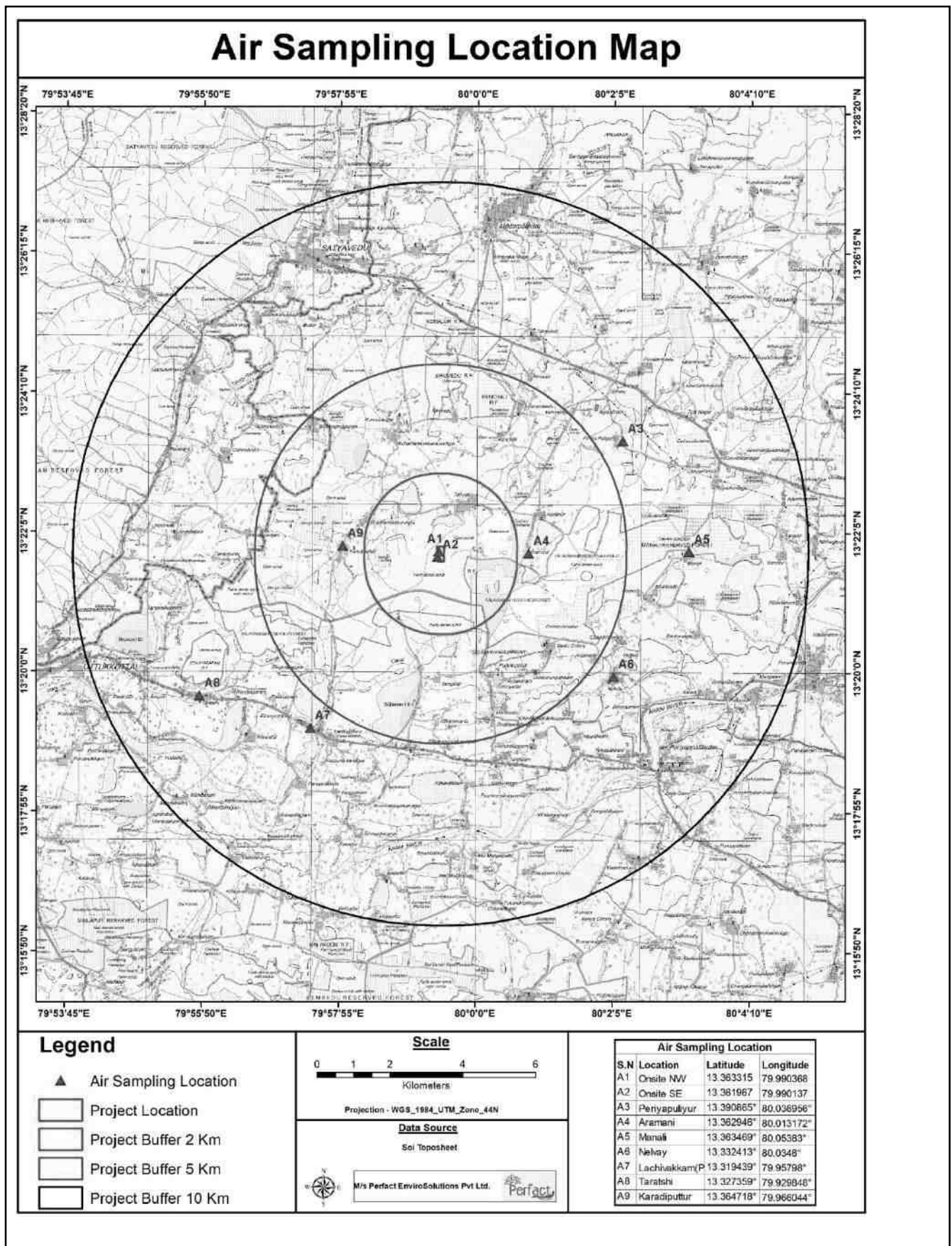


Figure 0.9. Air Sampling Locations

3.5.3. Sampling Procedure

Respirable Dust Samplers were used to collect samples for PM₁₀ and PM_{2.5} in ambient air at a flow rate of 1.2 m³/min. The ambient air was sucked through the cyclone and filter paper by a blower. Samples of gases were drawn at a flow rate of 0.5 litres per minute and were analyzed in the laboratory.

Monitoring was conducted in respect of the following parameters:

- Particulate Matter (PM₁₀)
- Particulate Matter (PM_{2.5})
- Sulphur Dioxide (SO₂)
- Nitrogen Dioxide (NO₂)
- Carbon Monoxide (CO)
- Volatile Organic Compounds (VOCs)
 - This procedure was adopted because there are no short-term variations and low concentration of gaseous pollutants was expected.

3.5.4. Analytical methods followed for ambient air quality monitoring

- Particulate Matter (PM_{2.5}) (US EPA Quality Assurance HandBook (Vol.II) Part II, Quality Assurance Guideline Document, 2.12): Particulate Matter (PM_{2.5}) was analyzed by the Gravimetric Method. Particulate matter was collected on the 37 mm diameter glass microfiber Filter Paper. PM_{2.5} value is determined from the values of volume of air passed through Ambient Fine Dust Sampler.
- Particulate Matter (PM₁₀) (IS: 5182 Part 23:2006): Particulate Matter (PM₁₀) was analyzed by the Gravimetric Method. It was carried out by Respirable Dust sampler as per IS: 5182(Part 23):2006. Particulate matter was collected on the GF/A Filter Paper. Particles with aerodynamics diameter less than the cut-point of the inlet are collected by the filter. The mass of these particles is determined by the difference in filter weight prior to and after sampling.
- Sulphur dioxide (SO₂) (IS: 5182; Part – II – 2001): Sulphur dioxide is absorbed by aspirating a measured air sample through a solution of Potassium or sodium tetrachloromercurate, TCM. This procedure results in the formation of a dichloro sulphite mercurate complex. The Sulphite Ion produced during sampling is reacted with sulphamic acid, formaldehyde and pararosaniline to form an azo dye and then determined colorimetrically.
- Nitrogen Oxides (IS: 5182; Part – VI – 2006): Nitrogen dioxide is collected by bubbling air through a sodium hydroxide- sodium arsenate solution to form a stable solution of sodium Nitrite. The Nitrite Ion produced during sampling is reacted with hydrogen peroxide, Sulphanilamide and NEDA to form an azodye and then determined colorimetrically.
- Carbon monoxide (CO) (IS:5182; Part -10-1999): Samples containing Carbon monoxide in the range of 0 to 100 mg/m³ are analyzed on a non-dispersive infrared absorption

gas analyser, namely, an electro-optical spectrophotometer with no spectral dispersion component. It may consist of a single or double source of infrared energy and one or more infrared detectors separated by an optical cell or cells to one or more of which the sample flows, whereby the specific spectral absorption of the component of interest is determined.

- **Volatile Organic Compounds (VOCs) (USEPA 0031/ ASTM D6889):** Samples were analyzed by USEPA method 0031 for collection of samples from site, i.e. properly sealed in tubes, locked and refrigerated until desorbed; these were desorbed at laboratory and further analyzed by using SPME technique and followed by injection to GC similar to that of ASTM D6889. Individually quantitated peaks were then used to calculate the TVOC Value by using calibration curve obtained for standard mass liquids i.e. CRMs. The Area thus was translated into values in $\mu\text{g}/\text{m}^3$. This study however did not include aldehydes, ketones, high molecular weight hydrocarbons, etc. It included Volatile PAH(s), Alcohols, Chlorinated Benzenes, Chloromethane and Chloromethane similar to that of USEPA TO-17A and USEPA 0031.
- **Ammonia (NH₃): (IS 5182 Part 25):** Ammonia in the atmosphere is collected by bubbling a measured volume of air through a dilute solution of sulfuric acid to form ammonium sulfate. The ammonium sulfate formed in the sample is analyzed colorimetrically by reaction with phenol and alkaline sodium hypochlorite to produce indophenol, a blue dye
- **Ozone (O₃) (IS: 5182; Part – IX – 2019):** Micro amounts of ozone and other oxidants are collected by absorption in a solution of potassium iodide buffered to a pH of 6.8. The iodine liberated in the absorbing solution is determined spectrophotometrically by measuring the tri-iodide ion at 352 nm.
- **Lead (Pb) (IS 5182 Part 22):** Samples are collected on filters from ambient air. Samples undergo acid digestion followed by analysis of samples using atomic absorption spectrometry.
- **Nickel (Ni) (IS 5182 Part 26, 2020):** method is based on acid digestion and atomic absorption spectroscopy for the chemical analysis of nickel in ambient air samples collected on filter paper using a high volume sampler.
- **BaP (IS 5182 Part 12):** Sample is collected through a high volume-sampler (HVS) using glass fibre (EPM — 2000) filter paper at a flow rate of -1.2 m³/ min. Sample is extracted and concentrated using a rotary evaporator. The extracted sample is analyzed using GC- FID.
- **Arsenic (Lab SOP - LSOP/AS/008 in reference to CPCB Guidelines for analysis of heavy metals):** Samples collected on filter paper using a high volume sampler accordance with the guidelines of NAMP using PM10 High Volume Sampler followed by extraction of samples and analysis using atomic spectrometry techniques/ ICP.
- **Total Hydrocarbons (THC):** Sampling is done by using a pumping sampler at ambient conditions to draw air through an adsorbent (e.g., activated charcoal). The component is separated by gas chromatography (GC) and quantified by appropriate detection principles. The retention time of the compound is compared with known data under identical conditions, thereby determining the approximate concentrations of the organic emission component beforehand.

3.5.5. Ambient Air Quality Results

3.5.5.1. Summer Season (April 2025 to June 2025)

At each station ambient air quality parameters i.e PM₁₀, PM_{2.5}, SO₂, NO_x & CO, were monitored twice a week for 3 months (April 2025 to June 2025) 24 hourly at uniform intervals.

Table 0.9. Ambient Air Quality Results (PM₁₀ & PM_{2.5})

Location	Min	Max	Mean	98 th Percentile	Min	Max	Mean	98 th Percentile
	PM _{2.5} (Standard – 60 µg/m ³)				PM ₁₀ (Standard – 100 µg/m ³)			
A1	17.69	27.67	22.75	26.92	38.55	60.25	48.33	57.85
A2	17.17	26.87	22.09	26.13	37.42	58.49	46.92	56.17
A3	19.24	30.09	24.73	29.27	41.91	65.51	52.55	62.91
A4	18.20	28.48	23.41	27.70	39.67	62.00	49.74	59.54
A5	18.72	29.29	24.07	28.49	40.79	63.75	51.15	61.22
A6	19.75	30.90	25.40	30.05	43.04	67.26	53.96	64.59
A7	20.27	31.70	26.06	30.84	44.16	69.02	55.37	66.28
A8	20.78	32.51	26.72	31.62	45.28	70.77	56.78	67.96
A9	21.30	33.32	27.38	32.41	46.40	72.53	58.18	69.65

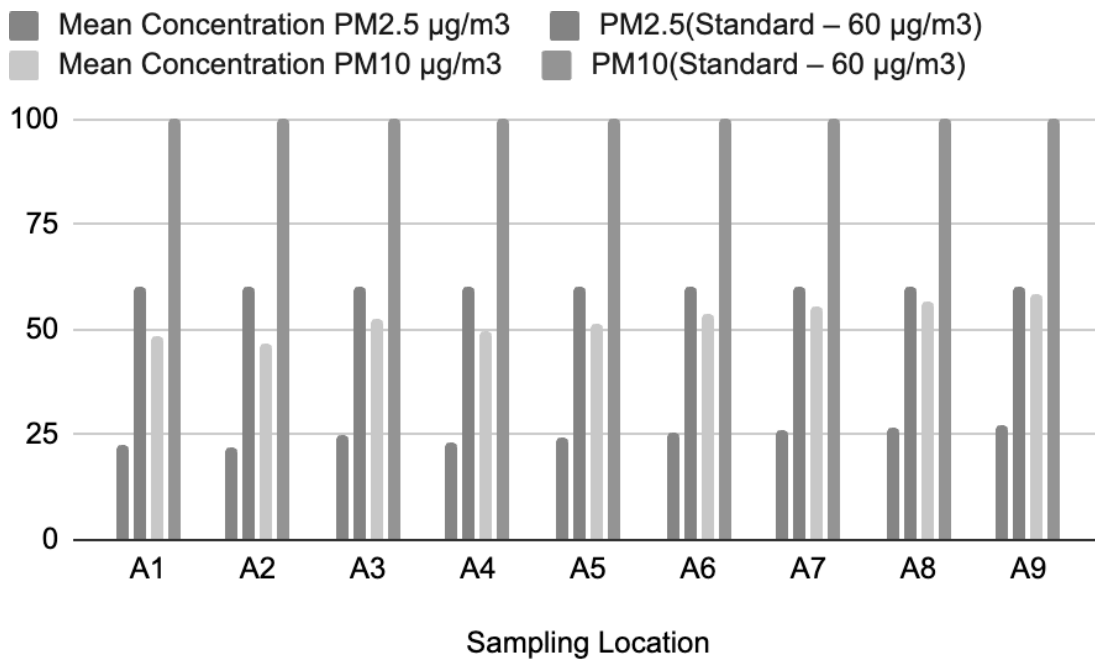


Figure 0.10. Ambient Air Quality Results (PM10 & PM2.5)

Table 0.10. Ambient Air Quality Results for SO₂ & NO₂

Location	Min	Max	Mean	98 th Percentile	Min	Max	Mean	98 th Percentile
	NO ₂ (Standard – 80 µg/m ³)				SO ₂ (Standard – 80 µg/m ³)			
A1	14.28	24.24	19.70	22.81	4.95	8.71	6.48	7.51
A2	13.86	23.54	19.13	22.15	4.81	8.46	6.29	7.29
A3	15.53	26.36	21.42	24.81	5.39	9.47	7.04	8.16
A4	14.69	24.95	20.27	23.48	5.10	8.96	6.66	7.73
A5	15.11	25.65	20.85	24.14	5.24	9.22	6.85	7.94
A6	15.94	27.07	21.99	25.47	5.53	9.73	7.23	8.38
A7	16.36	27.77	22.57	26.14	5.67	9.98	7.42	8.60

A8	16.77	28.48	23.14	26.80	5.82	10.23	7.61	8.82
A9	17.19	29.18	23.72	27.47	5.96	10.49	7.79	9.04

(Source of standards: G.S.R 826 (E) Dated 16 Nov 2009 of MoEF, Laboratory Engaged : Perfact Researchers Pvt. Ltd)

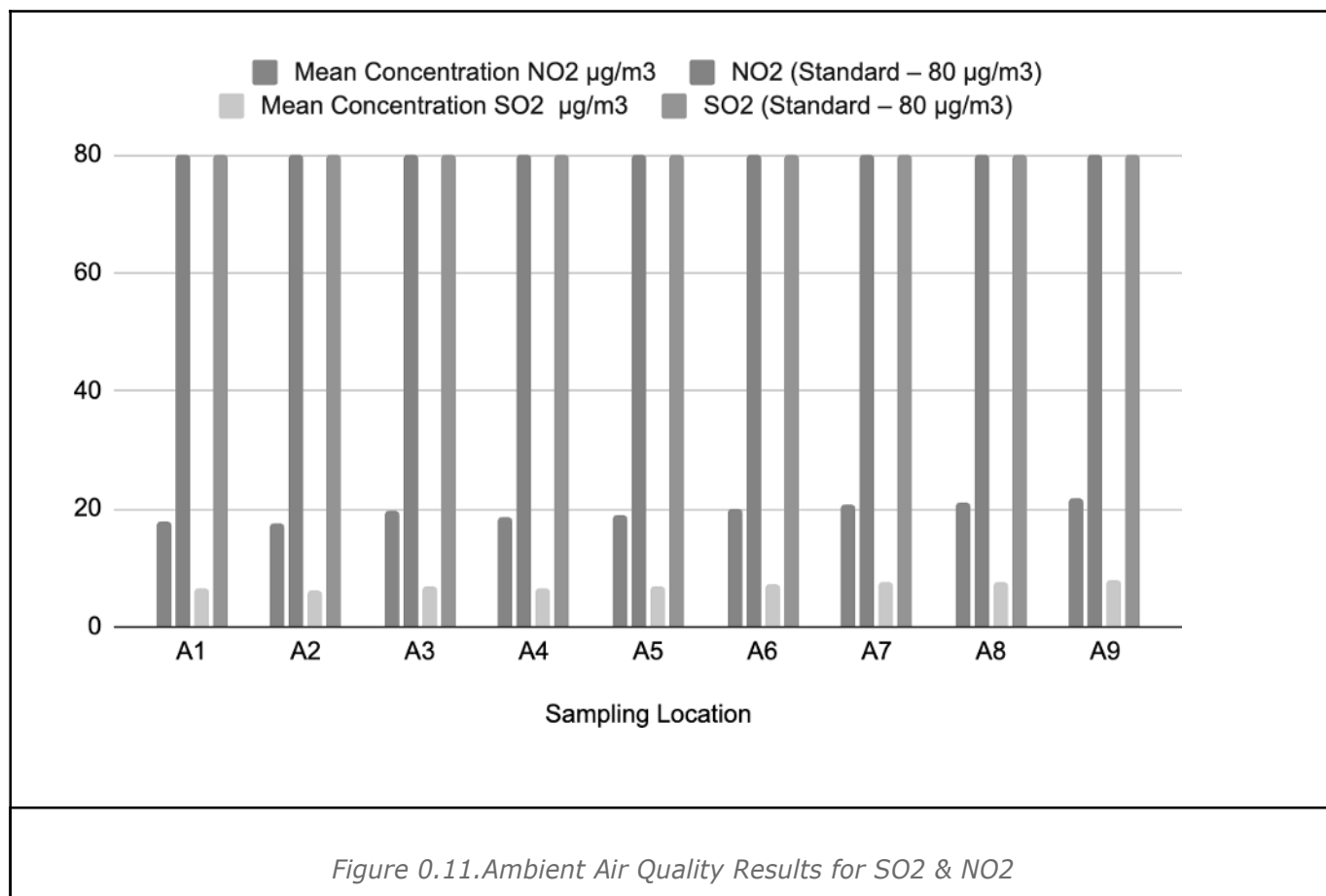
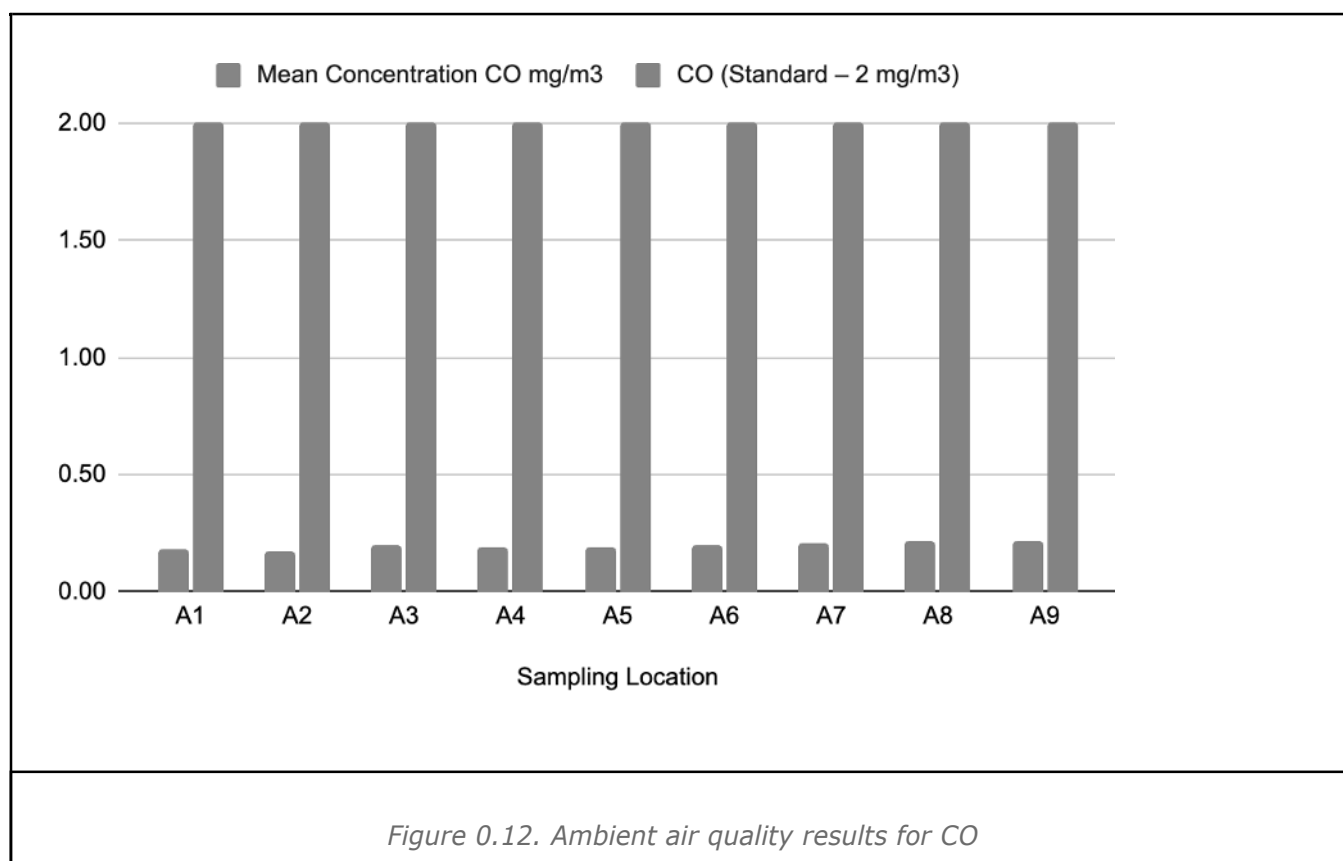


Table 0.11. Ambient Air Quality Results for CO & O3

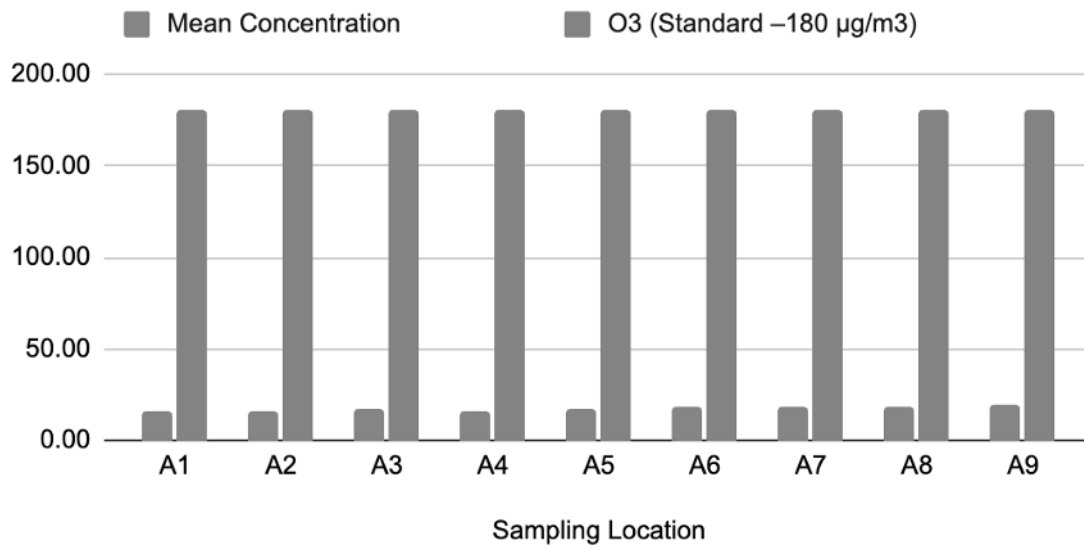
Location	Min	Max	Mean	98 th Percentile	Min	Max	Mean	98 th Percentile
	CO (mg/m³)				O ₃ (µg/m³)			
A1	0.14	0.22	0.18	0.22	11.57	19.64	15.96	18.48
A2	0.14	0.21	0.18	0.21	11.23	19.06	15.49	17.94
A3	0.15	0.24	0.20	0.23	12.58	21.35	17.35	20.09

A4	0.15	0.23	0.19	0.22	11.90	20.21	16.42	19.02
A5	0.15	0.23	0.19	0.23	12.24	20.78	16.89	19.56
A6	0.16	0.25	0.20	0.24	12.91	21.92	17.82	20.63
A7	0.16	0.25	0.21	0.25	13.25	22.49	18.28	21.17
A8	0.17	0.26	0.21	0.25	13.59	23.07	18.75	21.71

(Source of standards: G.S.R 826 (E) Dated 16 Nov 2009 of MoEF, Laboratory Engaged : Perfect Researchers Pvt. Ltd)



Mean Concentration O₃ µg/m³ O₃ (Standard –180 µg/m³)



3.5.6. Air Quality Index

As per CPCB guidelines, the worst sub index in a location is the AQI of that region (Source: <https://cpcb.nic.in/National-Air-Quality-Index/>). The results show that PM₁₀ has a good sub index over all the sampling sites. Therefore, the PM₁₀ has been considered for calculating the overall AQI. The table given below shows the Air Quality Index (AQI) range & category.

AQI RANGE	AQI CATEGORY	AQI RANGE	AQI CATEGORY
Good (0–50)	Minimal impact	Poor (201–300)	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	Very Poor (301–400)	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	Severe (>401)	Respiratory effects even on healthy people

(Computed using: CPCB, AQI CALCULATOR)

Figure 0.13. AQI Range with Category

Table 0.12. AQI of the Sampling Locations

Sampling Station	Sub-index Parameter	AQI Value	AQI Range

Onsite, West	PM ₁₀	60.25	Satisfactory
Onsite, East	PM ₁₀	58.49	Satisfactory
Periyapuliyur	PM ₁₀	65.51	Satisfactory
Aramani	PM ₁₀	62.00	Satisfactory
Manali	PM ₁₀	63.75	Satisfactory
Nelvay	PM ₁₀	67.26	Satisfactory
Lachivakkam (Palavakkam)	PM ₁₀	69.02	Satisfactory
Taratshi	PM ₁₀	70.77	Satisfactory
Karadiputtur	PM ₁₀	72.53	Satisfactory

3.5.7. Data Interpretation

The ambient air quality results are summarized in the above tables.

Core Zone:

During the monitoring period, the mean PM₁₀ concentrations in the core zone ranged from 46.92 to 48.33 µg/m³, while PM_{2.5} ranged from 22.09 to 22.75 µg/m³, both within the NAAQS limits of 100 µg/m³ and 60 µg/m³ respectively. Sulphur dioxide (SO₂) levels were between 6.29 and 6.48 µg/m³, and nitrogen dioxide (NO₂) ranged from 19.13 to 19.70 µg/m³, well below the NAAQS limit of 80 µg/m³. Carbon monoxide (CO) was consistently measured at 0.18 mg/m³, against the standard of 2.0 mg/m³. Ozone (O₃) levels ranged from 15.49 to 15.96 µg/m³, significantly below the permissible limit of 180 µg/m³. Volatile organic compounds (VOC), Total hydrocarbons- µg/m³, (THC), Hg, NH₃, BaP, As, Ni, Pb and benzene (C₆H₆) are below the detection levels.

Based on CPCB's Air Quality Index (AQI), the air quality in the core zone was classified as **Satisfactory** during the study period (1st April 2025 to 30th June 2025, Summer season).

Buffer Zone: The mean value of PM₁₀ at buffer zone locations ranges from (49.74 µg/m³ - 58.18 µg/m³) & PM_{2.5} ranges from (23.41 µg/m³ - 27.38 µg/m³), SO₂ ranges from (6.66 µg/m³ - 7.79 µg/m³), NO₂ ranges from (20.27 µg/m³ - 23.72 µg/m³), CO (0.19 µg/m³ - 0.22 mg/m³), O₃ (16.42 µg/m³ - 19.21 µg/m³) which are within the limits of National Ambient Air Quality Standards (NAAQS).

According to CPCB AQI categorisation, the buffer zone air quality during the monitoring period (1st April 2025 to 30th June 2025 , Summer season) was assessed as **Satisfactory**.

3.6. Noise Level

3.6.1. Methodology

At each station noise level was monitored for 24-hours simultaneously. For each measurement, dB (A) readings were taken for every 15 minutes for 24 hrs ones in a season to get Leq values. As per CPCB guidelines, the site of an area shall be selected such that it meets the land use pattern e.g. Commercial, Residential, Industrial. To assess the noise level of the proposed area, following stations were selected.

Criteria for site selection:

The baseline study of noise levels in the study area of 15 km has been carried out by selecting the noise monitoring locations based on the following criteria:

The site selection for noise quality monitoring were selected following the CPCB guidelines:

1. As per CPCB guidelines, the sites of an area for noise quality monitoring were selected such that it meets the land use pattern e.g. Commercial, Residential, Industrial, and silent zone. Silence zone is defined as an area comprising not less than 100 m around hospitals, educational institutions and courts. As per the site location, the type of location that was selected: industrial location, roads, and residential area, lies within the core and buffer area.
2. The presence of Noise sensitive receptors (environmental and ecological) in the vicinity of the project site were selected for noise quality monitoring. These included schools, hospitals, old age homes, religious places, etc.
3. Proximity of the noise generating source to the human settlements. The major source of noise in the site surrounding the area is increased urbanization, vehicular movement at day time and ambient base noise at night. The impacts from these sources are expected to be captured in the levels of noise measured in the site-specific background noise monitoring study.

Based on the above factors, overall 11 stations were selected.

Quality Assurance:

The noise level meter was calibrated immediately prior to and following each measurement event to check for the accuracy of measurement using an acoustic calibrator.

3.6.2. Ambient Noise Sampling Location

Table 0.13. Ambient Noise Sampling Locations

Location No.	Sampling Locations	Latitude & Longitude	Distance and direction from the project boundary	Type of Area	Environmental Significance
N1	Onsite	13.363298, 79.990402	Within the site - West Direction	Industrial Area	Core Zone
N2	Onsite	13.361950, 79.990180	Within the site - East Direction		
N3	Periyapuliyur	13.388701° 80.035457°	5.50 km NE		
N4	Aramani	13.362938° 80.013355°	2.35 km E	Residential Area	Buffer Zone
N5	Manali	13.363904° 80.053766°	6.73 km E		
N6	Nelvay	13.33239° 80.034756°	5.66 km SE		
N7	Lachivakkam (Palavakkam)	13.319379° 79.958098°	5.78 km SW		
N8	Taratshi	13.32736° 79.929763°	7.57 km SW		
N9	Karadiputtur	13.363123° 79.965291°	2.70 km W		
N10	Approach Road	13.360788° 79.990626°	0.10 km S	Commercial Area	
N11	NH	13.370228° 80.138652°	15.95 km E	Commercial Area	

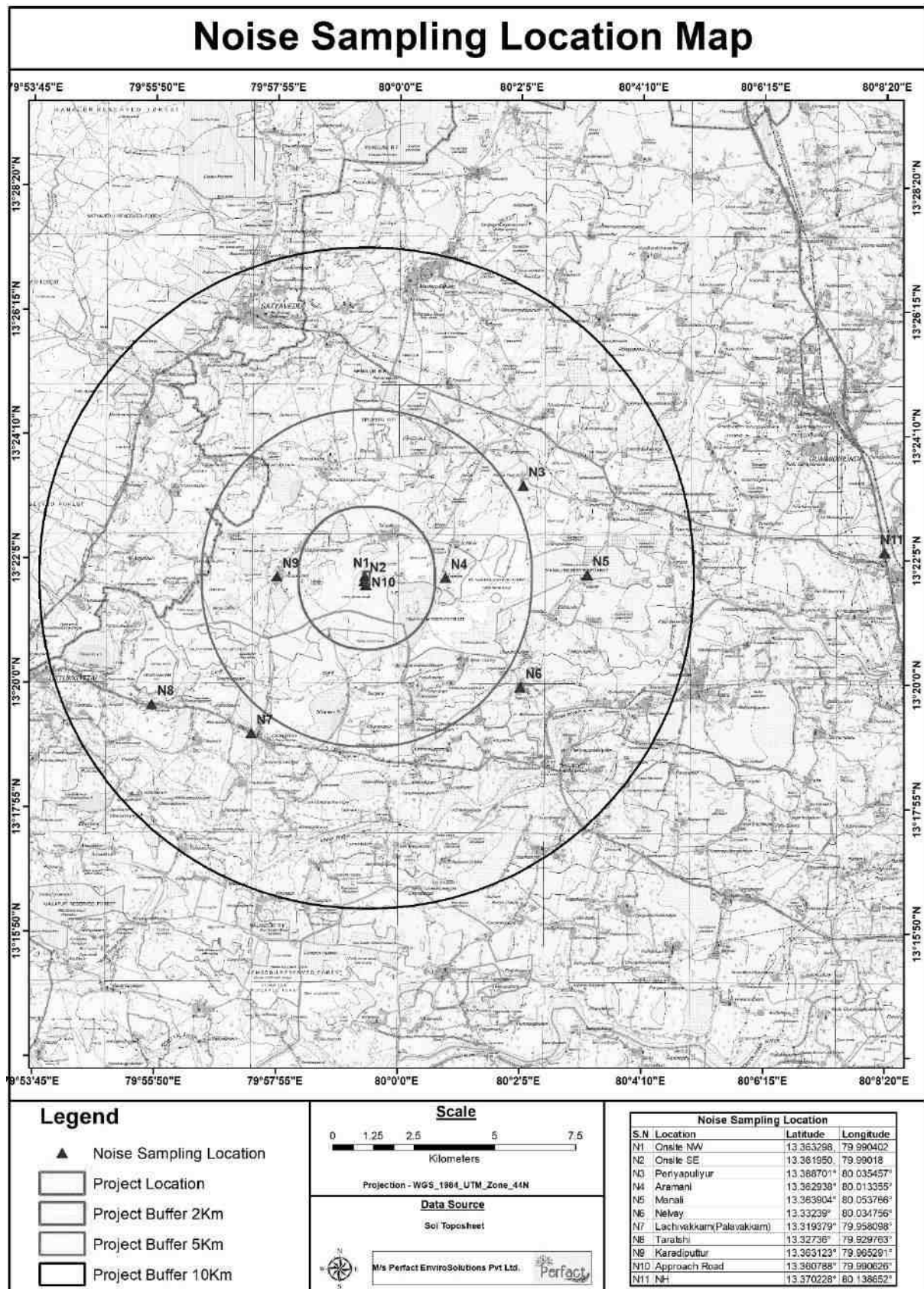


Figure 0.14. Noise Sampling Map

3.6.3. Results and Discussion

The Ambient Noise Quality results are summarized above. The results are discussed below:

Core Zone:

Table 0.14. Ambient Noise Quality (Core Zone)

Location No.	Locations	Zone	Leq Time dB(A)	Day Leq	Leq Night Time Leq dB(A)	Day time (6.00 A.M to 10.00P.M)	Night time (10.00 P.M to 6.00A.M)
N1	Within the site - West	Industrial area	55.7		44.6	75	70
N2	Within the site - East		55.9		44.8		

The ambient noise level during day time at the proposed project site varies from 55.7 dB (A) to 55.9 dB (A) which are within the day time standard limit of Industrial area ~75.0 dB (A). During night, the noise level at the project site ranges from 44.6 dB (A) to 44.8 dB (A) which are within the night time standard limit of Industrial area 70.0 dB (A).

Buffer Zone:

Table 0.15. Ambient Noise Quality (Buffer Zone)

Location No.	Locations	Zone	Leq Day Time Leq	Leq Night Time Leq	Day time (6.00 A.M to 10.00P.M)	Night time (10.00 P.M to 6.00A.M)
N3	Periyapuliyur	Residential area	53.7	42.8	55	45
N4	Aramani	Residential area	52.8	42.5		
N5	Manali	Residential area	53.1	43.7		
N6	Nelvay	Residential area	53.3	43.1		
N7	Lachivakkam (Palavakkam)	Residential area	54.7	44.2		
N8	Taratshi	Residential area	54.9	44.4		
N9	Karadiputtur	Residential area	53.9	43.8		
N10	Approach Road	Commercial Area	58.3	49.7	65	55
N11	Tirupati Road	Commercial Area	62.4	58.4		

Residential Area:

N3: The daytime ambient noise level at Periyapuliyur Village is 53.7 dB (A) which is within the daytime noise standard limit of the Residential area of ~ 55.0 dB (A). During the night the noise level was recorded at 42.8 dB (A) which is within the night-time noise standard limit of ~ 45.0 dB (A).

N4: The daytime noise level at Aramani is 52.8 dB (A) which is within the day time noise standard limit of ~ 55 dB (A). During the night the noise level was recorded at 42.5 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N5: The daytime ambient noise level at Manali is 53.1 dB (A) which is within the daytime noise standard limit of the Residential area of ~ 55.0 dB (A). During the night the noise level was recorded at 43.7 dB (A) which is within the night-time noise standard limit of ~ 45.0 dB (A).

N6: The daytime ambient noise level at Nelvay is 53.3 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 43.1 dB (A) which is also within the night-time noise standard limit of ~ 45.0 dB (A).

N7: The daytime noise level at Lachivakkam is 54.7 dB (A) which is within the daytime noise standard limit of Residential area ~ 55 dB (A). During the night the noise level was recorded at 44.2 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N8: The daytime noise level at Taratshi village is 54.9 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 44.4 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N9: The daytime noise level at Karadiputtur is 53.9 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 43.8 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

Commercial Area:

N10: The daytime noise level at Approach Road is 58.3 dB (A) which is within the standard limit of Commercial area ~ 65.0 dB (A). During the night the noise level was recorded at 49.7 dB (A) which is within the night-time noise standard limit of ~ 55 dB (A).

N11: The daytime noise level at Tirupati Road is 62.4 dB (A) which is within the standard limit of Commercial area ~ 65.0 dB (A). During the night the noise level was recorded at 58.4 dB (A) which is higher than the night-time noise standard limit of ~ 55 dB (A).

3.7. Hydrology & Geology

This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The study area covers an area equal to 10 km radius around the project site. The existing environmental setting covers baseline conditions with respect to geology and groundwater quality.

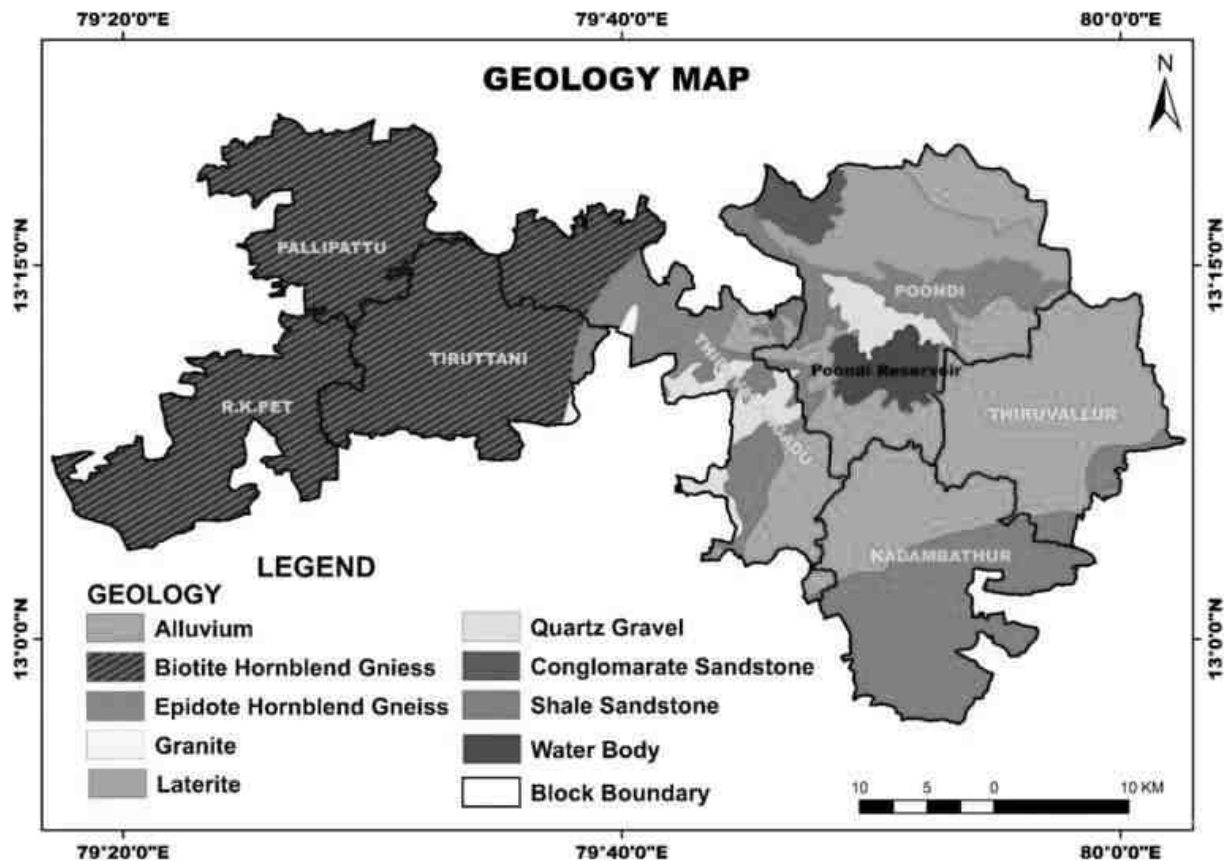


Figure 0.15 Geology map of Thiruvallur District

3.7.1. Objectives

The objectives of this study were to :

- To study the drainage network in the Core and Buffer zone.
- To study groundwater development status of the area.
- Identify potential impacts that the construction and operation of the Project could have on this environmental component

3.7.1 Hydrology

Figure No. 40 illustrates the flood hazard map prepared by the India Flood Hazard Map, Building Materials and Technology Promotion Council, which confirms that the project area is located well beyond the delineated flood-prone zones.

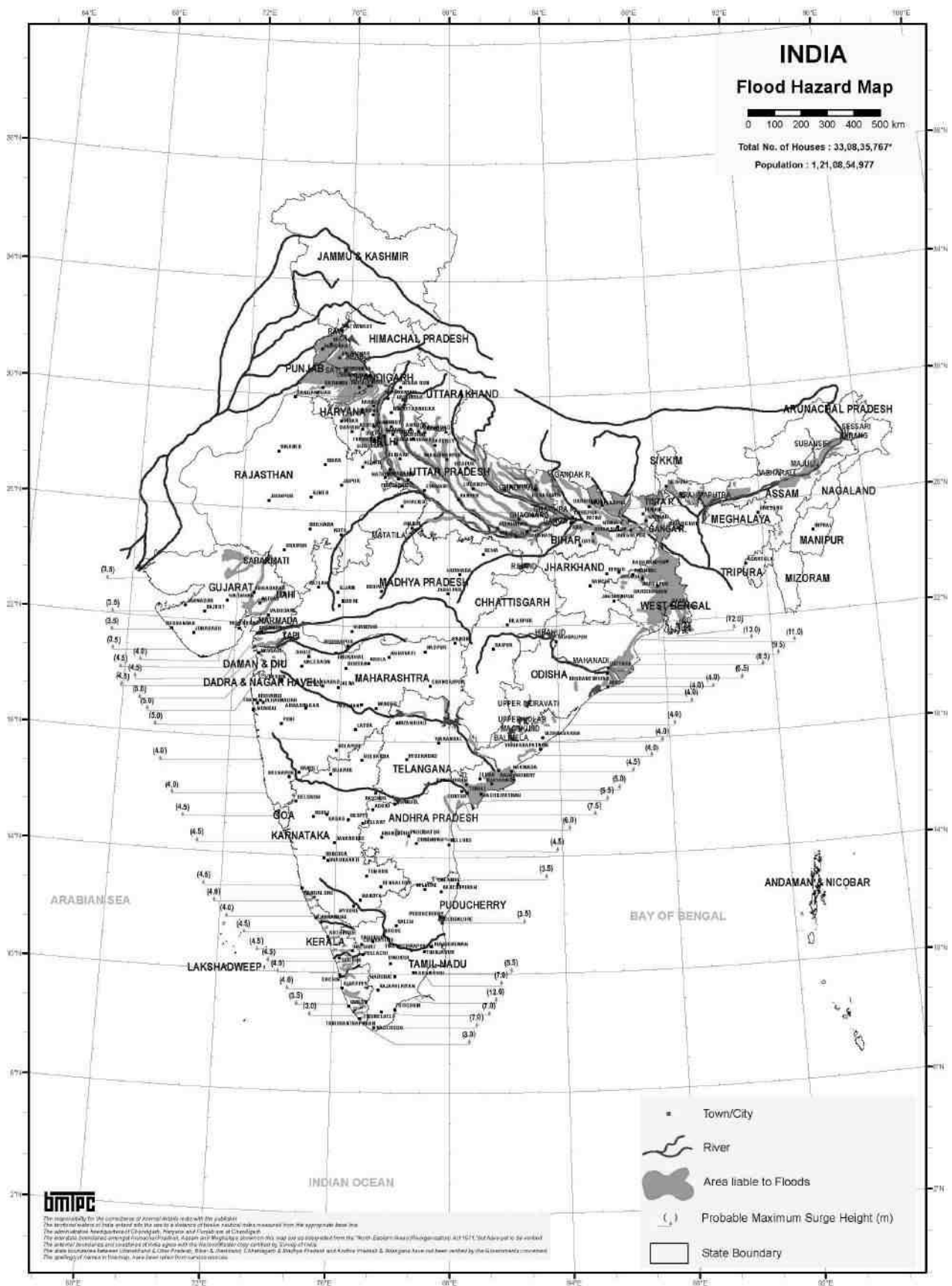


Figure 0.16 Flood Map

Source: https://bmtpc.org/DataFiles/CMS/file/VAI2019/MAP/floodmap/flood_jpg/Flood-INDIA.jpg

3.7.1 Ground Water Development

The area falls under the Gummidipoondi Tehsil/Taluk, Tiruvallur District. As per the CGWB report (2022), the area is categorized as "Safe" with the stage of groundwater development at about 58.1 %. The following table shows the Gummidipoondi Taluk groundwater development details;

Figure 0.17 Details of Gummidipoondi Ground water Development

Assessment unit Taluka	Total Extraction (Ham)	Annual Extractable Ground Water Resources (Ham)	Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for Future Use (Ham)	Stage of Ground Water Development (%)	Category
Gummidipoondi	7110.6	12241.8	299.4	5431.2	58.1	Safe

Source : https://www.cgwb.gov.in/old_website/GW-Assessment/GWR-2022-Reports%20State/Tamil%20Nadu.pdf

3.8 Water quality

To assess the water quality of the proposed area, a total of 16 stations were selected, comprising 8 groundwater and 8 surface water locations. The details and locations of the water sampling stations are provided below."

Figure 0.18 Ground Water Sampling Location

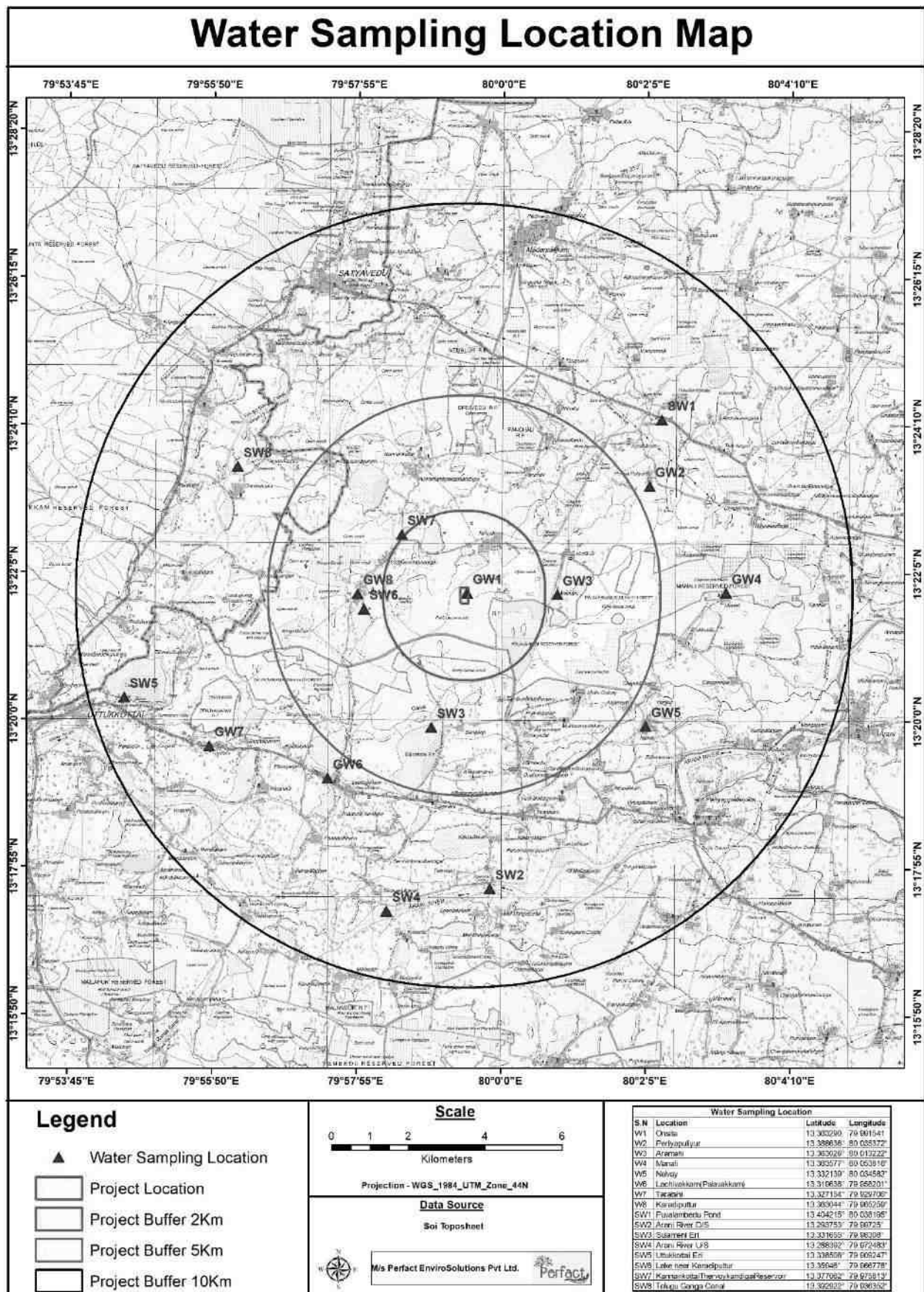
Location No.	Sampling Locations	Latitude Longitude	Distance and direction from the project boundary	Source of Water	Environmental Significance
GW1	Onsite	13.363290, 79.991541	Within site	Fresh Water	Core Zone
GW2	Periyapuliyur	13.388636° 80.035372°	5.46 km NE	Ground Water	Buffer Zone
GW3	Aramani	13.363026° 80.013222°	2.35 km E		

GW4	Manali	13.363577° 80.053816°	6.74 km E		
GW5	Nelvay	13.332139° 80.034582°	5.65 km SE		
GW6	Lachivakkam (Palavakkam)	13.319638° 79.958201°	5.76 km SW		
GW7	Taratshi	13.327154° 79.929706°	7.56 km SW		
GW8	Karadiputtur	13.363044° 79.965259°	2.70 km W		

Figure 0.19 Surface water sampling locations

Location No.	Sampling Locations	Latitude & Longitude	Distance and direction from the project boundary	Environmental Significance
SW1	Puvalambedu Pond	13.404215° 80.038195°	6.70 km NE	Buffer Zone
SW2	Arani River D/S	13.293753° 79.99725°	7.48 km S	
SW3	Sulameni Eri	13.331655° 79.98308°	3.37 km SSW	
SW4	Arani River U/S	13.288392° 79.972483°	8.27 km SSW	
SW5	Uttukkottai Eri	13.338508° 79.909247°	9.12 km WSW	
SW6	Lake near Karadiputtur	13.35946° 79.966778°	2.56 km S	
SW7	Kannankottai Thervoykandigai	13.377062° 79.975813°	2.14 km NNW	

	Reservoir			
SW8	Telugu Ganga Canal	13.392922° 79.936352°	6.65 km NW	



Environment Consultant: M/s Perfect Enviro Solutions Pvt Ltd.

Figure 0.20 Water sampling map

3.8.1 Criteria for Selection of Sampling Locations Quality Assurance in Sampling

- Water samples were collected in accordance with Standard Methods prescribed by IS and APHA (23rd Edition, 2017).
- All sampling equipment, collection bottles, and storage containers were thoroughly cleaned and sterilized in the laboratory before use.
- Care was taken to prevent contamination during handling; the bottle lip and inner surfaces were never touched during sampling.
- Prior to collection, each bottle was rinsed three times with the sample water before being filled.
- At each monitoring site, samples were collected from the upstream direction, ensuring water flowed directly towards the sampler to avoid human-induced contamination.
- Three replicate samples were collected from each location and stored in cold boxes for preservation.
- Samples were transported between the sampling sites and the laboratory in cold boxes to maintain sample integrity.

3.8.2 Sampling Frequency and Techniques

- In line with standard practices, **grab sampling** was conducted at eight locations for groundwater, while **composite sampling** was carried out for surface water sites, following IS and APHA (23rd Edition, 2017) procedures.
- Appropriate preservation techniques were applied to ensure the accuracy of results.
- Physical parameters such as pH, temperature, and electrical conductivity were measured in the field using a portable water quality analyzer.

Quality Assurance in Analysis

- Samples were transported to the laboratory for analysis of the selected water quality parameters.
- Analytical procedures strictly followed the American Public Health Association's Standard Methods for the Examination of Water and Wastewater.
- Only analytical-grade chemicals were used, and double deionized water (Milli-Q system, Millipore) was employed for all analytical work.
- All glassware and sample containers were thoroughly cleaned and rinsed with double distilled water prior to use.

3.8.3 Ground Water Results

Figure 0.21 Ground Water Quality Result

Parameter / Details	Unit	IS 10500:2012 (Drinking water standard)	Project Site	Periyapuliur	Aramani	Manali	Nelvay	Lachivakkam Palavakkam	Taratshi	Karadiputtur
Colour	Hazen	5.00	<1	<1	<1	<1	<1	<1	<1	<1
Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	NTU	1.00	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)	BDL (DL-1)
pH Value at 25°C		6.5-8.5	6.64	6.9	6.81	6.56	6.82	6.59	6.75	7.03
Temperature	°C	Not Specified	24.1	24.3	24.0	24.5	25.0	24.3	25.4	24.8
Conductivity at °C	µmho/cm	Not Specified	686	594	636	595	1136	525	989	237
Total Dissolved Solids	mg/l	500	456	398	424	394	748	348	652	160
Chloride (as Cl)	mg/l	250	86.0	72.0	63.0	106.0	168.0	50.0	165.9	46.0

Parameter / Details	Unit	IS 10500:2012 (Drinking water standard)	Project Site	Periyapuliyur	Aramani	Manali	Nelvay	Lachivakkam Palavakkam	Taratshi	Karadiputtur
Fluoride (as F)	mg/l	1.00	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)
Total Hardness	mg/l	200	100	96	184	160	412	132	392	64
Iron (as Fe)	mg/l	1.00	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)	BLQ (LOQ-0.05)
Sulphate (as SO ₄)	/l	mg200	35.59	61.70	48.20	33.17	127.70	17.33	37.53	13.46
Nitrate Nitrogen	mg/l	45.0	2.89	0.14	1.65	11.96	6.57	1.94	7.44	4.58
Nitrite Nitrogen	mg/l	Not Specified	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)	BDL (DL-0.02)
Alkalinity	mg/l	200	64.41	34.30	135.80	126.83	284.30	114.67	354.47	50.54
Sodium (as	mg/l	Not	34.30	33.00	13.40	43.00	54.80	8.20	38.00	16.20

Parameter / Details	Unit	IS 10500:2012 (Drinking water standard)	Project Site	Periyapuliyur	Aramani	Manali	Nelvay	Lachivakkam Palavakkam	Taratshi	Karadiputtur
Na)		Specified								
Potassium (as K)	mg/l	Not Specified	15.20	16.00	4.90	11.20	18.40	4.30	13.20	4.20

Aluminium, Boron, Iron, Nitrite Nitrogen, Total Chromium, Fluoride, Nickel, Manganese, Copper, Mercury, Cadmium, Arsenic, Lead, Zinc, Lithium, Iron ,TSS, Ammonical Nitrogen& Nitrite Nitrogen are below detection level (Source of standards: IS: 10500 : 2012, Laboratory: M/s Perfect Researchers Pvt. Ltd (NABL Accredited)

3.8.3 Ground Water Quality Result Interpretation

Core Zone: The water quality of the core zone shows that

1. The Total Dissolved Solids (TDS) is 456 mg/l. The TDS of sampling location is within the acceptable limit of 500 mg/l and permissible limit of 2000 mg/l respectively.
2. The Total hardness of the sampling location range is 100 mg/l. The Total hardness of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
3. The Alkalinity of the sampling location range is 64.41 mg/l. The Alkalinity of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
4. The Chloride Concentration of the sampling location range is 86 mg/l. The Chloride Concentration of sampling locations are within the acceptable limit of 250 mg/l.

Conclusion:

The ground water quality parameters are within IS 10500:2012 (Drinking water Standards)

Buffer Zone: The water quality of the buffer zone shows that

5. The Total Dissolved Solids (TDS) of the sampling location ranges from 160 mg/l to 748 mg/l. The TDS of sampling locations are within the acceptable limit of 500 mg/l and permissible limit of 2000 mg/l respectively.
6. The Total hardness of the sampling location ranges from 64 mg/l to 412 mg/l. The Total hardness of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
7. The Alkalinity of the sampling location ranges from 34.30 mg/l to 354.47 mg/l. The Alkalinity of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.

8. The Chloride Concentration of the sampling location ranges from 46 mg/l to 168 mg/l. The Chloride Concentration of sampling locations are within the acceptable limit of 250 mg/l.

Conclusion:

- The ground water quality parameters are within IS 10500:2012 (Drinking water Standards)

3.8.4 Surface Water Quality Results

Figure 0.22 Surface Water Quality Result

Parameters	unit	Kannankottai Thervoykandig ai Reservoir	Telugu Ganga Canal	Sulameni Eri	Lake near Karadiputtu r	Uttukkotta i Eri	Puvalambed u Pond	Arani River upstrem	Arani River downstre m
Colour	Hazen	<1	<1	<1	<1	<1	<1	<1	<1
Odour	--	Agreeable	Agreeabl e	Agreeabl e	Agreeable	Agreeable	Agreeable	Agreeabl e	Agreeable
Turbidity	NTU	BDL (DL-1)	BDL (DL- 1)	5.5	2.0	2.3	1.3	10.3	4.4
pH Value at 25°C		7.16	7.01	7.1	7.2	7.1	7.0	6.9	6.89
Temperatur e	°C	24.9	24.5	24.8	25.1	24.0	25.2	24.4	25.4
Conductivit y at °C	µmho/cm	504	530	625	241	646	449	1382	1659.0
Total Dissolved Solids	mg/l	330	352	418	164	432	298	975	1110.0

Environment Consultant: M/s Perfect Enviro Solutions Pvt Ltd.

Parameters	unit	Kannankottai Thervoykandig ai Reservoir	Telugu Ganga Canal	Sulameni Eri	Lake near Karadiputtu r	Uttukkotta i Eri	Puvalambedu Pond	Arani River upstream	Arani River downstream
Chloride (as Cl)	mg/l	81.0	56.0	88.0	41.0	102.0	64.0	305.9	321.0
Fluoride (as F)	mg/l	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)	BDL (DL-0.1)
Total Hardness	mg/l	76	96	108	32	48	64	324	388
Calcium (as Ca)	mg/l	24	26	21	11	8	19	64	91
Magnesium (as Mg)	mg/l	3.9	7.8	13.6	1.0	6.8	3.9	39.9	38.9
Sulphate (as SO ₄)	mg/l	15.34	60.24	3.86	16.60	1.81	1.72	55.20	62.5
Nitrate Nitrogen	mg/l	2.01	3.87	6.46	6.07	7.33	5.83	4.48	3.9
Nitrite Nitrogen	mg/l	0.04	BDL (DL-0.02)	BDL (DL-0.02)	0.0	BDL (DL-0.02)	0.2	BDL (DL-0.02)	BDL (DL-0.02)

Parameters	unit	Kannankottai Thervoykandig ai Reservoir	Telugu Ganga Canal	Sulameni Eri	Lake near Karadiputtu r	Uttukkotta i Eri	Puvalambedu Pond	Arani River upstream	Arani River downstream
Alkalinity	mg/l	60.66	35.76	104.14	15.40	46.19	62.28	268.80	325.50
Aluminum (as Al)	mg/l	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)	BLQ (LOQ- 0.02)
Boron	mg/l	BDL (DL-0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)	BDL (DL- 0.1)
Phosphate	mg/l	0.19	BDL (DL- 0.01)	BDL (DL- 0.01)	BDL (DL- 0.01)	BDL (DL- 0.01)	BDL (DL- 0.01)	BDL (DL- 0.01)	BDL (DL- 0.01)
Sodium (as Na)	mg/l	33.00	27.40	28.00	21.80	49.30	26.00	133.00	136.0
Potassium (as K)	mg/l	10.30	8.90	16.00	4.30	12.00	9.00	47.00	48.0
BOD for 3 Day at °C	mg/l	9.7	9.1	8.8	9.3	9.1	8.4	12.4	16.5
COD	mg/l	50	40	40	50	50	20.0	70.0	120.0
DO	mg/l	5.7	5.9	6.0	5.6	5.5	6.1	5.2	4.3

Parameters	unit	Kannankottai Thervoykandig ai Reservoir	Telugu Ganga Canal	Sulameni Eri	Lake near Karadiputtu r	Uttukkotta i Eri	Puvalambedu Pond	Arani River upstream	Arani River downstream
Ammonical Nitrogen (NH ₃ -N)	mg/l	0.7	BDL (DL- 0.1)	BDL (DL- 0.1)	0.0	BDL (DL- 0.1)	0.2	0.0	BDL (DL- 0.1)
TSS	mg/l	76.00	64.00	70.00	28.0	36.0	38.0	56.0	50.0
Oil & Grease	mg/l	7.6	5.2	6.8	4.8	8.4	6.8	5	9
Total Coliform	MPN/100 ml	54.0	21.0	43.0	18.0	17.0	20.0	22.0	58.0

Aluminium, Boron, Iron, Nitrite Nitrogen, Total Chromium, Fluoride, Nickel, Manganese, Copper, Mercury, Cadmium, Arsenic, Lead, Zinc, Lithium, Iron, TSS, Ammonical Nitrogen & Nitrite Nitrogen are below detection level (Source of standards: IS: 10500, Laboratory: M/s Perfect Researchers Pvt. Ltd (NABL Accredited))

Designated-Best-Use	Class of Water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	pH between 6.5 and 8.5 Dissolved Oxygen 6 mg/l or more Biochemical Oxygen Demand 5 days 20 °C 2 mg/l or less
Outdoor bathing (Organised)	B	pH between 6.5 and 8.5 Dissolved Oxygen 5 mg/l or more Biochemical Oxygen Demand 5 days 20 °C 3 mg/l or less
Drinking water source after conventional treatment and disinfection	C	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more Biochemical Oxygen Demand 5 days 20 °C 3 mg/l or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4 mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25 °C micro mhos/cm Max. 2250 Boron Max. 2 mg/l

(Source : Surface Water quality criteria as per CPCB)

3.8.5 Data Interpretation – Surface Water Quality

As per the samples collected and analysed from the identified locations, the following observations are made in reference to CPCB surface water quality Criteria ,Designated Best Use Criteria (Class A,B,C,D & E):

Surface water samples were collected for 8 locations namely "Kannankottai Thervoykandigai Reservoir", Telugu Ganga Canal, Sulameni Eri, Lake near Karadiputtur, Uttukkottai Eri, Puvalambedu Pond, Arani River upstream, Arani River downstream. As per the samples collected and analyzed from locations SW1, SW2, SW3, SW4, SW5, SW6, SW7 and SW8 surface water quality is meeting the criteria defined by class "E" as per the CPCB criteria. It is suitable for Irrigation, Industrial Cooling, Controlled Waste disposal.

1. The surface water quality of the "Kannankottai Thervoykandigai Reservoir" shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of "Kannankottai Thervoykandigai Reservoir" can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

2. The surface water quality of the Telugu Ganga Canal shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Telugu Ganga Canal can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
3. The surface water quality of the Sulameni Eri shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Sulameni Eri can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
4. The surface water quality of the Lake near Karadiputtur shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Lake near Karadiputtur can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
5. The surface water quality of the Uttukkottai Eri shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Uttukkottai Eri can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
6. The surface water quality of the Puvalambedu Pond shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Puvalambedu Pond can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
7. The surface water quality of the Arani river Upstream shows that the values of the parameters including fluoride, calcium, iron, sulphate nitrate and nitrogen are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Arani river Upstream can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.
8. The surface water quality of the Arani river Downstream shows that the values of the parameters including fluoride, calcium, iron, sulphate nitrate and nitrogen are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Arani river Upstream can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

3.9 Land Environment

Image processing and GIS software were utilized for the project to digitally process spatial data. Digital image processing techniques were employed to classify and map the land

use/land cover of the given area using satellite imagery. The methodology followed involved the following steps:

- **Satellite imagery generation** for the Area of Interest (AOI) using image processing software.
- **Geometric correction** to address distortions caused by the sensor, variations in Earth's geometry, and to convert the data into real-world coordinates.
- **Image enhancement** to improve the visual quality of the imagery, thereby aiding in interpretation and analysis.
- **Google imagery** was used as a reference for preparing the base map.

Visual interpretation techniques were applied to digitize geographical features and categorize various land use and vegetation cover classes based on their spatial patterns.

3.9.1 Interpretation of Satellite Image

Land use refers to human activities associated with land and its direct utilization (Anderson et al., 1976). Both land use and land cover influence the infiltration capacity of an area. Barren lands retain less water compared to grasslands and forests, which not only hold water on the surface for longer periods but also facilitate its percolation into the ground.

The terms land use and land cover (LULC) are commonly used to describe maps that show the physical features present on the earth's surface (land cover) and the human activities linked to them (land use). Satellite remote sensing serves as an effective tool for identifying different land use classes, enabling assessment over large areas with relatively less time and resources. However, satellite images do not directly capture land cover details; instead, they record the solar energy reflected from each surface area.

The amount of multispectral energy reflected across various wavelengths depends on the type of material present on the earth's surface. Specific land cover types are identified by correlating these reflected energies using either visual interpretation or digital image processing techniques.

In this study, the focus is on examining the land use and land cover in and around the project site. The analysis considers the various LULC categories within the proposed project area, following the procedure outlined below.

Flow Chart for Methodology of LULC Map Preparation is given below:

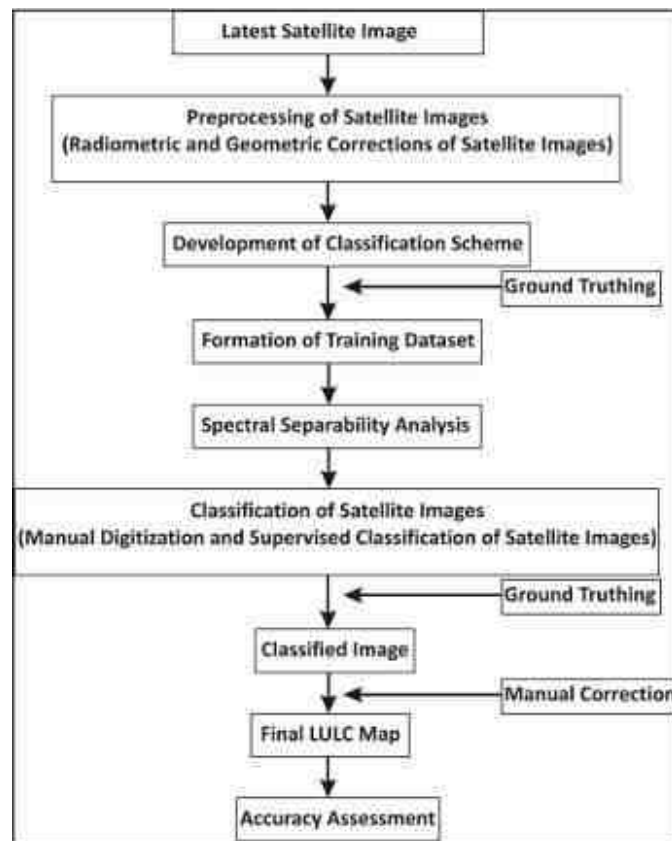


Figure 0.23 Flow Chart for Methodology of LULC Map Preparation

3.9.2 Results and Conclusions:

The land use/land cover map was prepared at a 1:50,000 scale through digital classification of satellite imagery. Using the adopted methodology, the existing land use/land cover has been categorized into the following major classes.

Table 0.16 Different Land use classes around 10 km radius from the project site

S.No	Land use	Percentage	Area in Sq.km
1	Crop Land	53.05	176.14
2	Fallow Land	3.66	12.16
3	Land without Scrub	10.29	34.16
4	Land with Scrub	3.90	12.94
5	Forest Plantation	17.65	58.60
6	Built-Up Land	1.27	4.20
7	Deciduous Forest	3.80	12.60

8	Mines	3.07	10.20
9	Plantation	1.93	6.40
10	River / Waterbody	1.39	4.60
Total	100.00	332.00	

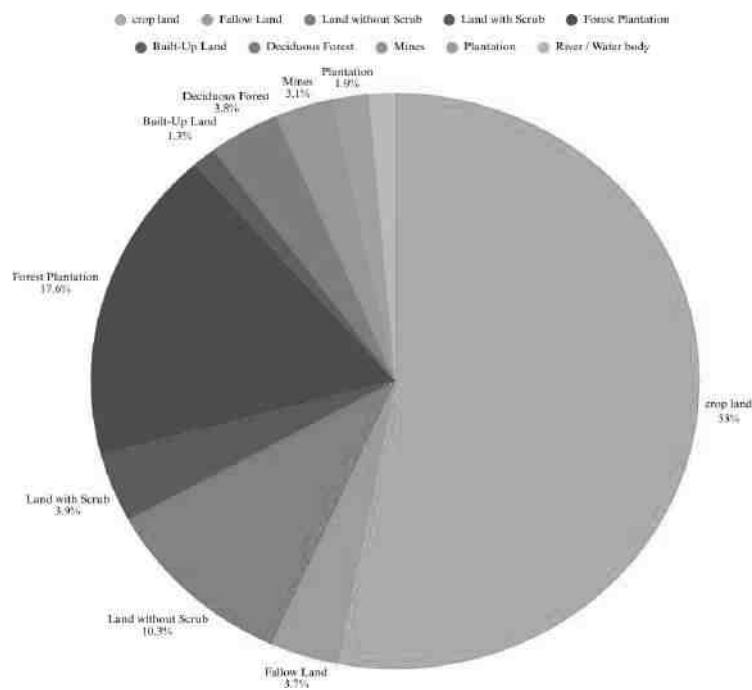


Figure 0.24 Different Land use classes around 10 km radius from the project site

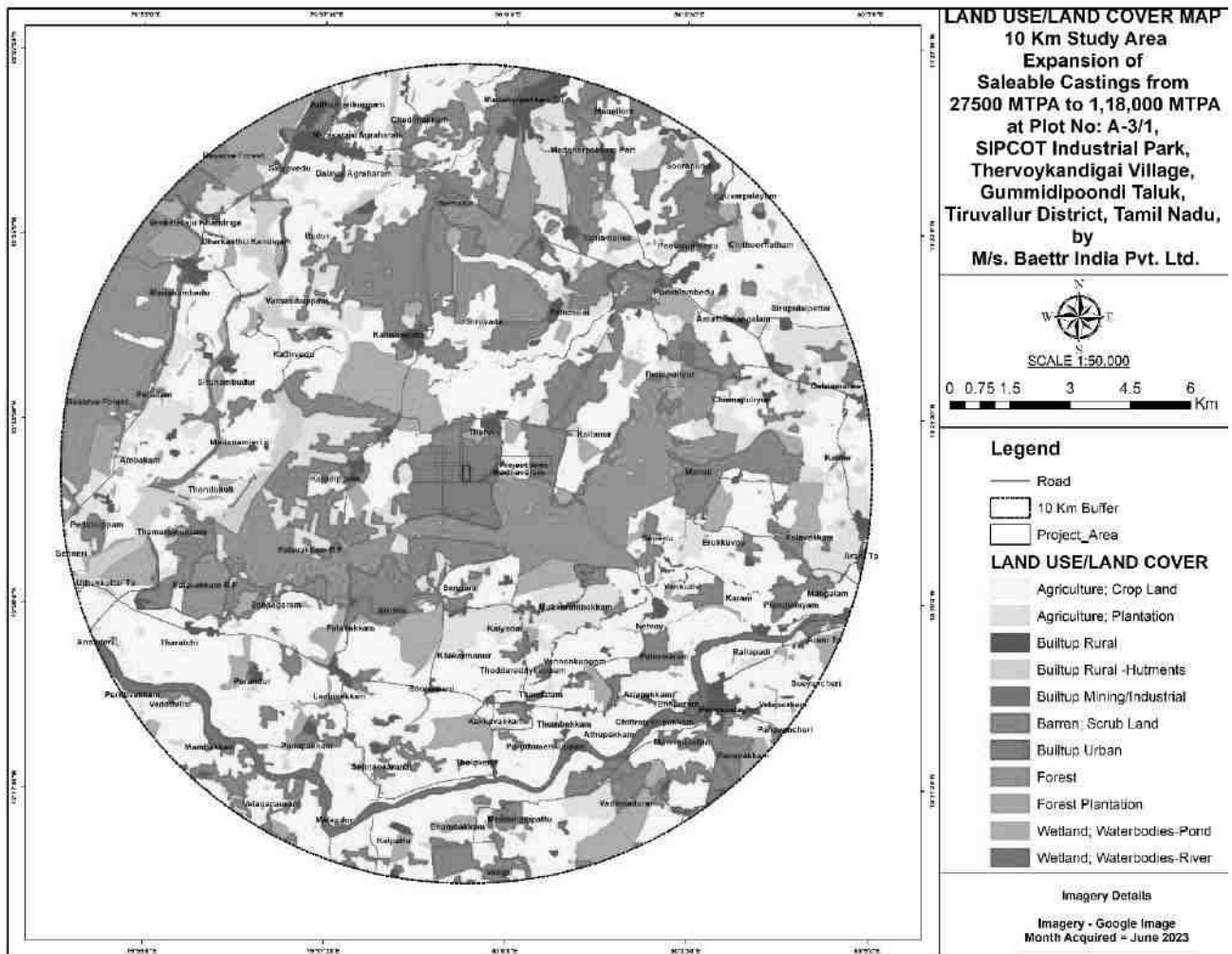


Figure 0.25 Land Use/Land Cover within 10 km Study Area based on IRS-P6 Satellite Imagery

3.10 Soil Quality

Soil sampling was conducted at Nine locations within a 10 km radius of the study area to assess soil characteristics, fertility status, and potential environmental impacts. The sampling sites were strategically selected based on predominant land use patterns, including agricultural lands, industrial areas, and residential zones, to ensure representation of varying soil conditions.

Soil samples were collected in accordance with CPCB guidelines, following the composite sampling method to obtain representative results. At each location, two depth intervals were targeted—topsoil (0–15 cm) and subsoil (15–30 cm)—using a hand-operated soil auger. This approach helps in understanding nutrient availability and physical properties at different root-zone depths.

The collected samples were air-dried in a dust-free environment, gently disaggregated, sieved through a 2 mm mesh, and stored in clean, labeled containers to prevent contamination. The prepared samples were analyzed for key parameters such as soil texture, pH, electrical

conductivity, organic matter, macronutrients (Nitrogen, Phosphorus, Potassium), and micronutrients (Zinc, Iron, Manganese, Copper). These tests provide insights into soil quality, fertility status, and suitability for different land uses.

The selected soil sampling locations are presented in Table. Testing of soil samples was carried out as per the standard protocols specified in the *Methods Manual for Soil Testing in India*, published by the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India (January 2011). The summary of the analytical results is provided in Table.

Table 0.17 Soil Sampling Locations

Location No.	Sampling Locations	Latitude & Longitude	Distance and direction from the project boundary	Environmental Significance
S1	Onsite West	13°21'48.29"N 79°59'26.78"E	Within site	Core Zone
S2	Onsite, East	13°21'42.61"N 79°59'24.59"E	Within Site	
S3	Periyapuliyur	13°23'27.97"N 80° 2'8.43"E	5.63 km NE	Buffer Zone
S4	Aramani	13°21'47.17"N 80° 0'47.42"E	2.32 km E	
S5	Manali	13°21'41.58"N 80° 3'8.81"E	6.58 km E	
S6	Nelvay	13°20'3.06"N 80° 2'6.48"E	5.58 km SE	
S7	Lachivakkam (Palavakkam)	13°19'15.25"N 79°57'38.36"E	5.49 km SW	
S8	Taratshi	13°19'35.73"N 79°55'38.84"E	7.80 km SW	
S9	Karadiputtur	13°21'47.91"N 79°57'59.57"E	2.54 km W	

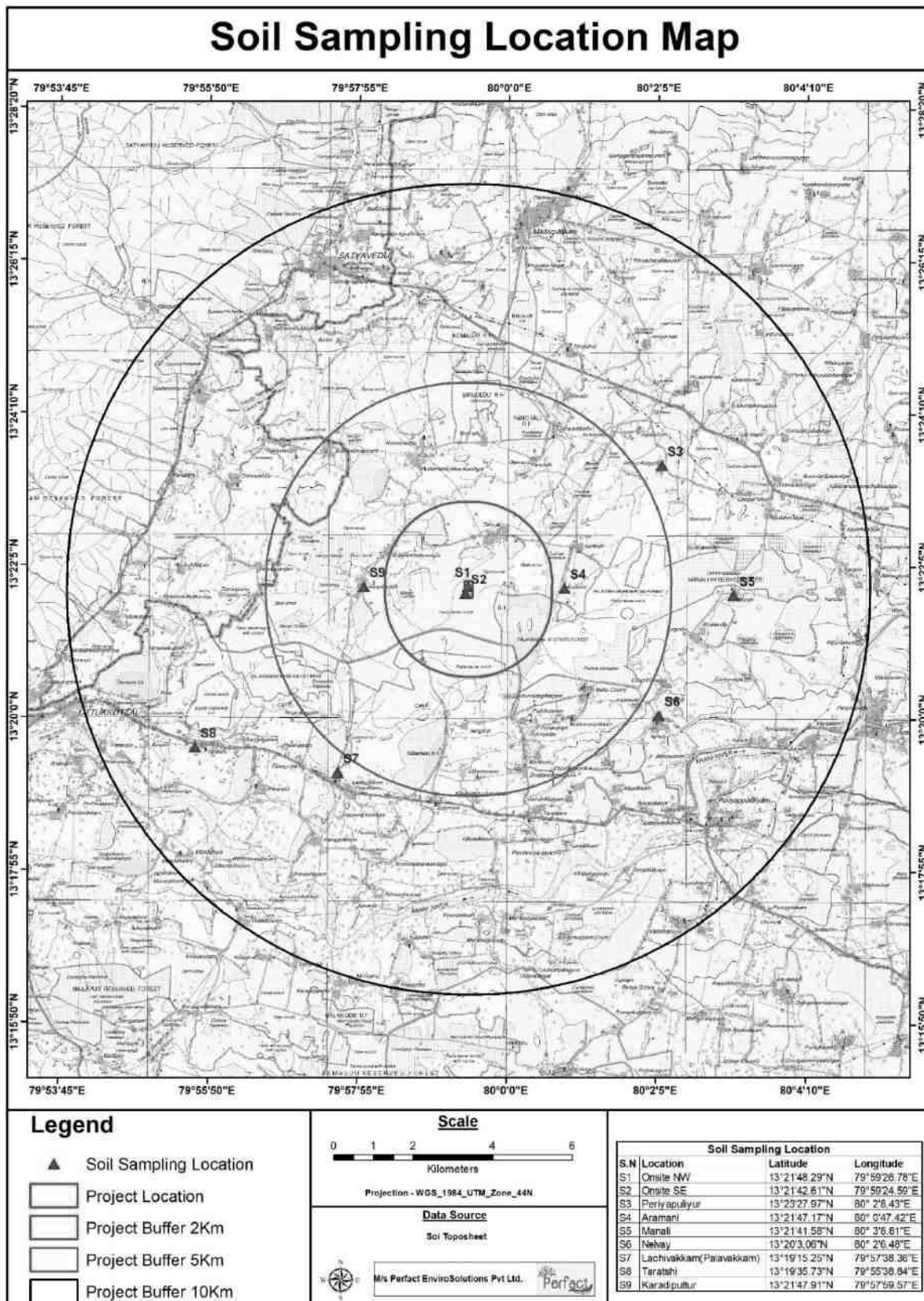


Figure 0.26 Soil Sampling locations

3.10.1 Physical & Chemical Properties of Soil

Table 0.18 Physical & Chemical Properties of Soil

Type Of Land		Land put to non agricultural uses	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land	Permanent Pastures and other grazing land - Grass Land
PARAMETER	UNITS	Onsite NE	Onsite SW	Periya Puliya	Arrmani	Karadiputtur	Nelvoy	Manali	Palavakkam	Taratbhi
Physical Characteristics										
Color		6/6 Bright yellowish Brown	5/4 Dull Reddish Brown	5/4 Dull Brown	5/8 Bright Brown	5/8 Bright Brown	6/4 Dull Orange	6/3 Dull Brown	5/4 Dull Brown	5/6 Bright Brown
Texture	Sand %	51.7	56.9	41.2	50.8	39.3	56.1	52.9	38.7	74.7
	Silt %	22.5	12.1	32.5	28.4	31.3	20.6	30.9	26.3	10.1
	Clay %	25.6	30.9	26.2	20.6	29.3	23.2	16.2	34.8	15.0
Moisture content	%	1.1	0.7	1.3	1.8	1.2	0.9	1.6	2.1	1.5
Electric Conductivity	μS/cm	52.1	19.12	42.8	38.7	101.5	271	712.1	76.1	57.9
Bulk density	g/cc	1.25	1.34	1.27	1.30	1.22	1.32	1.27	1.21	1.38
Porosity	%	28.1	26.7	29.8	25.7	28.6	25.1	26.9	31.2	24.3
Chemical Characteristics										
pH	-	7.58	7.79	7.65	7.2	7.02	7.03	9.92	8.27	8.32
Organic Matter	%	1.01	1.25	1.69	1.72	1.84	1.18	0.78	1.29	0.91
Available	mg/kg	92.4	106.8	148.8	158.8	174.6	98.6	76.4	108.2	88.4

Nitrogen										
Available Calcium	mg/kg	76.8	84.8	98.6	92.6	84.8	92.6	88.6	78.2	86.8
Available Magnesium	mg/kg	32.9	42.8	45.3	49.8	36.1	46.8	34.2	29.7	32.6
Available Potassium	mg/kg	21.3	15.9	22.6	19.4	26.9	31.2	49.50	26.7	23.5
Nitrate Nitrogen	mg/kg	52.4	64.8	82.6	86.8	92.8	56.4	42.6	64.2	48.8
Available Phosphorus	mg/kg	7.9	9.1	7.9	10.6	7.1	9.1	10.9	7.1	8.6
Chloride	mg/kg	26.6	17.8	26.6	26.6	53.3	133.1	186.4	35.5	26.6
Cation Exchange Capacity	meq/100gm	16.1	14.3	15.9	14.9	15.6	13.9	14.3	18.3	11.8
Available Sulphur	mg/kg	3.81	1.81	11.88	2.80	2.48	3.01	8.83	1.25	1.43
Available Sodium	mg/kg	39.8	28.6	38.4	32.6	72.3	83.8	178.9	49.6	45.5
Bicarbonate	mg/kg	61.0	73.2	73.2	61.0	48.8	48.8	134.2	109.8	109.8
SAR	%	5.4	3.6	4.5	3.9	9.3	10.0	22.8	6.8	5.9
WHC	%	44.0	48.0	46.0	42.0	48.0	40.0	38.0	44.0	36
Texture Class		Sandy Clay Loam	Sandy Clay Loam	Loam	Loam	Clay Loam	Sandy Clay Loam	Sandy Loam	Clay Loam	Sandy Loam

3.10.2 Data Interpretation

Core Zone : After analyzing the samples collected from the site, it shows that the soil texture is 6/6 Bright yellowish Brown and 5/4 Dull Reddish Brown, pH ranges from 7.58 to 7.79. The amount of primary nutrients like Organic matter ranges from 1.01 to 1.25 %, the available nitrogen 92.4 to 106.8 mg/kg is low to medium and available Potassium 15.9 to 21.3 is low to medium and the available Phosphorus 7.9 to 9.1mg/kg is medium to high range.

The overall fertility of this soil would be considered moderate to low. The low levels of organic matter, nitrogen, phosphorous and potassium suggest that the soil may need amendments, particularly organic matter and fertilizers, to improve fertility.

Buffer Zone : The soil texture is 5/8Bright Brown and 5/4 Dull Reddish Brown, pH ranges from 7.02 to 9.92. The amount of primary nutrients like Organic matter ranges from 0.78 to 1.84 %, the available nitrogen 76.4 to 174.6 mg/kg is low to high and available Potassium 19.4 to 49.5 is medium to high and the available Phosphorus 7.1 to 10.9 mg/kg is low to high range.

The overall fertility of this soil would be considered adequate due to high levels of phosphorus, organic matter, nitrogen, and potassium.

3.11 Biological Environment

The biological environment describes the diversity of plant and animal life, along with associated habitats, within the 10 km radius study area. This assessment establishes the baseline ecological profile, covering both terrestrial and aquatic ecosystems in the core zone (project site) and buffer zone (surrounding 10 km). Surveys were conducted in accordance with the Ministry of Environment, Forest and Climate Change (MoEF&CC) guidelines to record vegetation types, species composition, and the presence of any rare, endangered, or threatened species, as well as to assess habitat quality and ecological sensitivity. The study integrates field surveys, literature review, and analysis of secondary data to evaluate potential project-related impacts on biodiversity and to recommend suitable mitigation and conservation measures.

3.11.1 Agriculture

Tiruvallur District falls under the North Eastern Agro-Climatic Zone and is characterized by fertile soils and favorable climatic conditions for multiple cropping. Paddy is the predominant crop, cultivated in three seasons—Sornavari, Samba, and Navarai—supported by good groundwater availability. Major pulse crops include Greengram and Blackgram, with greengram predominantly grown in Minjur, Sholavaram, Ponneri, Ellapuram, and Tiruvallur blocks, while blackgram is cultivated in Kadambathur, Tiruthani, Pallipet, and RK Pet blocks during the Rabi season. Additionally, sugarcane is a significant commercial crop, largely cultivated in Tiruthani, Tiruvalangadu, RK Pet, and Pallipat blocks. Coconut, groundnut, and a variety of vegetables are also grown in pockets across the district, contributing to diversified agricultural output.

(Source: <https://tiruvallur.nic.in>)

Major Category	Specific Use	Area (Ha)
Forest Land	—	19,736
Waste Land	Uncultivable Waste	13,568
Non-Agricultural Uses	Buildings	15,059
	Roads	5,839
	Railway Lines	648
	Rivers	4,959
	Canals	5,543
	Check Dams	32,004
	Swamp Area	635
	Social Forest	2,011
	Others	30,414
Agricultural Land	Cultivable Waste Land	6,305
	Permanent Pasture & GrassLand	7,844
	Miscellaneous Tree Crops & Groves	6,582
	Current Fallows	31,529
	Other Fallow	52,542
	Net Cultivated Area	89,383
Total	—	194,185
Grand Total	—	324,601

3.11.2 Cropping Pattern

Agriculture in Thiruvallur District is characterised by diversified cropping, with paddy and millets as the predominant crops. Paddy is cultivated in three major seasons: Sornavari (April–July), supported by pre-monsoon showers and early irrigation; Samba (August–November), the principal crop season aligned with the northeast monsoon; and Navarai (December–March), sustained by irrigation from tanks, wells, and canals, ensuring continuous paddy

production.

Millet cultivation is undertaken during both Kharif (April–September), coinciding with the southwest monsoon, and Rabi (October–March), dependent on residual soil moisture and supplemental irrigation. Millets are valued for their drought tolerance, short maturity period, and nutritional benefits, contributing to crop diversification and food security.

Significant additional crops in Tiruvallur District include groundnut, cumbu, ragi, maize, tinai, mango, watermelon, jasmine, banana, guava, and various vegetables, contributing to agricultural diversification and strengthening the district's commercial crop profile.

The district's agricultural productivity is supported by fertile soils, a well-developed irrigation network, and favourable agro-climatic conditions, enabling multiple cropping and stable year-round output.

3.11.3 objective

In accordance with the Terms of Reference (ToR), this study undertakes a detailed evaluation of the area's biological environment, with objectives to document existing flora and fauna, establish baseline ecological data, and assess potential impacts on biodiversity.

3.11.4 Methodology

Vegetation types in the core and buffer zones were assessed using standard methodologies. The terrain within the impact zone is predominantly plain, with occasional gentle undulations. Biodiversity assessments have previously been undertaken across the entire study area. The floral study was carried out in accordance with the Ministry of Environment and Forests guidelines (1994), covering the prescribed scope and objectives. Primary data were obtained through field surveys, supplemented by reviews of published literature and existing records on flora and fauna. Faunal surveys employed both direct and indirect observation techniques to ensure comprehensive documentation.

3.11.5 Core and Buffer Zone Observations of Flora & Fauna

The biological environment of the study area was assessed as part of the Environmental Impact Assessment. Information on flora and fauna was gathered through field surveys and from secondary sources, including published literature, government databases, standard reference books, and scientific research papers. The collected data was analysed to evaluate potential ecological characteristics of the region.

Tiruvallur district features diverse ecosystems, including hills, plains, and coastal zones. The coastal region is mostly flat, while parts of Tiruttani and Pallipattu taluks are undulating to hilly. The predominant soils are red non-calcareous and coastal alluvial, which are generally fertile and contain a natural soil seed bank. Soil microflora consists mainly of bacteria, fungi, algae, and protozoa, while soil microfauna includes nematodes and protozoa, contributing to soil organic matter. Vegetation ranges from agricultural crops to wild plant species, with notable horticultural produce such as bananas, mangoes, coconuts, seasonal vegetables, and flowers like jasmine and tuberose.

The district's economy is primarily based on agriculture and allied activities. Paddy is the principal crop, cultivated in three main seasons—Sornavari (April–July), Samba (August–November), and Navarai (December–March). Other crops include green gram, black gram, groundnut, sugarcane, various millets (varagu, cumbu, ragi, tinai), pulses (red gram, gingelly), chillies, fruits, flowers, and vegetables.

Forests occupy about 5.8% of the district's total area, with 19,791 hectares classified as Reserved Forests and Reserve Lands. The district has seasonal rivers such as Kosasthalaiyar, Araniyar, Nandi, Kallar, Cooum, and the Buckingham Canal, but no perennial rivers. Within the 10 km study area, no rare or endangered species of birds or animals have been reported, and no protected areas such as National Parks or Wildlife Sanctuaries are present.

Flora in both core and buffer zones was documented through direct field observations and secondary data sources, covering herbs, shrubs, and trees. Faunal surveys used both direct sightings and indirect evidence to record species presence. Overall, the area supports a mix of agricultural, horticultural, and naturally occurring biodiversity typical of the Tiruvallur region.

Table 0.19 Common Flora Species in the Study area

S. NO.	SCIENTIFIC NAME	COMMON NAME
Herb		
1.	<i>Acalypha indica</i>	Kuppaimeni
2.	<i>Cassia italica</i>	Nilavahai
3.	<i>Catharanthus roseus</i>	Nithyakalyani
4.	<i>Euphorbia hirta</i>	Amampatchaiarisi
5.	<i>Nymphaea rubra</i>	Sivappu Alli,
6.	<i>Oryza sativa</i> L.	Nell
7.	<i>Datura metel</i>	Oomathai
8.	<i>Leucas aspera</i>	Thumbai
9.	<i>Portulaca quadrifida</i>	Siru pasalai keera
Shrub		
10.	<i>Abutilon indicum</i>	Thuthi
11.	<i>Aerva persica</i>	Perumpulai
12.	<i>Calotropis gigantea</i>	Erukku

13.	Carissa carandes	kalakaai
14.	Citrus aurantifolia	Yelumichai
15.	Opuntia stricta	Sappathikalli
16.	Tephrosia purpurea	Kolingi
Tree		
17.	Acacia nilotica	Karuvelamaram
18.	Azadirachta indica	Veppamaram
19.	Borassus flabellifer	Panaimaram
20.	Casuarina litorea	Chavuku
21.	Ficus religiosa	Arasu
22.	Ficus benghalensis	Aal
23.	Soathadea companulata	Tulip
24.	Tamarindus indica	Puliyamaram
25.	Tectona grandis	Teak
26.	Mangifera indica	Maanga
27.	Psidium guajava	Koyya
28.	Terminalia cuneata	Marutu
29.	Terminaliacatappa	Badam,
30.	Ziziphus mauritiana	Ilandhai
31.	Cocos nucifera	Thennaimaram
32.	Prosopis juliflora	Veelikkaruvai

Table 0.20 Common Fauna Species in the Study area

S. NO.	SCIENTIFIC NAME	COMMON NAME
1.	Bufo melanostictus	Toad
2.	Rana hexadactyla	Tree frog

3.	Bandicota bengalensis	Rice Rat
4.	Herpestes edwardii	Indian Grey Mongoose
5.	Rattus norvegicus	Field mouse
6.	Calotes ellioti	Forest Lizard
7.	Funambulus palmaram	Squirrel Anil
8.	Rattus rattus	House rat
9.	Chameleo zeylanicus	Indian chameleon
10.	Eutropis carinata	skink
11.	Graphium agamemnos	Tailed jay butterfly
12.	Alcedo atthis	Common Kingfisher
13.	Ardia intermedia	Mediem egret
14.	Anas poecilorhyncha	Indian spot billed duck
15.	Acridotheres tristis	Common myna
16.	Corvus splendens	House crow
17.	Cuculus varus	Cuckoo Kuyil
18.	Columba livia	Rock pigeon
19.	Hierococcyx varius	Common hawk
20.	Orthotomus sutorius	Common tailor bird
21.	Ploceus philippinus	Chitukuruvi
22.	Psittacula krameri	Rose ringed parakeet

As per MoEF&CC guidelines, a **10 km radius** from the project site is designated as the study area for assessing environmental sensitivity. No notified **ecologically sensitive zones** or protected wildlife habitats are present within this radius, and no sightings of endangered or vulnerable fauna were recorded during the survey.

3.12. Socio-Economy Environment

The socio-economic environment forms a vital part of any Environmental Impact Assessment (EIA) study. The demographic and economic characteristics of the local population act as important indicators of the region's development status. Regardless of its size, every development project has the potential to influence the living standards and economic well-

being of nearby communities and the wider area.

In the case of the proposed project, notable socio-economic effects are anticipated within the study area. This section provides an in-depth analysis of key social and economic aspects, based on a combination of findings from primary household surveys and insights drawn from secondary data sources relevant to the region.

Figure 0.27 Demographic data of Thiruvallur District

Sl.No	Name	No of Households	Total Population Person	Total Population Male	Total Population Female	Population (0–6) Person	Scheduled Castes Population	Scheduled Tribes Population
1	Vadathillai	161	598	307	291	92	0	94
2	Mambakkam	495	1911	953	958	192	1019	17
3	Thamaraikuppam	281	1017	493	524	157	0	255
4	Senjagaram	356	1394	651	743	175	377	418
5	Palavakkam	764	3013	1501	1512	324	1214	723
6	Sirunai	0	0	0	0	0	0	0
7	Sengarai	372	1368	670	698	178	427	123
8	Rallapadi	1030	4104	2067	2037	452	1122	158
9	Ellapuram	113	448	219	229	41	320	0
10	Ariapakkam	394	1596	784	812	135	547	34
11	Athupakkam	254	922	458	464	101	0	0
12	Vannankuppam	350	1390	699	691	160	360	0
13	Thoddareddykupam	76	242	120	122	17	25	0

14	Kaiyadal	73	306	161	145	39	248	5
15	Kilakarnamur	166	633	309	324	69	463	0
16	Soolaimani	337	1199	591	608	117	332	6
17	Lachivakkam	652	2481	1218	1263	249	646	104
18	Perandur	683	2502	1265	1237	246	987	45
19	Tharatchi	908	3187	1547	1640	316	1119	218
20	Panapakkam	518	1936	968	968	197	838	79
21	Sennankaranai	535	1821	887	934	170	98	21
22	Tholavedu	302	1099	532	567	110	681	3
23	Kakkavakkam	357	1337	668	669	182	764	0
24	Paruthimerikuppam	106	371	177	194	38	0	0
25	Thumbakkam	155	553	265	288	66	0	0
26	Thandalam	419	1594	781	813	172	322	30
27	Chittiraiyampakkam	0	0	0	0	0	0	0
28	Melmaligaipattu	290	1113	560	553	137	905	0
29	Velagagauram	631	2372	1181	1191	239	1012	17

30	Enambakkam	168	629	300	329	84	0	49
31	Kalpattu	580	2050	1016	1034	237	482	8
32	Palavakkam R.F.	0	0	0	0	0	0	0
33	Chedipakkam	329	1369	671	698	163	724	2
34	Nemalur	1106	4251	2086	2165	416	1724	476
35	Budur	495	1863	934	929	173	1160	30
36	DharkasthuKandigam	0	0	0	0	0	0	0
37	VarnasiKuppam	0	0	0	0	0	0	0
38	Kannankottai	538	2008	987	1021	227	1256	75
39	Siruvada	196	795	393	402	82	524	0
40	Panchalai	417	1505	738	767	161	540	4
41	Vanianallur	416	1518	755	763	165	672	112
42	Poovalambeedu	268	1056	547	509	110	692	0
43	Periapuliyur	195	683	345	338	50	405	0
44	Kollanur	164	525	262	263	52	0	0
45	Thervoy	792	3122	1558	1564	359	2433	4

46	Karadipudur	500	1969	963	1006	220	718	28
47	Madhavaram	0	0	0	0	0	0	0
48	Mukkarambakkam	869	3488	1768	1720	420	1829	341
49	Nelvoy	476	1632	816	816	155	335	0
50	Sepedu	61	231	113	118	23	205	0
51	Madaharpakkam (CT)	1109	4250	2082	2168	479	359	377
52	ChinnaEetivakam	225	813	413	400	85	300	79
53	Kothamarikuppam	694	3230	1316	1914	262	1277	416
54	Narasaraju Agraharam	259	977	485	492	95	7	59
55	Dalavai Agraharam	508	2245	1024	1221	214	1164	23
56	Satyavedu	2897	11474	5799	5675	1145	2756	888
57	VenketarajuKhandriga	199	766	379	387	95	210	20
58	Madamanbendu	1046	4045	1999	2046	407	1248	54
59	Madamanjeri	138	576	294	282	84	254	0
60	Peradam	161	609	264	345	73	623	124
61	Sirunambudur	377	1570	771	799	200	1290	13

62	Kadirevul	394	1509	764	745	182	861	0
Total		26353	101222	49888	51334	10689	37314	5535

3.12.1 Infrastructure and Surrounding Features

The project site, once utilized for agricultural purposes, has been reclassified as part of the SIPCOT Industrial Area and lies approximately 44 km from Chennai. The location benefits from established industrial infrastructure and close proximity to both Tamil Nadu and Andhra Pradesh.

Surrounding Boundaries

- **North:** Bhartiya Pulverisers
- **South:** Hindustan Resins and Turban
- **East:** Maha Agro Product
- Proximity to State Border: Andhra Pradesh

Nearby Settlements

Thervoy Kandigai, Kollanur, Karadipudur, and Sengarai are the primary habitations in the vicinity.

Prominent Industries in the Area

Tropical Breweries Pvt. Ltd., Baettr India Pvt. Ltd., Michelin India Pvt. Ltd., Wheels India Ltd., and Sheng Long Biotech India Pvt. Ltd. operate within the industrial cluster.

Educational and Public Services

- Government ADW High School, Adi Dravida Welfare School, CAAD – College of Architecture and Design, and the Academy of Learning and Designing are all located in Thervoy Kandigai.
- A Primary Health Centre functions at Kollanur.

Other Infrastructure Assets

- Weekly Saturday market at Thervoy Kandigai.
- Thervoy Kandigai Reservoir, located ~600 m northwest of the site.
- Arulmigu Kathu Selli Amman Temple.
- Periyapulivur bus stand.
- Bank of India branch ~6 km northeast.
- Thervoy Kandigai Fire Station, approximately 500 m away.

3.12.2 Educational and Healthcare Facilities in the Study Area

The SIPCOT Thervoy Kandigai region, under Gummidipoondi Block in Tiruvallur District, is well-supported by educational institutions catering to various academic levels, alongside a network of public healthcare facilities.

Educational Institutions

The vicinity hosts long-established institutions such as:

- Government Welfare High School, Thervoy Kandigai (est. 1912, classes 6–10, Tamil medium)
- ADW Primary School, ThervoyKandigai
- Panchayat Union Primary School, Thervoy Kandigai
- Government High School, Guruvaraja Kandigai (est. 1961, classes up to 10)
- Panchayat Union Primary School, Guruvaraja Kandigai
- Panchayat Union Middle School, Thanipoondi

These institutions serve as primary hubs for education in the region, offering instruction predominantly in Tamil.

Healthcare

Services

Within the 10 km study area, there are around 25 government-operated healthcare centres. No evidence of industrial activity–related respiratory ailments has been reported among residents.

Table 0.21 Educational and Medical Facilities

Sl. No.	Village Name	Direction from Project	Educational Institutions	Healthcare Facilities
1	Thervoy Kandigai	E	5	2
2	Karadipudur	SW	6	–
3	Kollanur	E	3	1
4	Kannankottai	NW	6	7
5	Sengarai	S	5	–
6	Siruvada	N	3	1
7	Panchalai	NE	6	–
8	Mukkarambakkam	SE	11	1
9	Nemalur	NW	12	1
10	Budur	NW	9	1
11	Madharapakkam	N	5	7
12	Manellore	N	13	2

3.13 Traffic Survey

a. Internal Logistics and Site Circulation

The project has been planned with a strong emphasis on efficient logistics for both raw materials and finished goods. The internal layout prioritises smooth vehicular circulation and operational safety.

- **Functional Zone Connectivity:**

All operational areas—including the raw material storage yard, workshop, production units, stockyard, loading/unloading bays, canteen, and rest areas—are connected through a well-laid internal road network.

- **Road Dimensions:**
 - **Main Approach Road (within site):** 10 m wide
 - **Internal Roads:** 7 m wide across the plant
- **Turning Radius:**

A minimum turning radius of 10 m is maintained to accommodate the manoeuvring of heavy-duty trucks and material handling vehicles.

- **Safety and Efficiency Measures:**
 - Clear directional signages across the premises
 - Segregated pedestrian walkways with surface markings
 - Designated parking for staff, visitors, and goods vehicles

Table 0.22 Internal Road Specifications

Road Type	Width (m)	Turning Radius (m)	Purpose
Main Approach Road	10	10	Entry of heavy trucks, material movement
Internal Roads	7	10	Circulation between operational zones
Pedestrian Walkways	1.5–2.0	N/A	Worker movement between units

b. Regional Road Connectivity

The site is advantageously located near major state and national highways, enabling direct access for inbound raw material supply and outbound product distribution.

- **State Highway Access:** ~5.92 km NNE from SH-52 (Kavarapettai–Satyavedu)

- **National Highway Access:** ~5.25 km south of NH-716A, linking NH-16 (near Chennai, Tamil Nadu) to NH-40 (near Kadapa, Andhra Pradesh).

Table 0.23 Road Connectivity

Route Type	Highway Code	Distance from Site (km)	Direction	Connectivity Description
State Highway	SH-52	5.92	NNE	Kavarapettai–Satyavedu corridor
National Highway	NH-716A	5.25	South	Links NH-16 (Chennai) to NH-40 (Kadapa)

c. Rail Connectivity

The site is well-served by a nearby rail network, providing options for freight transport.

- **Nearest Station:** Gummidipoondi Railway Station – approximately 15.09 km NNE of the project site.

Table 0.24 Rail Connectivity

Station Name	Distance from Site (km)	Direction	Remarks
Gummidipoondi Railway Station	15.09	NNE	Suitable for freight and cargo handling

d. Air Connectivity

The project has access to a major international airport within a reasonable travel distance, facilitating movement of personnel and potential air freight operations.

- **Nearest Airport: Chennai International Airport** – approximately 42.86 km SE of the site.

Table 0.25 Air Connectivity

Airport Name	Distance from Site (km)	Direction	Remarks
Chennai International Airport	42.86	SE	International passenger and cargo handling

e. Port Connectivity

The site benefits from proximity to a major seaport, enabling efficient import and export logistics for raw materials and finished products.

- **Nearest Seaport: Chennai Port** – approximately 39.9 km SE from the site.

Table 0.26 Port Connectivity

Port Name	Distance from Site(km)	Direction	Remarks
Chennai Port	39.9	SE	Containerised and bulk cargo handling

f. Traffic Assessment

A detailed traffic impact study has been undertaken to assess the influence of the project on surrounding road networks. The study followed the methodology outlined in **IRC:106-1990**, focusing on road capacity evaluation and **Level of Service (LOS)** during peak operating hours.

Key Considerations in Traffic Study:

- Existing traffic volume on SH-52 and NH-716A
- Anticipated increase in heavy vehicle movement due to project operations
- Adequacy of approach road width and design for projected load
- Integration of internal traffic circulation with external connectivity

4.0. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Prediction of impacts is the most important component in the Environmental Impact Assessment studies. Several scientific techniques and methodologies are available to predict impacts of developmental activities on physical, ecological and socio-economic environments. Such predictions are superimposed over the baseline (pre-project) status of environmental quality to derive the ultimate (post-project) scenario of environmental conditions. The prediction of impacts helps to minimize the adverse impacts on environmental quality during pre-and post-project execution.

Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly by the project and 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 actions.

4.1. Impact Assessment Methodology

For the proposed project, the impact assessment shall be performed in following steps:

- Identification of interactions between activities and environmental receptors.
- Identification of potentially significant environmental impacts.
- Based on this preliminary identification, environmental indices that are likely to be impacted due to the project are:
- **Land Use/Land Cover:** Due to the expansion being carried out within the existing available land area, there will be no change in land use. The land is located within a notified industrial area developed by SIPCOT
- **Air Quality:** Baseline studies reveal air quality in the core zone is satisfactory and in buffer zone is moderate; due to the proposed activities during construction/installation the air quality will be affected by increased Dust generation, vehicular emission, loading/unloading activities, and during operation phase, emissions from manufacturing processes, Utilities , vehicular emission, and material handling operations.
- **Noise:** Vehicular movement & construction /installation activities during construction phase, and from the process machineries, operation of Boilers, DG sets loading/unloading activities.
- **Water:** Increased fresh water requirement will adversely affect the neighborhood area, as the project is drawing ground water. Increased wastewater generation will require additional systems and facilities to treat and maximize reuse of treated wastewater within the facility.
- **Soil:** Excavation activity and contamination due to deposition of metals in dust oil, grease and other chemicals bearing wastewater.
- **Storage and handling** of solid and hazardous waste.
- **Ecology and Biodiversity:** Construction activities and operational activities will have an effect on the avifauna and the existing plant of the study area.
- **Socio – Economic:** There will be a minor positive impact due to increase in additional

employment generation, increased revenue to neighborhood people and increased tax payment to the local administration.

- **Occupational Health, Community Health and Safety:** Occupational health risk during exposure to dust, noise, hazardous wastes and solid wastes.

4.2. Potential Impacts during Construction Phase

During the construction phase of the proposed project will involve temporary activities such as site preparation, foundation works, equipment installation, and utility integration. This phase will generate approximately 9,390 man-days of employment, engaging workforce from the nearby region. The estimated water requirement is 12.5 KLD, primarily for domestic needs, curing, and dust suppression, and will be met through private tankers without burdening local water resources.

Environmental impacts during construction are expected to be negligible, as best management practices will be adopted. Soil handling will be done in a confined and controlled manner to avoid erosion or contamination. All construction materials will be stored in designated areas, and temporary drainage systems with silt traps will be installed to manage stormwater runoff efficiently.

Air quality will be well maintained through regular water sprinkling, the use of covered transport vehicles, and low-emission DG sets. Noise levels will be kept within permissible limits by using low-noise equipment, conducting activities only during daytime hours, and ensuring workers are equipped with PPE such as earplugs and masks.

Approximately 3 KLD of domestic wastewater will be generated during construction, which will be treated in the existing 20 KLD STP. Mobile sanitation facilities will be provided to maintain hygiene and prevent any adverse impact on land or groundwater.

Overall, the construction phase is expected to have no significant adverse environmental impacts due to the adoption of effective mitigation measures and environmentally sound construction practices.

4.2.1. Activity – Construction Activities

Construction like buildings, Industrial sheds, STP, ETP, Installation of MS structures, RCC structures, mechanical beams, etc.

In this proposed construction/installation phase,

- Generation of Construction and demolition (C&D) waste
- Generation of broken raw material
- Generation of Scrap materials
- Noise from construction equipment & machinery

Table 0.1. Construction of New Structure

Environmental Components	Anticipated Impact	Proposed Mitigation Measures
Air Environment	- Emission from DG sets	- A stack of adequate height will be provided.
	- Emission from Construction machinery including mixing machines and grinder	- Closed containers will be used to avoid emissions and leaks, periodical maintenance will be adhered to attend to prevent any leaks, loose joints, etc.
	- Cutting of MS steel structural materials at site	- Cutting activities will be restricted to an identified shed to confine dusts or any particle generation within the shed itself
	- Dust generation during material handling	- Covering the construction area upto 5m/10m height as required, water sprinkling at roads, material handling activities, etc., will be employed to reduce and restrict dust emission locally.
Water Environment	- Utility wastewater generation from cleaning and washing of vessels after construction.	- Wastewater will be collected and passed through sedimentation tanks.
	- Wastewater will be generated from Construction workers water requirement	- Mobile STP will be installed and treated water will be used for greenbelt development.
Land Use	- It is already an established factory wherein we are going in for the expansion activity, hence no adequate impact.	- The existing Greenbelt area remains the same after proposed expansion.
Soil Environment	- Construction activity does not have any negative impact on the soil as there will be no basement activities.	- Due to construction activity, soil fertility will not deteriorate, however periodically monitoring of soil quality will be conducted.

Environmental Components	Anticipated Impact	Proposed Mitigation Measures
	- Improper disposal of C&D waste.	- C&D will be either disposed off weekly to the C&D Waste site or utilized in internal road formation for the proposed expansion.
Noise & Vibration	- Noise generation from DG set.	- DG set will be put under an acoustic enclosure. The noise generation will be limited to 1 m radius.
	- Vibration will be due to construction equipment like cutter and driller and will be limited as it will be operated intermittently and the vibration area is limited to 1m radius.	- Machines and equipment will be properly greased, lubricated and regularly maintained and shall be provided with anti-vibration pads.
Hydrology & Geology	- No impact	- Nil
Solid & Hazardous Waste	- Due to construction workers about 30 kg/day solid waste will be generated.	- Recyclable construction waste material will be sold to authorized recyclers.
	- Packaging waste will be generated.	- Packaging waste will be sold to authorized recyclers.
	- Construction debris & waste materials will be generated.	- The construction debris will be used within the site for road laying.
	- Generation of used oil from DG set	- Used oil be sold to CPCB Authorized recyclers
Socio-Economic	- Positive impact by giving employment to the local people. - Increase in local economic activity.	- Nil
Ecology & Biodiversity	- No impact due to construction activity.	- Increasing the greenbelt parallelly in the expansion area and the density of the greenbelt will be

Environmental Components	Anticipated Impact	Proposed Mitigation Measures
		increased in the existing plant area.

4.2.2. Activity – Operation of Construction Machinery (Concrete mixing machinery, DG Sets, etc.)

Aspects

- Used oil generation
- Air emission
- Dust generation
- Noise generation

Table 0.2. Operation of Construction Machinery

Environmental components	Impact	Proposed Mitigation Measures
Air Environment	- Emissions from the use of construction machinery will cause respiratory problems to the workers at site.	- Personal Protective Equipment like masks shall be provided to the construction workers. - Emission from construction activities will be restricted within the site by providing cover sheets of 5-10 m height, water sprinkling and periodical removal of dust generating wastes.
	- Pollutants emitted from the stack will increase the Ground Level Concentration which will affect the respiratory health of people in a nearby area.	- The only source of air pollution is the DG sets. Adequate stack shall be provided in order to ensure good dispersion in air
	- Generation of dust from the operation of construction machinery.	- Dust barriers of 5-10 m height and water sprinkling systems will be installed for suppression of particulates.

Environmental components	Impact	Proposed Mitigation Measures
	- Spillage of Diesel, used oil, chemicals may result in emission of VOCs in the air environment which may cause irritation in eyes, nose and throat, difficulty breathing and nausea.	- Quantity of fuels /oils handled at site will be less ; vehicles will be fuelled in external bunks . Collection of Used Oil from the DG sets will be done only by trained service technicians.
Water Environment	- Spillage of oil & chemicals, if in any case encounters with water bodies can deteriorate the groundwater & surface water body which in turn may affect life also.	- The hazardous waste generated will be Used oil only. Used Oil will be stored in HDPE drums and kept in covered rooms under lock and key and will be sold to authorized vendors only. - Cement residue from concrete mixer plants will be properly collected and reused in construction sites.
Land Use	None	None
Soil Environment	- Chemical degradation of soil may occur while refueling vehicles transporting construction materials and servicing of vehicles through breakage due to wear and tear.	- Vehicles will not be allowed to get fuelled within the site. SOP to that effect will be implemented. - Lubricating waste oil will be collected separately in drums and handed over to the authorized outside agency.
Socio -Economic	- Noise due to operation of DG Sets, Vehicular movement and construction machineries will disturb the neighborhood people -Positive impacts due to	- DG Sets will be used only during the Emergency. - Provision of Ear Plugs will be made in case of exposure to reduce the impact of noise on Ears of Workers can reduce the impacts. - Project construction

Environmental components	Impact	Proposed Mitigation Measures
	employment generation	activities will generate 9390 Man-hour employment.
Ecology & Biodiversity	- Increase in PM level will result in deposition of dust on leaves which may cause decrease in Transpiration rate of flora.	- Water sprinkling will be done at the site to reduce dust emission. - All the construction activities will be carried out during the daytime. No activity will be done during late evenings which is the roosting time for the avian population and also during night time.
	- Increased noise will cause disturbance of existing avi-fauna; however, avifauna is not restricted to one place for a long time, thus it will not result in their displacement.	- All the machinery used will be provided with vibration isolators in accordance with their vibration generation.
Noise & Vibration	- Noise and vibration generated due to the operation of machinery and equipment may cause physiological and psychological effects on laborers like annoyance, problems like speech interference, sleep disturbance, headache, Auditory impact, increase in heartbeat of elderly people. Running of machinery will cause vibration generation in the immediate surrounding area.	- Noise & vibration due to the running of concrete mixture/Pneumatic hammer m/c will be prevented by provision of protective devices like earmuff/plugs to the workers and keeping the machine in an enclosed system with a provision of vibration isolator. - Greenbelts in an area will act as a barrier and help in reducing noise levels at the project site as a result of attenuation of noise generated due to plant operations and transportation. - Less noise producing machinery will be purchased and shall be properly lubricated and regularly maintained.

Environmental components	Impact	Proposed Mitigation Measures
Hydrology & Geology	None	None
Solid & Hazardous Waste	- Waste generated from construction machinery including waste oil, grease, and any other may cause nuisance if not maintained properly.	- All the waste generated will be properly disposed of as per solid waste management rules, 2016.

4.2.4. Activity – Transportation (Raw Material, Labour)

Aspects

- Vehicular emission
- Diesel/petrol leakage
- Road congestion & breakage of roads
- Noise generation
- Dust Emission

Table 0.3 Transportation.

Environmental Components	Impact	Proposed Mitigation Measures
Air Environment	- Emissions from vehicles used for transportation will affect the health of construction workers and nearby populations.	- Vehicles with valid PUC certificates will be used for transportation of construction material -Construction material shall be transported in closed and covered trucks. - Improved combustion efficiency, catalytic converters, and reformulated gasoline shall be used to reduce VOC emissions from vehicles. - Water sprinkling shall be carried out for dust suppression from movement of transport vehicles. - In the proposed expansion, air

Environmental Components	Impact	Proposed Mitigation Measures
		pollution reducing tree species, and other native tree species will be planted in the existing area. - In the proposed expansion, air pollution reducing tree species, and other native tree species will be planted in the proposed area.
Water Environment	- Leakage of Diesel/ petrol from vehicles, if in any case comes in contact with the water body then it may deteriorate the groundwater & surface water body quality. This in turn may affect aquatic life also.	- PUC certified vehicles will be used, so that diesel/ petrol leakage does not occur & air emissions will be maintained within the prescribed limit & thereby restricting its deposition on the water bodies.
	- Vehicular emission & dust emission if deposited over the surface of the water body may deteriorate the water quality and thereby affect aquatic life and make water unfit for consumption.	- The vehicles carrying construction material and construction debris will be cleaned before they are permitted to ply on the road and covered vehicles will be used to reduce the dust emission & thereby restricting its deposition on the water body. - Wheel washing arrangement of construction vehicles will be provided at site.
	- If raw material falls down near or on the water body it can deteriorate the water quality.	- Adequate drainage will be provided.
Land Use	None	None
Soil Environment	- Contamination of soil may occur due to Diesel/ petrol seepage into the soil if any spillage occurs	- Procedures for maintenance of vehicles would ensure that this risk is minimized, and clean-up response is rapid if any spill

Environmental Components	Impact	Proposed Mitigation Measures
	or while refueling (Diesel/ petrol) of vehicles transporting construction materials and servicing of vehicles.	occurs. Lubricating waste oil shall be collected separately in drums and handed over to the authorized outside agency.
Socio - Economic	- Due to the construction of the project there will be an increase in usage of vehicles which will have a direct impact on traffic load on the existing roads in the area. Due to which there will be a traffic jam, chaos, discomfort, safety issues on the roads.	- Existing road width is sufficient to handle the load of increased traffic. - Adequate temporary parking @ 15 truck parking, @50 Two wheeler parking will be provided.
	- Indirect employment generation due to transportation will be there, hence, the economic condition of their families will improve. The purchasing power of people will increase. Hence, there will be overall development of the area.	- There will be a positive impact due to increase in employment and other indirect requirements.
Ecology & Biodiversity	- None	- None
Noise & Vibration	- Due to transportation of construction materials and machinery for installation high levels of noise may be generated which may cause physiological & psychological effects.	- Barriers of noise absorbing materials with adequate height will be maintained throughout the boundary of the project site.
	- There will not be much impact due to vibration on the project.	- Green belt within the project site will be done which will dampen the noise.
Hydrology &	- None	- None

Environmental Components	Impact	Proposed Mitigation Measures
Geology		
Solid & Hazardous Waste	- Due to improper handling & transportation of raw material such as RMC & waste during transportation, littering of waste will occur leading to unhygienic conditions.	- Proper care will be taken while handling & transportation of raw material such as RMC & waste during transportation to avoid littering of it on roads and sites.

4.2.5. Activity –Working & Daily Activity of Construction Labor

Aspects

- Vehicular movement of construction materials,
- Solid waste & E-waste generation,
- Water requirement & waste water disposal.

Table 0.4. Working & Daily Activity of Construction Labor

Environmental components	Impact	Proposed Mitigation Measures
Air Environment	- Biodegradable Waste generation may lead to odour problems if not stored properly & treated within time.	- The generated organic waste will be collected properly & will be treated in an inhouse OWC.
Water Environment	- For construction laborers of Domestic water shall be sourced through the SIPCOT water supply and this will lead to wastewater. If the waste water is not properly disposed off, then it can deteriorate the surface water quality of nearby water bodies.	- Domestic wastewater will be generated from the plant and it will be sent to a mobile STP. - Temporary toilets & bathrooms will be made.
Land Use	- None	- None
Soil Environment	- Impact on soil due to improper disposal of solid waste & liquid waste.	- Solid waste generated during the installation phase will be treated in existing OWC.

Environmental components	Impact	Proposed Mitigation Measures
Socio -Economic	- Improper disposal of Solid waste & wastewater from labors may cause nuisance due to smell if not properly managed & treated.	- The generated organic waste will be collected and disposed of in an existing OWC.
Ecology & Biodiversity	- None	- None
Noise & Vibration	- None	- None
Hydrology & Geology	- None	- None
Solid & Hazardous Waste	- Improper storage and disposal of Biodegradable waste will enhance the risk of microbial contamination and will enhance the risk of disease occurrence and cause foul smell. It will attract the vectors.	- Solid waste from the laborers will be properly collected, stored in respective color coded containers. - The generated organic waste will be collected properly and will be sent to the Solid waste Handling Site. -Recyclable materials like aluminum, steel, wood pieces, cement bags, plastic containers, cartons, glass etc. will be given to recyclers.

4.3.Potential Impact During Operational Phase

4.3.1. Activity – Loading, unloading & storage of raw material

Aspects

- Generation of dust particles from Coal, Iron Ore, Dolomite, Lime Powder and Scraps
- Generation of Noise
- Generation of Solid waste, packaging material

Table 0.5. Loading, Unloading & Storage of Raw Material

Environmental Components	Impact	Mitigation Measures
Air Environment	- Point Source- Nil - Fugitive emission - Nil - Dust particle emission from material handling of Iron ore and coal. -	- Raw material dumping should be restricted to closed sheds. - Water sprinkling will be done for the dust suppression. - Loading or unloading activity will be mechanically supported.
Water Environment	- If dust particles are spread out in the neighborhood of the shed it may contaminate the water	- Dust particles and coal particles should not spill in water and soil. The storage of raw materials will be in a pucca earmarked area with flooring where washing will be done and washed water channelized to ETP. - Water sprinkling for dust suppression.
Land Use	- No impact	-
Soil Environment	- The dust if uncontrolled emission occurs over the neighborhood soil, will settle on the top soil.	- Periodic Sweeping of the surface - Periodic washing and washed water will be sent to ETP.
Socio-Economic	- The truck drivers and cleaners may create unwanted interaction with the neighborhood area.	- Restrooms for the truck drivers and other people also who are coming in the factory premises.
	- Traffic density will increase.	- Existing Thervoy Kandigai Road is 9.0 m wide, and has a carrying capacity of 1,800 PCU/hr . Even after the expansion, the LOS will remain in "A" - there will be no impact on the Thervoy Kandigai.
Ecology & Biodiversity	- Vehicular emission like NO₂, NO etc. can inhibit the growth of plants and premature leaves senescence.	- Water sprinkling is done to reduce dust generation.

Environmental Components	Impact	Mitigation Measures
Noise & Vibration	- Loading and unloading of raw materials will not cause much of a significant impact on noise level of the area, it may only cause physiological effects like annoyance to the workers. - Noise due to transportation	- Limited to plant area - Regular checking of PUC.
Hydrology & Geology	- None	- None
Solid & Hazardous Waste	- Improper handling of raw material may cause its littering thereby generating the waste.	- Solid waste generated from the site is collected and sent to an authorized recycler.

4.3.2. Activity – Manufacturing Process

Aspects

- Emission of heat, fumes, and particulate matter during metal melting in induction furnaces.
- Noise generation from sand mixing, shot blasting, and fettling operations.
- High electricity consumption due to continuous operation of induction furnaces.
- Use of water for cooling purposes (DM and soft water), mostly recycled with minimal discharge.
- Generation of solid waste such as used foundry sand, slag, dust, sweep waste, and shot blasting waste.
- Occupational exposure of workers to heat, dust, and noise during moulding and finishing processes.
- Potential dust and material spillage during handling and storage of raw materials.
- Off-spec casting generated are recycled back into the melting process.
- Efficient use of resources with high metal yield and reclaimed sand reuse to minimize waste.

Table 0.6. Impact & Mitigation during Manufacturing Process

Environmental Components	Impact	Mitigation Measures
Air Environment	- Emission from process.	- Sand Storage Area is equipped with dust collectors and a 20 m

Environmental Components	Impact	Mitigation Measures
		high stack to control particulate emissions. - Sand Cooler Classifier Area Silo uses vent filters with a 4.5 m high stack to arrest dust. - 60 T & 100 T Mixer Silos are provided with vent filters and a 4.5 m stack of 2400 mm diameter to manage dust emissions effectively. - 10 T Mixer Silos (Existing & Proposed) are fitted with vent filters and 4.5 m stacks of 300 mm diameter for emission control. - Sand Reclamation Storage Silos have vent filters with 4.5 m stacks (300 mm dia) to maintain clean air within the plant boundary. - Shot Blasting Unit is controlled using vent filters with a 600 mm dia stack, ensuring fugitive dust is minimized. - Induction Furnace (1×24T with 2 Crucibles) is equipped with individual suction hoods connected to a common Bag Filter

Environmental Components	Impact	Mitigation Measures
		system and a 30 m high stack (1709 mm dia) for fume extraction. - Shakeout Unit has a dust collector with a 30 m high stack (2400 mm dia) to capture sand and fine dust.
	- Emission from DG sets	- DG Sets (1500 KVA, Existing & Proposed) are provided with acoustic enclosures and 30 m stacks (each) to control noise and flue gas emissions.
	- Dust emission during material handling.	- Water sprinkling during material handling activities will be employed to reduce and restrict dust emission locally
Water Environment	- Fresh Water requirement will increase from 63 KLD to 72 KLD after expansion.	Freshwater demand of 72 KLD post-expansion will be entirely met through a reliable and sustainable supply from SIPCOT Industrial Park, Thervoykandigai. To promote water conservation, a Rainwater Harvesting (RWH) system is proposed to harvest approximately 34.5 KLD, which will be reused for non-potable applications such as greenbelt development and plant maintenance, thereby reducing reliance on freshwater. Stormwater management infrastructure

Environmental Components	Impact	Mitigation Measures
		includes 48 percolation/recharge pits, each with an effective storage volume of approximately 21.64 m³, resulting in a total recharge capacity of ~1,052.78 KL. These pits are strategically placed along the site perimeter to facilitate groundwater recharge. A dedicated rainwater storage pond measuring 42 m × 80 m × 3.4 m (with an estimated capacity of 11,400 KL) is also proposed to collect excess runoff during monsoon periods for future reuse. - The facility's water needs will be fully met through SIPCOT, with no reliance on groundwater sources.
	- Water sprinkling for dust suppression & floor cleaning may lead to contamination of the groundwater and soil.	- Excess water in dust suppression activity and floor wash water will be collected and channelised to the Existing 10 KLD ETP for treatment and reuse. Hence, there will be no adverse impact over aquifer or soil.
	- Wastewater from process, plant, utilities and Cooling tower will have a negative impact if discharged untreated.	- Groundwater recharging with rainwater harvesting during the rainy season. - The existing STP of 20 KLD will be increased to 20 KLD (STP : 2 X 20 KLD) to treat the increased sewage during proposed expansion.
Land Use	- No Impact	-
Soil Environment	- No Impact	-

Environmental Components	Impact	Mitigation Measures
Socio-Economic	- Economic Impacts - Employment generation Impacts	- Revenue increase through increased - A total of 709 direct employment opportunities will be created during the operational phase and 9,390 man-days of employment will be generated during the construction phase.
Ecology & Biodiversity	- No impact	-
Noise & Vibration	- Noise: DG Set and Material Transportation.	- DG Sets will be installed with acoustic enclosures to maintain Noise levels less than 72 dB at 1m distance will have noise suppressors installed in the shed in order to localize the noise pollution - Workers will be given a PPE/Ear muffler and controlled exposure will be allowed at a time period for 20 mins will be allowed - It will be re-checked and assured that mufflers systems will be installed in engines of machineries which helps in reduction of noise. - Machines and equipment will be properly greased, lubricated and regularly maintained and shall be provided with anti-vibration pads..
	Vibration: Due to machinery and DG sets.	- DG sets will be mounted over Anti-vibration pads.
Hydrology & Geology	- No impact	- No impact
Solid & Hazardous Waste	- Process residues, slags, sludge, STP	- Proper care will be taken while handling & transportation, PPE will be

Environmental Components	Impact	Mitigation Measures
	used oil, etc. will be impacting the workers and nearby villagers	used. - Biodegradable MSW @191 kg/day will be disposed of through in-house Organic Waste Converter (OWC), and non-biodegradable waste @128 kg/day will be handed over to TNPCB-authorized recyclers. - The unit will generate 20 TPA of spent/used oil, which will be collected in drums and sent to CPCB-authorized recyclers for recovery or reuse. - Around 20 TPA of oily residues will be sent to CPCB-authorized recyclers. - ETP sludge @5 TPA will be disposed of at the Common Hazardous Waste Treatment, Storage, and Disposal Facility (CHWTSDF).

4.3.3. Activity – Operation of Utility Equipment (DG set, STP, ETP, Boilers, etc.)

Aspects

- Emission of air pollutants (SO₂, NO_x, PM) from DG sets and boilers during fuel combustion.
- Noise generation from DG set operation, especially during power outages.
- Wastewater generation from STP and ETP operations, which if not treated properly, can impact soil and water bodies.
- Sludge generation from STP and ETP, requiring proper handling and disposal as per norms.
- Use of chemicals in ETP (like coagulants, neutralizers) can pose risks if mishandled.
- Thermal emissions from boiler operations may raise ambient temperature locally.
- Risk of oil spillage or leakage during DG set fuel handling and storage.
- Consumption of fresh water in utilities like boilers and auxiliary systems.
- Energy consumption by pumps, blowers, and other utility machinery.
- Occupational exposure of workers to noise, heat, and fumes during routine maintenance and operation.

Table 0.7. Operation of Manufacturing Machinery & Equipment

Environmental Components	Impact	Mitigation Measures
Air Environment	- Emission from utilities.	- Sand Storage Area is equipped with dust collectors and a 20 m high stack to control particulate emissions. - Sand Cooler Classifier Area Silo uses vent filters with a 4.5 m high stack to arrest dust. - 60 T & 100 T Mixer Silos are provided with vent filters and a 4.5 m stack of 2400 mm diameter to manage dust emissions effectively. - 10 T Mixer Silos (Existing & Proposed) are fitted with vent filters and 4.5 m stacks of 300 mm diameter for emission control.
Water Environment	- Utilisation of water may impact the water demand of the vicinity and improper disposal of waste water generated may affect	- The proposed project will not cause any adverse impact on local water

Environmental Components	Impact	Mitigation Measures
	the quality of nearby surface water body & ground water. - The wastewater if not properly disposed off, then it can deteriorate the surface water quality of nearby water bodies by increasing the no. of pathogens, BOD, COD, TSS etc and making water unfit for consumption. It will also affect aquatic life.	demand as the total freshwater requirement of 72 KLD will be met through assured supply from SIPCOT Industrial Park, Thervoy kandigai. There is no dependence on groundwater, thereby ensuring sustainable water sourcing without affecting local aquifers. - The wastewater management system is designed to eliminate the risk of water contamination . A total of 38.8 KLD of wastewater (including 28.8 KLD domestic and 10 KLD process) will be treated through 20 KLD existing STP + 20 KLD

Environmental Components	Impact	Mitigation Measures
		proposed STP for sewage and a 10 KLD ETP for process effluent. All treated water will be recycled for greenbelt development, floor cleaning, and dust suppression, achieving Zero Liquid Discharge (ZLD). - With these measures, no untreated wastewater will be discharged into any surface or groundwater source, thereby eliminating risks of BOD, COD, TSS, or pathogen loading in the environment. This ensures protection of aquatic life and maintains water quality in the surrounding area.
Land Use	- None	- None
Soil Environment	- During the operation and manufacturing of heavy machinery and equipment, soil quality may be affected due to accidental spillage or leakage of oils, lubricants, coolants, hydraulic fluids, and fuels. Deposition of metal dust, welding slag, paint overspray,	- will ensure all storage areas have impervious flooring with bunds, use drip trays for machinery, and store scrap and foundry sand in covered areas. All waste oils and coolants will be collected and sent only to TNPCB authorized recyclers. Separate drainage will be provided for stormwater and process water to avoid cross-contamination. Our team will

Environmental Components	Impact	Mitigation Measures
	and improper disposal of solid waste such as used foundry sand and oily rags can further contribute to soil contamination. Long-term accumulation of these contaminants may lead to deterioration of soil fertility and potential migration of pollutants to nearby surface water or groundwater sources.	carry out regular preventive maintenance to avoid leaks and conduct periodic soil testing to confirm that there is no impact on soil quality.
Socio-Economic	- The construction phase of the project is expected to increase vehicular movement in the area, which may result in higher traffic loads on the existing road network. This could potentially lead to congestion, disruption of smooth traffic flow, inconvenience to road users, and increased safety risks. - Transportation-related activities will create indirect employment opportunities, contributing to an improvement in the economic status of local families. With increased income, the purchasing power of	- A positive impact is anticipated through the creation of direct employment opportunities as well as additional indirect job requirements, contributing to economic growth in the area.

Environmental Components	Impact	Mitigation Measures
	the community is likely to rise, fostering overall socio-economic development in the region.	
Ecology & Biodiversity	-	-
Noise & Vibration	- During the operation of machinery, noise and vibration may be generated from the machineries which may cause speech interference, annoyance, hearing impairment, increase in heartbeat/ blood pressure in the workers.	- Machineries of the reputed make and less noise producing will be purchased. - Stationary machineries and equipment will be properly enclosed by enclosures and provided with dampeners for minimizing noise generated due to vibration of machineries. - Sufficient oiling and lubrication will be done to all the parts of the machineries to ensure that minimal noise is generated. - Noise and vibration during operations will be within permissible limits. Regular maintenance, periodic noise monitoring, and provision of PPE (like earplugs/earmuffs) to workers will ensure no adverse health impacts such as hearing impairment or stress.
Hydrology & Geology	-	-
Solid & Hazardous Waste	- ETP sludge, used oil, residues containing oil, etc. will be impacting the workers and nearby villagers	- Approximately 0.95 TPA of ETP sludge will be generated and safely disposed of through the Common Hazardous Waste

Environmental Components	Impact	Mitigation Measures
		Treatment, Storage and Disposal Facility (CHWTSDf) operated by TNWML, Gummidipoondi. - Around 3.5 TPA of spent/used oil will be stored in designated leak-proof containers and handed over to CPCB-authorized recyclers for recovery and reuse, in accordance with applicable regulations. - An estimated 1.5 TPA of oily residues (waste/residues containing oil) will be collected and dispatched to TNWML's TSDF for environmentally sound incineration. -

4.3.4. Activity – Transportation of Raw material, finished product, waste, etc.

Aspects

- Vehicular Emission and Dust emission
- Littering of solid waste
- Road congestion & Breakage of roads
- Noise Generation
- Spillage/leakage of raw material

Table 0.8. Transportation of Raw Material, Finished Products, Wastes, etc.

Environmental Components	Impact	Mitigation Measures
Air Environment	- Gaseous emissions from vehicles used for transportation will affect the respiratory health of staff and nearby population.	- Vehicles with valid PUC certificates are being used for transportation. - Tree Plantation all around the periphery has been done. - Proper maintenance of vehicles are done periodically to ensure no leakage from the vehicles - Vehicular transportation is done shift wise in order to reduce the stress on the roads - Proper maintenance and cleaning of vehicles and tyres are done in order to reduce dust generation. - The transportation of the raw material, & products is being done in covered trucks & tempos.
Water Environment	- If dust emitted or spillage/leakage gets deposited on the water body it can deteriorate the water quality.	- Trucks used are fully covered during transportation to the project by road.
Land Use	None	None
Soil Environment	-	-
	- Dust and emission from	- The present road conditions are

Environmental Components	Impact	Mitigation Measures
Socio-Economic	movement of vehicles are likely to cause some impacts on the working population within the immediate vicinity of the project site. - Traffic congestion in the area.	reasonably good for proposed movement of traffic, the site is connected to the National Highway. - Preventive maintenance is carried out for vehicles and pollution checks on a periodic basis. - Materials transported are fully covered during transportation to the project site by road.
Ecology & Biodiversity	- Increased noise due to vehicular transportation will cause disturbance of existing avifauna, however, avifauna is not restricted to one place for a long time, thus it will not result in their displacement.	- Water sprinkling is being done to reduce the dust generation - Vehicular movements for transportation of raw material are carried out only in day-time and try to avoid unnecessary honking with the help of signboards.
Noise & Vibration	- Due to transportation of construction materials and machinery for installation high levels of noise may be generated which may cause physiological & psychological effects on workers like annoyance, speech interference, headache, Auditory impact, increase in heartbeat of elderly people. - There will not be much impact due to vibration on the project.	- Silencers are checked in the vehicles used for transportation of materials. - No honking zone is maintained. - Reverse horn in the transportation vehicles is banned. - Only PUC certified vehicles are allowed for transportation - Maintenance of vehicles is done on a regular basis. - Tree Plantation within the project site has been done which will dampen the noise.

Environmental Components	Impact	Mitigation Measures
Hydrology & Geology	-	-
Solid & Hazardous Waste	-	-

4.3.5. Activity - Working & Daily Activity of Staff, Visitors

Aspects

- Solid & e-waste generation
- Water requirement & wastewater generation

Table 0.9. Working & Daily Activity of Staff, Visitors

Environmental Components	Impact	Mitigation Measures
Air Environment	- Biodegradable Waste generation may lead to odour problems if not stored properly.	- Biodegradable waste is Treatment in inhouse organic waste converter (OWC) and use manure for horticulture development purposes in the premises.

Environmental Components	Impact	Mitigation Measures
Water Environment	- Waste water, if not properly disposed of, can deteriorate the surface water quality of nearby water bodies. - The abstraction of groundwater is proposed for the project, hence there will be impact on Groundwater of the area.	- Post-expansion, the facility will generate approximately 38.8 KLD of total wastewater, including 28.8 KLD from domestic activities and 10 KLD from industrial processes. If inadequately managed, this wastewater could lead to contamination of nearby watercourses, affecting aquatic ecosystems and public health. The project does not involve any extraction of groundwater, as the entire 72 KLD freshwater demand will be fulfilled by SIPCOT's assured supply network, ensuring the region's groundwater table remains unaffected.
Land Use	- None	- None
Soil Environment	- None	- None
Socio-Economic	- Direct & indirect employment generation	- The project will generate 709 direct employment opportunities during the operational phase, comprising 250 permanent and 459 contractual positions.
Ecology & Biodiversity	- No significant impact	- None
Noise & Vibration	- No significant impact	- None
Hydrology & Geology	- Infiltration of silt and sand may occur with improper stormwater harvesting	- The site features 48 percolation pits (each ~21.64 m ³) and stormwater drains with a total storage capacity of 1,885.22 KL, effectively managing runoff from 70 mm rainfall. Excess runoff

Environmental Components	Impact	Mitigation Measures
		(1,411.08 KL) is directed to a proposed 11,400 KL rainwater pond (42 m × 80 m × 3.4 m). - This integrated stormwater system prevents flooding and infiltration of silt, with graded drains and sediment traps reducing the risk of soil erosion and protecting groundwater quality through enhanced percolation.
Solid & Hazardous Waste	- Improper storage and disposal of Biodegradable waste will enhance the risk of microbial contamination, population. - Improper storage and disposal of MSW waste, will enhance the risk of disease occurrence and cause foul smell. It will attract the vectors.	- Biodegradable MSW is estimated at 132.44 kg/day and will be treated using an in-house Organic Waste Converter (OWC) system, thereby preventing microbial contamination, foul odor, and vector attraction. - Non-biodegradable MSW is estimated at 88.29 kg/day and will be handed over to authorized recyclers for proper disposal and recycling, ensuring no accumulation or unsanitary conditions. All waste will be managed in accordance with the Solid Waste Management Rules, 2016, ensuring segregation at source, covered storage, and timely disposal to mitigate any risk to public health and the environment.

4.4. Summary of Impact and Mitigation

4.4.1. Air Environment

The project activities which would increase the emission of Volatile Organic Compounds (VOC's), SO₂, CO₂, PM, SO₂, NO₂ generation, dust generation which could lead to an increase

in ground concentration level (GLC), respiratory problems, damage to flora and fauna and aesthetic properties in the environment and increase the level of toxic chemicals to other aspect of environment indirectly. To check such impacts, APCS like bag filters with adequate stack height, Recuperator with adequate stack height, ESP with adequate stack height, etc., are being installed. Plantation of trees, installation of water sprinkling systems and dust compression systems in the nearby areas, provision of proper nose masks to laborers, Vehicles with valid PUC certificates will be used for transportation etc. shall be done. Vehicles with valid PUC certificates will be used for transportation of construction material, raw material, waste and finished products.

4.4.2 Water Environment

The activities which would probably pose an impact on the water environment would be the manufacturing process, operation of machinery & equipment, working & daily activities of staff, visitors, transportation. The aspects of the activities may be the generation of waste water, scarcity of water, depletion of water table and deterioration of water quality which could lead to deterioration of aquatic life, generation of water-borne diseases to nearby populations.

The total water requirement for the proposed facility is 70 KLD, which will be sourced from SIPCOT supply. Out of this, 38 KLD will be utilized for industrial processes, 4 KLD for domestic purposes, and the balance for utilities such as cooling, landscaping, and dust suppression.

Wastewater generation is projected at 15 KLD, comprising 14 KLD from industrial operations and 1 KLD from domestic activities. Industrial effluent will be routed to a dedicated Effluent Treatment Plant (ETP) with tertiary treatment to facilitate complete recycling and reuse within the process, thereby maintaining a Zero Liquid Discharge (ZLD) system. Domestic sewage will be treated in a Sewage Treatment Plant (STP), with the treated water reused for greenbelt irrigation.

This integrated water management approach ensures no untreated wastewater is discharged outside the premises, thereby safeguarding the surrounding water environment and promoting sustainable water use.

4.4.3 Soil Environment

The major activities which would negatively impact the soil environment would be loading & unloading of raw material, manufacturing process of product, operation of machinery (Boiler, DG sets, Induction furnace, ETP, STP, etc.), handling of raw material, transportation of raw material, finished product and waste. The aspects of the activities would be soil erosion, waste generation and spillage of hazardous wastes or chemical on the soil which could lead to permanent damage to land productivity, destabilization of landscape, decrease in permeability, damage to fertility of soil, chemical degradation and indirect negative impact on other aspects of environment like Air, Water & Ecology and Biodiversity.

Due to construction activity, soil fertility will not deteriorate, however periodically monitoring of soil quality will be conducted. C&D will be either disposed off weekly to the C&D Waste site or utilized in internal road formation for the proposed expansion. Solid waste generated

during the installation phase will be treated in existing OWC. Contamination of soil may occur due to Diesel/ petrol seepage into the soil if any spillage occurs or while refueling (Diesel/ petrol) of vehicles transporting construction materials and servicing of vehicles. Procedures for maintenance of vehicles would ensure that this risk is minimized, and clean-up response is rapid if any spill occurs. Lubricating waste oil shall be collected separately in drums and handed over to the authorized outside agency. Vehicles will not be allowed to get fuelled within the site. SOP to that effect will be implemented..

4.4.4 Socio-Economic

Aspects of project activities which would be dust emission, waste generation and socio-economic conditions in the nearby area which could impact to the extent of annoyance, loss of life respiratory problems to nearby population further, positive impacts include an increase in employment and revenue generation among the population in the nearby area. To minimize negative impacts, mitigation measures like proper air pollution control systems will be used, effluent treatment by ETP will be provided and industrial activities will be restricted and limited only to the project area. Proper segregation of waste, good housekeeping, maximization of employment to locals, proper treatment and disposal of all wastes generated from the plant would also be adopted in the area. All the safety measures will be followed and a safety data sheet will be provided.

4.4.5 Ecology & Biodiversity

The major activities which would have an impact on the Ecology and Biodiversity in the project area and the surroundings would be site preparation, excavation, manufacturing process, operation of machinery & equipment, transportation, loading & unloading of raw material. The aspects of the activities would be dust emission, increase in GLC, increase in noise level, soil erosion, noise generation, water contamination, vehicular emission and waste generation which would directly /indirectly impact in decrease in transpiration rate of flora, loss of habitat, decrease in plant/tree cover, disturbance to avi-fauna and other species, premature senescence of floral species and hence decrease in population of local faunal species in the area and the surroundings. To minimize such impacts, mitigation measures like provision of air pollution control equipment, scrubbing system to the vents, provision and proper maintenance of green area, installation of water sprinkling systems and dust suppression systems, provision of noise barriers, maintenance of vehicular movement near the project site and proper disposal and treatment of wastes generated from the project site. Vehicular movement for transportation of raw material will be carried out only in day-time and will try to avoid unnecessary honking with the help of sign boards. Green belt/greenery will be developed along most of the periphery of the project area as well as along roads.

4.4.6 Noise and Vibration

The major activities which would have an impact on the environment would be operation of machinery and transportation. The aspects of the activities would be an increase in noise level and increased noise generation which could lead to physiological and psychological problems to workers and nearby population, increased vibration in the nearby areas and an indirect decrease in the biological diversity in the nearby area. To minimize such impacts, mitigation

measures like silencers are checked in the vehicles used for transportation of materials, No honking zone will be maintained, Reverse horn in the transportation vehicles will be banned. Only PUC certified vehicles are allowed for transportation, maintenance of vehicles is done on a regular basis. Machineries of the reputed make and less noise producing will be purchased. Stationary machineries and equipment will be properly enclosed by enclosures and provided with dampeners for minimizing noise generated due to vibration of machineries. Sufficient oiling and lubrication will be done to all the parts of the machineries to ensure that minimal noise is generated. Green belt/greenery will be developed along most of the periphery of the project area as well as along roads. The green area in the plot is 5.00 Acre (25.02 % of plot area).

4.4.7 Hydrology and Geology

The major activities which would have an impact on the hydrology and geology would be excavation, manufacturing process, operation of machinery & equipment, working of daily activity of laborers, staff and visitors and transportation. The aspects of the activities are generation of Solid Waste, E-Waste and Bio-Medical Waste, Wastewater generation, spillage/leakage of waste/chemical which would impact in deterioration of water quality (in both Surface Water and Groundwater). To minimize such impacts, mitigation measures proper channelization of waste water and proper disposal, all probable leakage areas such as pipelines, joints, pumps and structure of reactor/ storage vessel inspection, installation of leak Detector(s), case of spills of chemicals, dry adsorbents/cotton shall be used for cleaning instead of water and Proper treatment and disposal of Waste water shall be adapted in the project site.

4.4.8 Solid and Hazardous Waste

The solid wastes generated from the expansion units will be utilized for beneficial purposes. The Company has assured that it will not dump the solid wastes inside the plant premises or on any land outside the plant premises.

The Hazardous Wastes that will be generated from the expansion units will be disposed of in a scientifically acceptable manner, after obtaining authorization from TNPCB, as per Rules. The wastes will be collected in drums and stored at an earmarked place in a covered shed. The storage will be done for a maximum 90 days and thereafter given to TSDF or sold to authorized re-processors. The details of hazardous wastes are given below:

Item 5.1: Spent / used Oil: 3.5 T/Y (collected in drums and Recover & Reuse/CPCB Authorized recyclers)

Item 5.2: Waste or residues containing Oil: 1.50 T/Y (Send to common TSDF of TNWML, Gummidipoondi for incineration)

Item 35.3: ETP Sludge: 0.95 T/Y (CHWTSDF).

4.4.9 Traffic Density

The activities which would probably be responsible for traffic congestion would be

transportation of raw materials and products for which trucks and tempo will be used. Traffic to the different sites during construction/installation will be intensive and heavier than at present in normal operating conditions. The aspect of the activities would be generation of dust from movement of vehicles are likely to cause some impacts on the working population within the immediate vicinity of the project site. In turn, it will subject existing roads to more stress. To control the impact, dust suppression systems (water spray) will be used as per requirement at the construction site. Construction materials will be fully covered during transportation to the project site by road. Vehicle flow during shift changes will be regulated by allowing exits in a phased manner. The present road conditions are reasonably good for proposed movement of traffic. Preventive maintenance will be carried out for vehicles and pollution checks on a periodic basis will be mandatory. All the activities will be done for a limited period of time. The traffic survey for the proposed unit was conducted and detail is given in Chapter 3.

Table 0.10. Air Pollution Control Measures for Existing and Proposed Project

Air Pollution Control Measures for Existing and Proposed Project								
S. No.	Description of item	No's	APC Measures	Stack Height (m)	Stack Dia (mm)	Velocity (m/s)	Flow rate (Nm ³ /hr)	Particulate Matter (mg/Nm ³)
1	Induction Furnace –	1	having individual suction hood with Bag Filters with Stack	30	1709	73	117165	Less than 20
2	Sand Storage Area (Existing)	1	Dust collectors with stack	20	1200	17	19260	Less than 20
3	Sand Cooler Classifier Area Silo (Existing)	1	Vent Filters with Stack	4.6	1200	42	48150	Less than 20

	)							
4	60 T Mixer Silo (Existing)	1	Vent Filters with Stack	4.5	2400	70	14150	Less than 20
	100 T Mixer Silo (Proposed)							
5	10 T Mixer Silo (Existing)	1	Vent Filters with Stack	4.5	300	14	2830	Less than 20
	10 T Mixer Silo (Proposed)							
6	Sand Reclamation Storage Silo (Existing)	2	Vent Filters with Stack	4.5	300	14	2830	Less than 20
7	Sand Reclamation System - 60	1	Bag Filters with stack	20	1709	85	136245	Less than 20

	Ton/Hr (Existing)							
8	Fettling Cabins (Existing)	1	Bag Filters with stack	30	400	16	6140	
9	Shot blasting (Existing)	1	Vent Filters with Stack	-	600	50	48150	Less than 20
10	Shakeou t (Existing)	1	Dust collector with stack	30	2400	70	14150	Less than 20
11	DG Set 1500 KVA (Existing)	1	Acoustic Enclosure s and adequate stack height	30 (Each)	-	-	-	Less than 20
	DG Set 1500 KVA (Propose d)							

5. ANALYSIS OF ALTERNATIVES

5.1. Site Selection

The proposed expansion project by Baettr India Pvt. Ltd. is planned entirely within the existing facility premises located at S.F. No. 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu – 601202, encompassing a total area of 8.094 ha (20 acres).

Since the proposed activity involves capacity enhancement within the existing operational site, no alternative sites have been considered for the expansion. The selection of the existing site for the expansion is based on the following considerations:

Availability of Land and Infrastructure: The project site already possesses adequate land area, along with essential infrastructure such as power supply, water, and access roads, which eliminates the need for fresh land acquisition or infrastructure development.

Regulatory Compatibility: The site falls within the SIPCOT-notified industrial area, which is specifically designated for industrial activities. As such, there are no land-use conflicts or issues related to reclassification of land.

Environmental and Social Compliance: Since the expansion is proposed within an established industrial estate:

- No displacement of people or resettlement is required.
- There is no impact on ecologically sensitive areas.
- The site is free from any litigation or legal constraints.

Operational Continuity and Logistics: Carrying out the expansion at the current site ensures continuity in operations, optimized logistics, and utilization of existing workforce and utilities. The environmental features and sensitivity analysis of the area within a 15 km radius from the project site are detailed in Chapter 3.

The proposed expansion aims to increase the production capacity of casting products from 27,500 TPA to 95,040 TPA using the existing Induction Furnace setup (1 x 24T), and to upgrade the Furnace Panel Board capacity from 5,000 kW to 8,000 kW. There is no change in the number of furnaces, and the expansion will be executed without altering the site layout significantly.

In conclusion, the selection of the existing site is both technically viable and environmentally favorable, hence no alternate site was required to be evaluated for the proposed expansion project.

5.2. Alternate Technology

The company is fully committed to the improvement of technology to achieve conservation, safety, and environmental sustainability.

The proposed expansion project will continue to utilize the Induction Furnace-based casting technology, which is a well-established, energy-efficient, and environmentally friendly method for producing high-quality casting. The technology involves melting pig iron, steel scrap, and ferro alloys in Induction Furnaces (1 x 24T capacity), followed by casting the molten metal into moulds prepared using green sand with bentonite clay. The process includes pattern making, sand preparation, moulding, coating, assembly, pouring, cooling, shakeout, fettling, shot blasting, and non-destructive testing (NDT). No significant change in core technology is proposed; however, production capacity will be enhanced through increased operational hours and optimization of process parameters. The Induction Furnace setup, sand mixers, and shot blasting units are technically advanced, and the system is integrated with recycling features such as sand reclamation and reuse of scrap, aligning with sustainable industrial practices.

Analysis of Alternative Technology

There is no change in the type of casting process; only the production capacity will be increased. The proposed expansion will adopt the best available technology in the market to ensure high production efficiency with minimum pollution and emissions. The industry is committed to maintaining product quality while also focusing on environmental protection and resource conservation. Continuous efforts will be made to upgrade the plant and machinery with the best available technology from time to time.

ENVIRONMENTAL MONITORING PROGRAM

6.1. Details of Monitoring to Judge Effectiveness of Measure

To check the efficiency of the system with proposed modifications a regular monitoring programme has been drawn. The program has been outlined for the construction and operation phase. In order to facilitate this, the regular site inspections and their noting will be documented by the PP/Contractor. The organizational structure (Environment Management Cell or EMC) of the M/s BAETTR India Pvt. Ltd is discussed in Chapter 10.

6.1.1. Construction Phase

Periodic monitoring of the below mentioned parameters will be done once the industry commences construction.

Table 0.1 Environment Monitoring Plan-Construction Phase

Sr. No.	Type of Monitoring	Frequency of Monitoring	Parameter	Location	No. Per Year	Unit Rate (Rs)	Cost (Rs)	Responsibility
1	Ambient Air Quality	Six Monthly	Particulate Matter (PM2.5), Particulate Matter (PM10), Sulphur Dioxide (SO ₂), Nitrogen Oxides (NO _x), Carbon monoxide (CO)	2 in Core Zone and 4 in buffer zone	12	5500	66000	EMC (Air Incharge) & Contractor
2	Stack emission for point sources	Six Monthly	PM10, PM2.5, SO ₂ , NO _x , CO, VOCs	1 No. - DG Stack	2	500	1000	EMC (Air Incharge) & Contractor

3	Water Quality for drinking water	Six Monthly	All parameters mentioned in IS:10500	One drinking water sample	2	7500	15000	EMC (Water Incharge) & Contractor
4	Water Quality for Construction purpose	Six Monthly	All parameters mentioned in IS:456	One construction water sample	2	7500	15000	EMC (Water Incharge) & Contractor
5	Ambient Noise Level	Six Monthly	Day and Night noise level	2 Locations	4	2000	8000	EMC (Noise Incharge) & Contractor
6	DG Set Room Noise Level	Six Monthly	-	None as DG set shall be used as stand-by power	0	0	0	-
7	Soil Quality	Six Monthly	All parameters to check soil Fertility	Two Locations in core zone and 4 locations in buffer zone	12	4000	48000	EMC (Soil Incharge) & Contractor
Total Cost (Rs)							153000	

6.1.2. Operation Phase

The periodic monitoring schedule is mentioned below in the table.

Table 0.2. Monitoring Plan-Operation Phase

Monitoring Category	Frequency of Monitoring	Parameters	Location	Numbers Per Year	Unit Rate (Rs)	Cost (Rs)	Responsibility	Records to be Maintained
Air & Stack								
Ambient Air Quality	Monthly	PM10, PM2.5, SO2, NOx	2 Onsite Location	24	5500	132000	-EMC (Air Incharge)
-External Laboratory analyst & incharge	NABL Accredited Lab Result
	Six Monthly		2 Locations in Buffer Area	4	5500	22000		
Water & Wastewater								

Water Quality	Monthly	Monitoring for relevant parameters as per Drinking water standard IS-10500	Groundwater : Onsite Location (2 No. Open well & 5 No. Borewell)	84	7500	630000	-EMC (Water Incharge)
-External Laboratory analyst & incharge	NABL Accredited Lab Result
	Six Monthly		2 Buffer area Location	4	7500	30000		
Noise								
Day & Night level Noise Monitoring	Monthly	Leq (night), Leq (day), Leq (24 hourly)	2 Onsite Location	24	2000	48000	-EMC (Noise Incharge)
-External Environmental consultant	NABL Accredited Lab Result
	Six Monthly		2 Locations in Buffer Area	4	2000	8000		
Soil								

Qualitative and Quantitative Parameters	Monthly	All Parameters to check soil fertility	1 Onsite Location	12	4000	48000	-EMC (Soil Incharge)
-External Environmental consultant	NABL Accredited Lab Result
	Six Monthly		2 Location in Buffer Zone	4	4000	16000		
Waste Generation Monitoring / Record Keeping								
Records of generation, handling, storage, transportation and disposal	Monthly	Hazardous, Non Hazardous, E-waste, Organic waste, Recyclable Waste	-	12	500	6000	-	Logbooks
Sludge Characteristics and Quantity	Characteristics-Monthly, Quantity - daily	TCLP Test and Quantity	ETP Sludge, STP Sludge	24	5000	120000	-External Laboratory analyst incharge &	NABL Accredited Lab Result

Ecology and Biodiversity Monitoring								
Green belt & plantation monitoring	Six monthly	Survival rate of the planted Trees, Greenbelt development status	-	2	30000	60000	EMC (gardener)
-External	Logbooks
Social Monitoring								
Checking Effectiveness of the Corporate Social Responsibility/ Corporate Environmental Responsibility	Annual	Cost spent and where it is carried out	-	1	30000	30000	CSR Team	Audit Reports
Power and Energy Monitoring								

Energy savings	Annual	Energy consumption in terms of 1. Quantity of fossil fuels 2. Power drawn Renewable energy 1.Solar harvesting 2.use of Alternate source of energy	-	1	50000	50000	Utility Team	Energy meter
Work Zone Monitoring								
Work Zone	Monthly	PM10, PM2.5, SO2, NOX, CO2, CO & VOCs.	Process Area, DG Set Area, Raw material and finished good Storage Area	12	20000	240000	-External Laboratory analyst & incharge	NABL Accredited Lab Result

Sum Total (Estimates)	1440000	

6.2. Submission of Six Monthly Compliances

As per the standard environment clearance conditions, six monthly compliances of the conditions mentioned in the EC letter will be submitted to various concerned officials of MOEF, SPCB and Regional office of CPCB. These compliances will be submitted in the months of June and December for the periods April to September and October to March respectively every year for construction phase until the construction is completed and operation phase for the life of the project.

6.3. Environmental Audit

Annual Environment Audits with Form V statements will be regularly conducted to check the compliance of environmental conditions for the operational industry to MoEF&CCR.O.

6.4 Compliances of Environmental Approvals

6.4.1. Environment Clearance

The existing plant is operational with latest Consent to Operate (CTO) issued vide TNPCB CONSENT ORDER NO. 2405255166266 Dated: 15/02/2024 under Air Act & TNPCB CONSENT ORDER NO. 2405155166266 Dated: 15/02/2024 under Water Act from TNPCB. The project is going for a fresh Environment Clearance for the proposed expansion.

6.4.2. HW Authorization/Disposal

For the safe disposal of the Hazardous waste, TNPCB-Hazardous Waste Authorization vide No. 23HFZ52464334 and dated: 05/06/2023, valid up to 31/03.2028.

6.4.3. Water supply from SIPCOT

For the proposed project, water supply will be sourced from the SIPCOT Industrial Estate at Thervoykandigai. An agreement was entered into between BAETTR India Private Limited and SIPCOT on 04 November 2020 for the provision of water supply. As per the agreement, a total quantity of 63.76 KLD will be made available by SIPCOT. This water will be utilized for both plant operations and domestic purposes within the project premises. The assured supply from SIPCOT ensures that the project will not depend on local groundwater sources, thereby reducing stress on regional water resources.

6.4.4. Conservation Plan

6.4.5. Forest Clearance

No forest land involved. Hence, Not Applicable.

6.4.6. Annual returns

The Proponent with the help of 3rd party Environmental consultants will annually submit the

Environment Audit with the Form V statement, FORM 13 of Hazardous waste, CTO Compliance. Similarly, six monthly EC compliance will be submitted to MoEF&CC R.O. and Regional State Pollution Control Board (Tamil Nadu) after the grant of the Environmental clearances.

The industry will have the well-defined Environmental Management Cell (EMC) for the communication with internal and external Stakeholders. The detailed existing reporting mechanism with the role and responsibilities is given in Chapter 10 Section 10.2.1.

6.4.7 ASI Authentication

As indicated in **Table 9 of Chapter-2**, the study area includes multiple Archaeological Survey of India (ASI)–notified sites within a 15 km radius of the project location. These comprise megalithic cists, cairns, and urn burial sites located in various directions from the project boundary. Given the cultural and historical significance of these archaeological areas, the project shall obtain the necessary authentication and clearance from the Archaeological Survey of India (ASI) to ensure compliance with The Ancient Monuments and Archaeological Sites and Remains Act, 1958. This step is crucial to confirm that the proposed development will not pose any adverse impact on nearby protected or regulated archaeological assets.

ADDITIONAL STUDIES

7.1. Introduction

As per the Terms of Reference issued vide letter NoIA-J-11011/279/2024-IA-II(IND-I) dated 03.07.2025 by Ministry of Environment, Forest, and Climate Change (MoEFCC), New Delhi following Additional Studies required to be carried out for the proposed expansion project.

- Hazard Identification and Risk Management; and
- Risk Assessment and Disaster Management Plan.
- Study On Decarbonisation Program

7.2. Public Consultation

Details will be incorporated after Public Hearing.

7.3. Risk Hazard

7.3.1 Definition

Risk is a combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).

Risk assessment is a process of evaluating the risk(s) arises from a hazard(s), taking into account the adequacy of any existing controls, and deciding whether or not the risk(s) is acceptable.

Hazard is a source, situation, or act with a potential for harm in terms of human injury or ill health, or a combination of these.

Disaster is a natural or man-made hazard resulting in an event of substantial extent causing significant physical damage or destruction, loss of life or drastic change in environment.

7.3.2 Study Methodology

The Risk Assessment Methodology is primarily based on the likelihood of occurrence of the risk identified and their possible hazard consequences based on the professional/expert judgement & hypothetical scenarios. With respect to the proposed project, major risks associated like leaks, rupture of storage tanks have been assessed qualitatively and evaluated through a risk matrix generated to combine the risk severity and likelihood factor.

Hazard identification exercise is conducted taking into consideration of materials, material handling methods, and safety measures to be taken in the proposed plant. Containment failure scenario related to storage area is considered for hazard analysis and consequences of such containment failures are considered in detail.

7.3.3 Hazard Identification

The principal objective of the study is to identify the potential hazards from the proposed facility and estimate the effects of the hazards to people and property within the vicinity of the plant premises. The consequences resulting due to accidental release of flammable gases and leakage of fuels will provide data for developing strategies to prevent accidents right from design to operational phase. This will also generate information for formulating a meaningful Disaster Management Plan (DMP).

Typical methods for hazard identification employed are:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (as amended in 2000)
- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

A preliminary hazard analysis shall be carried out to identify major hazards associated with storages in the facility, handling of Chemicals and Metals, and process involved for the production and Manufacturing of Metallurgical products like Saleable Casting. Hazard Involved can be categorized into the following Categories as mentioned below as per the Technical Guideline Manual for Metallurgical Industry:

1. Physical Hazard
2. Mechanical Hazard
3. Ergonomic and Psychological Hazard
4. Frequent Accidental causes
5. Hazardous substances and waste
6. General Concerns

Table 0.1 Details of Safety Equipments

S. No.	Description	Unit	Existing	Proposed	After Expansion
1	Fire Hydrant Pump	Nos	4	0	4
2	Fire Sprinklers	Nos	30	0	30
3	Fire Hydrant Point	Nos	50	4	54
4	First Aid Hose Reel	Nos	23	4	27
5	Fire Detection system	Nos	200	0	200
6	Fire Extinguisher	Nos	130	23	153

7.3.4. Hazard Identification & Consequence Analysis

The approach followed for Risk Analysis Study is in accordance with the CPCB document titled "Environment Risk Analysis due to Handling and Storage Chemicals" has also been referred to. The hazards were identified by studying the PI diagram and shown in Table.

Table 0.2. Consequence Analysis

S. No.	Activity	Hazard
1	Loading/Unloading of materials by Trucks & Dumpers	Fall of material on person while unloading material from truck/dumper resulting in blunt injury. Toppling of vehicle resulting into fatal/major injury
		Collision of vehicle with people or hitting the structure resulting into fall of structure which may lead to serious / fatal injuries Accident
2	Material Handling by Cranes	Fall of materials resulting into Impact injury
		Spill-over of material and dust all around may cause breathing problems and eye problems.
3	Material handling by Belt conveyors	Belt breakage may cause major injury or fracture to the person meeting the mishap, Spillage of Material.
4	Material feeding in day bins.	Structural failure, Fall or Slip
		Dust pollution during material feeding; breathing problem.
5	Material feeding in charging hopper	Dust problem, Spillage of material
6	Charging of materials in Furnace	Burn injury due to hot gasses, hot metal / furnace eruption
		Electrocution.
7	Kiln / Furnace Operation	Charge Eruption, Burn injury, Heat stress, Fumes & Dust emission

		Electric shock by high voltage.
8	Scrap / Correction Material feeding to Furnace	Charge Eruption, Burn injury, Cut injury, Heatstress, Fumes & Dust emission
9	Furnace start up, tapping	Furnace puncture hot metal leakage, Hot material eruption, Heat stress resulting in fatigue.
		Over flow of hot slag & metal, Hot metal spillage - burnt injury Electrocutation
10	Operation of the transformer	Electrocutation, Burn injury and Transformer oil firing
11	Kiln & Furnace repair work	Deposited slag, loose castle may fall on workmen, Slip/ fall
		Exposure to furnace gasses while replacement of the contact clamp & Pr. Ring etc..
		Eye injury / infection, Burn injuries due to hot steam, Equipment water leakage.
12	Operation of LRF	Fall of material, Hot metal leakage,
13	Handling of hot metal cakes in finished yard	Heat stress, Respiratory problem due to fumes. Explosion in hot metal, Burn injury
14	Slag crushing	While crushing the induction furnace slag, may come in contact with eyes & causes eye injury,
		Fractures in other body parts due to fall & trip, hand fingers & leg toe injury while handling buckets/tubs.
15	Metal & slag loading /unloading.	Gantry Crane may hit the person, major Fracture/injury takes place, Fall/Slip
		Roll away or fall of Gantry crane due to heavy wind, burn injury, Cut injury.
16	Metal separation by jigging m/c	Fall / slip causing fracture, blunt injury, hand Fingers & leg toe injury during handling metal/slag tubs

17	Material crushing by m/c (crushing m/c)	Fall of person, Electrocution, Eye injury, Caught in rotating machine parts, Respiratory disorder due to dust
18	Crusher operation	Fall of person, Electrocution, Eye injury, Caught in rotating machine parts, Respiratory disorder due to dust
19	Loading of materials in trucks	Fall & Slip hazard due to improper supervisions during loading
20	Work on gantry crane rail tracks	Accident on track or hit by crane movement may result impact injury, fracture or loss of organ
21	Maintenance of Idlers, Rollers.	Fall of Idlers, Rollers which make deep cuts.
22	Electric arc welding	Electric shock resulting muscle spasms or cardiac arrest, Exposure to welding arc resulting into arceye or Cataract
		unconsciousness or severe burn injury, Fall at floor level resulting into blunt injury, Exposure to welding fumes during welding resulting into breathing difficulty or lung cancer
		Burn injury due to Contact with hot metals, contact with holder, welding sparks fallen on clothes and Fire hazard.
23	Gas Cutting set jobs	Burn injuries, Fall of cylinders while handling Fire / Explosion due to Backfire.
24	Grinding Operation	Electrocution, Eye injury due to flying spatters, Fire & High noise, Wheel breakage resulting into deep cut or injury
25	Running of Compressor	High noise resulting to hearing loss
26	Running of ID Fan	High noise resulting in hearing loss , Person may trap in rotating parts.
27	Unloading of hopper dust	Come in contact with heat dust Due to inhalation of dust lungs problem
28	Dismantling of filter bags	Come in contact with heat & dust, inhalation of dust

		may cause lungs problem
29	Unloading of dust from ash silo	Come in contact with heat & dust, inhalation of dust may cause lungs problem
30	Maintenance activity of Dewatering pump suction pipes	Fall of person in tank, slip/ fall.
31	Maintenance jobs of hydraulic equipment	Bursting of hydraulic hose & fire hazard Hit by pressurized oil jet Fall of material Fall, slip.
32	Cleaning of blowdown & cold water, hot water, dewatering & cooling tower tank.	Person fall from ladder result impact injury, Fall into cooling tower tank, Burn injury due to hot water
		During Cleaning of slippery floor person maybe slip result impact injury, fracture
33	Maintenance activity in softener plant /DM plant	Fire incident Slip / Fall injury.
34	Changeover of I.D.Fan	Come in contact with running equipment / rotating parts, sound pollution
35	Changeover of cold water	Failure of f/c running equipment due to drop in water pressures.
36	Changeover of hot water pumps	Failure of f/c running equipment due to drop in water pressures.
37	Transformer maintenance.	Fall, Slipped due to transformer oil, Electrical shock
38	Repairing of electrical appliances	Cut by running equipment. Electric shock resulting into muscular spasm
39	Working with electrical appliances	Electric shock resulting into muscular spasm, cardiac arrest, burn injury, Fire resulting into burn injury
40	Working at height for laying and welding of pipe.	Falling from height, Electrocution during welding
41	Cleaning of Surge Hopper/ Ground Hopper	Head injury, dust exposure, Slip/ Fall
42	Replacement of blower	Falling from height, Exposure to furnace gases while replacement of the blower, Electric shock, Cut Injury,

		burn injury
43	Maintenance of EOT Crane	Falling from height, Electric shock & dust emission while cleaning
44	Maintenance of FDCmotor	Falling from height, Electric shock, cut injury & dust emission while cleaning,
45	Maintenance of ID fan motor & Actuator	Falling from height, Electric shock, cut injury & dust emission while cleaning
46	Maintenance of DGset	Electric shock
47	Laying of Cable on Trays.	Falling from height, Electric shock, cut injury & dust emission while cleaning,
48	Removal of mill scales using large material handling equipment	Fall of material, eye injury, exposure to dust

7.3.5. Hazard Assessment and Evaluation

Hazard study for the expansion project was assessed and subsequently reviews were formulated. The following table (Table 7.3.) shows the hazard categorization and subsequently the hazards for the project were calculated and control measures were suggested (**Table 7.4.**).

Table 0.3. Hazard Categorization

Sr. No.	S = Severity (Hazard Severity)	P= Probability (Probability of Hazard)	N=No. of persons will get affected	D=Asset Damage
1	1 = (unlikely to have an adverse impact on employee's safety and health)	1 = Less likely. Can occur once/once in a year	1 = 1 person	1 = Inside the premises, negligible impact, can be corrected immediately with less than Rs 1000 as correction expense
2	2 = Minor (unlikely to result in a near miss accident or to have a minor impact on employees health)	2 = May be possible. Exposure occurs few times in Quarter	2 = 2 Person	2= Can cause property damage which can be corrected with up to Rs 1 lakh expense

3	3= Moderate (likely to result in a near miss accident or to have a minor impact on employees health or first aid)	3 = Likely occurrence. Exposure occurs few times in a month.	3 = 5-10 person	3= Can cause damage resulting in stoppage of the production operation, with Rs. 5 to Rs.20 lakh as correction expense
4	4= Serious (Likely to result in an accident with minor injuries or to have a moderate impact on employees health or reportable accident)	4 = Likely occurrence. Exposure occurs few times in a week.	4 = More than 10 person	4= Can cause catastrophic damage within the premises with > Rs.10 lakh as correction expense
5	5= Extremely serious (likely to result in a serious accident or to have a serious impact on employees health or death)	5 = High probability. Occurs very frequently, many times in a Day. Highly certain, Constant and continuous exposure exists	5 = More than 50	5=Can cause damage to a property external to the premises - say outside surroundings
Total Score= Total Risk Score (R) = Severity (S) x Probability (P) x No. Of Person affected (N) x Asset Damage (A)				
	Significant Risk	=Total score=200 & >200	Instructions /Toolbox talk, Training & additional measures or Objectives and Programs to be formulated to reduce the risk level to tolerable levels.	
	No significant Risk	= Total score <200		

Table 0.4. . Hazard Identification, Assessment and Evaluation Table

Sr. No.	Activity	Hazard	Risk Rating					Control Measures	Recommendations
			S	P	N	A	Total Risk (R)		
1	Unloading of Raw Material from Trucks	Fall from Height Fall of material causing injury to person. Crush Injury Leakage/Spillage of chemicals causing fire & explosion in case of flammable materials.	4	1	3	1	12	Trained & Experience persons are deployed. Required PPEs are provided. Work is planned during the daytime. SOP is made First aid boxes & safety showers are available.	Toolbox talk to be given before start up. SOP to be modified for adding HES requirements. No hot work around the unloading area. Unloading to be started after parking the vehicle & driver remains out of the driver's cabin with the key. Training on "Safe Material Handling" to be imparted.

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Sr. No.	Activity	Hazard	Risk Rating					Control Measures	Recommendations
			S	P	N	A	Total Risk (R)		
								Fire Extinguishers are provided.	
2	Store of Raw Material.	Spillage & Leakage Fire & Explosion Fall of containers if stacked high. Inhalation of fumes.	2	1	2	2	8	Air Ventilators are provided on the roof. Fire Extinguishers are provided. No Electrical supply. Identification of chemicals displayed	Ventilation to be provided at ground floor level. Cautionary Sign Board indicating restricted entry, Hazardous properties to be displayed. Foam trolley with nozzle is to be provided. Spill control kit to be provided. Smoke detectors to be installed.
3	Transportation of raw materials to	Spill & leak Inhalation of vapor. Fire &	2	2	5	1	20	Drums/containers are transported using a standard trolley.	Spill & leak kit is to be kept at site

Sr. No.	Activity	Hazard	Risk Rating					Control Measures	Recommendations
			S	P	N	A	Total Risk (R)		
	the feeding floor using hoists.	Explosion Physically hazardous to person						Hoist is dedicated for transport material. Trained & Experienced person. PPEs like dust	SOP to be made.
4	Charging of Raw Material into reactors.	Explosion of vapor. alInjury Leak	2	4	4	3	96	Trained & Experienced person. SOP is available. PPEs like dust mask, Apron, Safety Gloves etc. being used. Supervision.	SOP to be reviewed & HSE requirement to be added. Spill leak kit to be made available. Fire blanket to be made available. Mechanical ventilation is to be provided.

7.3.6 Risk Mitigation Measure

Identification of major hazards associated with storages and the processes of the plant. 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. The Major aspects are described below

Table 0.5. Major Aspects and mitigation measures

Equipment	Process	Potential Hazard	Mitigation Measures
Induction Furnace (1 x 24 T)	Melting of pig iron, scrap, and alloys	Heat, molten metal splash, fume & dust generation	- Individual suction hoods with common bag filters and stack - Stack height of 30 m with dust control below 20 mg/Nm³ - Workers provided with PPE (gloves, face shields, heat-resistant aprons) - Routine maintenance of furnace coils and hydraulic tilting system - Emergency stop systems and interlocks in place
Sand Mixers (10+60 T/h and 10+100 T/h)	Mixing of sand, bentonite, resin	Dust generation during sand preparation and loading	- Vent filters with stacks to control particulate emission - Dust collector system at each silo - Stack heights maintained for effective dispersion - Workers to use dust masks and enclosed cabins - Moisture-controlled sand to reduce dust
Thermal Reclamation Unit (5 T/h)	Reclaiming used sand for reuse	High-temperature operations, dust, and fine particles	- Bag filters with stack of 20 m and 85 m/s velocity - Insulated ducting and confined system design

			- Regular inspection of refractory lining - Safety interlocks for overheat conditions
Shot Blasting Machine (40 T capacity)	Cleaning of casting	High noise, dust, and particle projection	- Vent filters with stack to control emissions - Shot blasting cabins enclosed - Operators to wear ear protection, goggles, and gloves - Regular maintenance of blasting nozzles and dust collector
Shakeout System	Separation of casting from mould	High dust generation, mechanical vibration	- Dust collector system with stack of 30 m - Isolation pads under equipment to absorb vibration - Workers to use dust masks and proper posture - Periodic sand cleaning and reclamation to prevent buildup
Coating Station & Drying Oven (2x12 mould/day)	Mould/core surface preparation and drying	VOCs, fumes, and fire hazard due to coating materials	- Use of water-based zirconium coatings - Proper ventilation and fume extraction - Electrical ovens with temperature control and fire alarm - Fire extinguishers and first aid kept nearby
Compressors (4 x 110 kW)	Compressed air supply	Noise, pressure hazard, equipment failure	- Enclosed compressor house - Regular maintenance and pressure safety valves

			- Acoustic enclosures to reduce noise - Monitoring of air pressure and temperature
Cranes (10 to 150 T)	Lifting of heavy loads	Load drop, mechanical failure, electrical hazard	- Overload protection systems - Routine inspection of wire ropes, pulleys - Trained operators and signaling system - Emergency stop buttons
DG Sets (2 x 1500 KVA)	Power backup	Noise, exhaust gases, fire	- Acoustic enclosures and stack height of 30 m - Fire extinguishers and alarm systems - Emergency shut-off mechanism - Low sulphur fuel used to reduce emissions
Fettling Cabins	Grinding and finishing of casting	High noise, metal burrs, flying particles	- Bag filters with stack - Enclosed cabins - Use of safety goggles, gloves, and ear protection - Mechanical grinding where possible
Sand Silos & Storage (100–200 T)	Sand transfer and storage	Dust emission during filling and discharge	- Vent filters installed on silos - Stack emission < 20 mg/Nm³ - Moist sand used to suppress dust - Covered transfer belts and enclosed feeding systems

Scrap Charger (10 T)	Feeding scrap into furnace	Risk of falling scrap, impact injury, high temperature	- Use of mechanical charger with safety guards - Restriction of personnel in loading area during operation - PPE and heat-resistant clothing for operators
General Utilities (Cooling Tower, Pumps)	Cooling of furnaces and systems	Water leakage, pump failure, electrical hazard	- Plate-type heat exchanger for efficient cooling - Soft and DM water with conductivity monitoring - Emergency tanks for overflow - Isolated pump house with leak sensors
Fire Protection System	Fire and emergency response	Fire, explosion, injury	- Fire hydrants, extinguishers, hose reels, and sprinklers installed across units - 200 fire detectors across plant - Regular mock drills and maintenance of fire safety systems - Restricted access to hazardous areas

7.4. Disaster Management Plan

The purpose of this Disaster Management Plan (DMP) is to detail organizational responsibilities, actions, reporting requirements and support resources available to ensure effective and timely management of emergencies at or affecting any operation of proposed expansion. This will be achieved by.

- Describing procedures to deal with emergencies affecting personnel, equipment, third party contractors, local community and environment.
- Defining the role and responsibility of Incident Response Group (IRG) and others at the plant.
- Describing the external resources available to the IRG for use in an emergency and how these resources will be coordinated.

- This plan should recognize that.
- Incident Controllers will be authorized to initially control and contain any and all emergency situations.
- The Site Controller will be authorized to coordinate strategic response to all emergencies associated with the operation.
- The EHS management Review Committee will be authorized to co-ordinate the overall strategic response to any emergency at the plant.
- It should be clubbed with DMP of existing operation.

7.4.1 Objective of DMP

- Following are the main objectives of the DMP.
- Define and assess emergencies, including hazards and risk.
- Control and contain incidents.
- Safeguard employees and people in the vicinity.
- Minimize damage to property and/ or the environment.
- Minimization of risk and impact of event accident.
- Preparation of action plan to handle disasters and to contain damage.
- Inform employees, general public and the authority about the hazards/ risk assessed, the role to be played by them in the event of an emergency and to provide safeguards.
- Be ready for 'mutual aid' if need arises to help neighboring units.
- Inform authorities and mutual aid centres to come for help.
- Effective rescue and treatment of casualties.
- Effective rehabilitation of the affected people and prevention of damage to the property.
- Identify and listing of any fatality.
- Inform and help kith and kin.
- Secure the safe rehabilitation of affected areas and to restore normalcy.
- Provide authoritative information to the media, etc

7.4.2 Methodology

- No matter how well a process is controlled and safeguarded by instruments and process safety procedures, it is inevitable that there is a residual risk, which is capable of causing a variety of emergencies.
- The Factories Act, 1948 as amended in the year 1987 under section 41B requires that every occupier shall draw up a Disaster Management Plan and detailed disaster control measures for his plant and make them known to the employees and to the general public living in the vicinity of the plant. According to GFR, it is statutory for the industries to submit Disaster Management Plan with relevant details.
- Its objective is to reduce the severity of loss in particular hazardous incidents. At the same time, it must be clearly understood that it is not a substitute for maintaining good standards for working consistency with the requirements of safety and health inside the plants.

7.4.3 Classification of Emergencies

Emergencies can be categorized into the following three (3) broad levels on the basis of seriousness and response requirement.

Level-I: This is an emergency or an incident which

- Can be effectively and safely managed and contained within the site, location or installation by the available resources.
- It has no impact outside the site, location or installation.

Level-II: This is an emergency or an incident which

- Cannot be effectively and safely managed or contained at the location or installation by the available resources and additional support is alerted or required.
- Is having or has the potential to have an effect beyond the site, location or installation and where external support of mutual aid partners may be involved.

Level-III: This is an emergency or an incident with off-site impact which

- Could be catastrophic and is likely to affect the population, property and environment inside and outside the installation.
- Management and control are done by the District Administration.

Although Level-III emergencies fall under the purview of the District Authority, until the Authority steps in, it should be the responsibility of the concerned unit to manage the emergency. Based on the QRA study, chances of Level-III emergencies occurring are negligible.

7.4.4 Emergency Preparedness Plan (EPP)

Incidents, accidents and contingency preparedness should be accounted for during the construction and operation process. Emergency Preparedness Plan (EPP) is prepared as per the National Environmental Emergency Plan and OSHA guidelines. According to these guidelines, an environmental emergency plan would essentially provide the following information:

1. Assignment of duties and responsibilities among the authorities, participating agencies, response team, their coordinators and/or those responsible for the pollution incident.
2. Relationship with other emergency plans.
3. A reporting system that ensures rapid notification in the event of a pollution incident.
4. The establishment of a focal point for coordination and directions connected to the implementation of the plan.
5. Response operations should always cover these four phases:
 - Discovery and alarm

- Evaluation, notification and plan invocation
 - Containment and countermeasures
 - Cleanup and disposal
6. Identification of expertise and response resources available for assistance for the implementation of plan.
 7. Directions on the necessary emergency provisions applicable to the handling, treatment or disposal of certain pollutants.
 8. Link to the local community for assistance, if necessary.
 9. Support measures, such as procedures for providing public information, carrying out surveillance, issuing post-incident reports, review and updating of the plan, and periodic exercising of the plan.

7.4.4.1 Emergency Organisation

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

Each Incident Controller organizes a team responsible for controlling the incident with the personnel under his control. Shift in-charge would be the Reporting Officer, who would report the incident to the Incident Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and support services. For these purposes, Security in-charge, staff of the Personnel Department/ Essential services would be engaged. All these personnel would be designated as key personnel.

In each shift, electrical supervisor, pump house in-charge and other maintenance staff would be drafted for emergency operations. In the event of Power communication system failure, some of the staff members in the office/ 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.

7.4.4.2 Emergency Communication

Whosoever notices an emergency situation such as fire, growth of fire, leakage etc. would inform his immediate superior and Emergency Control Center. The person on duty in the Emergency Control Centre would appraise the site controller. Site controller verifies the situation from the Incident Controller of that area or the shift in-charge and takes a decision about implementing On-Site Emergency Plan. This would be communicated to all the Incident Controllers and Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.4.4.3 Emergency Responsibilities

The responsibilities of the key personnel are appended below:

7.4.4.3.1 Site Controller

On receiving information about an emergency, he/she would rush to the Emergency Control Centre (ECC) and take charge of the ECC and the situation. He /She would assess the magnitude of the situation in consultation with the incident controller and decide:

- Whether affected area needs to be evacuated.
- Whether personnel who are at assembly points need to be evacuated.
- Declares Emergency and orders for operation of emergency sirens.
- Organizes announcement by public address system about location of emergency.
- Assesses the areas which are likely to be affected, and need to be evacuated or alerted.
- Maintains a continuous review of possible development and assesses the overall situation to decide whether shutting down any section or whole of the Plant is required.
- Directs personnel of rescue, rehabilitation, transport, fire brigade, medical and other designated mutual support systems, locally available, for meeting emergencies.
- Controls evacuation of affected areas. If the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, inform the District Emergency Authority, Police, and Hospital and seek their intervention and help.
- Informs Inspector of factories, Deputy Chief Inspector of factories, SPCB and other statutory authorities.
- Give a public statement, if necessary.
- Keeps record of chronological events and prepares an investigation report and preserves the evidence.

After managing the emergent situation and bringing the normalcy at the workplace, he /she makes a statement accordingly.

7.4.4.3.2 Incident Controller

The Responsibilities of the Incident Controller are mentioned below:

- Assembles the incident control team.
- Directs operations within the affected areas with the priorities for safety to personnel, minimizes damage to the plant, property and environment and minimizes the loss of materials.
- Directs the shutting down and evacuation of plants and areas likely to be adversely affected by the emergency.
- Ensures that all-key personnel help is sought.

- Provides advice and information to the Fire and Security officer and the local Fire Services as and when they arrive.
- Ensures that all non-essential workers / staff of the affected areas evacuated to the appropriate assembly points and the areas are searched for victims, if any
- Understands the need for preservation of evidence so as to facilitate any inquiry into the cause and circumstances, which resulted or escalated the emergency.
- Coordinates with emergency services at the site.
- Provides tools and safety equipment's to the team members.
- Keep in touch with the team and advise them regarding the method of control to be used.
- Keep the Site Controller informed continuously about the progress being made.

7.4.4.3 Emergency Coordinator : Rescue and Fire-Fighting

The Responsibilities are mentioned below:

- Rushes to the Emergency Control Centre after knowing about the emergency.
- Helps the Incident Controller in containment of the emergency.
- Ensures fire pumps in operating conditions and instructs pump house operators to be ready for any emergency.
- Guides the fire fighting crew i.e. Firemen, trained Plant personnel and security staff.
- Organizes shifting the fire fighting facilities to the emergency site, if required.
- Takes guidance of the Incident Controller for firefighting as well as assesses the requirements of outside help.
- Arranges the traffic control at the gate and the incident area.
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision.
- Evacuates the people in the Plant or in the nearby areas as advised by the site controller.
- Searches for any casualties and arranges proper aid for them.
- Assembles search and evacuation team.
- Decides paths for the workers evacuating the site
- Maintains law and order in the area, and if necessary, seeks the help of police and local administration.
- Arranges safety tools/equipment for the members of his team.

7.4.4.3.4 Emergency Coordinator: Medical, Mutual Aid, Rehabilitation, Transport and Communication

- The event of failure of electric supply and there by internal telephone, sets up
- communication point and establishes contact with the Emergency Control Center (ECC) in the event of failure of electric supply and communication network.

- Organizes medical treatment to the injured and if necessary, will shift them to nearby hospitals.
- Mobilizes extra medical help from outside, if necessary
- Keeps a list of qualified first aid providers of the factory and seek their assistance.
- Maintains first aid and medical emergency requirements.
- Makes sure that all safety equipment's are made available to the emergency team.
- Assists Site Controller with necessary data and coordinates the emergency activities.
- Assists Site Controller in updating emergency plans.
- Maintains liaison with Civil Administration
- Ensures availability of canteen facilities and maintenance of rehabilitation centre.
- Remains in liaison with Site Controller / Incident Controller.
- Ensures availability of necessary cash for rescue / rehabilitation and emergency expenditure.
- Controls rehabilitation of affected areas at the end of emergency.
- Makes available diesel/petrol for transport vehicles engaged in emergency operation

7.4.4.4 Emergency Facilities

7.4.4.4.1 Emergency Control Centre

During the emergency, the office block would function as an Emergency Control Centre. It would have an external Telephone & Fax facility. All the Incident Controllers, Officers, senior personnel would be available there.

The following information and equipment will be provided at the ECC.

- Intercom, telephone
- Fire suit / gas tight goggles / gloves / helmets
- Factory layout, emergency siteplan
- Emergency lamp / torchlight
- Plan indicating locations of hazardous inventories, Plant control room, sources of safety equipment, work road plan, assembly points, rescue locations, vulnerable zones, escape routes.
- Hazard chart
- Self-contained breathing apparatus
- Hand tools, wind direction, wind velocity indications
- Public Address Megaphone, Hand bell, Telephone directories (Internal and External).
- Address with telephone numbers of key personnel, Emergency coordinator.
- Important addresses, telephone numbers of experts from outside, government agencies, neighboring industries etc.
- Emergency shutdown procedures.
- Nominal roll of employees.

7.4.4.4.2 Emergency Medical Facilities

Gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical Centre as well as in the emergency control room. Private medical practitioners' help would be sought. Government hospitals would be approached for emergency help.

Apart from Plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities nearby town i.e., Gummidipoondi would be prepared and updated. Necessary specific medicines for emergency treatment of burnt patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial managements in this regard would also be taken on a mutual support basis.

7.4.4.4.3 Fire Fighting Facilities

First Aid and Fire Fighting equipment suitable for emergencies should be maintained as per statutory requirements/ TAC Regulations. A fire hydrant line covering major areas would be laid. It would be maintained at 6 kg / sq.cm. pressure.

7.4.4.5 Emergency Actions

7.4.4.5.1 Emergency Warning

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

7.4.4.5.2 Emergency Shutdown

There are number of facilities which can be provided to help in dealing with hazardous conditions. The suggested arrangements are:

- Stop feed
- Deluge contents
- Remove heat
- Transfer contents

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

7.4.4.5.3 Evacuation of Personnel

The area would have an adequate number of exits and staircases. In the event of an emergency, unrelated personnel have to escape to the assembly point. Operators have to take

emergency shutdown procedures and escape. The time office maintains a copy of deployment of employees in each shift at the Emergency Communication Centre. If necessary, persons can be evacuated by rescue teams.

7.5 General Safety and Occupational safety

It is of utmost importance to take into account the safety of the plant personnel irrespective of the plant size. Proper safety measures should be followed in this regard.

- These include the use of Personal Protective Equipment (hand gloves, dust masks, face shield, goggles, apron, etc.) during working.
- Avoid contact with the raw materials without the use of Personal protective equipment.
- A schedule should be prepared for regular maintenance of each unit and the same should be followed regularly.
- All the valves, which are prone to open and spill inflammable/ toxic material due to accident impact, must be placed with a suitable guard.
- The unit's management should ensure that all rotating machines and moving parts are provided with appropriate guards and the guards are put back in the position after check-up and maintenance.
- All the control systems are being periodically checked for their reliability and accuracy.
- Proper ventilation to be provided in areas where there are chances of a build-up of hazardous gases, chemicals and causing fire hazards

7.5.1 General Working Conditions

7.5.1.1 Housekeeping

- All the passages, floors, and stairways should be maintained in good condition. The system should be available to deal with any spillage of dry or liquid chemicals at the plant.
- Sufficient disposable bins should be clearly marked, and these should be suitably located in the plant.
- Chemical storage area specifically designed as per chemical properties
- Walkways should be clearly marked and free from obstructions.
- In the plant, precaution, and instructions should be displayed at strategic locations.
- All pits, sumps should be properly covered or securely fenced.
- Roads/walkways within the plant should be maintained neat and clean.

7.5.1.2 Ventilation

- Adequate ventilation should be provided in the work floor environment.
- The work environment should be assessed and monitored regularly.
- Local ventilation is most effective method for controlling dust and gaseous emissions at work floor

7.5.1.3 Electrical Safety

- A licensed electrician has deployed to complete all temporary wiring and electrical installations required for construction activities.
- Approved Rubber mat will be provided below the MCC panels and near the electrical junction.
- Electric proof hand gloves will be available to avoid electrical shock.
- Fuses and circuit breakers (ELCB's) are used to protect motherboards, conductors and equipment to avoid short circuiting and electric shock. MCB's and fuses are also to use to protect the electrical equipment from over current and over voltage.
- Extension cords for equipment or as part of a temporary wiring system shall not be damaged or compromised in any way and insulation must be of the highest grade.
- The joints of electrical wires avoided or an extension cord can be used if needed
- Anytime electrical equipment will be deactivated for repair, or circuits will be shut off, the equipment have locked out and tagged at the point where it can be energized.
- Proper earthing is ensured for all equipment and electrical panels.
- Temporary lights are not suspended by their cords.
- The employer will provide the necessary safety equipment, supplies and monitoring equipment to their personnel.
- To follow the Lock Out Tag Out (LOTO) system.

7.5.1.4 Work Permit

- ❖ Safety Permit will be taken for job in case of:
 - Work on line opening involving hazardous chemicals
 - Work involving entry into tanks, vessels or work on pipelines.
 - Work involving hot jobs like gas cutting, welding, burning, lighting etc. required to be done in the battery limit / hazardous area of the plant.
 - When it is required to carry out hot work on or adjacent (within 7 mt. Radius) to tank / vessel containing inflammable liquid / gas / solid, rubber lines equipment and piping.
 - Work involving electric shock or hazards from starting up of equipment.
 - When the work is to be done on the roof of buildings.
 - Working at a height above 2 mt. Where working arrangements like ladders, stairs, platforms, railing etc. are not available.
 - Work involving excavation and digging jobs in plant / factory premises.
- ❖ Cold Work Permit will be taken for job in case of:
 - Work below 2 m height.
 - Work where no inflammable material available within 7 m Radius.
 - Work on pipeline – where hazardous material or height work is not to be carried out.
 - Excavation and digging job inside plant / factory premises.
 - Any maintenance job which does not follow Safety permit criteria.
- ❖ Jobs will be extended beyond office hours or non-working days:
 - Permit must be revalidated by and permitted with the consent of DGM / HOD.
 - The responsible person of the concerned department should present till the validity of extension of permit.
 - Shift in-charge (permit issuer) will personally take care of the situation and take

necessary safety precautions like using PPE, Isolation, Decontamination, Draining, Venting, depressurization etc.

- In case of an emergency breakdown job - outside working hours (apart from 'G' shift timings) - Shift In charge (issuer) and Permittee will take care of the whole job by due concern with the Safety Department by following all the SOPs and Safety Guidelines.

7.5.1.5 Working at Heights

- Examine ropes, hooks for defects before putting them into service. Use chains or cables to suspend tackle overtonners.
- Each man handling the falls should know how to tie the rope knots properly and safely.
- Make sure that supports to which hoists are attached are strong enough to withstand the loads to which they will be subject.
- Do not tie knots to retain cables run through chains and hooks.
- Use cable clamps or wedge sockets, manila rope is not to be used for slings on material contaminated with acid.
- Care should be exercised in selecting equipment to snug taglines. Be sure it is strong enough to withstand the load.
- Hoisting equipment operators should keep their eyes on the man giving signals. Do not allow cables to stack up on the side of the drum. In giving signals to the Crane Operator, keep attention on the load.
- As a matter of safety, all this equipment should be inspected every year and each year a different color code is to be used to show and exhibit that the equipment has been checked.
- Hoist ropes must not be used if more than three outside adjacent wires are broken within a length of one lay or if outer wires are worn 2/3 of their original diameter, or if marked corrosion appears.
- Truck cranes must be properly blocked and be on firm footing before lifting a heavy load with a lowroom.
- Employees must stand clear off the swing of the crane and keep out from under suspended loads.

7.5.1.6 Boiler Safety

Boiler shall be installed as per the Boiler Rules with all the safety equipment and instruments. Start-up and shut down procedures shall be formulated and complied with. Boiler operation will be carried out by qualified personnel with a boiler proficiency certificate. Boiler inspections will be done as per rules.

Hazards associated with Boiler Room:

- Risk Of Explosion
- High Pressure steam
- Combustion Gases
- Moving Machinery
- Hot Surfaces

Safety aspects:

- Water level
- Safety Valve
- Steam valves/traps
- Flame scanner system
- Burner control system
- Use of protective clothing like face shield along with safety glasses
- Fire safety plans shall include the locations of fire alarms, fire extinguishers, the main electrical breaker, fire main, and exits for each area of the facility
- Lock Out Tag Out System

7.5.2 Engineering Control

- Drains and vents will be provided on chemical pipe lines to pump suction.
- Checking schedule/maintenance Schedule for Pump, Control valves, Air Instrument system and Instrument will be prepared
- Testing, inspection and certification will be carried out for all pressure vessels, lifting tackles and storage tanks as per Factories Act.
- Calibration will be carried out to maintain the flow indicator.
- Mechanical sealed pumps will be used to avoid and reduce leakages and fugitive emissions.
- Double mechanical seals will be provided for agitators
- Workplace monitoring will be carried out.
- Removal of combustible scrap and debris (wood, clearing/grubbing material) from the site daily and to store it at designated places.
- Spill prevention control will be provided to limit the risk of hazardous material release into the environment.
- Secondary control will be provided for material transfer in the form of leakage collection tray.
- Alarm system will be provided for deviation of temperature, Pressure and level in storage tanks.
- Cooling arrangement will be provided for the storage tank in case of fire/Heat.
- A double earthing system/Earthing grid will be provided for tanks, piping and road tankers.
- Proper labeling will be provided for all equipment and materials.
- Safety systems like Emergency Shut Down (ESD) switches will be provided for proper functioning.
- Sprinkler systems, gas/fire detectors and Remote operated valves (ROV) will be provided as safety systems.
- Lightning protection systems will be provided to cover tank farms.
- Windsocks at various locations to know the direction of wind in case of a leak or fire.
- Proper ventilation will be provided to keep the area well-ventilated to avoid accumulation of gas/ vapors and to keep it below PEL/ TWL values.
- Every floor, working place and passageway will be free from protruding nails, splinters, holes or loose boards.
- Working surfaces will be dry to prevent slips and falls.

- Occupational health centers will be developed to cater any emergency.
- Competent and authorized contractors will be deployed for transport of hazardous material and to follow the Motor vehicles act strictly for hazardous material transportation.

7.6 R&R Action Plans

There is no need for R&R activities for the proposed unit, the additional land required for further construction is abutting the existing plot area.

7.7 Plan and Budget for Occupational health and safety

Table 0.6. Plan and Budget for Occupational Health and Safety

Sr. No.	Description	Amount (INR Lakhs)
1	Workers will be subjected to primary health check-up before they are employed to ascertain their health conditions. Thereafter, Regular Medical check-up & First Aid facility will be organized for workers to evaluate the adverse impact if any on these persons due to the proposed activity. Occupational health surveillance programmes shall be done yearly. A Medical Officer and full-fledged medical staff are recruited.	26.0
2	Facilities such as sanitation, restroom, canteen etc. shall be provided to the labour force during construction as well as to the casual workers including truck drivers during the operation phase.	10.34
Total		36.34

7.8 Decarbonization Program

The PP is engaged in manufacturing of wind turbine components such as casting, machining, surface treatment, and assembly. In order to reduce carbon emissions, energy-efficient practices in foundry operations are being implemented. The use of Waste Heat Recovery Systems (WHRS) is being explored. The PP is in the process of selecting expert consultants for its decarbonization programme. The company has proposed an equity partnership to develop captive renewable energy projects such as solar and wind power plants to meet part of its energy requirement. The allocated budget for the same is INR 20 Crores.

8. PROJECT BENEFITS

8.1. Environmental Benefits

The proposed expansion project will continue to adopt sustainable and energy-efficient practices in all operations. To reduce air emissions, additional APC measures including enhanced dust extraction and collection systems are planned. These will ensure particulate matter remains within permissible limits.

Wastewater generated from furnace cooling and other operations (10 KLD) is being treated in the existing ETP (10 KLD capacity). Treated water will be reused for fire hydrant systems, washing, and process needs. Additionally, sewage generated (existing 18.4 KLD + proposed 28.5 KLD) will be treated in two STPs (2 x 20 KLD capacity). Treated sewage will be reused for greenbelt and dust suppression, ensuring Zero Liquid Discharge (ZLD).

A comprehensive Rainwater Harvesting (RWH) system and stormwater management plan will be implemented, including recharge pits and stormwater collection drains. It will help improve groundwater percolation and reduce dependency on external sources.

A greenbelt area covering 25% of the project site (20,253.58 sq.m.) and 10% in the OSR area will be developed using native tree species. In addition, 1650 trees will be planted within a 2 km radius to support ecological balance and improve ambient air quality.

All solid, hazardous, and municipal wastes will be managed as per statutory norms. Organic solid waste will be composted on-site and used for greenbelt maintenance.

Environmental Monitoring systems will be maintained for Air (PM_{2.5}, PM₁₀, SO₂, NO₂, CO, TVOC), Water, Noise, and Soil. All emissions will be kept within permissible norms.

8.2. Economic Benefits

The total capital cost for the proposed expansion is INR 72.68 Crores. This investment will contribute to:

- Increased annual turnover to INR 725 Crores (FY 2025–2026).
- Annual profit projected at INR 25 Crores.
- Enhanced contribution to government revenue through GST, customs, income tax, and other levies.
- Growth of ancillary industries (machining, logistics, fabrication, etc.) in the region.

Additionally, the project will generate small business and vending opportunities for local entrepreneurs, contributing to the local economy.

8.3. Social Benefits

The expansion will create significant direct and indirect employment:

- Total workforce to increase from 424 to 709 (including permanent and contract staff).
- Indirect employment for approximately 100 persons in upstream and support sectors.
- Temporary jobs during the construction phase for about 25 workers.

Under Corporate Environment Responsibility (CER), INR 72.68 Lakhs has been earmarked for activities in and around Thervoykandigai village, including:

- Improvement of primary health care centres and Anganwadis.
- Development of infrastructure in government schools.
- Providing drinking water facilities and sanitation improvements.
- Support for heritage and worship structures.
- Traffic and road safety measures near plant approach roads.
- Restoration of water bodies and development of green zones.

The company is also committed to continued support under CSR (2.5% of revenue), focusing on education, environment, women empowerment, and health.

8.4. Other Tangible benefits

India's renewable energy sector is growing rapidly, with wind power playing a critical role. BAETTR's expansion will strengthen the domestic supply chain for wind turbine components and support India's renewable energy targets.

Key contributions include:

1. Supplying precision components to global wind turbine OEMs.
2. Reducing imports and enhancing local manufacturing.
3. Contributing to national renewable energy infrastructure.

The project supports SIPCOT's vision for clean, green, and industrially advanced zones. The proposed facility, being one of its kind in India, will set benchmarks in safety, quality, and sustainability, while continuing to operate with full legal and environmental compliance.

As per EIA Notification 2006, Chapter 9 i.e. Environmental Cost Benefit Analysis (ECBA) is to be prepared if recommended at the Scoping Stage.

- Environmental Cost Benefit Analysis (ECBA) is the application of Cost Benefit Analysis (CBA) to projects that have an impact on the environment, either directly or indirectly. It helps to evaluate whether the environmental gains from a project justify the costs involved.
- CBA is a tool used before making investment decisions, especially in projects involving large capital and potential environmental impacts. Ensuring a clean and safe environment is the priority of every development activity.
- CBA helps in making informed "Go" or "No-Go" decisions by analyzing resource use and ensuring maximum benefit with minimal environmental loss.
- For the proposed expansion project of BAETTR India Private Limited, the project benefits include both Use values (like employment, infrastructure, renewable energy support) and Non-Use values (like environmental protection, long-term sustainability,

and community welfare). Environmental components considered include air, water, soil, noise, and ecological balance.

- Environmental costs include investment in pollution prevention systems, environmental monitoring, wastewater and solid waste treatment, and development of greenbelt and rainwater harvesting systems. These are addressed through dedicated Environmental Management Plans (EMP) and mitigation measures.
- Overall, ECBA supports the conclusion that the environmental and social benefits of the proposed expansion at BAETTR India outweigh the associated environmental costs, making the project environmentally and economically viable.

10. ENVIRONMENT MANAGEMENT PLAN

10.1 Introduction

The Environment Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all stakeholders including the project proponents, contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk. Adequate environment management measures need to be incorporated during the entire planning, construction and operating stages of the project to minimize any adverse environmental impact and assure sustainable development of the area.

The Environment Management Plan presented below will be followed and regular monitoring of relevant parameters as stated in the post – project monitoring schedule will be carried out. The Environment Management Plan will be proactive in nature and will be upgraded if new facilities or modification of existing facilities, with environmental concerns, come up at a later stage.

10.2. Organizational Role and Responsibility

Management Policy

The company has a written policy for safety, Health and Environment Management. Through this policy, the company management commits itself to the following objectives:

- Meet all the relevant laws, regulations and international agreements.
- Conduct its activities safely, protecting the health of all employees and the product's users.
- Reduce the adverse environmental impacts to a practicable minimum at an acceptable cost to the company and society.

Encourage continuous improvement in safety, health and environment performance.

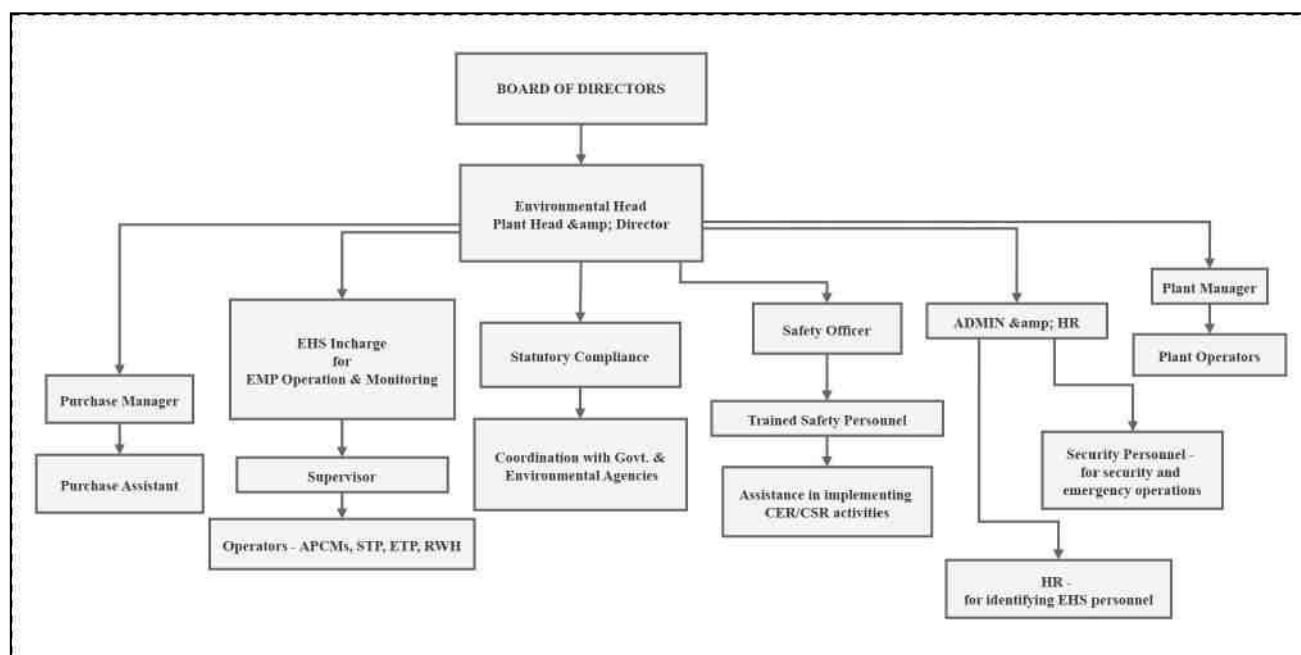


Figure 10.1 Environment Management Cell

Environment Management

- Periodic review of environmental status;
- Implementation and maintenance of green buffer areas;
- Review of ETP, Boilers, DG operations and maintenance of APCs;
- Monitoring of collection and treatment of waste;
- Compliance to conditions stipulated in Environmental Clearances (EC) and consents;
- Implementation of EMP;
- Undertake awareness activities for industries and residential areas.

Social Management

- Undertake continuous engagement with local community;
- Address grievances of the complex, local community and residents.

10.2.1 Corporate Environmental Commitment

M/s BAETTR India Private Limited has adopted a strong Environmental Policy endorsed by its Board of Directors, underscoring the company's commitment to environmental sustainability and responsible industrial growth. This policy provides a structured framework to ensure that all operations are conducted with minimal environmental impact while fully complying with applicable environmental laws, regulations, and standards. Environmental considerations are integrated into all levels of decision-making, promoting a proactive approach to sustainable manufacturing, especially in support of the renewable energy sector. The policy also aligns with BAETTR Group's global commitment to Health, Safety, Environment, and Quality (HSEQ) excellence. A copy of the Environmental Policy is enclosed

in Annexure.

10.2.2 Standard Operating Procedures for Environmental Compliance

To operationalize its Environmental Policy, M/s BAETTR India Private Limited has developed detailed Standard Operating Procedures (SOPs) to ensure full regulatory compliance. These SOPs outline systematic processes for identifying, managing, and preventing non-compliance or deviations from environmental clearance conditions and applicable legal standards. The SOPs include periodic environmental audits, inspections, and clearly defined corrective action mechanisms. Regular training and awareness programs are conducted for employees at all levels to reinforce knowledge of regulatory requirements and best environmental practices. A structured monitoring framework is also implemented to track air, water, noise, and soil quality to ensure that operations remain within permissible limits at all times.

10.2.3 Hierarchical System for Environmental Management

M/s BAETTR India Private Limited follows a tiered environmental management system to ensure effective implementation of environmental safeguards. At the operational level, an Environmental Officer is designated to monitor daily environmental performance and implement mitigation measures recommended in the EIA and Environmental Clearance. An Environment Manager supervises all compliance-related activities, conducts inspections, prepares reports, and ensures timely submission of returns to regulatory authorities. At the corporate level, the Head – Environment & Compliance ensures alignment of site-level activities with corporate environmental policies and strategic goals. Regular updates on environmental performance are reviewed by Senior Management, and key insights are shared with the Board of Directors to support continuous environmental improvement.

10.2.4 Non-Compliance Reporting Mechanism

To maintain accountability and transparency, M/s BAETTR India Private Limited has established an internal reporting system for environmental non-compliances. Any deviation or violation is documented by the Environment Manager and reviewed by the site leadership. Monthly and quarterly environmental performance reports are submitted to senior management, and any significant non-compliance is escalated to the Board of Directors. Externally, the company is committed to disclosing major environmental incidents through sustainability disclosures and ensures timely corrective actions with regular follow-up to ensure effective resolution.

10.2.5 Commitment to Environmental Excellence

BAETTR India Private Limited is committed to achieving environmental excellence through responsible manufacturing and continuous improvement. By integrating environmentally sound technologies, complying with statutory requirements, and embedding sustainability into its operations, the company ensures its activities contribute positively to environmental conservation and community well-being. The environmental policy is a reflection of BAETTR's global mission to support renewable energy and reduce carbon footprints, positioning the company as a responsible partner in India's transition to clean energy. Through this

commitment, BAETTR aims to set high standards for environmental responsibility in the wind energy manufacturing supply chain.

10.3. Role of Project Proponent (Top Management)

M/s BAETTR India Private Limited will have ultimate responsibility for implementing the provisions of the EMP. This will include the management of environmental impacts, monitoring of contractor performance as well as development of mechanisms for dealing with environmental problems. The proponent will also ensure that the activities of its contractors during the installation and implementation of which will be required through contractual documentation. In order to facilitate this, the regular site inspections and their noting will be documented by the PP/Contractor. The organizational structure of the company is presented below.

10.4. Role of Contractor

Contractors will also be expected to demonstrate commitment to the environmental monitoring programs at all levels in the contractor's management structure. It will be ensured the following:

- The Contractors involved in the project will be responsible for implementation of and adherence to, all the mitigation measures outlined in the EIA;
- Appropriate experienced and qualified personnel are employed as the Contractor's Environmental Manager
- All the environmental incidents to be reported at the earliest;
- To maintain records of all the inspections conducted;
- A program of regular self-inspection and audit will be developed and implemented and results reporting will be done to the M/s BAETTR India Private Limited. EHS team on a regular basis.

10.5. Inspection, Monitoring and Audit

This will increase the effectiveness of the EMP. Through this process M/s BAETTR India Private Limited. will ensure the conditions stipulated in the Environmental Clearance (EC), Consent to Establish (CTE), Consent to Operate (CTO) etc are complied with. The Audit will be conducted by the team for the implementation of the management system. The entire process of inspection and audit will be documented and findings of the above will be implemented by M/s BAETTR India Private Limited.

10.6. Monitoring, Reporting and Documentation

- Reporting of environmental, health, safety and social performance reports or check list, incident record register etc. will be developed and implemented through a program of reporting and reviewing throughout the project.
- Reports from inspection, audits and other improvement programs will be regularly communicated;
- All complaints and enquiries will be addressed with records maintained in an assigned register by the safety officer of each contractor;
- Internal and external reporting mechanism will be developed, internal reporting will comprise the concerned officials from the Environment management team, the representatives of the contractors and the top management of M/s BAETTR India Private Limited
- The internal reporting will be undertaken on quarterly basis while the external reporting will be undertaken half yearly.
- Annual environmental report known as 'Environment statement' as per FORM V of the EPA Rules, 1986, six monthly compliance reports as per EC of MoEFCC, compliance reports as per CTE/CTO etc. will be submitted to the regulatory authorities.

10.7. Internal Monitoring, Reporting and Communication

The EHS In-Charge will be responsible for the internal monitoring. Inspection and audit findings along with the improvement program will be reported to the senior management regularly. Records should be maintained for regulatory, monitoring and operational issues..

10.7.1. Documentation

It is the most important step in the implementation of the Environment Management plan. M/s BAETTR India Private Limited. has a well established record keeping and management system as per the requirement. Responsibilities will be assigned to the relevant personnel ensuring that the EMP documentation and records are maintained. Typical record keeping requirements for the proposed project is summarized below.

- Master Environment Management System document
- Legal register
- Operation Control Procedures
- Work Instructions
- Incident reports
- Emergency preparedness and response procedure
- Training records
- Monitoring reports

- Audit reports
- Compliance Report
- Safety Committee meeting record.
- Complaints/Suggestions register and issue attended/closed
- Solid Waste and Hazardous waste generation, Handling and Disposal
- Quantity of wastewater and Treated water generated and its quality
- Survival rate/ratio of the Trees planted.
- Environmental Permits / Consents from MOEF
- Employee environmental, health and safety records
- Equipment inspection and calibration record where applicable
- Vehicle maintenance and inspection record

10.8. EMP Review and Amendments

The EMP will be reviewed periodically to update it addressing any changes in the organization, process or regulatory requirements. The EHS Head has the mandate for coordination of the actions required for environment mitigation and management and monitoring the progress of the proposed management plans and various action plans to be implemented for the project.

10.8.1. Environment Management Plan

An Environment Plan has been developed following the identification of impacts and mitigation measures. The mitigation measures suggested will be as according to the monitoring schedule.

The EMP includes the following:

- Mitigations suggested for adverse environmental and social impacts and associated risks;
- Personnel responsible for implementing the mitigation measures at various stages of the project;
- The mitigation measures suggested in Chapter 4 would be implemented. This will reduce the impact on the environment due to the proposed project. To facilitate easy implementation, the recommendations suggested are grouped in different phases.

All the above reports will be documented in the documentation system as per the requirement of MoEFCC and other relevant regulatory authorities.

10.9. Decarbonization Program

The PP is engaged in the manufacturing of wind turbine components through processes such as casting, machining, surface treatment, and assembly. To reduce carbon emissions and improve energy efficiency, various sustainable practices are being implemented.

The company is exploring the use of energy-efficient technologies in its foundry operations and considering future integration of Waste Heat Recovery Systems (WHRS). As part of its long-term sustainability vision, BAETTR India has proposed the installation of solar panels and is planning an equity partnership to develop captive renewable energy projects (solar and wind-based) to meet part of its operational power requirements.

The allocated budget for the decarbonization initiative is INR 20 Crores. This is in line with the company's commitment to reduce environmental impact and support India's clean energy goals.

10.10 EMP Implementation Budget

During Operation Phase:

i) Capital Cost

Table 10.1 Total project Cost

S. No	Particulars	Unit	Existing	Proposed	After Expansion
1	Land	INR Crores	13.59	0	13.59
2	Building	INR Crores	71.50	23.1	94.60
3	Land & Building Improvements	INR Crores	21.60	1.46	23.06
4	Plant and Machinery	INR Crores	52.22	28.37	80.59
5	Moulds & Pallets	INR Crores	19.3	8.92	28.22
6	Material Handling Equipments	INR Crores	18.54	9	27.54
7	ETP/STP/APC	INR Crores	11.29	1.83	13.12
8	others	INR Crores	5.01	0	5.01
Total		INR Crores	213.05	72.68	285.73

ii) EMP Capital Cost

Table 10.2 EMP Capital Cost

Sr. No.	Particulars	Unit	Existing	Proposed additions	After Expansion
1.	Air Pollution Control Systems	INR	932.08	130.34	1062.42
2.	Water Pollution Control Systems	INR	165.05	55.7	220.75
3.	Solid / Hazardous Waste management	INR	43	25.30	68.3
4.	Rainwater Harvesting & Storm Water Management	INR	38	16.4	54.4
5.	Greenbelt Development	INR	20	20	40
Total (in lakhs)		INR	1198.13	247.74	1445.87

iii) Recurring Cost

Table 10.3 Recurring Cost

Sr. No.	Particulars	Unit	Recurring Expenses
1.	Air Pollution Control Systems	INR	45.15
2.	Water Pollution Control Systems	INR	10.48
3.	Solid / Hazardous Waste management	INR	0.85
4.	Rainwater Harvesting & Storm Water Management	INR	0.27
5.	Greenbelt Development	INR	1.20
Total (in lakhs)		INR	57.96

10.11. CER Budget

Table 10.4 CER Activities

S. No	Details	Project Description	Amount in Rs. (Lakh)		
			2025-26	2026-27	2027-28
1	Providing RO water	Providing Potable drinking water Plant to nearby schools	10,00,000		
2	Environmental conservativ measures	Provide Solar Lights for the nearby government hospitals		10,00,000	
3	Environmental conservative measures	Greenbelt development (1000 plants) - at Schools & Public community nearby villages Each plant (250/-)	2,50,000		
4	Environmental conservative measures	Planting trees in tank Bund in Kannankottai lake	1,00,000	1,00,000	1,00,000
5	Environmental conservative measures	Planting trees in the road divider inside SIPCOT road	1,00,000	50,000	1,00,000
6	Environmental conservative measures	De siltation of existing water ponds in nearby villages		10,00,000	
7	Sustainability	Providing Solar streetlight for the nearby Village			15,00,000
8	Health Centre in SIPCOT	Construct a medical clinic with Basic medicine inside SIPCOT			10,00,000
9	Educational	Furniture, Library with Rack and Tables govt school in Thervoykandigai village		4,24,000	5,44,000
Sub Total (INR Rs)			14,50,000	25,74,000	32,44,000
Total (INR Rs)			72,68,000		

10.12. Carbon Footprint

Mitigation Measures of Carbon Footprint:

1. Development of Greenbelt.
2. Prevent further GHG mitigation with alternatives.
3. Procurement of Raw Materials (RM) from nearby sources
4. Operate air conditioning on a schedule.
5. Use of Publictransportation.
6. Switch to energy-efficient lightbulbs.
7. Transition to net-zero buildings.
8. Opportunities for process improvements in energy efficiency, manufacturing process changes, product or feedstock.
9. Use of renewable energy.
10. More efficient use and recycling of materials.
11. Carbon capture and storage (CCS) to reduce emissions over the long term.
12. Fuel switching.
13. Combined heat and power.
14. Use of low-emission alternatives.
15. Reduction of HFCs.

11. SUMMARY AND CONCLUSION

11.1. About Project

M/s BAETTR India Private Limited, established in 2020, is located at S.F No. 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu – 601202. The company is engaged in the manufacturing of wind turbine components including casting, machining, surface treatment, and assembly.

The unit is currently operating with valid Consent to Operate from Tamil Nadu Pollution Control Board (TNPCB) with a melting capacity of 30,000 TPA using 1×24T induction furnaces and a panel board capacity of 5000 kW. Hazardous waste authorization is valid till 31.03.2028.

The company proposed expansion of production capacity of saleable castings from 27500 TPA to 95040 TPA by enhancing the furnace panel board capacity from 5000 kW to 8000 kW within the existing project area of 20 acres. No additional land is required.

The total cost of the existing project is INR 213.05 Crores, and the cost of proposed expansion is INR 72.68 Crores. Thus, the total project cost after expansion will be INR 287.73 Crores.

As the project falls under Secondary Metallurgical Processing with capacity >30,000 TPA, and the Tamil Nadu–Andhra Pradesh interstate boundary is located at 3.82 km (WNW), the project attracts General Condition and is classified under Schedule 3(a), Category 'A' of the EIA Notification, 2006 & its amendments. As the site is located in a Notified Industrial Area (SIPCOT), the project is exempted from Public Hearing and will be appraised by EAC, MoEF&CC, New Delhi.

11.2. Project Description

Location & Accessibility

The project is located at S.F No. 32/2, Plot No. A-3/1, SIPCOT Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu – 601202.

Coordinates:

Latitude: 13°21'45.76"N

Longitude: 79°59'27.05"E

Elevation: ~44 m above MSL

Table 11.1 Major Infrastructure Connectivity

S. No	Description	Distance (Km)	Direction
Railway Connectivity			
1	Gummidipoondi Railway Station	~15.09	NNE
2	Chennai International Airport	~42.86	SE
Nearest Town, City, and District Headquarters			
1	Town: Periyapalayam	~7.80	SE
2	City: Chennai	~25.34	SE
3	District HQ: Thiruvallur	~23.42	SSW
Road Connectivity			
1	NH 716A: Tirupathi Road (NH 16 near Chennai, TN – NH 40 near Kadapa, AP)	~5.25	S
2	SH 52: Kavarapettai –Sathiyavedu	5.92	NNE
3.	Thervoy Kandigai SIPCOT Road (Approch Road)	~0.02	South

Production Capacity

Table 0.2. Production Capacity

S. No.	Name of Unit	Unit	Capacity			End use of Product
			Existing	Proposed Addition	After Expansion	
1.	Saleable casting	TP A	27500	67540	95040	Components mainly used for wind turbine.
2	Industrial Sheds and Buildings	Sq. m	18471.82	27979.288	46451.108	For the operations of the Unit

Water Requirement:

Source of Freshwater – SIPCOT Industrial Estate, Thervoykandigai, which receives supply from Kannan kottai Reservoir.

Existing Phase:

Total water requirement: 90.5 KLD (Fresh water – 63 KLD, Recycled water – 27.5 KLD). Freshwater used for domestic (23 KLD), cooling/boiler (30 KLD), chiller/process (10 KLD). Recycled water (9.5 KLD) is reused for fire hydrant & plant washings. Treated sewage from existing 20 KLD STP is reused for flushing.

Proposed Expansion:

Total water requirement after expansion: 110 KLD (Fresh water – 72 KLD, Recycled water – 38 KLD).

Freshwater usage includes domestic (32 KLD), cooling (30 KLD), and process (10 KLD). Recycled water (9.5 KLD) is reused for fire hydrants and washing.

Greenbelt requirement: 28.5 KLD through percolation. Treated domestic sewage handled through combined capacity of existing + proposed STP (2 x 20 KLD).

Construction Phase:

Water requirement approx. 12.5 KLD, sourced from private tankers.

Wastewater Generation & Management:

The proposed project will generate both liquid and solid wastes, which will be managed in accordance with environmental norms. The primary liquid waste streams include blowdown water from cooling and boiler systems, as well as domestic sewage. In the existing setup, around 10 KLD of industrial effluent is generated and is currently treated in a 10 KLD Effluent Treatment Plant (ETP). Domestic wastewater generation is approximately 18.4 KLD, which is treated in the existing 20 KLD Sewage Treatment Plant (STP). Post expansion, domestic wastewater generation is expected to increase to 29 KLD, and this will be treated using both the existing and an additional proposed 20 KLD STP. The treated wastewater will be reused for greenbelt development and for dust suppression in plant roads and raw material storage areas, thereby promoting zero liquid discharge from domestic sources.

During the construction and operation phases, municipal solid waste will also be generated. Based on CPHEEO guidelines (0.45 kg/day per person), the total municipal solid waste generation after expansion is estimated at 319 kg/day, comprising 191 kg/day of biodegradable waste and 128 kg/day of non-biodegradable waste. Biodegradable waste will be composted and used as manure within the premises, while non-biodegradable waste will be collected and disposed of through TNPCB-authorized waste handlers.

Hazardous waste generated from the facility includes used or spent oil (20 TPA), oil-containing

residues (20 TPA), empty containers/barrels contaminated with hazardous substances (360 numbers per annum), and ETP sludge (5 TPA). These wastes will be handled as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. All hazardous wastes will be stored safely, and then sent to authorized recyclers or Treatment, Storage and Disposal Facilities (TSDF) as applicable.

In addition, significant quantities of non-hazardous solid wastes will be generated, including furnace waste, slag, foundry sand, sweep waste, and shot blasting dust. After the proposed expansion, the estimated quantities are: foundry sand – 34,640 TPA, slag – 6,440 TPA, dust – 9,730 TPA, sweep waste – 5,490 TPA, and shot blasting waste – 537 TPA. All these non-hazardous wastes will be collected and sent to authorized recyclers for reuse or safe disposal. STP sludge (10 TPA) generated from domestic wastewater treatment will be utilized as manure for greenbelt maintenance within the plant premises.

Power Requirement

The total power requirement for the project operations will be met through Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO). Currently, the sanctioned power for the existing facility is 7,000 KVA, supplied through a 33 kV substation. With the proposed expansion, an additional 6,000 KVA will be required, which will be sourced via a dedicated 110 kV substation from TANGEDCO. Thus, the total power requirement after the expansion will be 13,000 KVA. For backup during grid failure, one existing 1x1500 KVA Diesel Generator (DG) set is in place, and an additional 1x1500 KVA DG set is proposed. High-Speed Diesel (HSD) will be the only fuel used for operating the DG sets during emergency situations.

Fuel Requirement:

High-Speed Diesel (HSD) is the primary fuel used in the project, specifically for the Diesel Generator (DG) sets, and is consumed only during power outages or grid failures. The existing DG set has a maximum daily HSD requirement of 990 litres. With the addition of a new DG set as part of the proposed expansion, the total HSD requirement will increase to approximately 1,980 litres per day. HSD will be sourced from nearby authorized fuel stations.

In addition to HSD, grease is used as a lubricant for various machinery. The consumption of grease is expected to increase from 180 kg/month to 200 kg/month after expansion, which will be sourced from oil companies.

Furthermore, furnace oil will be introduced for use in the expanded facility, with a projected daily requirement of 566 litres. This fuel will also be procured from approved oil suppliers.

Liquefied Petroleum Gas (LPG) will be newly introduced in the expanded phase at a consumption rate of 2.5 tons per day. It will be used primarily for thermal sand reclamation processes and will be stored in cylinders within the premises. LPG will be supplied by Super Gas Company operating within the SIPCOT Industrial Park. There is no LPG usage in the existing setup.

Employment After Expansion:

The proposed expansion of the facility will significantly enhance employment opportunities, both directly and indirectly. At present, the existing plant employs 424 individuals, comprising 154 permanent and 270 temporary workers. With the proposed expansion, an additional 285 jobs will be created, including 96 permanent and 189 temporary positions. As a result, the total manpower for the facility post-expansion will increase to 709 personnel, covering both permanent and temporary employment during the operational phase.

In addition to direct employment, the project is expected to generate indirect employment for approximately 100 people, including those engaged in the upstream supply chain and ancillary services such as logistics, maintenance, and material handling. Furthermore, during the construction phase, about 9390 of Total Man days will be involved in site development and civil work activities for a duration of approximately 313days.

The expansion is also expected to contribute to socio-economic development in the surrounding areas through Corporate Environmental Responsibility (CER) and Corporate Social Responsibility (CSR) initiatives. A total of INR 72.68 lakhs has been allocated under the CER plan in accordance with the MoEF&CC guidelines, focusing on community development activities in and around Thervoykandigai village.

Overall, the expansion will lead to improved living standards, growth of ancillary industries, increased state revenues through taxes and duties, and infrastructure development, while also reinforcing the company's role as a key supplier in the global wind turbine component sector.

Greenbelt Development

The total project area is 8.094 hectares (20 acres), of which 2.023 hectares (5 acres) have been developed as green belt, covering 25% of the total area. Additionally, another 10% of the project area has been developed as green space within the Open Space Reservation (OSR) area provided by SIPCOT, bringing the total green coverage to 35% of the project area. Currently, approximately 1,393 trees have already been planted along the project boundary. To further enhance the green cover, an additional 1,650 saplings will be planted in a phased manner within one year. A capital amount of ₹4.5 lakhs has been earmarked for the proposed greenbelt development. The green belt will serve as a buffer zone, aiding in dust suppression, noise attenuation, and enhancing the aesthetic and ecological value of the project site.

Rain Water Harvesting

A well-planned storm water management and rainwater harvesting system will be implemented as part of the project to reduce dependence on external water sources and improve groundwater recharge. The system is designed to capture and store rainwater from rooftop and paved surface runoff. The harvested rainwater will be used for non-potable purposes such as greenbelt development, dust suppression, and other utility requirements.

With an average annual rainfall of 1330.61 mm and predominantly lateritic soil, the system includes rooftop rainwater collection, percolation pits, and structured stormwater drains. A total storage capacity of 1,885.22 KL has been created through 48 recharge pits and drains,

effectively managing up to 57.2% of the estimated runoff from a 70 mm rainfall event. This infrastructure supports flood prevention, ensures zero discharge of stormwater, and promotes sustainable water use within the site.

An investment of approximately ₹14.39 lakhs has been allocated for the rainwater harvesting system, with ₹9.39 lakhs towards civil works, ₹5 lakhs for tank/storage development, and ₹46,000 for filtration and recharge structures. An annual maintenance cost of around ₹71,000 has also been provisioned to ensure continued functionality of the system.

11.3. Description of the Environment

Study Period:

Monitoring was carried out in the Summer Season from **April 2025 - June 2025**.

Ambient Air Quality:

Core Zone:

Core Zone: The mean value of PM₁₀ at core zone locations ranges from (46.92-48.33 µg/m³) & PM_{2.5} ranges from (22.09-22.75 µg/m³), SO₂ ranges from (4.81-8.71 µg/m³), NO₂ ranges from (19.13-19.70 µg/m³), CO (0.18 mg/m³), O₃ (11.23-19.64 µg/m³) which are within the limits of National Ambient Air Quality Standards (NAAQS).

As per the Air Quality Index by CPCB, the air quality of the core zone is found to be Satisfactory during the sampling period - April 2025 - June 2025.

Buffer Zone: The mean value of PM₁₀ at buffer zone locations ranges from (39.67-72.53 µg/m³) & PM_{2.5} ranges from (18.20-33.32 µg/m³), SO₂ ranges from (5.10-10.49 µg/m³), NO₂ ranges from (14.69 - 29.18 µg/m³), CO (0.15-0.27 mg/m³), O₃ (11.90-23.64 µg/m³) which are within the limits of National Ambient Air Quality Standards (NAAQS).

As per the Air Quality Index by CPCB, the air quality of the buffer zone is found to be Moderate during the sampling period - April 2025 - June 2025.

Ambient Noise Quality:

Core Zone:

The ambient noise level during day time at the proposed project site varies from 55.7 dB (A) to 55.9 dB (A) which are within the day time standard limit of Industrial area ~75.0 dB (A). During night, the noise level at the project site ranges from 44.6 dB (A) to 44.8 dB (A) which are within the night time standard limit of Industrial area 70.0 dB (A).

Buffer Zone:

N3: The daytime ambient noise level at Periyapuliyur Village is 53.7 dB (A) which is within the daytime noise standard limit of the Residential area of ~ 55.0 dB (A). During the night the

noise level was recorded at 42.8 dB (A) which is within the night-time noise standard limit of ~ 45.0 dB (A).

N4: The daytime noise level at Aramani is 52.8 dB (A) which is slightly above the day time noise standard limit of ~ 55 dB (A). During the night the noise level was recorded at 42.5 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N5: The daytime ambient noise level at Manali is 53.1 dB (A) which is within the daytime noise standard limit of the Residential area of ~ 55.0 dB (A). During the night the noise level was recorded at 43.7 dB (A) which is within the night-time noise standard limit of ~ 45.0 dB (A).

N6: The daytime ambient noise level at Nelvay is 53.3 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 43.1 dB (A) which is within the night-time noise standard limit of ~ 45.0 dB (A).

N7: The daytime noise level at Lachivakkam is 54.7 dB (A) which is within above the daytime noise standard limit of Residential area ~ 55 dB (A). During the night the noise level was recorded at 44.2 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N8: The daytime noise level at Taratshi village is 54.9 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 44.4 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

N9: The daytime noise level at Karadiputtur is 53.9 dB (A) which is within the daytime noise standard limit of Residential area ~ 55.0 dB (A). During the night the noise level was recorded at 43.8 dB (A) which is within the night-time noise standard limit of ~ 45 dB (A).

Commercial Area:

N10: The daytime noise level at Approach Road is 58.3 dB (A) which is within the standard limit of Commercial area ~ 65.0 dB (A). During the night the noise level was recorded at 49.7 dB (A) which is within than the night-time noise standard limit of ~ 55 dB (A).

N11: The daytime noise level at Tirupati Road is 62.4 dB (A) which is within the standard limit of Commercial area ~ 65.0 dB (A). During the night the noise level was recorded at 58.4 dB (A) which is higher than the night-time noise standard limit of ~ 55 dB (A).

Groundwater Quality:

Core Zone:

Core Zone: The water quality of the core zone shows that

1. The Total Dissolved Solids (TDS) of the sampling location is 456 mg/l. The TDS of sampling location is within the acceptable limit of 500 mg/l and permissible limit of 2000 mg/l respectively.
2. The Total hardness of the sampling location is 100 mg/l. The TDS of sampling locations

are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.

3. The Alkalinity of the sampling location is 64.41 mg/l. The TDS of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
4. The Chloride Concentration of the sampling location is 86 mg/l. The TDS of sampling locations are within the acceptable limit of 250 mg/l.

Conclusion:

- The ground water quality parameters is within IS 10500:2012 (Drinking water Standards)

Buffer Zone:

Buffer Zone: The water quality of the buffer zone shows that

1. The Total Dissolved Solids (TDS) of the sampling location ranges from 160 mg/l to 748 mg/l. The TDS of sampling locations are within the acceptable limit of 500 mg/l and permissible limit of 2000 mg/l respectively.
2. The Total hardness of the sampling location ranges from 64 mg/l to 392 mg/l. The TDS of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
3. The Alkalinity of the sampling location ranges from 166 mg/l to 273 mg/l. The TDS of sampling locations are within the acceptable limit of 200 mg/l and permissible limit of 600 mg/l respectively.
4. The Chloride Concentration of the sampling location ranges from 46 mg/l to 158 mg/l. The TDS of sampling locations are within the acceptable limit of 250 mg/l.

Conclusion:

- The ground water quality parameters are within IS 10500:2012 (Drinking water Standards)

Surface Water Quality:

Surface water samples were collected for 8 locations namely "Kannankottai Thervoykandigai Reservoir", Telugu Ganga Canal, Sulameni Eri, Lake near Karadiputtur, Uttukkottai Eri, Puvalambedu Pond, Arani River upstream, Arani River downstream. As per the samples collected and analyzed from locations SW1, SW2, SW3, SW4, SW5, SW6, SW7 and SW8 surface water quality is meeting the criteria defined by class "E" as per the CPCB criteria. It is suitable for Irrigation, Industrial Cooling, Controlled Waste disposal.

1. The surface water quality of the "Kannankottai Thervoykandigai Reservoir" shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking

water quality standards. Electrical Conductivity value indicating that the surface water quality of "Kannankottai Thervoykandigai Reservoir" can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

The surface water quality of the Telugu Ganga Canal shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Telugu Ganga Canal can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

2. The surface water quality of the Sulameni Eri shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Sulameni Eri can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

3. The surface water quality of the Lake near Karadiputtur shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Lake near Karadiputtur can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

4. The surface water quality of the Uttukkottai Eri shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Uttukkottai Eri can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

5. The surface water quality of the Puvalambedu Pond shows that the values of the parameters including TDS, total hardness chloride, fluoride, calcium, magnesium, iron, sulphate, nitrate nitrogen and alkalinity are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Puvalambedu Pond can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

6. The surface water quality of the Arani river Upstream shows that the values of the parameters including fluoride, calcium, iron, sulphate nitrate and nitrogen are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Arani river Upstream can be placed in Class "E"

i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

7. The surface water quality of the Arani river Downstream shows that the values of the parameters including fluoride, calcium, iron, sulphate nitrate and nitrogen are within the IS drinking water quality standards. Electrical Conductivity value indicating that the surface water quality of Arani river Upstream can be placed in Class "E" i.e. Irrigation, Industrial Cooling, Controlled Waste disposal per CPCB surface water quality - Designated Best Use Water Quality Criteria.

Soil Quality:

Core Zone : After analyzing the samples collected from the site, it shows that the soil texture is 6/6 Bright yellowish Brown and 5/4 Dull Reddish Brown, pH ranges from 7.58 to 7.79. The amount of primary nutrients like Organic matter ranges from 1.01 to 1.25 %, the available nitrogen 92.4 to 106.8 mg/kg is low to medium and available Potassium 15.9 to 21.3 is low to medium and the available Phosphorus 7.9 to 9.1mg/kg is medium to high range.

The overall fertility of this soil would be considered moderate to low. While the phosphorus levels are adequate, the low levels of organic matter, nitrogen, and potassium suggest that the soil may need amendments, particularly organic matter and fertilizers, to improve fertility.

Buffer Zone : The soil texture is 5/8 Bright Brown and 5/4 Dull Reddish Brown, pH ranges from 7.03 to 9.92. The amount of primary nutrients like Organic matter ranges from 0.78 to 1.84 %, the available nitrogen 76.4 to 174.6 mg/kg is low to high and available Potassium 19.4 to 49.5 is medium to high and the available Phosphorus 7.1 to 10.9 mg/kg is low to high range.

The overall fertility of this soil would be considered moderate. The soil good potential due to its loamy texture however due to high levels of phosphorus, organic matter, nitrogen, and potassium suggest that the soil is fertile.

Socio-Economic Environment:

The villages in and around Thervoy Kandigai, Tiruvallur District are well-equipped with essential infrastructure, including reliable drinking water facilities, paved roads, uninterrupted electricity supply, shopping amenities, educational institutions, and dependable transportation services. The local economy is primarily driven by agriculture, complemented by employment in both government and private sectors within the region. The literacy rate in the surrounding communities is relatively high.

Industrial units operating in the vicinity provide substantial employment, playing a key role in shaping the economic profile of the area. Overall, the region exhibits moderate development levels, supported by a strong road network that ensures easy connectivity. The primary sources of drinking water are hand pumps and bore wells.

Residents have convenient access to essential services such as schools, post offices, banks, hospitals, and marketplaces. While the majority of the population earns their livelihood

through agriculture, daily wage labor, and various service sector roles, a smaller segment engages in animal husbandry and poultry farming. The presence of multiple industries further diversifies job opportunities, contributing to the region's economic stability and growth.

11.4. Anticipated Environmental Impacts and Mitigation Measures

Air environment

During the installation phase, impacts on ambient air would be mainly due to dust emissions and movement of vehicles. However, these impacts would be short term in nature and limited only to the construction period. Dust suppression systems (water spray) will be used. Construction materials will be fully covered during transportation to the project site by road.

During the operational phase, air emissions will primarily arise from sand handling, mixing silos, fettling cabins, shot blasting, induction furnaces, and DG sets. To control these emissions, appropriate Air Pollution Control (APC) measures such as dust collectors, vent filters, and bag filters have been installed at all major sources. Each unit is provided with a stack of adequate height (ranging from 4.5 m to 30 m) to ensure effective dispersion of pollutants. Two DG sets of 1500 KVA (one existing and one proposed) will be used during power failures, each equipped with acoustic enclosures and 30 m high stacks. The power requirement will be met from TANGEDCO, with the total load increasing from 7000 KVA to 13,000 KVA after expansion. The APC systems are designed to ensure emissions remain within the prescribed standards, and regular maintenance and monitoring will be carried out to maintain efficiency.

Water Environment

Source of Fresh Water: SIPCOT's water supply

Construction phase: The water used for construction purposes will be treated in sedimentation tanks and shall be reused appropriately. The wastewater from domestic activities will be managed in STP. No water shall be released untreated in the environment.

Operational phase: The plant will install ETP to manage processed wastewater. Treated water will be recycled and reused within the plant. STP treated water will be reused for greenbelt development.

Land Use and Soil quality

There won't be any change in land use during the proposed expansion. To avoid impact on soil quality, C&D wastes during the construction phase shall be collected and disposed off separately. Similarly, solid and hazardous wastes shall be collected and managed in separated drums to avoid open disposal.

Noise Levels

The major noise generation sources during construction and operation phases are DG sets, vehicular movement, Boilers etc and other plant machineries. Noise barriers and anti vibration

pads shall be installed to mitigate noise impacts. Similarly, to reduce noise from vehicular movement, servicing shall be carried out at regular intervals. Greenbelt of adequate width shall be provided to mitigate the overall noise level from the plant during its operation. The workers shall be provided with ear muffs to avoid health impacts.

Solid and Hazardous Waste:

Solid wastes are segregated onsite into biodegradable and non biodegradable. Biodegradable wastes shall be managed via OWC and composting. Non Biodegradable waste shall be supplied to authorised recyclers and vendors.

Hazardous waste shall be collected in separate drums and transported authorised vendors.

Flora and Fauna:

Additional greenbelt consisting of native tree species shall be provided inside the plot area. This will also enhance the natural beauty of the project site along with added benefits of noise and air emission reduction.

Socio-Economic Environment:

No rehabilitation and resettlement are required. Employment opportunities will be generated for the local population during the construction/installation phase which will lead to a rise in income and improve standard of living. The expansion of existing industry would also generate jobs for the labourers during the construction phase as well as during the operation phase. It will provide direct and indirect employment to local youth.

11.5. Environmental Monitoring Programme

M/s BAETTR India Pvt. Ltd. will ensure continuous monitoring of environmental performance during both construction and operational phases of the project. The monitoring program will cover ambient air quality, stack emissions, work zone air quality, noise, water and wastewater quality, and soil characteristics, ensuring that all parameters comply with prescribed environmental standards. Waste generation (hazardous, non-hazardous, recyclable, e-waste), greenbelt development, energy consumption, and CSR activities will also be periodically assessed.

Occupational health and safety of workers will be ensured through routine health check-ups, proper safety protocols, and documentation of incidents during construction and operation. All monitoring activities will be conducted through NABL-accredited laboratories and supervised by the Environmental Management Cell (EMC). Environmental monitoring reports, audit findings, and compliance data will be submitted regularly to the concerned regulatory authorities.

The stack emissions from major sources including the DG sets and induction furnaces are provided with adequate pollution control systems and stack heights. The proposed 1500 KVA

DG set will also be equipped with an acoustic enclosure and connected to a stack. Provision for online Continuous Emission Monitoring System (OCEMS) and Continuous Online Monitoring for wastewater (OCMS) will be made at the outlet of the proposed ETP and STP, ensuring real-time compliance with environmental norms.

11.6. Additional Studies

Public Consultation

Details will be incorporated after Public consultation.

Risk Assessment

A Hazard Identification and Risk Assessment (HIRA) is a systematic risk assessment tool that can be used to assess the risks of various hazards. Risk Assessment is done through consequence analysis to know the type of damage that any accident could pose on the human beings and property. Based on the extent of damage, risk mitigation measures are suggested. In order to manage the hazard, an on-site risk management plan is prepared. The on-site risk management plan is also known as Disaster Management Plan. Off-site risk management plan is prepared if the consequence analysis predicts the possibility of risks to people and property present within the damagezone.

General Safety Measures

- Occupational health surveillance programmes will be done six monthly & and their records will be well maintained.
- At the project site an emergency First Aid facility will be provided. A room will be provided separately with provision of bed and an experienced doctor.
- Health check-up camps will be organised on a regular basis at company dispensary / nearby locations for nearby people to evaluate exposure of the workers to chemicals during pre-placement and periodic medical monitoring.
- Prior to working with chemicals, workers will be trained on its proper handling & storage and its MSDS.
- Proper medical facility arrangements will be provided in case of any accidental release.
- Label Precautions and First Aid facility will be provided.
- Emergency plans will be prepared and a mock drill of the on-site emergency conducted.
- Employers and employees will be made aware of the hazardous properties of materials in their workplaces, and the degree of hazard each poses.
- Inspection of the industrial activity will be done at least once a year and an annual status report on compliance with the Rules will be submitted.
- An Environment, Health and Safety (EHS) Head will be available, which handles all the safety issues related to man, machine & materials.
- Exterior refuge or safe areas include parking lots, open fields or streets which will be located away from the site of the emergency and which provide sufficient space to accommodate the employees.

11.7. Project Benefits

The benefits due to the proposed expansion project by M/s BAETTR India Pvt. Ltd. are as follows:

- Additional APC systems like upgraded bag filters, vent filters, and dust collectors will be installed, ensuring that air emissions including PM_{2.5}, PM₁₀, SO₂, and NO_x remain within permissible limits. The plant will continue to operate as a Zero Liquid Discharge (ZLD) facility. Treated water from the existing and proposed STPs (2 × 20 KLD) and ETP (10 KLD) will be reused for greenbelt development, firefighting, and process purposes.
- A well-structured Rainwater Harvesting system comprising 20+ recharge pits and stormwater drains will facilitate groundwater recharge. This will reduce dependence on external water sources and support sustainability.
- A total greenbelt area of 20,253.58 m² (25% of the site) will be developed using native species. Additionally, 5,000 trees will be planted within a 2 km radius to improve local air quality and ecology. Organic municipal solid waste generated (approx. 170 kg/day) will be processed using an in-house Organic Waste Converter (OWC) to produce compost for greenbelt use.
- The proposed expansion involves only an increase in casting and machining capacity with no significant increase in pollution load. Additional stack for 1 × 1500 KVA DG set and upgraded common bag filters for existing and proposed induction furnaces are planned for emission control.
- The project will continue to comply with all environmental norms, and the maximum predicted ground-level concentrations from project emissions are well within limits: PM_{2.5} – 0.85 µg/m³, PM₁₀ – 0.71 µg/m³, NO₂ – 2.64 µg/m³, SO₂ – 2.07 µg/m³, CO – 0.007 mg/m³, TVOC – 0.01 mg/m³.
- Under CER, a total of INR 72.68 Lakhs will be spent in and around Thervoykandigai village and Gumidipoondi towards improvement of healthcare (Anganwadis and PHCs), sanitation and drinking water facilities, traffic and road safety, restoration of water bodies, and development of green zones. Further support will be extended to heritage structures and local governmentschools.
- The project will generate direct employment for 709 persons (up from 424) and indirect employment for about 100 persons in support and service sectors. Around 25 jobs will be created during the construction phase.
- The expansion will strengthen the domestic wind energy component supply chain, reduce import dependency, and support India's Make in India initiative, thereby contributing to foreign exchange savings and promoting sustainable manufacturing aligned with national renewable energy goals.

11.8. Environmental management Plan

An effective environmental management system has been developed by M/s BAETTR India

Pvt. Ltd. to ensure sustainable implementation of the proposed expansion project. The EMP includes mitigation, monitoring, and management strategies for all key environmental components—air, water, noise, soil, and solid waste—across both construction and operation phases.

Work zone monitoring will be conducted by the HSE department every month, focusing on gaseous pollutants and dust levels in the workplace. Sampling locations will be fixed, and monitoring will be carried out by NABL-accredited third-party laboratories. All records will be maintained in prescribed formats as per Factories Act and Environmental Rules.

The EMP will be executed and updated by a dedicated Environment Management Cell (EMC), with defined roles and responsibilities for top management, contractors, and EHS teams. Internal audits, documentation, and reporting mechanisms are in place to ensure compliance with EC, CTE, and CTO conditions. Regular training, inspections, and stakeholder engagement are integral parts of the plan.

has been allocated towards environmental protection measures, including air and water pollution control, greenbelt development, and environmental monitoring.

The company has also committed INR 72.68 Lakhs under CER for social and ecological initiatives in surrounding villages.

11.9. Conclusion

A comprehensive assessment of the potential environmental impacts associated with the proposed project expansion has been carried out for both the construction and operational phases. The evaluation was conducted using standard models, methods, and techniques to ensure accuracy and reliability. Based on the findings, a well-structured Environmental Management Plan (EMP) has been formulated to mitigate, monitor, and manage these impacts effectively. The EMP includes necessary control measures, dedicated budgetary provisions for both capital and recurring expenses, and the deployment of qualified and skilled personnel for implementation.

The proposed expansion will not significantly alter the existing land use of the area. With the execution of the planned mitigation strategies and environmental safeguards, the project is expected to operate within acceptable environmental standards. Thus, it is concluded that the proposed expansion is environmentally sustainable and will not result in any significant adverse impact on the environment.

12.DISCLOSURE OF CONSULTANTS ENGAGED

About Environmental Consultant

Perfact Enviro Solutions Pvt. Ltd, established by experienced environmental and related experts, provides specialized services in the field of Environment and Pollution Control for all types of Industrial, Construction, Nuclear Sciences, Biodiversity Mining, Aerial Ropeway and other related fields. Our transparent and professional approach, commitment to excellent quality and service, and timely deliveries have contributed to create a name in the field of environment. We have a core group of highly qualified experts from various fields like Environment, Forestry, Chemistry, Civil Engineering, Geology, Social Sciences, Electronics and Telecommunication with rich and diversified experience in the field of environment and pollution control. Perfact Enviro Solutions Pvt. Ltd. management, experience, excellence, professionalism and ultimate satisfaction has helped in achieving the heights of success in their specialized field of environment.

ACCREDITATIONS OBTAINED

- ISO-9001:2015 Certification
- ISO-14001:2015 Certification
- A-Category QCI – NABET Scheme for Accreditation of EIA Consultant Organizations

Table 0.1 List of FAEs Involved (Category A)

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
1.	EIA Coordinator-3(a), Cat A	Mr. Partho Mukherjee	I had visited the site along with the FAEs to understand the project site and the study area. Coordinated with the experts and prepared the impact assessment methodology. Identification and Prediction of the impact assessment, Formulation of the Environment Management Plan, Technical Review. Period of Involvement: January 2025 to August 2025
2	AP	Dr. Nipun Bhargava	I had visited the site to assess the site conditions in the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures Period of Involvement: January 2025 to August 2025

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
3	AQ	Dr. Nipun Bhargava	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: January 2025 to August 2025
4	RH	Dr. Nipun Bhargava	I had visited the site to assess the site conditions in the surrounding area and identified hazards. After assessing the risk and hazard, I prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
5	WP	Mr. Muthukumaran Ganpathi Narayan	I had visited the site to assess the water sources and its water quality in the study area. After studying the Water pollution sources have prepared Sampling plan & collected samples ; based on the results from the lab and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
6	SE	Dr. Rahul Deshmukh	I had visited the site to collect the baseline status of socio-economic conditions and studied Villages in study areas using Topographical maps and extracted Secondary data from Census of India. Then was involved in preparing a socio economic study report using the primary survey and secondary data which includes impact and mitigation measures. Period of Involvement: January 2025 to August 2025
7	NV	Mr. Muthukumaran Ganpathi Narayan	I had visited the site to assess the site conditions in the surrounding area. After assessing the Noise pollution sources have prepared the Impact Mitigation measures.

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
			Period of Involvement: January 2025 to August 2025
8	SHW	Mr. Praveen Bhargava	I had visited the site to assess the Solid waste sources and status in the study area. After studying the sources have prepared the Impact report and suggested Mitigation measures and development of EMP. Period of Involvement: January 2025 to August 2025
9	HG	Mr. Santosh Pant	The physical observation of the study area including Ground water sources and its water quality was made. After studying the Water pollution sources, the Impact report was prepared and Mitigation measures were suggested. Period of Involvement: January 2025 to August 2025
10	GEO	Mr. Santosh Pant	I had visited the site to assess the geology of the study area. After studying I have prepared the Impact report and suggested mitigation measures Period of Involvement: January 2025 to August 2025
11	SC	Mrs. Rachna Dogra	I had visited the site to assess the site conditions in the surrounding area. After assessing the type of soil and need of Soil Conservation, Prepared the Impact Mitigation measures accordingly. Period of Involvement: January 2025 to August 2025
12	LU	Mr. Rajneesh Maurya	I was involved in preparing a Land Use map using Satellite Imagery, Google maps after primary survey. Period of Involvement: January 2025 to August 2025
13	EB	Mrs. Tulika Rawat	I had visited the site to assess the various forest areas, Ecological and Biodiversity sources in the study area. After studying the various floral and faunal species, assisted FAE in preparing the Impact

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
			report and suggested Mitigation measures Period of Involvement: January 2025 to August 2025

List of FAEs Involved (Category B)

Table 0.2 List of FAEs Involved (Category B)

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
1	EIA Coordinator-8(a) , Cat B	Mr. Muthukumaran Ganapathi Narayanan	I had visited the site along with the FAEs to understand the project site and the study area. Coordinated with the experts and prepared the impact assessment methodology. Identification and Prediction of the impact assessment, Formulation of the Environment Management Plan, Technical Review. Period of Involvement: January 2025 to August 2025
2	AP	Mr. Muthukumaran Ganapathi Narayan	I had visited the site to assess the site conditions in the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
3	AQ	Mrs. Shweta Rajput	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: January 2025 to August 2025
4	WP	Mrs. Shweta Rajput	I had visited the site to assess the water sources and its water quality in the study area. After

S. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
			studying the Water pollution sources have prepared Sampling plan & collected samples ; based on the results from the lab and the site specific details along with Project Specific Details obtained, I have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
5	RH	Mr. Muthukumaran Ganpathi Narayan	I had visited the site to assess the site conditions in the surrounding area and identified hazards. After assessing the risk and hazard, I prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
6	NV	Mr. Partho Sarathi Mukherjee	I had visited the site to assess the site conditions in the surrounding area. After assessing the Noise pollution sources have prepared the Impact Mitigation measures. Period of Involvement: January 2025 to August 2025
7	GEO	Mrs. Saloni Sharma	I had visited the site to assess the physical observation of the study area. After studying the site, an Impact & mitigation report is prepared. Period of Involvement: January 2025 to August 2025

List of FAA Involved

Table 0.3 List of FAA Involved

Sr. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
1.	AP	Mrs. Tanya Thakur	I had visited the site to assess the site conditions in

Sr. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
			the surrounding area. After assessing the Air pollution sources. Made Sampling plan & conducted monitoring; based on the results and the site specific details along with Project Specific Details obtained , I have prepared the Impact Mitigation measures. Period of Involvement: June 2025 to August 2025
2.	AQ	Mrs. Tanya Thakur	I had visited the site for the assessment of the sources and the emissions. After studying, I calculated the model input data related to the proposed emissions and micrometeorology interpretation of modeling results and development of EMP. Period of Involvement: June 2025 to August 2025
3.	SHW	Ms. Navneet Kaur	I had visited the site to assess the Solid waste sources and status in the study area. After studying the sources have prepared the Impact report and suggested Mitigation measures and development of EMP. Period of Involvement: June 2025 to August 2025

List of Team Members Involved

Table 0.4 List of Team member Involved

Sr. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
1.	AP	Mrs. Sadaf Akhtar	I had visited the site to assess the site conditions in the surrounding area. After studying the various AP sources, assisted FAE in preparing the impact report and suggested mitigation measures. Period of Involvement: June 2025 to August 2025
2.	WP	Mrs. Sadaf Akhtar	I had visited the site to assess the water sources and its water quality in the study area. After studying the various WP sources, assisted FAE in preparing the impact report and suggested mitigation

Sr. No.	Functional Areas	Name of Expert(s)	Involvement (Period & Task)
			measures. Period of Involvement: June 2025 to August 2025
3.	LU	Mr. Deepak Kumar	I was involved in preparing a Land Use map using Satellite Imagery, Google maps after primary survey. Period of Involvement: June 2025 to August 2025
4.	EB	Mrs. Disha Patel	I had visited the site to assess the various forest areas, Ecological and Biodiversity sources in the study area. After studying the various floral and faunal species, assisted FAE in preparing the Impact report and suggested Mitigation measures Period of Involvement: January 2025 to August 2025
5.	HG	Mr. Deepak Kumar	I have visited the site and assessed the hydrology of the area. After studying the hydrology and pollution sources the impact and mitigation have been identified. Period of Involvement: June 2025 to August 2025