DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR THE PROPOSED EXPANSION OF MS INGOTS

M/s. RAN INDIA STEELS (P) LTD., UNIT - II

At

Nallur Village

Paramathi Velur Taluk

Namakkal District, Tamil Nadu

Prepared By

Enviro Care India Private Limited

43, 2nd Street Harvey Nagar,

Madurai – 625 016.

(QCI NABET – Certificate No: NABET/EIA/2124/RA 0249)

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TERMS OF REFERENCE

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

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY – TAMIL NADU
3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet,
Chennai-15.
Phone No. 044-24359973
Fax No. 044-24359975

TERMS OF REFERENCES (ToR)

Lr No.SEIAA-TN/F.No.9175/SEAC/3(a)/ToR- 1183/2022 dated: 17.06.2022

To

The Authorised Signatory
M/s. Ran India Steels(P) Ltd Unit - II
Ayyappa Tower
1st Floor,C.H.B Colony ,Velur Road
Tiruchengode - 637 211

Sir/Madam,

Sub: SEIAA-TN – Terms of Reference for the proposed expansion of existing facility for production of MS Ingots from 3000T/M to 4300T/M by M/s. Ran India Steels (P) Ltd, Unit-II at Survey Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2 of Nallur Village, Paramathi Velur Taluk, Namakkal District – under Category "B1" and Schedule Sl. No. 3(a) – " Metallurgical Industries (Ferrous & Non - Ferrous)" of EIA Notification 2006. – ToR with public hearing issued – Preparation of EIA Report – Regarding.

Ref:
1. Online Application No. SIA/TN/IND/74895/2022, dated: 09.04.2022
2. Your application for Terms of Reference dated: 18.04.2022
3. Minutes of the 276th SEAC meeting held on 21.05.2022.
4. Minutes of the 521st meeting of SEIAA held on 17.06.2022.

The proponent M/s. Ran India Steels(P) Ltd Unit - II has submitted application seeking Terms of Reference with public hearing under Category "B1" and Schedule Sl. No. 3(a) – " Metallurgical Industries (Ferrous & Non - Ferrous)", of EIA Notification 2006 for the proposed expansion of

17/6/2022
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existing facility for production of MS Ingots from 3000T/M to 4300T/M by M/s. Ran India Steels (P) Ltd, Unit-II at Survey Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2 of Nallur Village, Paramathi Velur Taluk, Namakkal District.

Remarks by SEAC:

Proposed expansion MS Ingot unit (from - 3000 T/M to 4300 T/M) at SF.No.254/1A1, 254/2A1A, 255/4B 255/5A, 255/5B, 255/6A1 & 255/6A2 Nallur Village, Paramathi Velur Taluk, Namakkal District Tamil Nadu by M/S. RAN INDIA STEELS (P) Ltd., Unit - II - For Terms of Reference (SIA/TN/IND/74895/2022, dated 09.04.2022)

The proposal was placed in this 276th SEAC Meeting held on 21.5.2022. The details of the project furnished by the proponent are available in the website (parivesh.nic.in).

The project proponent gave a detailed presentation. SEAC noted the following:

1. The Proponent, M/S. Ran India Steels (P) Ltd., Unit - II has applied for Terms of Reference for the proposed expansion MS Ingot unit (from MS Ingot - 3000 T/M to 4300 T/M) at SF.No. 254/1A1, 254/2A1A, 255/4B 255/5A, 255/5B, 255/6A1 & 255/6A2 Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu.
2. The project/activity is covered under Schedule B1 Category 3(a) "Metallurgical industries (ferrous & nonferrous)" of the Schedule to the EIA Notification, 2006.
3. The proposal consists of expansion of MS Ingots from Existing – MS Ingots – 3000 T/M to MS Ingots – 1300 T/M. After Expansion – MS Ingots – 4300 T/M. Raw maerila after expansion - Sponge Iron – 800 T/M, Ferro Alloys – 30 T/M, MS Scrap – 4070 T/M

Based on the presentation made by the proponent and the documents furnished the SEAC decided **to recommend the proposal for the grant of Terms of References (ToR) with Public Hearing** subject to the following specific conditions in addition to the points mentioned in the standard terms of reference for EIA study for Metallurgical Industries (Ferrous & Non-Ferrous) and details issued by the MoEF& CC to be included in EIA/EMP report:

1. The proponent shall furnish the production detail submitted to the Commercial Tax department for the last 5 years.
2. The proponent shall submit the copy of the consent to operate and the latest renewal consent order issued by the TNPCB.
3. The project proponent shall furnish the detailed comparison statement of existing and expansion project details in the EIA report.

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4. The proponent shall submit the compliance report from TNPCB for the conditions imposed in the consent order issued by the TNPCB and Environmental Clearance.
5. The proponent shall implement the cleaner technologies for the expansion activity and the detail should be included in the EIA report.
6. The Environmental pollution control measures proposed to deal with increased Air pollution, effluent generation and slag generation should be detailed.
7. The project proponent has to strengthen the air pollution control measures of the existing system and furnish an adequacy report on the revamped system from a reputed institution like Anna University or IIT, Madras along with the EIA report. The revamping of the existing air pollution control measures should include the interlinking of the position of the hood system and furnace to ensure that the emission from the furnace shall be treated and routed through wet scrubber and stack.
8. The proponent shall obtain prior permission from the Central Ground Water Authority for withdrawal of groundwater.
9. Material balance and Water balance shall be furnished in accordance with MoEF&CC guidelines.
10. A detailed report on Solid waste management, Hazardous waste shall be furnished.
11. Report on AAQ survey and proposed Air pollution prevention and control measures shall be furnished in the EIA report.
12. The project proponent shall do the Stoichiometric analysis of all the involved reactions to assess the possible emission of air pollutants in addition to the criteria pollutants, from the proposed project.
13. Adequacy report for ETP &STP for the proposed project obtained from any reputed Government institution such as IIT, Anna University, NIT shall be furnished.
14. Land use classification shall be obtained from the DTCP for the Survey Numbers of this project. Further, the project proponent shall submit the planning permission obtained from the DTCP, if any.
15. The proponent shall conduct the EIA study and submit the EIA report for the entire campus along with layout and necessary documents such as "A" register and village map.
16. The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non- forest purpose

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involved in the project.

17. The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.
18. The project proponent shall explore the possibilities of treating and utilizing the trade effluent and sewage within the premises to achieve Zero liquid discharge.
19. The layout plan shall be furnished for the greenbelt area earmarked with GPS coordinates by the project proponent on the periphery of the site and the same shall be submitted for CMDA/DTCP approval. The green belt width should be at least 3m wide all along the boundaries of the project site. The green belt area should be not less than 15 % of the total land area of the project.
20. As the plant operation involves the sensitive processing, the medical officer and the supporting staff involved in the health centre activities shall be trained in occupational health surveillance (OHS) aspects through the outsourced training from the experts available in the field of OHS for ensuring the health standard of persons employed.
21. As per the MoEF&CC Office Memorandum F.No. 22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall furnish the detailed EMP.

Remarks by SEIAA:

The proposal was placed in the 521th Authority meeting held on 17.06.2022. After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference (ToR) along with Public Hearing for the preparation of Environment Impact Assessment Study and Environment Management Plan subject to the conditions as recommended by SEAC & normal condition in addition to the following conditions:

1. Proposal for the APC measures provided for the furnace.
2. Proposal for the online monitoring system for APC measure provided by the proponent.
3. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.
4. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.

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5. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
6. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.
7. The Environmental Impact Assessment should study impact on standing trees and the trees should be numbered.
8. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and hydrological cycles.
9. The Environmental Impact Assessment should study impact on climate change, GHG emissions, temperature rise, pollution and above soil & below soil carbon stock.
10. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways.
11. The project proponent shall furnish the details of trees in the project site with all trees numbered and protected.
12. The project proponent shall furnish a detailed study on the impact of proposed activity with mitigation measures on the nearby environmental fragile areas.
13. The project proponent shall furnish the detailed study on health with regard to respiratory distress due to allergens on workers and nearby villagers.
14. The project proponent shall furnish the impact on dust pollution on the nearby habitation and livelihoods.
15. The project proponent shall furnish the Risk assessment plan, EMP and Disaster management plan which should be prepared after thorough study.
16. GPS co-ordinates for all along the boundaries of the project site.
17. The GPS co-ordinates for the boundaries at the green belt of 33% of proposed project site shall be furnished separately.
18. Air quality modelling study shall be conducted for the CPCB primary air pollutants specified by considering the impact on the proposed plant to the nearby villages.

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

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

A. STANDARD TERMS OF REFERENCE (TOR)

1) Executive Summary

2) Introduction
   - i. Details of the EIA Consultant including NABET accreditation
   - ii. Information about the project proponent
   - iii. Importance and benefits of the project

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

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be attached with the EIA-EMP report.

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

4) Site Details

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

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

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

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

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

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

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

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

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

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

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood

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Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)

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

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

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

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

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

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

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

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

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

6) Environmental Status

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

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

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98%

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values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.

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

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

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

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

viii. Soil Characteristic as per CPCB guidelines.

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

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

xi. Socio-economic status of the study area.

7) Impact and Environment Management Plan

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

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

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

iv. A note on treatment of wastewater from different plant operations, extent recycled and

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reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

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

vi. Measures for fugitive emission control

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

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

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

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

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

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

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

8) Occupational health

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

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision

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testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

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

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

9) Corporate Environment Policy

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

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

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

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

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

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12) Any litigation pending against the project and/or any direction/order passed by any Court of

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

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

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

1) Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs & outputs (material and energy balance).
2) Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.
3) Details on installation/activation of opacity meters with recording with proper calibration system
4) Details on toxic metals including mercury, arsenic and fluoride emissions
5) Details on stack height requirement for integrated steel
6) Details on ash disposal and management -Non-ferrous metal
7) Complete process flow diagram describing production of lead/zinc/copper/ aluminium, etc.
8) Raw materials substitution or elimination
9) Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation
10) Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium
11) Details on solvent recycling
12) Details on precious metals recovery
13) Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.
14) Details on toxic metal content in the waste material and its composition and end use (particularly of slag).
15) Trace metals Mercury, arsenic and fluoride emissions in the raw material.
16) Trace metals in waste material especially slag.
17) Plan for trace metal recovery
18) Trace metals in water

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C. ADDITIONAL TOR FOR INTEGRATED STEEL PLANT

1) Iron ore/coal linkage documents along with the status of environmental clearance of iron ore and coal mines.
2) Quantum of production of coal and iron ore from coal & iron ore mines and the project they cater to. Mode of transportation to the plant and its impact
3) For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
4) Recent land-use map based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.
5) Respirable Suspended particulate matter (RSPM) present in the ambient air must be analysed for source analysis - natural dust/RSPM generated from plant operations (trace elements). The RSPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM and incorporating of RSPM data.
6) All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.
7) Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.
8) Plan for slag utilization
9) Plan for utilization of energy in off gases (coke oven, blast furnace)
10) System of coke quenching adopted with justification.

In addition to the above, the following shall be furnished:-

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1) Project name and location (Village, District, State, Industrial Estate (if applicable).
2) Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)

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4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
5) Measures for mitigating the impact on the environment and mode of discharge or disposal.
6) Capital cost of the project, estimated time of completion.
7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt/ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
10) Likely impact of the project on air, water, land, flora-fauna and nearby population
11) Emergency preparedness plan in case of natural or in plant emergencies
12) Issues raised during public hearing (if applicable) and response given
13) CSR plan with proposed expenditure.
14) Occupational Health Measures
15) Post project monitoring plan

The following general points shall be noted:

All documents shall be properly indexed, page numbered. Period/date of data collection shall be clearly indicated.

1. Authenticated English translation of all material provided in Regional languages.
2. The letter/application for EC shall quote the SEIAA. File No. and also attach a copy of the letter.
3. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report.
4. Certificate of Accreditation issued by the QCI to the environmental consultant shall be included.
5. The prescribed TORs would be valid for a period of Three years for submission of the EIA/EMP reports, as per the O.M. No. J- 11013/41/2006-IA.II(I) dated 22.08.2014. As per

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the Ministry of Environment, Forest and Climate Change Impact Assessment Division, Government of India, Circular Memo No.J-11013/41/2006-Ia-II (I) (Part) dated 7th November, 2015.

6. After preparing the draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006. The final EIA / EMP shall be submitted to the SEIAA – Tamil Nadu for obtaining Environmental Clearance.
7. The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
8. The TORs prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August 2017.

The receipt of this letter may be acknowledged.

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Copy to:

1. The Additional Chief Secretary to Government, Environment & Forests Dept, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
3. The Member Secretary, TNPCBoard, 76, Mount Salai, Guindy, Chennai - 600 032.
4. The APCCF (C), Regional Office, Ministry of Environment & Forest (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
5. Monitoring Cell, I A Division, Ministry of Environment & Forests, Paryavaran Bhavan, CGO Complex, New Delhi - 110 003.
5. The District Collector, Namakkal District.
6. Stock File.

Terms of Reference - Compliance

RAN INDIA STEELS (P) Ltd., Unit – II, Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu. SEIAA Approved Terms of Reference (ToR) for EIA Study and Compliance (Letter No. SEIAA-TN/F.No.9175/SEAC/3(a)/ToR-1183/2022 dated 17.06.2022)

S.No	ToR Point	Reply
1	The proponent shall furnish the production detail submitted to the Commercial Tax department for the last 5 years.	Given in Annexure
2	The proponent shall submit the copy of the consent to operate and the latest renewal consent order issued by the TNPCB.	Given in Annexure VIII
3	The project proponent shall furnish the detailed comparison statement of existing and expansion project details in the EIA report.	Given in Chapter 2 (Section 2.7)
4	The proponent shall submit the compliance report from TNPCB for the conditions imposed in the consent order issued by the TNPCB and Environmental Clearance.	Given in Annexure IX
5	The proponent shall implement the cleaner technologies for the expansion activity and the detail should be included in the EIA report.	Given in Chapter 10 (Section 10.6.4) Chapter 7 (Section 7.10)
6	The Environmental pollution control measures proposed to deal with increased Air pollution, effluent generation and slag generation should be detailed.	Given in Chapter 2 (Section 2.17)
7	The project proponent has to strengthen the air pollution control measures of the existing system and furnish an adequacy report on the revamped system from a reputed institution like Anna University or IT, Madras along with the EIA report. The revamping of the existing air pollution control measures should include the interlinking of the position of the hood system and furnace to ensure that the emission from the furnace shall be treated and routed through wet scrubber and stack.	Given in Chapter 10 (Section 10.6.1)
8	The proponent shall obtain prior permission from the Central Ground Water Authority for withdrawal of groundwater.	Given in Annexure III
9	Material balance and Water balance shall be furnished in accordance with MoEF&CC guidelines.	Given in Chapter 2 (Section 2.13 & 2.14)
10	A detailed report on Solid waste management, Hazardous waste shall be furnished.	Given in Chapter 2 (Section 2.15 & 2.16)

11	Report on AAQ survey and proposed Air pollution prevention and control measures shall be furnished in the EIA report.	Given in Chapter 3 (Section 3.8)
12	The project proponent shall do the Stoichiometric analysis of all the involved reactions to assess the possible emission of air pollutants in addition to the criteria pollutants, from the proposed project.	Given in Chapter 4 (Section 4.3.5)
13	Adequacy report for ETP & STP for the proposed project obtained from any reputed Government institution such as IIT, Anna University, NIT shall be furnished.	Given in Annexure XIII
14	Land use classification shall be obtained from the DTCP for the Survey Numbers of this project. Further, the project proponent shall submit the planning permission obtained from the DTCP, if any.	Given in Annexure II
15	The proponent shall conduct the EIA study and submit the EIA report for the entire campus along with layout and necessary documents such as "A" register and village map.	Given in Chapter 2 (Section 2.6)
16	The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non- forest purpose involved in the project	Not Applicable
17	The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.	Not Applicable
18	The project proponent shall explore the possibilities of treating and utilizing the trade effluent and sewage within the premises to achieve Zero liquid discharge.	Trade effluent is sent to Solar Evaporation Pans. Chapter 2 (Table 2.10)
19	The layout plan shall be furnished for the greenbelt area earmarked with GPS coordinates by the project proponent on the periphery of the site and the same shall be submitted for CMDA/DTCP approval. The green belt width should be at least 3m wide all along the boundaries of the project site. The green belt area should be not less than 15 % of the total land area of the project.	Given in Chapter 2 (Fig. 2.9 & 2.5)
20	As the plant operation involves the sensitive processing, the medical officer and the supporting staff involved in the health centre activities shall be (rained in occupational health surveillance (OHS) aspects through the outsourced training from the experts available in the field of OHS for ensuring the health	Available in our Factory

	standard of persons employed.	
21	As per the MoEF&CC Office Memorandum F.No. 22-65/2017-IA.JII dated: 30.09.2020 and 20.10.2020 the proponent shall furnish the detailed EMP.	Given in Chapter 10
	Remarks by SEIAA	
1	Proposal for the APC measures provided for the furnace.	Given in Chapter 4 (Table 4.1)
2	Proposal for the online monitoring system for APC measure provided by the proponent.	Given in Annexure V
3	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	The points will be discussed in Public Hearing and will be added in EIA Report.
4	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	There are no carbon emissions from this unit.
5	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Given in Chapter 3 (Section 3.12.3)
6	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impacts have been studied
7	The Environmental Impact Assessment should study impact on standing trees and the trees should be numbered.	Given in Chapter 10 (Section 10.6.4)
8	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and hydrological cycles.	Given in Chapter 3 (Section 3.4.8)
9	The Environmental Impact Assessment should study impact on climate change, GHG emissions, temperature rise, pollution and above soil & below soil carbon stock.	Given in Chapter 4 (Section 4.2)
10	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways.	Not Applicable

11	The project proponent shall furnish the details of trees in the project site with all trees numbered and protected.	Given in Chapter 10 (Section 10.6.4)
12	The project proponent shall furnish a detailed study on the impact of proposed activity with mitigation measures on the nearby environmental fragile areas.	Given in Chapter 4 (Section 4.3)
13	The project proponent shall furnish the detailed study on health with regard to respiratory distress due to allergens on workers and nearby villagers.	Given in Chapter 7 (Section 7.7.5.4 & 7.8)
14	The project proponent shall furnish the impact on dust pollution on the nearby habitation and livelihoods.	Given in Chapter 7 (Section 7.7.5.4)
15	The project proponent shall furnish the Risk assessment plan, EMP and Disaster management plan which should be prepared after thorough study.	Given in Chapter 7 (Section 7.6 & 7.9)
16	GPS co-ordinates for all along the boundaries of the project site.	Given in Chapter 2 (Fig. 2.5)
17	The GPS co-ordinates for the boundaries at the green belt of 33% of proposed project site shall be furnished separately.	Given in Chapter 2 (Fig. 2.5)
18	Air quality modelling study shall be conducted for the CPCB primary air pollutants specified by considering the impact on the proposed plant to the nearby villages.	Given in Chapter 3 & 4 (Section 3.8 & 4.3.5)
	A. Standard TOR for Conducting EIA Study	
1	Executive Summary	
2	Introduction	
	I. Details of EIA consultant including NABET accreditation	Given in Chapter 12
	II. Information about project proponent	Chapter 1 (Section 1.2)
	III. Importance and benefits of the project	Given in Chapter 8
3	Project Description	
	I. Cost of Project and time of completion	Chapter 2 (Section 2.1)
	II. Products with capacities for the proposed project	Chapter 2 (Section 2.8)
	III. If expansion project, details of existing products with capacities and whether adequate land is available is available for expansion, reference of Earlier EC if any.	Chapter 2 (Table 2.2)
	IV. List of raw materials required and their source along with mode of transportation	Chapter 2 (Section 2.9)

	V. Other chemical and materials required with quantities and storage capacities.	Chapter 2 (Table 2.4)
	VI. Details of Emission, effluents, hazardous waste generation and their management.	Chapter 2 (Section 2.16)
	VII. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Chapter 2 (Section 2.14)
	VIII. Process description along with major equipments and machineries, process flow sheet, (quantities) from raw material to products to be provided	Chapter 2 (Section 2.10.2 & Table 2.13)
	IX. Hazard identification and details of proposed safety systems.	Chapter 7 (Section 7.1)
	X. Expansion/modernization proposals	
	a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30" 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.	Environmental Clearance is not obtained for the existing project.
	b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	Given in Annexure XI and Annexure VIII
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.	Chapter 2 (Fig. 2.1)
	II. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000	Chapter 2 (Fig. 2.3)

	scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)	
	III. Details w.r.t. option analysis for selection of site	Chapter 2 (Section 2.6)
	IV. Co-ordinates (lat-long) of all four corners of the site.	Chapter 2 (Fig. 2.5)
	V. Google map-Earth downloaded of the project site.	Chapter 2 (Fig. 2.2 & 2.4)
	VI. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	Chapter 2 (Fig. 2.9)
	VII. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	Given in Annexure VII
	VIII. Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)	Chapter 2 (Section 2.7)
	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.	Chapter 3 (Section 3.13.2 (g))
	X. Geological features and Geo-hydrological status of the study area shall be included.	Chapter 3 (Section 3.4.7)
	XI. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided.(mega green field projects)	Chapter 3 (Section 3.4.3)
	XII. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	The proposed project does not require any new lands.
	XIII. R&R details in respect of land in line with state Government policy	Not Applicable
5	Forest & Wildlife Related Issues (if applicable)	
	I. Permission and approval for the use of forest land (forestry clearance), if any, and	Not Applicable

	recommendations of the State Forest Department. (if applicable)	
	II. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha)	Not Applicable
	III. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not Applicable
	IV. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-a-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon	Not Applicable
	V. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area.	Not Applicable
	VI. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife	Not Applicable
6	Environmental Status	
	I. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Chapter 3 (Section 3.3)
	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 CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	Chapter 3 (Table 3.14)
	III. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Chapter 3 (Table 3.14)
	IV. Surface water quality of nearby River (100m	Chapter 3 (Section 3.10)

	upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	
	V. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.	No, the site does not fall near to polluted stretch of river
	VI. Ground water monitoring at minimum at 8 locations shall be included.	Chapter 3 (Fig. 3.19)
	VII. Noise levels monitoring at 8 locations within the study area.	Chapter 3 (Fig. 3.18)
	VIII. Soil Characteristic as per CPCB guidelines.	Chapter 3 (Table 3.19)
	IX. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Chapter 4 (Section 4.5)
	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.	Chapter 3 (Section 3.12.3)
	XI. Socio-economic status of the study area.	Chapter 3 (Section 3.13)
7	Impact and Environment Management Plan	
	I. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided, The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any	Chapter 4 (Section 4.3.5.1)
	II. Water Quality modelling - in case of discharge in water body	No such activities are done.
	III. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall	Chapter 4 (Section 4.3.5.1 (C))

	be examined.	
	IV. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.	Chapter 10 (Section 10.6.3)
	V. Details of stack emission and action plan for control of emissions to meet standards.	Chapter 2 (Section 2.17)
	VI. Measures for fugitive emission control	Chapter 4 (Section 4.3.5.2)
	VII. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Chapter 10 (Section 10.6.5)
	VIII. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Since, coal is not used as a fuel, fly ash is not generated.
	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.	Chapter 10 (Section 10.6.4)
	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.	Chapter 7 (Section 7.10)
	XI. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Chapter 10 (Table 10.7)
	XII. Action plan for post-project environmental monitoring shall be submitted.	Chapter 10 (Section 10.6.8)
	XIII. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Chapter 7 (Section 7.9)

8	Occupational Health	
	I. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers	Chapter 7 (Section 7.8)
	II. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	Chapter 7 (Section 7.8)
	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,	Chapter 7 (Section 7.8)
	IV. Annual report of health status of workers with special reference to Occupational Health and Safety.	Chapter 7 (Section 7.8)
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.	Chapter 6 (Section 6.1)
	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.	Chapter 6 (Section 6.6)
	III. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	Chapter 6 (Section 6.5)
	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 EJA report	Chapter 6 (Section 6.4)
10	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided	Chapter 6 (Table 6.3)

	to the labour force during construction as well as. to the casual workers including truck drivers during operation phase.	
11	Enterprise Social Commitment (ESC)	
	I. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	The points will be discussed in Public Hearing and will be added in EIA Report.
12	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.	Not Applicable
13	A tabular chart with index for point wise compliance of above TOR.	Given in EIA Report
	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).	Chapter 2 (Section 2.10)
2	Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.	Chapter 2 (Section 2.18)
3	Details on installation/activation of opacity meters with recording with proper calibration system	Not Applicable
4	Details on toxic metals including mercury, arsenic and fluoride emissions	Chapter 4 (Table 2.12)
5	Details on stack height requirement for integrated steel	Chapter 4 (Table 4.1)
6	Details on ash disposal and management -Non-ferrous metal	Chapter 2 (Section 2.11.1)
7	Complete process flow diagram describing production of lead/zinc/copper/ aluminium, etc.	Chapter 2 (Section 2.10)
8	Raw materials substitution or elimination	Chapter 2 (Section 2.9)
9	Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation	Chapter 2 (Section 2.10.2)
10	Details on Holding and de-gassing of molten	Chapter 2 (Section 2.10.2)

	metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium	
11	Details on solvent recycling	Not Applicable
12	Details on precious metals recovery	Not Applicable
13	Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.	Not Applicable
14	Details on toxic metal content in the waste material and its composition and end use (particularly of slag).	Not Applicable
15	Trace metals Mercury, arsenic and fluoride emissions in the raw material.	Not Applicable
16	Trace metals in waste material especially slag.	Not Applicable
17	Plan for trace metal recovery	Not Applicable
18	Trace metals in water	Not Applicable
	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.	Not Applicable
2	Quantum of production of coal and iron ore from coal & iron ore mines and the project they cater to. Mode of transportation to the plant and its impact	Not Applicable
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.	Chapter 2 (Fig.3.12.b)
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.	Chapter 2 (Fig. 2.6)
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), ic. Benzene soluble	Chapter 3 (Table 3.14.a & 3.14.b)

	fraction, where applicable. Chemical characterization of RSPM and incorporating of RSPM data.	
6	All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.	The stock piles have been provided
7	Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines,	Given in Annexure XII
8	Plan for slag utilization	Given in Annexure IV
9	Plan for utilization of energy in off gases (coke oven, blast furnace)	Given in Annexure IV
10	System of coke quenching adopted with justification.	Not Applicable
	Executive Summary of the EIA/EMP Report	
1	Project name and location (Village, District, State, Industrial Estate (if applicable).	The details are given in Executive Summary
2	Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.	The details are given in Executive Summary
3	Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)	The details are given in Executive Summary
4	Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.	The details are given in Executive Summary
5	Measures for mitigating the impact on the environment and mode of discharge or disposal.	The details are given in Executive Summary
6	Capital cost of the project, estimated time of completion.	The details are given in Executive Summary
7	Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt/ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)	The details are given in Executive Summary
8	Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population	The details are given in Executive Summary
9	Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	The details are given in Executive Summary

10	Likely impact of the project on air, water, land, flora-fauna and nearby population	The details are given in Executive Summary
11	Emergency preparedness plan in case of natural or in plant emergencies	The details are given in Executive Summary
12	Issues raised during public hearing (if applicable) and response given	The details are given in Executive Summary
13	CSR plan with proposed expenditure,	The details are given in Executive Summary
14	Occupational Health Measures	The details are given in Executive Summary
15	Post project monitoring plan	The details are given in Executive Summary

CHAPTER - 1 INTRODUCTION

1.0 INTRODUCTION

M/s. Ran India Steels (P) Ltd., Unit - II is an existing M.S. Ingots manufacturing unit to be located at S.F. Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District, which is located 30 km away from Namakkal. This unit is propose to expands their production capacity from 3000 T/M of M.S. Ingot to 4300 T/M to fulfill the requirements in Tamil Nadu and other parts of India. The gross assets value of the expansion unit is about Rs. 0.38 crores (Expansion only).

Ran India Steels (P) LTD, made a zealous entry as a manufacturer of cold twisted deformed (CTD) bars with TOR quality standards in the year 1995 and it was incorporated by the Managing Director Mr. R. Radha and Executive Director Mr. R. Nagarajan and CEO - Mr.R.R.Prasad & Mr.E.N.Dinesh Raj. RAN INDIA STEELS PVT LTD was started in 1995, In this modern age, the quality of the products is concentrated and achieved the same by using hi-class quality in raw materials, with diligent labours, and with Hi-End Technologies lined up for production. With all these chained up, the annual production and quality keeps growing. Not only attained ISO 9001 certificate for the legitimate management of the company but also have attained TOR and ISI certification for the quality products.

1.1 PURPOSE OF THE REPORT

In pursuance of Government of India policy vide Environmental (Protection) Act, 1986 new projects or expansion of any existing plant necessitates statutory prior environmental clearance in accordance with the objectives of National Environmental Policy as approved by the Union Cabinet on 18th May, 2006 and EIA Notification of MoEF dated 14.09.2006, by preparing Environmental Impact Assessment (EIA) report.

In order to assess the environmental impacts due to the proposed expansion of MS Ingots, Environmental Impact Assessment (EIA) report has been prepared. As per the latest Environmental Impact Assessment Notification dated 14th September 2006, the proposed expansion of MS Ingots (metallurgy industry – Ferrous & Non-Ferrous) falls under 'Category B1' for which Environmental Clearance (EC) from State Level Impact Assessment Agency (SEIAA) is necessary. In line with EIA Notification dated 14.09.06, a TOR meeting was held for determining Terms of Reference (TOR) on 17th June 2022 for the preparation of EIA report for the proposed expansion project. Based on TOR conditions given by SEIAA vide its letter No. SEIAA-TN/F.No.9175/SEAC/3(a)/ToR-1183/2022, this EIA has been prepared.

The objective of the EIA study is to take stock of the prevailing quality of environment, to assess the impacts of proposed industrial activity on environment including public and to plan appropriate environmental control measures to minimize adverse impacts and to maximize beneficial impacts of the proposed project. The following major objectives have been considered for the EIA study:

- Assess the existing baseline status of environment
- Assess the impacts due to the proposed expansion project
- Suggest pollution control and ameliorative measures to minimize the impacts
- Prepare an action plan for implementation of suggested ameliorative measures
- Suggest a monitoring program to assess the efficacy of the various adopted environmental control measures
- Clearances from statutory authorities

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

M/s. Ran India Steels (P) Ltd., was established in the year 1995 and is located in Southern part of India in the district of Namakkal. It was incorporated by the Managing Director Mr. R. Radha and Executive Director Mr. R. Nagarajan and CEO - Mr.R.R.Prasad & Mr.E.N.Dinesh Raj.

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 Nature of the Project

M/s. Ran India Steels (P) Ltd., Unit-II has an existing foundry at Nallur Village, Paramathi Vellur Taluk, Namakkal District. The existing unit is M.S. Ingots manufacturing unit. The proposed expansion unit will increase its capacity as 4300 TPM from 3000 TPM. The proposed production quantity of the unit is 1300 TPM of MS Ingots, with project cost of Rs.8.34 Crores (after expansion).

1.3.2 Size of the Project

M/s. Ran India Steels (P) Ltd., Unit-II has proposed to construct an expansion unit with a project cost of Rs.8.34 Crores. The proposed expansion unit will increase its capacity as 4300 TPM from 3000 TPM.

Table 1.1 Salient Features of the Project

Promoter	**Ran India Steels (P) Ltd., Unit-II**
Location	S.Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2 Village: Nallur Taluk: Paramathi Velur District : Namakkal State: Tamil Nadu.
Geographical location	Latitude : 11°14'52.45"N Longitude : 77°57'5.53"E
Mean Sea Level (MSL)	230 m

Land Use Classification	Unclassified
Plant Capacity	Existing - 3000 TPM (MS Ingots) Expansion - 1300 TPM (MS Ingots) After Expansion - 4300 TPM (MS Ingots)
Source of water	Bore well inside the premises & Rain water.
Water Requirement	Total water requirement : 17.0 KLD
Estimated Employment (Direct & Indirect)	No. of Employees: Existing – 70 nos. No changes in employees after expansion
Power Consumption	Existing - 4000 KVA Proposed - 900 KVA After Expansion – 4900 KVA
Land Requirement	Existing – 3.39 Hectares After Expansion – 3.39 Hectares
Project Cost	Existing - Rs. 7.96 crores Proposed - Rs. 0.38 crores After Expansion – 8.34 Crores

1.3.3 Location of the Project

Ran India Steels (P) Ltd., Unit-II is located at S.Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu. The site is located about 14 Km from Tiruchengode town. The nearest railway station is located at Sankari at a distance of 22 Km. The nearest airport is Trichy Airport (95 Km). The proposed site falls under Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu.

Table 1.2 Existing Environmental Setting of the Project Site

SELECTION CRITERIA	DETAILS
Geographical Location	Latitude : 11°14'52.45"N Longitude : 77°57'5.53"E

SELECTION CRITERIA	DETAILS
Climate conditions as per IMD data	Maximum Monthly mean Temp 39 ^{o}C Minimum Monthly mean Temp 17.4^{o}C Maximum total Rain Fall 270 mm Maximum mean Relative Humidity 87% Minimum mean Relative Humidity 27%
Land use classification	"Unclassified Area" by Department of Local Planning Authority, Government of Tamil Nadu.
Nearest Airport	Trichy (95 km)
Nearest Railway station	Sankari (22km)
Nearest Major City	Erode
Nearest Town	Tiruchengode
Ecologically sensitive zone (Wild Life Sanctuaries)	Nil within 10 km radius
Reserved Forests	NIL

1.4 SCOPE OF THE EIA STUDY

The EIA report has been prepared as per the Model TOR issued by State Level Expert Appraisal Committee vide Letter No. SEIAA-TN/F.No.9175/SEAC/3(a)/ToR-1183/2022 Dated:17.06.2022. The copy of terms of reference and its compliance have been enclosed in Pg.No.1.

1.4.1 Methodology

Environmental Impact Assessment (EIA) studies include identification, assessment, quantitative evaluation and prediction of possible impacts. To minimize the impact of the project on various environmental attributes, mitigation measures are suggested for implementation along with the project.

The methodology of this study can be schematized as detailed below:

- To gather information on present environmental conditions and relevant national environmental guidelines and EIA procedures.
- Scoping of impacts.
- Assessment of significant impacts.
- Description of residual impacts.
- Development of monitoring plans.
- To inform all relevant and involved authorities regarding the impact of the project on the environment and the proposed mitigation measures.

1.4.2 Regulatory Framework

A policy framework has been developed to complement the legislative provisions. The Policy Statement for Abatement of Pollution, National Conservation Strategy and Policy Statement on Environment & Development were brought out by the MoEF in 1992, to develop and promote initiatives for the protection and improvement of the environment. The EAP (Environmental Legal and regulatory framework Action Programme) was formulated in 1993 with the objective of improving environmental services and integrating environmental considerations into development programmes. The major following acts and rules have been promulgated by the government from time to time for protection and preservation of environment, which the industry proposes to follow and comply with.

There are many Acts / Rules / Notifications issued by different regulatory authorities of which, few are mentioned below.

- The Environment (Protection) Act (EPA), 1986 as amended in 1991 and the rules thereunder.
- The Water Act, 1974 and the rules thereunder.
- The Air Act, 1981 and the rules thereunder.
- The Factories Act 1948 and the rules thereunder.

- The Public Liability Insurance Act, 1991 as amended 1992 and the rules thereunder.
- Environmental Impact Assessment Notification dated 14th September 2006 and its amendments along with the rules thereunder.
- Hazardous & other wastes (Management & Trans boundary Movement) Rules, 2016.
- Solid Waste Management Rules, 2016.
- Construction and Demolition Waste Management Rules, 2016.
- Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996.
- The Manufacture, Storage and import of Hazardous chemicals (Amendment) Rules 2000.
- Noise Pollution (Regulation and Control) Rules, 2000 and its amendments.
- The Batteries (Management and Handling) Rules 2001.
- Ozone Depleting Substances (Regulation and Control) Rules 2000.
- Plastic Waste Management Rules, 2016 ⌜ E-waste (Management) Rules, 2016.
- Biomedical Waste Management Rules, 2016.
- The Petroleum Act 1934 and its amendments.
- The Petroleum Rules 2002 and its amendments.
- Gas Cylinder Rules 2016 and its amendments.
- The Explosive Act 1884 and its amendments.
- The Explosive Rule 1983 and its amendments.
- India Boiler Act 1923 and its amendments.
- The Indian Boiler Regulations 1948/1952 and its amendments.
- The Indian Electricity Rules 1956 and its amendments.
- The Standards of Weights & Measures Act 1976 and its amendments.
- The Standards of Weights & Measures (Packaged Commodities) Rules 1977 and its amendments.

- The Static & Mobile Pressure vessels (unfired) rules 1981 and its amendments.
- The Motor Vehicle Act 1988 and its amendments.
- The Central Motor Vehicle Rules 1989 and its amendments.
- Building and other construction Act and its amendments.
- Indian Electricity Act 1910 / 2003 and its amendments.
- The Chemical Weapons Conservation Act 2000 and its amendments.
- Energy Conservation Act 2001 and its amendments.

The current EIA study has been conducted to fulfill the requirement of the regulatory provisions as enacted in EPA, 1986 (as amended thereon). As per the EIA notification, 2006, the company needs to have the Environmental Clearance prior to installation & commissioning of the above proposed expansion of Metallurgical project. Metallurgical Industries (Ferrous & Non-Ferrous) at S. No. 3(a) of Schedule of EIA notification 2006 and its amendments, it is considered under Category-B1 and is apprised at Central level by Expert Appraisal Committee (EAC). There is no interlink and interdependent project for this project.

1.4.3 Environmental Clearance Process

The environmental protection is an important and essential requirement in the developmental process. It will be duly integrated at every stage in industrial and economic developments to make them sustainable over long term. In this direction, the MoEF&CC, Government of India formulated policies, enacted Environment (protection) Act in 1986 and stipulated regulatory procedures governing industrial and other major developments in the country to prevent and mitigate the potential environmental & ecological hazards due to indiscriminate exploitation of natural resources. The MoEF&CC made prior Environmental Clearance (EC) mandatory for certain developmental projects through its notification dated 14-09-2006, which includes scoping of

environmental impact assessment study through Terms of Reference (ToR) approval, in the process of prior environmental clearance for scheduled development projects.

The environmental clearance process for the projects in Category "B" (as per the Schedule in MoEF Notification 2006) will comprise of a maximum of three stages, which are briefly described below:

Stage (1) – Scoping: Scoping in the case of category "B" projects, refers to the process by which the Expert Appraisal Committee (EAC) determine detailed and comprehensive ToR addressing all relevant environmental concerns for the preparation of Environmental Impact Assessment (EIA) study report in respect of the identified site as well as proposed project for which prior environmental clearance is sought.

Stage (2) – Public Consultation: "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project are addressed as appropriate. In general the category "B" projects are required to undertake Public consultation. After carrying out EIA study, the project proponent will submit the Draft EIA report to the respective State Pollution Control Board (SPCB) for arranging public consultation.

Stage (3) – Appraisal: Detailed scrutiny of the application and other documents like Final EIA report, outcome of the public consultation including public consultation proceedings, reports of special studies as per approved ToR etc. submitted by the applicant to SEIAA, (the regulatory authority) by the EAC for grant of Environmental Clearance (EC).

1.5 ENVIRONMENTAL IMPACT ASSESSMENT

The EIA is an anticipatory tool with the objective of environmental protection and to facilitate the decision-making process by clearly evaluating the environmental consequences of the proposed modernization activity before the implementation of the project. Early identification and characterization of critical

environmental impacts allows the public and the government to form a view about the environmental acceptability of a proposed developmental project and what conditions should be imposed to prevent or mitigate risks and adverse impacts associated with the project implementation.

The EIA study for the proposed expansion project is carried out in summer season baseline environmental quality data and prediction of impacts from proposed expansion project on all components of environment. Keeping in view of the approved ToR, Draft EIA report is prepared and is submitted to SPCB for conducting Environmental Public Hearing. On obtaining the minutes of the public hearing, final EIA report is prepared incorporating the industry's response to the issues raised in public hearing and submitted to the SEIAA for its appraisal. The structure of EIA report is as per the generic structure given in Appendix-III & III A of EIA notification 2006. The report contains the following Chapters,

Chapter 1 - Introduction gives brief description of the project background & proposed modernization project; identification of project proponent, description of the nature, size and location of the project and its importance to the country. It also outlines the statutory requirement of prior Environmental Clearance including the scope of the study as per the approved Terms of Reference.

Chapter 2 - Project Description, brief description of the existing scenario, plant layout and infrastructure facilities incorporating all industrial and environmental activities of the project for setting up of the proposed modernization project for manufacture of various types of APIs and phytochemicals. It also gives manufacturing process description, raw materials requirement, utilities, product wise pollution loads and existing plant environmental scenario etc.

Chapter 3 – Description of the Environment: Establishment of baseline environmental study as identified in the Scope, i.e. Study area, period, and

methodology; status of meteorology, air quality, water, noise, land, ecology and socio-economic environment of the study area based on information collected through field study or from secondary sources.

Chapter 4 – Anticipated environmental impacts and impacts mitigation measures: This has been developed based on the Chapter 2 and Chapter 3, by correlating the activities under the proposed modernization project and their impacts on the receiving environmental attributes including Mitigation Measures for minimizing the adverse impacts.

Chapter 5 - describes **analysis of alternative sites**.

Chapter 6 - Environmental Monitoring Programme delineates aspects of monitoring the effectiveness of mitigation measures (measurement frequency, parameters, locations, data analysis, and the budgetary provisions for pollution control measures).

Chapter 7 - Additional studies Viz., Risk assessment study and public consultation.

Chapter 8 - Project benefits: Describes improvement in physical & social infrastructure; employment potential and other tangible benefits.

Chapter 9 - Environmental management plan (EMP): Description on ensuring that mitigation measures are implemented.

Chapter 10 – Summary & Conclusion: Describes briefly on introduction, project description, baseline environment quality, anticipated impacts and mitigation measures including environmental management and monitoring plan along with project benefits.

Chapter 11 – Disclosure of Consultants engaged: Provides the brief profile of consultant organization and the NABET Accreditation certificate including names of experts used in preparation of EIA report.

1.6 OBJECTIVE

The objective of the study is to prepare EIA report based on the following guidelines provided by SEIAA:

- Present status of air, water, land, socio-economic and biological components of the environment including noise and other parameters of human interest for one season (Summer Season) within the study area covering 10 km radial distance around the project site for conventional chemical pollutants.
- Identification of forest land, agricultural land, waste land, water bodies etc. in the area of interest.
- Identification, quantification, prediction and evaluation of significant impacts from the proposed project during construction and operation phases.
- Preparation of an Environmental Management Plan (EMP) to be adopted for mitigation of anticipated adverse impacts, if any.

CHAPTER - 2 PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

M/s. Ran India Steels is a Private Company registered. M/s. Ran India Steels (P) Ltd., Unit-II has an existing M.S. Ingots manufacturing unit at Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu. The existing unit produces MS Ingots. The proposed expansion unit will expand the quantity of MS Ingots from 3000 TPM to 4300 TPM. The total cost after expansion is about Rs.8.34 Crores. The production capacity of the unit after expansion is 4300 TPM of MS Ingots.

2.2 NEED FOR THE PROJECT

Metal industries are the indispensable part of an economy. They form the backbone of industrial development of any country. India Steel Industry has grown by leaps and bounds, especially in recent times with Indian firms buying steel companies overseas. The scope for steel industry is huge and industry estimates indicate that the industry will continue to grow reasonable in the coming years with huge demands for stainless steel in construction of new airports and metro rail projects.

There exists enormous potential in the economy for higher growth of domestic steel demand in medium and long term. In terms of actual steel usage, India lags behind other major steel producing countries. In 2018 our per capita consumption of steel was only 68 Kg as against the world average of 208 Kg. A massive investment to the tune of 1 trillion dollars has been envisaged during Twelfth Five Year Plan in the infrastructure sector. Besides, there is a greater emphasis on the growth of the Manufacturing Sector in the country. This augurs well for expansion of the base of steel consumption in the economy. A rough estimate of incremental demand for steel in the country works out approximately to 40 million tonnes in infrastructure alone. Hence it is likely to

raise intensity of steel consumption in the country measured in terms of steel consumption per unit of Gross Domestic Product (GDP).

2.3 DEMAND SUPPLY GAP

- As per Joint Plant Commission (JPC), India's total steel production during April to January 2014 grew by 3.7% to 70 million tonnes against 67 million tonnes a year earlier.
- Crude steel production at the rate of 8-9% per annum 112-114 million tonnes in January, 2022.
- Production of finished steel of 9.65 million tonnes in January, 2022.
- Consumption of steel of 86.3 million tonnes in January, 2022.

2.4 IMPORT VS INDIGENOUS PRODUCTION

In the last 20 years (i.e. 1991-92 to 2010-11) import of steel as a percentage of total consumption in India has varied between a high of over 13% in 2007-08 and a low of 4.8% in 1998-99 and 2001-02.

2.5 DOMESTIC/ EXPORT MARKETS

2.5.1 Domestic Demand

Based on Planning Commission Report, the demand for steel has been worked out on the basis of observed relationship between steel consumption and selected macro-economic variables under four scenarios of GDP growth (i.e. of 8%, 8.5%, 9% and 9.5%) by 2016-17. In the most likely growth scenario i.e. 9% GDP growth, the demand for steel works out to be 113.3 million tonnes by 2016-17. Therefore, it is likely that in the demand will grow at a considerably higher annual average rate of 10.3% as compared to around 8.1% growth achieved during the last two decade (1991-92 to 2010-11).

2.5.2 Export Demand

India has enormous potential, necessary resources and capabilities to become a global supplier of quality steel. Also there exists ample market opportunities in the neighboring regions of Asia, Africa and the Middle East.

Table 2.1 Estimated Demands and Capacity Creation

S.No.	ITEM	2010-11	2016-17
1	Demand for Carbon Steel	62.14	108.3
2	Demand for Alloy/Stainless Steel	3.47	5.0
3	Total Domestic Demand for Steel	65.61	113.3
4	Net Export	-3.34	2.0
5	Production (net of double counting)	62.27	115.3
6	Category-wise consumption (Carbon steel)		
	a. Total Long	31.16	54.3
	b. Total Flat	30.99	54.0
	c. Total Carbon Steel	62.14	108.3
7	Total requirement of crude steel	-	142.3
8	Likely Capacity of Crude Steel	78.0	149.0

2.6 PROJECT LOCATION

M/s. Ran India Steels (P) Ltd., Unit – II is located at S.No. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District, Tamil Nadu. The site is located about 14 Km from Tiruchengode town. The nearest railway station at Coimbatore at a distance of 10 Km. The nearest airport is Trichy Airport (95 Km). The proposed site falls under Tiruchengode Mnunicipality.

The proposed site and the study area of 10 Km radius are covered in the Survey of India Topo sheet No. 58E/15, 16, 103 & 104. The geographical co-ordinates of the proposed expansion site is latitude 11°15'20.88"N and longitude 77°56'59.67"E.

Following are the details regarding the Project site.

a) Archaeological monuments

The location does not have any archaeological monuments in nearby 10km radius.

b) Biological resources

It was found during study period that the location is devoid of any endangered flora and fauna in 25km radius.

c) Cultural Monuments

There is no cultural monument around 10 km radius from the site.

d) Defence

There is no defence installation around 10 km from the location.

e) Employment Generation

This expansion unit generates the employment (70 no.s) in the immediate surroundings of the people who are depending mainly on rain fed agriculture.

f) Highway

The nearest Highway is SH-86 which is 770 m away. The setting up of this unit will not harm the traffic and unwanted settlement in the vicinity of highway.

g) Geography

The location is geographically suitable for setting up of industry, as the unit will not be disturbed by climatic and other geographical condition.

h) Human settlement

The nearest major human settlement is Tiruchengode whose periphery is 14 km away from this unit.

i) Land use classification

Tamil Nadu government has recognized the location of this unit as Unclassified area. The area has also dominated by medium, small scale Industries. The area is suitable for setting up Industries.

j) Transportation facilities

The Industrial site is well connected by road and rail. The important townships falling within 60 km radius are Namakkal, Erode, Velur, Truchengode, and Sankari. The nearest major railway station is Sankari (22 km) and Airport is Trichy (95 km).The site is connected by the Tiruchengode – Velur road. The raw material can be conveniently transported by road.

k) Socio-economic

The expansion unit will improve the economy at national level.

l) Land use and availability

This expansion unit is using the area, which dry land and favourable climatic conditions for developing industries.

m) Meteorology

Both micro and macro meteorology is found to be suitable for this unit.

n) Natural disaster

The area is devoid of natural disasters like earthquake, cyclone, landslides etc.

o) On-site and off-site emergency buffering capacity

The unit will not use or produce any hazardous substance. Hence the only disaster of small scale can be expected, which will be handled by the work force of the unit without much difficulty.

p) Power

The industry draws power from TNEB grid, which has sanctioned total power supply of 4000 KVA to the proponent for existing facility. After the expansion activities, the power requirement drawn from TNEB will be 4900 KVA.

q) Quantum of water and wastewater

The requirement of water for this unit is drawn from existing bore well inside the factory premises. The total consumption of water for this unit is 13.5 KLD at present. After expansion, 17 KLD of water will be required.

The trade effluent from the process will be evaporated by Solar Evaporation Pan. The sewage from domestic operation, which is very minimal quantity of this industry is treated and disposed by septic tank with dispersion trench.

r) Raw material

Raw materials (Sponge Iron, Ferro Alloys, M.S Scraps) are easily available in nearby areas and other parts of Tamil Nadu.

s) Topography

The topography is plain and will not lead to disaster by accumulation of air pollutants. The average elevation of the area is about 230m from Mean Sea Level.

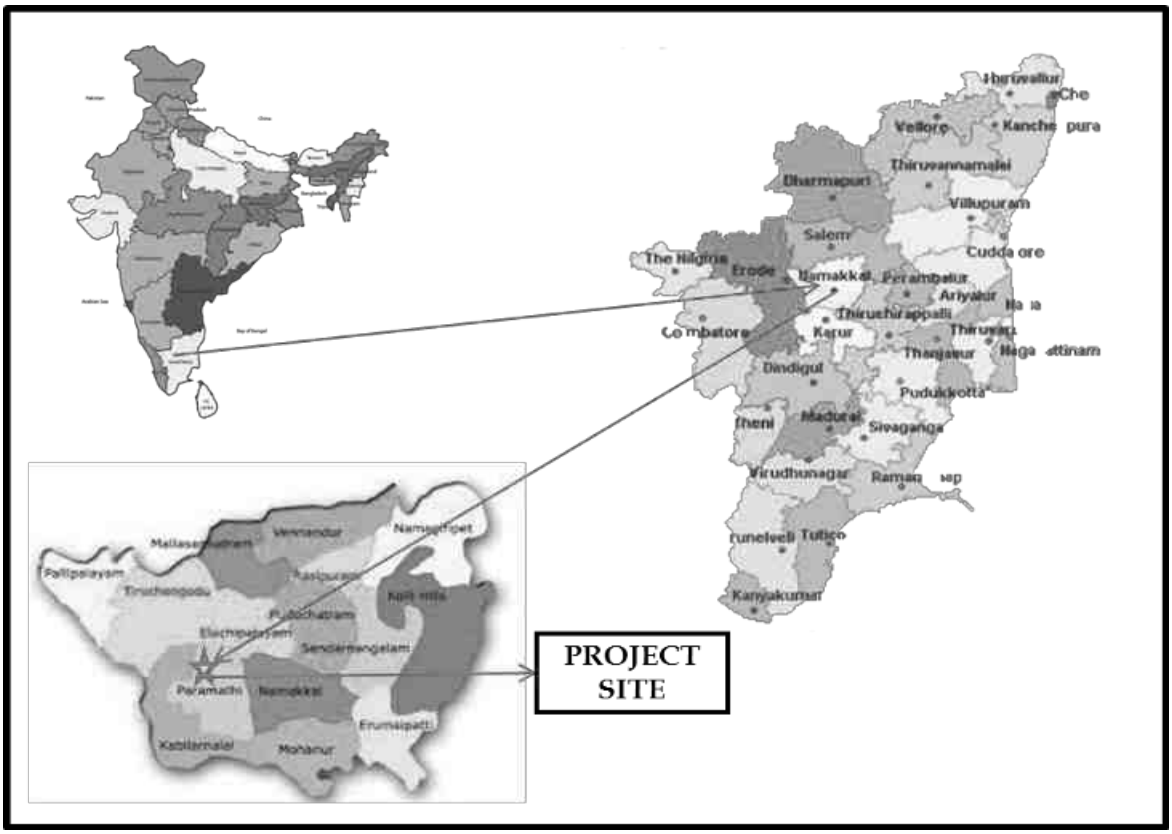


Fig 2.1 Location Map of the Project Site

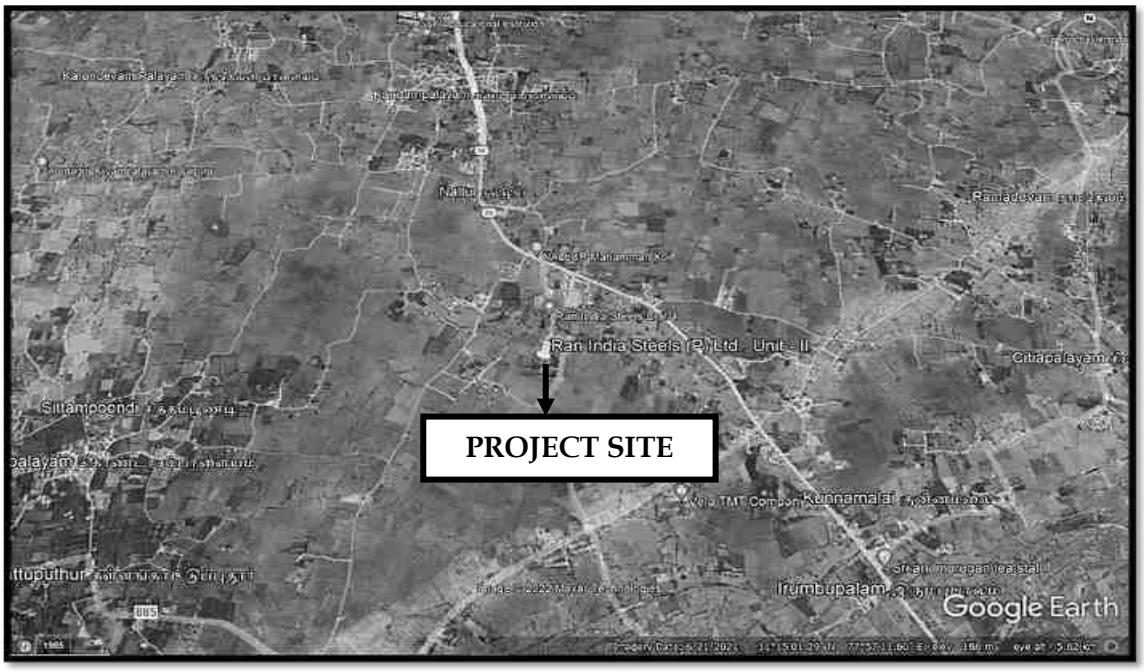


Fig.2.2 Satellite Imagery of the Project Site

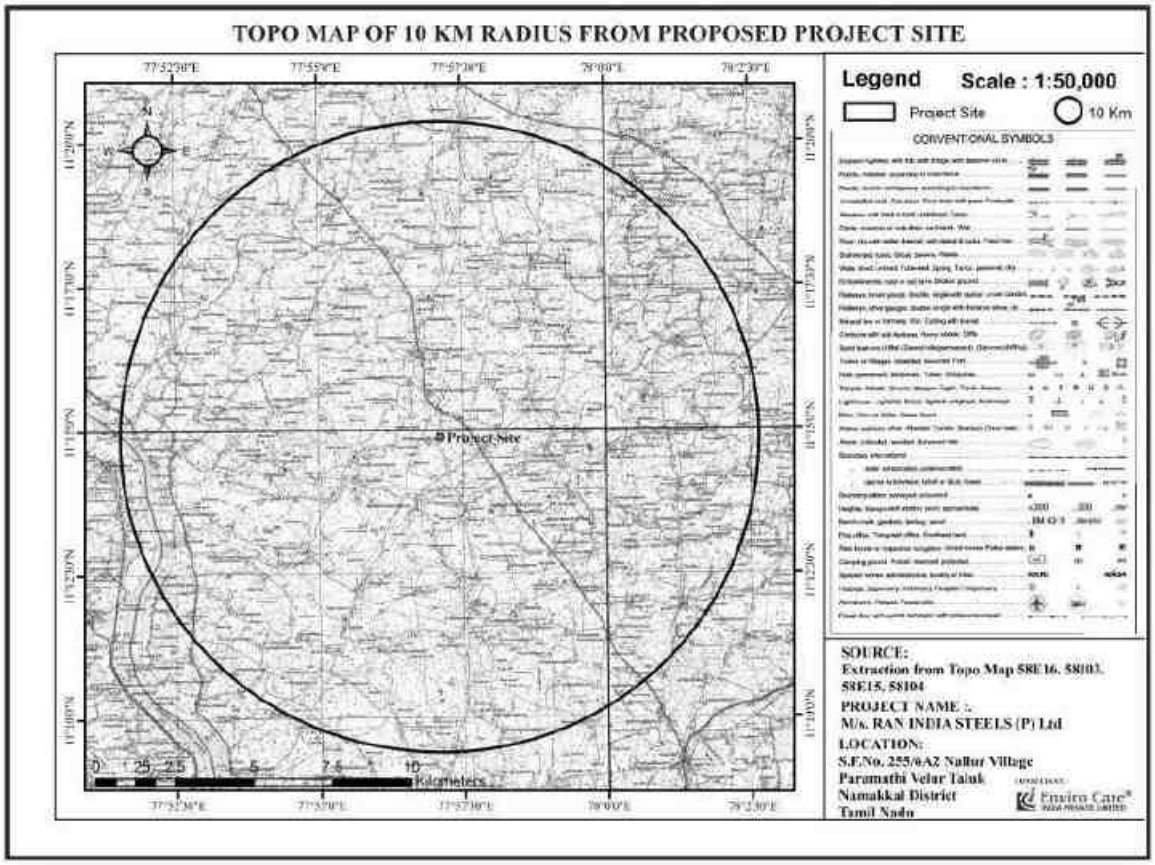


Fig 2.3 Topo Map of the Project Site within 10 Km Radius

Fig.2.4 Satellite Imagery of boundary of the Project Site

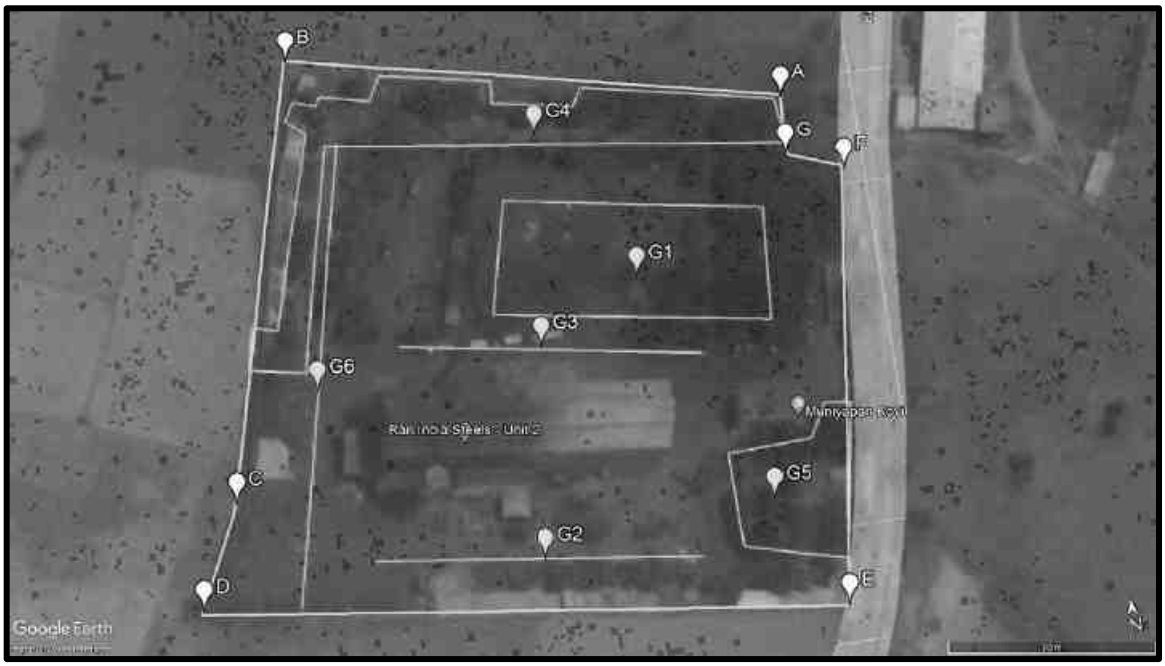


Fig. 2.5 Layout Co-ordinates

Layout Co-ordinates	
A	11°14'54.86"N, 77°57'9.34"E
B	11°14'55.79"N, 77°57'3.86"E
C	11°14'51.39"N, 77°57'2.70"E
D	11°14'50.20"N, 77°57'1.93"E
E	11°14'49.35"N, 77°57'9.17"E
F	11°14'54.15"N, 77°57'9.84"E
G	11°14'54.31"N, 77°57'9.25"E
Greenbelt Co-ordinates	
G1	11°14'53.10"N, 77°57'7.38"E
G2	11°14'50.22"N, 77°57'5.95"E
G3	11°14'52.48"N, 77°57'6.22"E
G4	11°14'54.79"N, 77°57'6.47"E
G5	11°14'50.52"N, 77°57'8.52"E
G6	11°14'52.34"N, 77°57'3.72"E

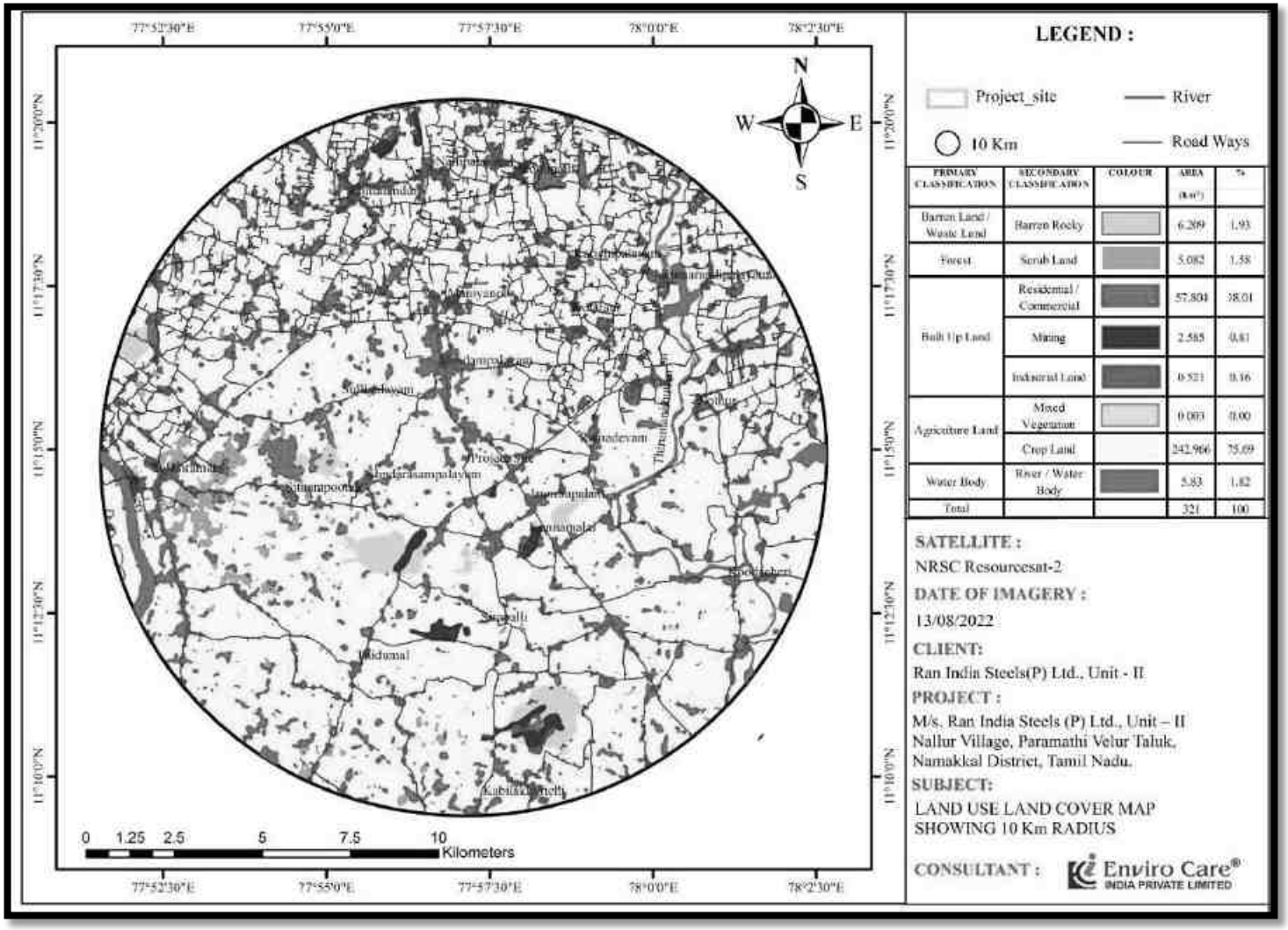


Fig 2.6 Land Use & Land Cover Map of the project site – 10 km radius

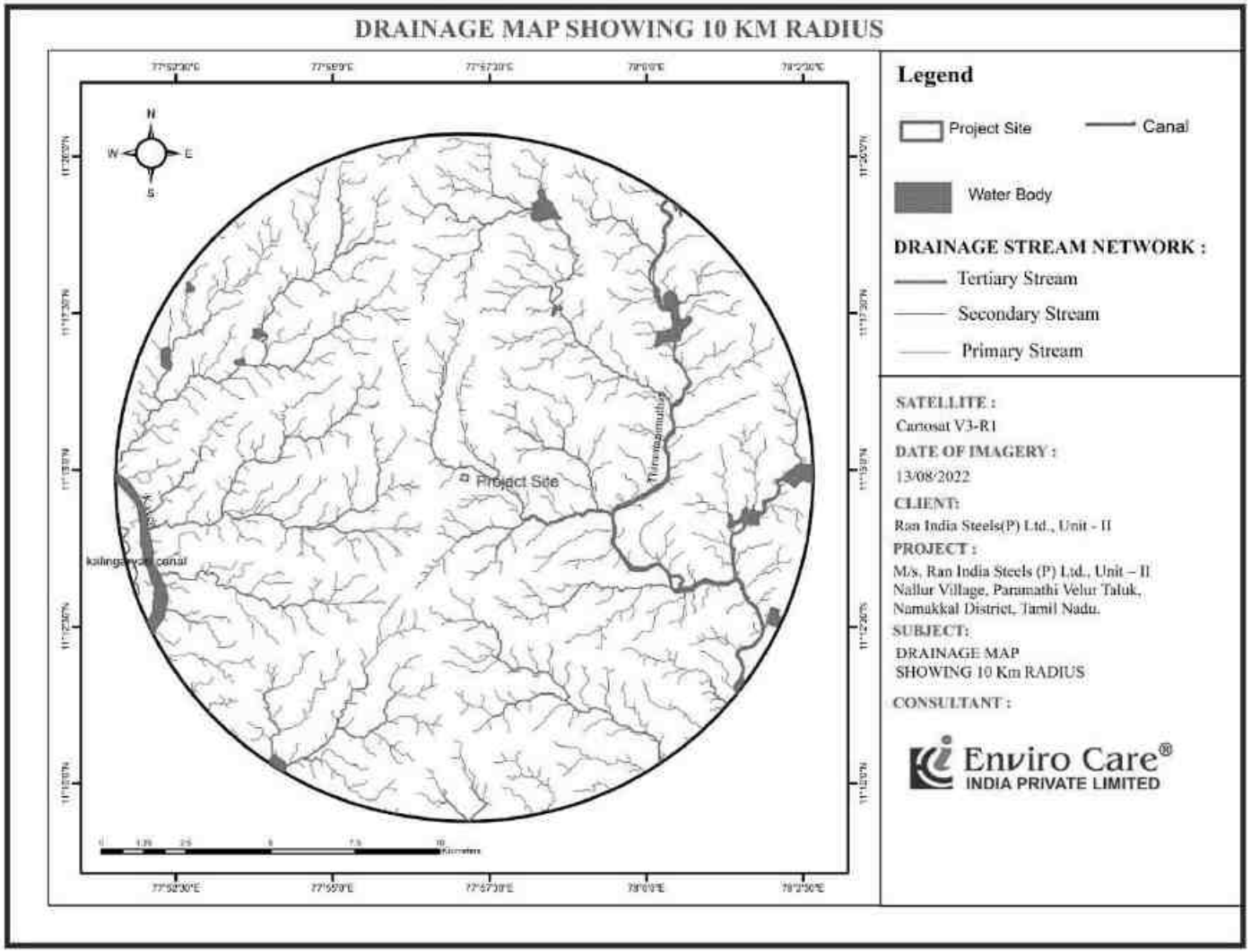


Fig 2.7 Drainage Map of the project site – 10 km radius

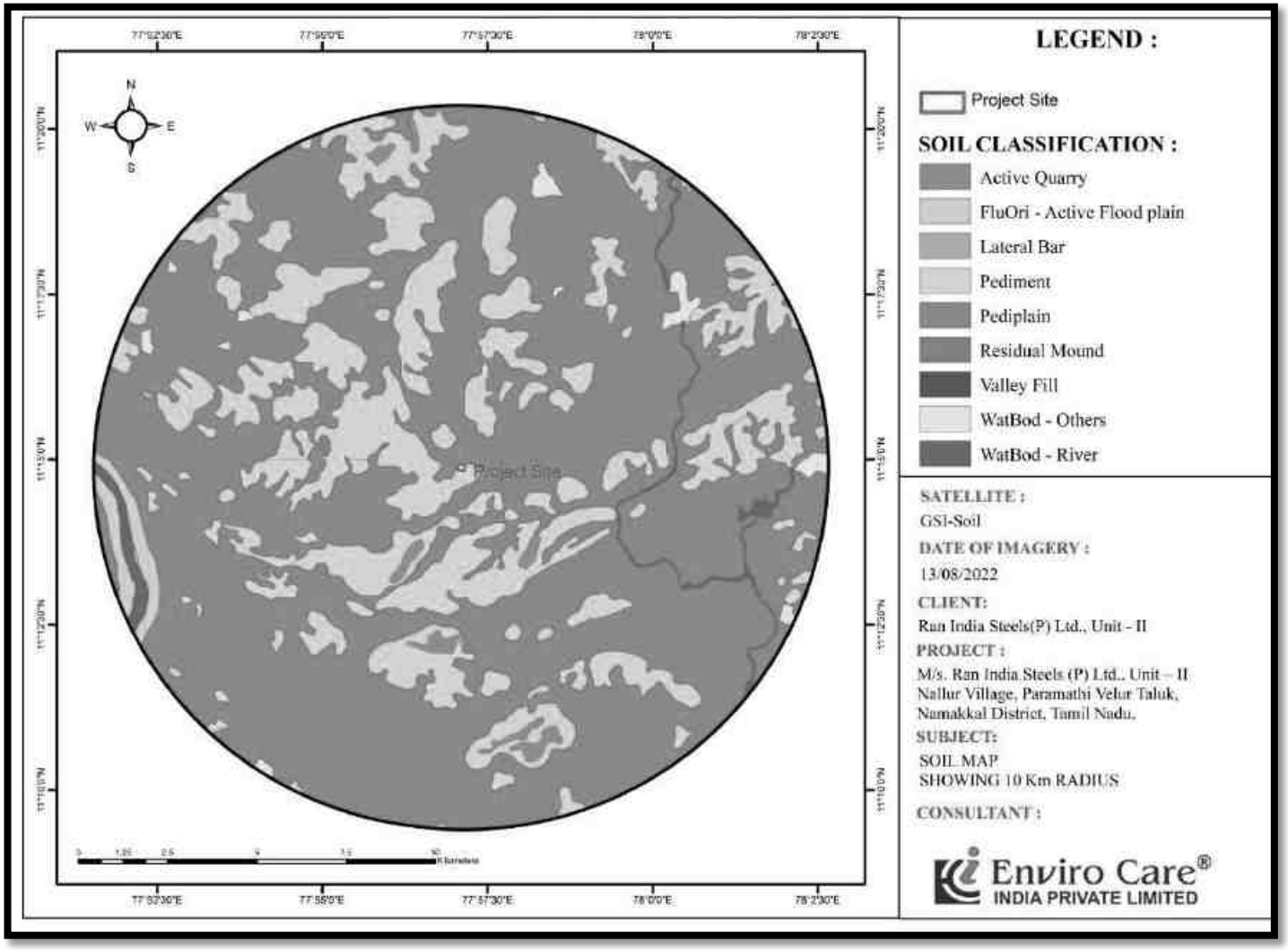
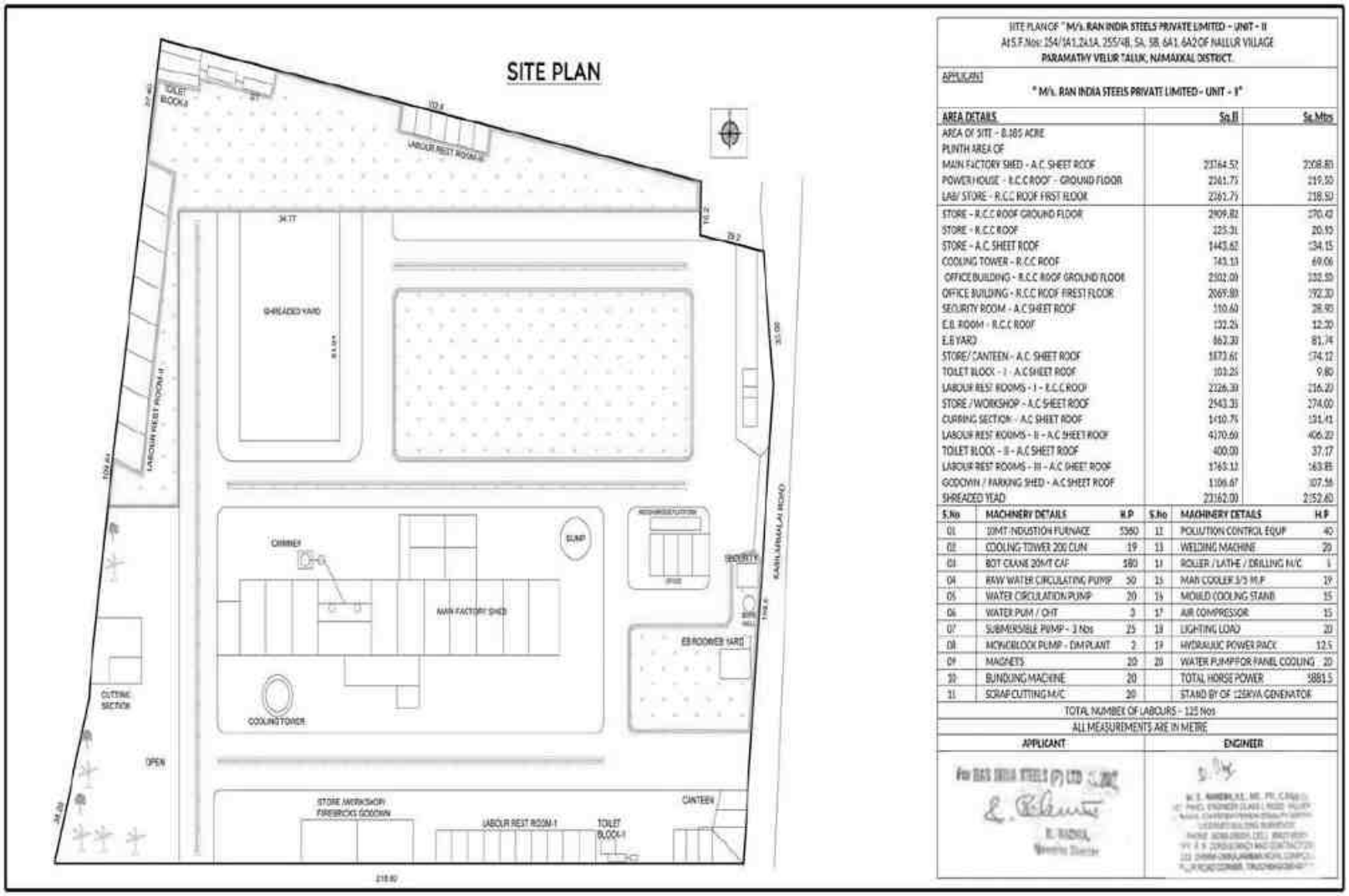


Fig 2.8 Soil Map of the project site – 10 km radius



SITE PLAN OF " M/s. RAN INDIA STEELS PRIVATE LIMITED - UNIT - II
At S.F.Nos: 154/1A1,2A1A, 255/4B, 5A, 5B, 6A1, 6A2 OF NALLUR VILLAGE
PARAMATHY VELLUR TALUK, NAMAKKAL DISTRICT.

APPLICANT
" M/s. RAN INDIA STEELS PRIVATE LIMITED - UNIT - II"

AREA DETAILS	Sq.ft	Sq.Mtrs
AREA OF SITE - 8.185 ACRE		
PLINTH AREA OF		
MAIN FACTORY SHED - A.C. SHEET ROOF	23764.52	2208.83
POWER HOUSE - R.C.C ROOF - GROUND FLOOR	2361.75	219.50
LAB/ STORE - R.C.C ROOF FIRST FLOOR	2361.79	219.50
STORE - R.C.C ROOF GROUND FLOOR	2909.82	270.42
STORE - R.C.C ROOF	225.31	20.93
STORE - A.C. SHEET ROOF	1443.62	134.15
COOLING TOWER - R.C.C ROOF	743.13	69.06
OFFICE BUILDING - R.C.C ROOF GROUND FLOOR	2502.09	232.50
OFFICE BUILDING - R.C.C ROOF FIRST FLOOR	2069.80	192.30
SECURITY ROOM - A.C SHEET ROOF	310.60	28.90
E.B. ROOM - R.C.C ROOF	132.26	12.30
E.B YARD	862.30	81.74
STORE/ CANTEEN - A.C. SHEET ROOF	1873.61	174.12
TOILET BLOCK - I - A.C SHEET ROOF	103.26	9.80
LABOUR REST ROOMS - I - R.C.C ROOF	2326.39	216.20
STORE / WORKSHOP - A.C SHEET ROOF	2543.35	274.00
CURING SECTION - A.C SHEET ROOF	1410.75	131.41
LABOUR REST ROOMS - II - A.C SHEET ROOF	4370.69	406.20
TOILET BLOCK - II - A.C SHEET ROOF	400.09	37.17
LABOUR REST ROOMS - III - A.C SHEET ROOF	1765.12	163.88
GODOWN / PARKING SHED - A.C SHEET ROOF	1166.67	107.56
SHREADED YEAD	23162.00	2152.40

S.No	MACHINERY DETAILS	H.P	S.No	MACHINERY DETAILS	H.P
01	10MT INDUSTION FURNACE	5360	11	POLLUTION CONTROL EQUIP	40
02	COOLING TOWER 200 CUM	19	13	WELDING MACHINE	20
03	EOT CRANE 20MT CAP	580	14	ROLLER / LATHE / DRILLING M/C	1
04	RAW WATER CIRCULATING PUMP	50	15	MAIN COOLER 3/5 H.P	19
05	WATER CIRCULATION PUMP	20	16	MOULD COOLING STAND	15
06	WATER PUM / OHT	3	17	AIR COMPRESSOR	15
07	SUBMERSIBLE PUMP - 2 Nos	25	18	LIGHTING LOAD	20
08	MONOBLOCK PUMP - DM PLANT	2	19	HYDRAULIC POWER PACK	12.5
09	MAGNETS	20	20	WATER PUMP FOR PANEL COOLING	20
10	BUNDLING MACHINE	20		TOTAL HORSE POWER	5881.5
11	SCRAP CUTTING M/C	20		STAND BY OF 125KVA GENERATOR	

TOTAL NUMBER OF LABOURS - 125 Nos
ALL MEASUREMENTS ARE IN METRE

APPLICANT | ENGINEER

Fig: 2.9 Layout of the Project Site

2.7 SIZE OR MAGNITUDE OF THE PROJECT

2.7.1 Land Requirement

The land requirement for the proposed expansion of the plant structures is 3.39 Hectares. The land selected for the proposed project is classified as "Unclassified Area" by Department Local Planning Authority, Government of Tamil Nadu. The land proposed to be used for establishment of expansion unit belongs to the project proponent. (Refer **Annexure – II** for Land Use Classification Certificate).

Table 2.2 Land Requirement for the Project

Description	Existing (Hectares)	After Expansion (Hectares)
Building area	0.173	0.173
Solid Waste Storage	0.96	0.96
Green belt area	1.10	1.10
Vacant area	1.157	1.157
Total area	3.39	3.39

2.8 PRODUCT MANUFACTURING

Product	Existing (TPM)	Proposed (TPM)	Total After Expansion (TPM)
MS Ingots	3000	1300	4300

2.9 RAW MATERIAL

2.9.1 Raw Material for MS Ingots

Table 2.3 Required Raw Materials for MS Ingots

S.No.	Raw Material	Existing (TPM)	Proposed (TPM)	After Expansion (TPA)
1	Sponge Iron	245	555	800
2	Ferro Alloys	5	25	30
3	MS Scraps	3250	820	4070
Total		**3500**	**1400**	**4870**

Raw Materials are purchased from nearby local markets.

2.10 PROJECT DESCRIPTION WITH PROCESS DETAILS

2.10.1 PROCESS FLOW CHART

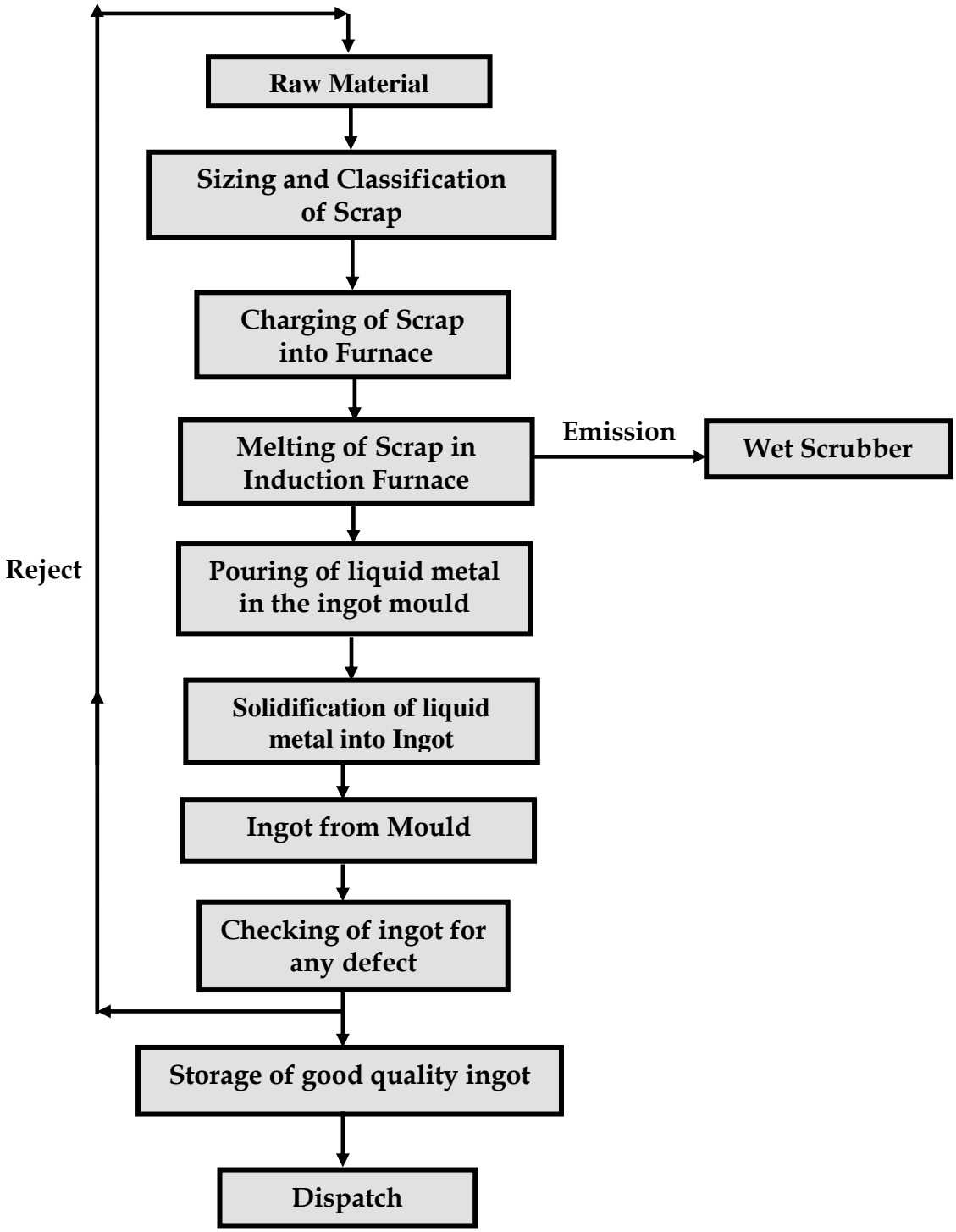


Fig 2.10 Process Flow Chart of the Production

2.10.2 Process Description

M.S. Ingots are manufactured by melting of M.S. scraps in Electric Induction Furnaces and casted in cast iron moulds to get ingots. The molten metal in the Induction Furnaces is poured into the Cast Iron Moulds. The Ingots are cooled and separated from the Moulds.

The raw material required for the manufacture of M.S. Ingots are M.S.Scrap, Ferro alloys and Sponge Iron obtained from the open market.

Required quantities of M.S. scraps from the stock yard are transported through Mobile crane and EOT cranes into the furnace yard. By the electro magnet and crane fed into furnace. A minimum manual shoveling is required.

The Electric Furnace is open type, with a capacity of 12 tonnes. There are two furnaces (Crucible) out of which one is standby. The furnace has solid state medium frequency induction generator.

The scrap charged into the furnace gets heated and melted at a temperature of about 1600^{o}C.

When the required temperature is attained, the furnace crucible is tilted by means of hydraulic system and the molten material is poured into laddle and then into the Iron moulds through ladder. This gets cooled to form the finished product – M.S. Ingots.

Table 2.4 Chemical Composition of Raw Materials

S.NO.	CONSTITUENTS	PERCENTAGE (%)
Sponge Iron		
1.	Ferrous	85-88
2.	Oxygen	0.50 – 1.0
3.	Others	12 – 13
Ferro Silicon		
1.	Silicon	70 – 75
2.	Ferrous	20 - 25
3.	Phosphorus	0.04 - 0.06
4.	Sulphur	0.02 - 0.04
5.	Aluminium	0.5 – 1.0
Silico Manganese		
1.	Manganese	60 – 65
2.	Silicon	12 – 18
3.	Sulphur	0.02 – 0.04
4.	Phosphorus	0.04 – 0.06
5.	Carbon	1.5 – 2
6.	Ferrous	15 – 20
M.S Scrap		
1.	Ferrous	95-99
2.	Oxygen	0.50 - 1.0
3.	Others	0.50 - 1.0

Table 2.5 Chemical Composition of Products

Sl.No.	Constituents	Percentage (%)
1.	Ferrous	98.5
2.	Carbon	0.234
3.	Silicon	0.230
4.	Manganese	0.510
5.	Phosphorus	0.053
6.	Sulphur	0.031
7.	Chromium	0.091
8.	Nickel	0.066
9.	Copper	0.15
10.	Zinc	0.015
11.	Others	0.120

2.11 SLAG PRODUCTION IN MODERN INTEGRATED STEEL PLANT

Pit slag and clean out slag are other types of slag commonly found in steel-making operations. They usually consist of the steel slag that falls on the floor of the plant at various stages of operation, or slag that is removed from the ladle after tapping.

Because the ladle refining stage usually involves comparatively high flux additions, the properties of these synthetic slags are quite different from those of the furnace slag and are generally unsuitable for processing as steel slag aggregates. These different slags must be segregated from furnace slag to avoid contamination of the slag aggregate produced. In addition to slag recovery, the liquid furnace slag and ladle slags are generally processed to recover the ferrous metals. This metals recovery operation (using magnetic separator on conveyor and/or crane electromagnet) is important to the steelmaker as the metals can then be reused within the steel plant as furnace feed material for production.

2.11.1 Disposal

While most of the furnace slag is recycled for use as an aggregate, excess steel slag from other operations (raker, ladle, clean out, or pit slag) is usually sent to cement manufacturers.

2.11.2 Market Sources

Steel slag can normally be obtained from slag processors who collect the slag from steel-making facilities. Slag processors may handle a variety of materials such as steel slag, ladle slag, pit slag, and used refractory material to recover steel metallics. These materials must be source separated, and well-defined handling practices must be in place to avoid contamination of the steel slag aggregate. The slag processor must also be aware of the general aggregate requirements of the end user. The processing of steel slags for metals recovery is not only important to remove excess steel at the market source for reuse at the steel plant, but is also important to facilitate the use of the nonmetallic steel slag as construction aggregate. This nonmetallic slag will be send to Cement manufacturers for further use. Commitment letter will be obtained from local cement industries before getting EC.

2.11.3 Highway Uses & Processing Requirements

Asphalt Concrete Aggregate, Granular Base, and Embankment or Fill

The use of steel slag as an aggregate is considered a standard practice in many jurisdictions, with applications that include its use in granular base, embankments, engineered fill, highway shoulders, and hot mix asphalt pavement Prior to its use as a construction aggregate material, steel slag must be crushed and screened to meet the specified gradation requirements for the particular application.

2.12 MATERIAL PROPERTIES OF STEEL SLAG

2.12.1 Physical Properties

Steel slag aggregates are highly angular in shape and have rough surface texture. They have high bulk specific gravity and moderate water absorption (less than 3 percent).

Table 2.6 Physical Properties of Slag

Property	Value
Specific Gravity >	3.2 - 3.6
Unit Weight, kg/m^3	1600 – 1920
Absorption	up to 3%

2.12.2 Chemical Properties

The chemical composition of slag is usually expressed in terms of simple oxides calculated from elemental analysis determined by x-ray fluorescence. Undernoted table lists the range of compounds present in steel slag from a typical base oxygen furnace. Virtually all steel slags fall within these chemical ranges but not all steel slags are suitable as aggregates. Of more importance is the mineralogical form of the slag, which is highly dependent on the rate of slag cooling in the steel-making process.

Table 2.7 Chemical Composition of Steel slag

S.No.	Constituent	Composition (%)
1	CaO	40 – 52
2	SiO_2	10 – 19
3	FeO	10 – 40 (70 - 80% FeO, 20 - 30% Fe2O3)
4	MnO	5 – 8
5	MgO	5 – 10
6	Al_2O_3	1 – 3
7	P_2O_5	0.5 – 1
8	S	< 0.1
9	Metallic Fe	0.5 – 10

2.12.3 Mechanical Properties

Processed steel slag has favorable mechanical properties for aggregate use, including good abrasion resistance, good soundness characteristics, and high bearing strength.

2.12.4 Thermal Properties

Due to their high heat capacity, steel slag aggregates have been observed to retain heat considerably longer than conventional natural aggregates. The heat retention characteristics of steel slag aggregates can be advantageous in hot mix asphalt repair work in cold weather.

2.13 MATERIAL BALANCE CHART

2.13.1 EXISTING ACTIVITY

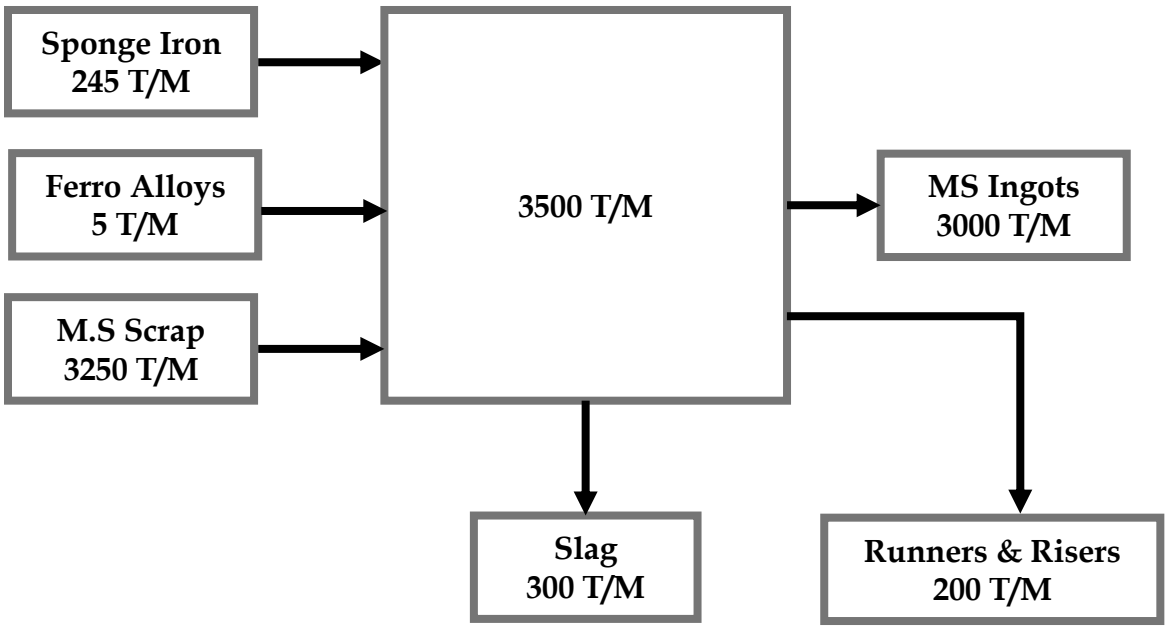


Fig 2.11 Material Balance for Existing Activity

2.13.2 AFTER EXPANSION ACTIVITY

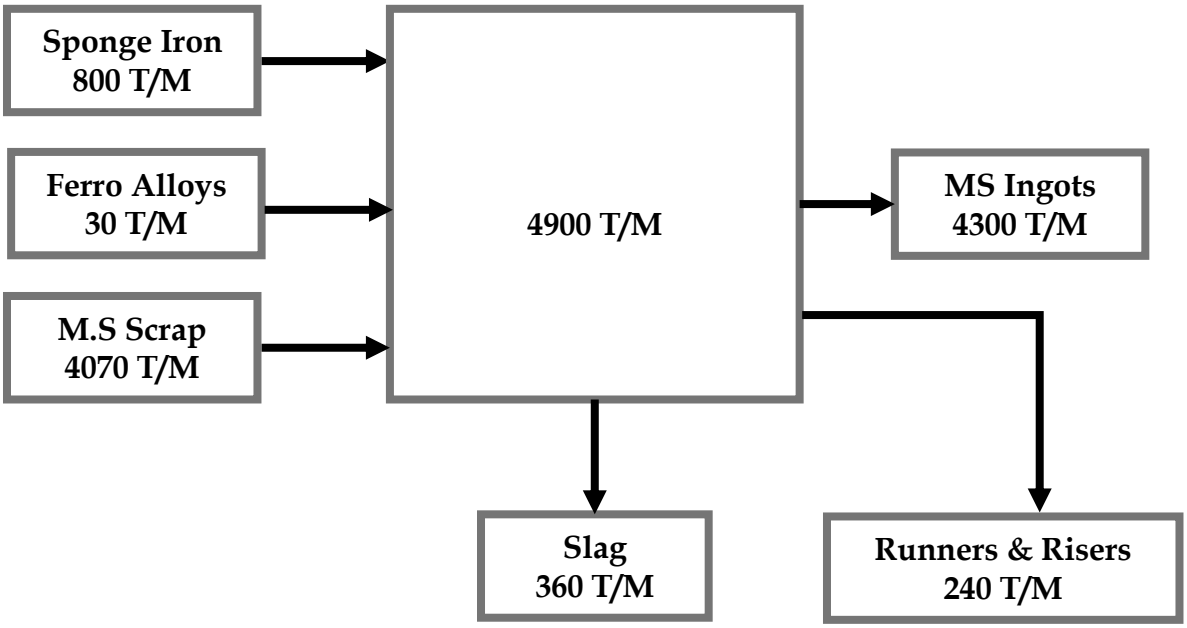


Fig 2.12 Material Balance for After Expansion Activity

2.14 SOURCE OF WATER AND POWER REQUIREMENT

The total raw water required for the unit will be around 17 KLD. The entire raw water for the unit is met from Local Panchayat. The existing power demand is 4000 KVA with a standby diesel generator of capacity 250 KVA. The total power demand of this unit after expansion will be 4900 KVA. During shutdown/maintenance, power will be drawn from diesel generator capacity of 250 KVA.

2.15 MANPOWER REQUIREMENT

Table 2.8 Water Requirement Details

Purpose	Existing	Expansion	Total After Expansion
Manpower	70	-	70

2.16 WATER REQUIREMENT DETAILS

Table 2.9 Water Requirement Details

Purpose	Existing (KLD)	Proposed (KLD)	Total After Expansion (KLD)
Process	4.5	-	4.5
Cooling & Boiler	4.5	0.5	5
Domestic	4.5	-	4.5
Greenbelt	-	3.0	3.0
Total	**13.5**	**3.5**	**17.0**

2.17 WATER BALANCE DIAGRAM

2.17.1 Existing Activity

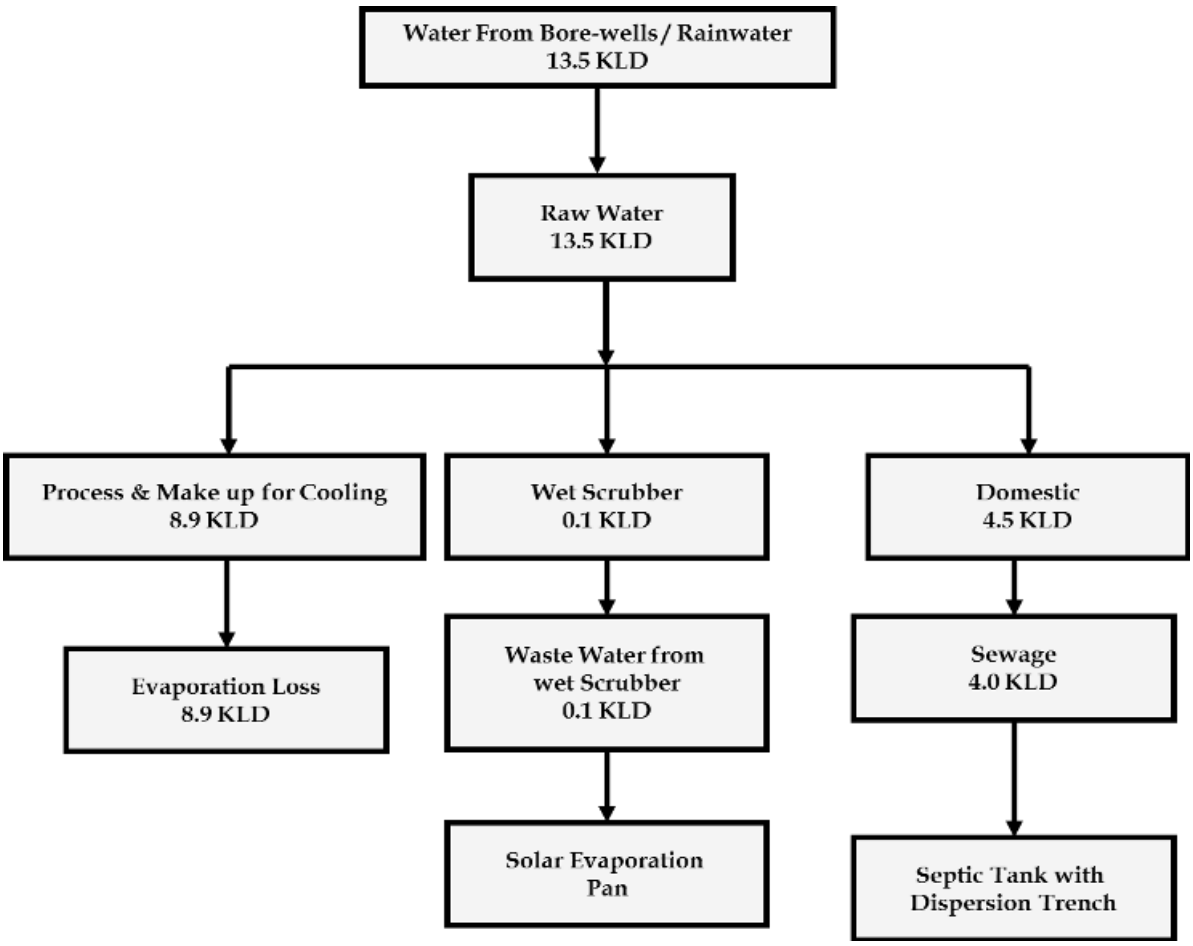


Fig 2.13 Water Balance for Existing Activity

2.17.2 After Expansion Activity

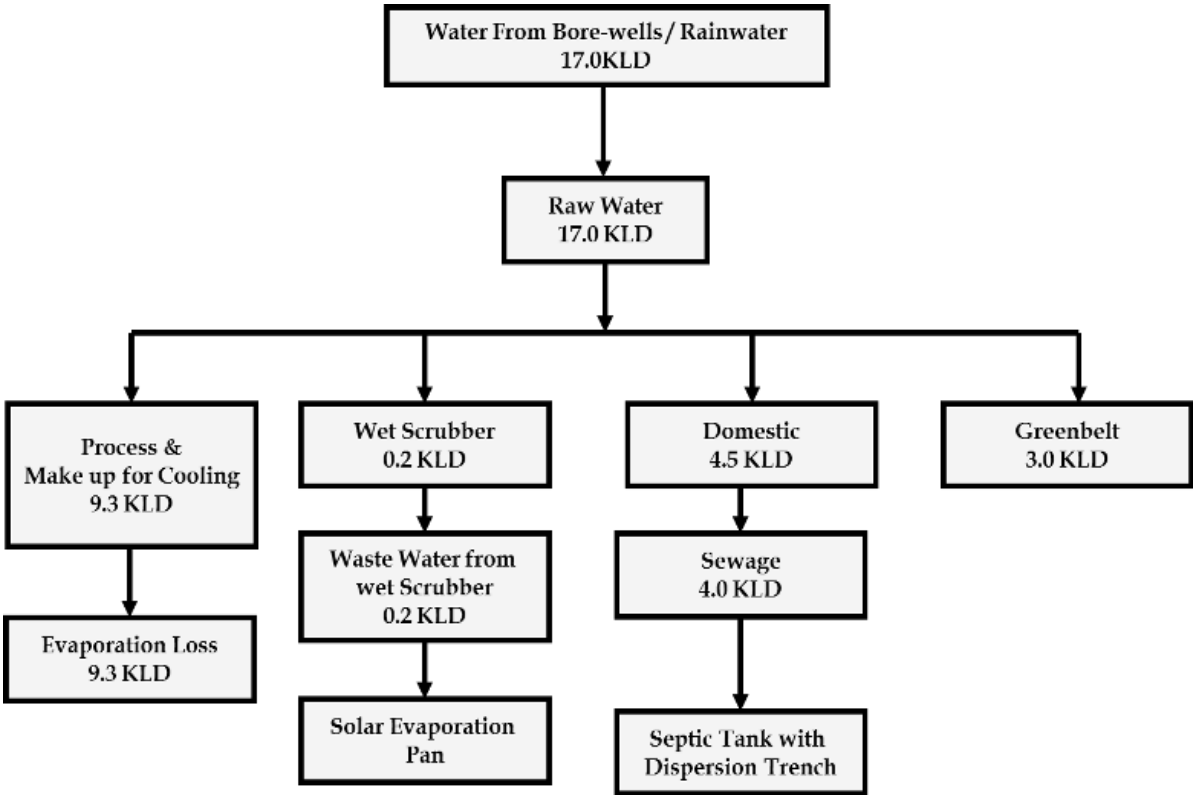


Fig 2.14 Water Balance for Expansion Activity

2.18 WASTE WATER GENERATION AND METHOD OF TREATMENT

2.18.1 WASTE WATER GENERATION

Table 2.10 Wastewater Generation Details

Wastewater	Existing (KLD)	After Expansion (KLD)	Method of Treatment
Sewage	4.0	4.0	Septic Tank Size : 5.0 x 2.1 x 4.0 m – 1 No Dispersion Trench Size: 2. 2.5 x 2.0 x 2.4 m
Trade Effluent	0.1	0.2	Solar Evaporation Pan 4.8 x 3.4 – 2 Nos 12.6 x 1.1 – 1 No
Total	**4.1**	**4.2**	

2.18.2 Design Details of the Septic Tank

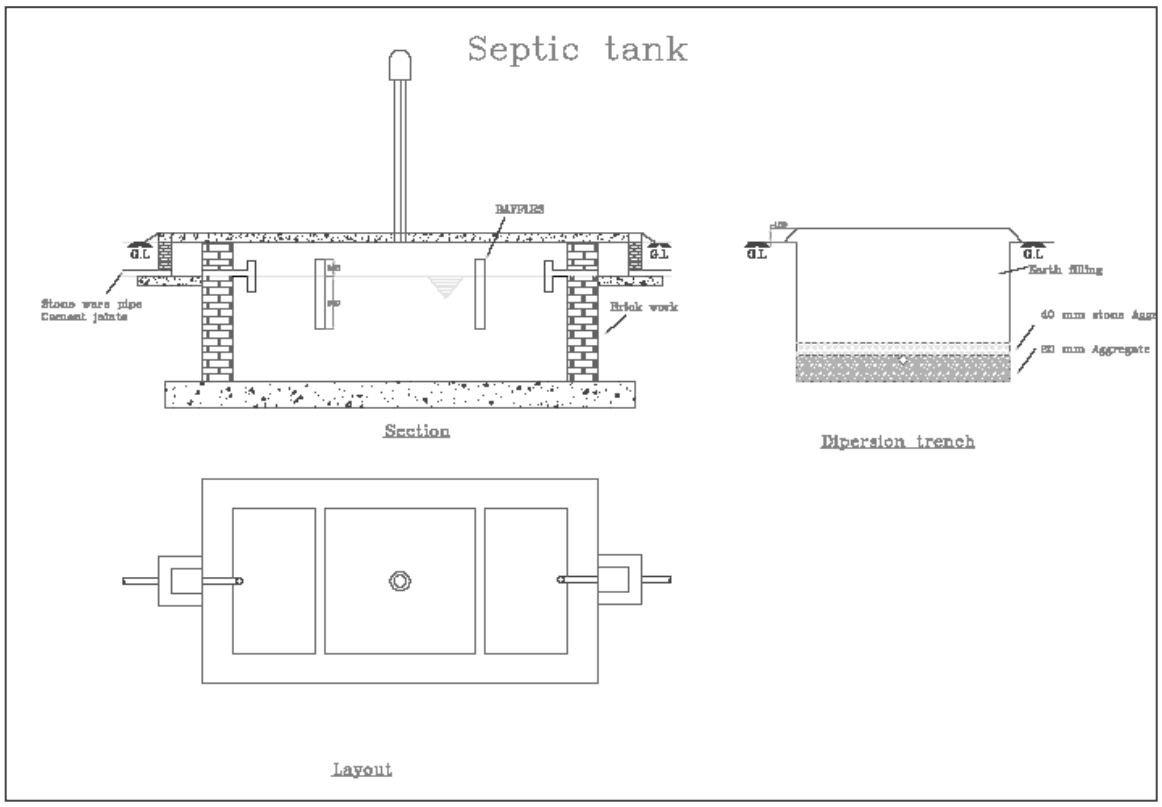


Fig 2.15 Design of Septic tank followed by Dispersion Trench

2.19 SOLID WASTE GENERATION

Table 2.11 Solid Waste Generation Details

S.No.	Solid Wastes	Quantity (TPM)		Method of Disposal
		Existing	After Expansion	
1	Runners and Riser	200	240	Re-used in the Process
2	Slag from Furnace	300	360	Pulverized for metal recovery and sizing disposed for earth filling and aggregate use

2.20 HAZARDOUS WASTE GENERATION

Table 2.12 Hazardous Waste Generation Details

S.No.	Description	Quantity (T/A)		Method of Disposal
		Existing	After Expansion	
1	5.1-Used or spent oil	0.2	0.2	Send to authorised HW recyclers
2	35.1-Exhaust Air or Gas cleaning residue	5.0	5.5	Packed in HDPE bags and storage in closed shed with impervious platform and disposed to Authorised HW pre-processors
3	35.3-Chemical sludge from waste water treatment	0.3	0.5	Packed in HDPE bags and storage in closed shed with impervious platform and disposed to Authorised HW pre-processors.

2.21 SOURCE OF EMISSION & AIR POLLUTION CONTROL MEASURES

Existing

Stack No.	Sources of Emission	Details of APC measures
1	Induction Furnace – 10 TPH (2 Crucible)	42 m height 0.8 m dia of stack with wet scrubber has been provided.
2	DG Set (250 KVA)	Stack height of 2.3 m with acoustic enclosures has been provided.

After Expansion

Stack No.	Sources of Emission	Details of APC measures
1	Induction Furnace – 12 TPH (2 Crucible)	Existing 42 m height 0.8 m dia of stack with wet scrubber will be used.
2	DG Set (250 KVA)	Stack height of 7.5 m with acoustic enclosures will be provided.

2.22 DETAILS OF FURNACE

Existing

The existing furnace is a induction furnace of capacity 10 TPH. The air pollution control measure adopted for this furnace is wet scrubber with solar evaporation pan.

Proposed

The expansion activity will have 12 TPH induction Furnace will be used. Wet scrubber is proposed to be installed to control the emissions from the furnace.

2.23 POWER CONSUMPTION

The existing power consumption is 4000 KVA with a standby diesel generator of capacity 250 KVA. The total power requirement of this unit after expansion will be 4900 KVA. During shutdown/maintenance power will be drawn from diesel generator for the capacity of 250 KVA (high speed diesel for full capacity load for diesel generator).

The lists of machineries with power consumption for existing and proposed units are as follows:

Table 2.13 Existing Machineries

Sl.No.	Name of Equipment	HP	KW	KVA	Voltage
	CRANE CONTROL PANEL - 1				
1	Hosit - main.	41.5			415
2	Hosit - auxiliary	33.0			415
3	Cross travel.	3.5			415
4	Long travel. - 1	9.0			415
5	Long travel. - 2	9.0			415
6	Electro magnet - 1		14.5		440
7	Electro magnet - 2		14.5		440
	CRANE CONTROL PANEL - 2				
8	Main Hoist.	41.5			415
9	Auxiliary Hosist.	33.0			415

10	Cross travel.	3.5			415
11	Long travel - 1	9.0			415
12	Long travel - 2	9.0			415
13	Shearing M / C	20.0			415
14	Bundling M / C.	15.0			415
15	Welding M / C.			6	415
16	Mobile Electromagnet		16		415
17	Mobile Electromagnet - Standby		16		415
18	Panel Cooling Pump - 1	20.0			415
19	Panel Cooling Pump - 2	20.0			415
20	Hydraulic Power pack - 1	12.5			415
21	Hydraulic Power pack - 2	12.5			415
22	Bundling M / C - 2	50.0			415
23	Raw water pump - 1	25.0			415
24	Raw water pump - 2	25.0			415
25	Soft water pump - 1	20.0			415
26	Soft water pump - 2	20.0			415
27	Cooling tower fan	15.0			415
28	OHT pump.	3.0			415
29	Compressor	15.0			415
30	Bore well motor - 1	10.0			415
31	Bore well motor - 2	7.5			415
32	Lathe	10.0			415
33	Mould Cooler - 1	3.0			415
34	Mould Cooler - 2	3.0			415
35	Drilling M/C	3.0			415
36	Mould Cooler - 3	3.0			415
37	Magnet Cooler	3.0			415

38	Welding M / C			8	415
39	Lab Grinding M / C	1.0			415
40	Bore well motor - 3	7.5			415
41	Bore well motor - 4	7.5			415
42	Mould Cooler - 4	2.0			415
43	Water Pump (Sump)	5.0			415
44	Mould Cooler - 5	3.0			415
45	Mould Cooler - 6	3.0			415
46	Water pump (Screper)	3.0			415
47	Transformer Cooling Fan		0.85		415
48	Exhaust Fan 1-8 (0.450 Kw)		3.6		415
49	Exhaust Fan 4	1.5			415
50	Exhaust Fan 5		0.85		415
51	Welding M / C			6	415
52	Grinding M / C	1.0			415
53	Transformer Cooling Fan -2		0.85		415
54	Dust Collector	100.0			415
55	Air Compressor	15.0			415

Table 2.14 Proposed Machineries

S.No.	Description	Unit	Capacity
1	12 ton furnace (for 2) 500 KW in additional with existing 4000 KW	KW	4500
2	DM water motor (2 x 20)	HP	40
3	Hydraulic motor (2 x 15)	HP	30
4	Coil water motor (2 X 20)	HP	40
5	Raw water motor (2 X 25)	HP	50
6	Cooling Tower motor (1 X 15)	HP	15
7	Softener motor (2 x 20)	HP	40
8	Bore well motor(2)	HP	17.5
9	EOT cranes Pdn yard	HP	96
10	EOT cranes scr yard	HP	96

S.No.	Description	Unit	Capacity
11	Bundle machine	HP	65
12	Shearing machine	HP	20
13	Pollution Block	HP	100
14	Water pumps	HP	10
15	Exhausters(10 no)	HP	8
16	Man cooler (10 no)	HP	16
17	Air compressor (3X 20)	HP	15
18	Electro Magnet	KW	14.5
19	Slag Crusher	HP	50
20	Slag Dust Collector	HP	20

Table 2.15 Specifications of the DG Set

Make and model	Kirloskar
Rated capacity	250 KVA
Air : fuel ratio	14.50:1
Fuel used	HSD
Fuel consumption at full load	45 ltrs/hr
Fuel economy under load variation kWh/L	3.5
Exhaust gas temperature (^{o} C)	180

2.24 NOISE POLLUTION

The major sources of noise in the plant are blowers, compressor, furnace operation, DG set etc., Several noise suppression and attenuation features shall be designed into the plant for the protection of personnel at all normally accessible locations within the plant boundary, both inside and outside the plant and for the protection of the inhabitants living in the vicinity of the plant.

CHAPTER - 3 DESCRIPTION OF THE ENVIRONMENT

3.0 DESCRIPTION OF THE ENVIRONMENT

In order to predict the anticipated impacts due to any project, it is necessary to obtain baseline information of the environment, as it exists, which would serve as a datum. The interaction of baseline environment and the anticipated impacts are the basis for the environmental management plan for the activities of the proposed expansion of MS Ingots. This chapter includes existing scenario for various environmental components of the study area.

The baseline environmental quality status is assessed through field studies within the study area for various components of environment, viz, air, noise, water, land, biological and socio-economic. Baseline data collection for each of the environmental components is based on the location of proposed project and anticipated distance of the significant impact. The study area is defined for each of the environmental components independently taking into consideration the vulnerability of the environmental component with respect to the activity of the proposed project. Majority of data on water quality, vegetation, air and noise quality was collected during field studies in April to June 2022.

3.1 ENVIRONMENTAL COMPONENT

Considering the environmental setting of the project, project activities and their interaction, environmental regulations and standards, following Environmental attributes have been included for the EIA study. Study Area will be covering 10 km Radius from project boundary.

- Site specific micrometeorological data for the parameters Wind Speed & direction, Temperature, Humidity, Cloud Cover and Rainfall.
- Ambient Air Quality (at 8 locations) for the parameters: PM10, $PM_{2.5}$, SO_2, NO_X & CO.
- Noise Level Measurements at 8 Locations for both Leq-Day and Leq-Night values.
- Water Quality- Ground Waters (8 Locations) for IS: 10500 Norms.
- Soil Quality (8 Locations) for Textural & Physical Parameters, Nutrients, etc.

- Present & Post-project Land Use Pattern based on Satellite Imagery.
- Biotic Attributes: Flora & Fauna -Core zone & Buffer zone-Diversity Index.
- Socio-Economic Profile (2011 Census): Total Population, Household Size, Age, Gender Composition, SC/ST, Literacy Level, Occupational Structure, etc.

3.2 SAMPLING LOCATIONS

Locations of sampling stations for micrometeorology, air, noise, and water and soil quality are presented in Fig 3.17 - 3.20 respectively.

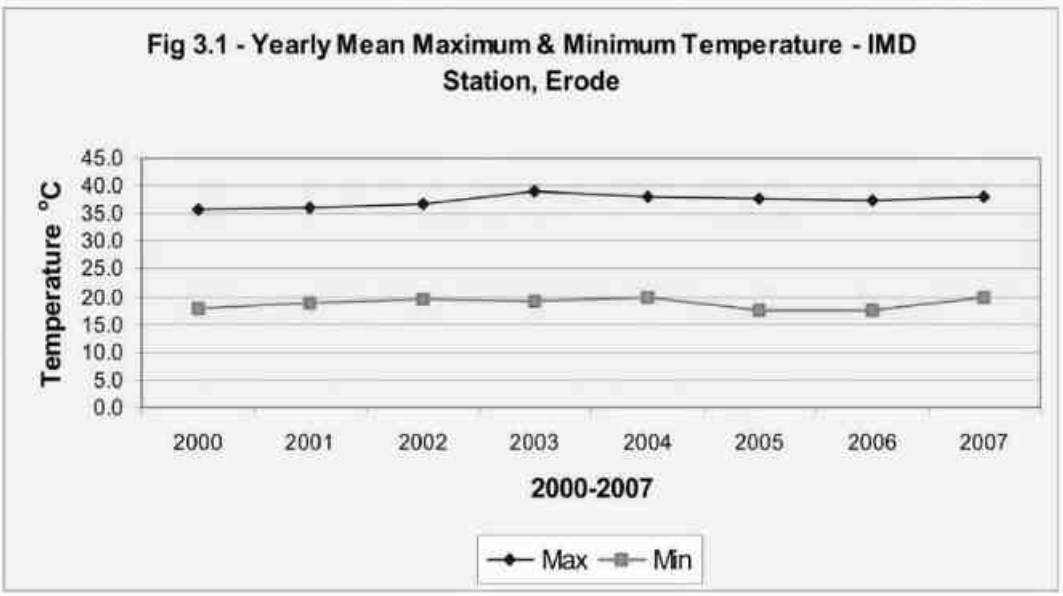
3.3 MICROMETEOROLOGY

As a part of the study, the micrometeorology and microclimatic parameters were recorded by installing a weather monitoring station in the Plant site at 9 m height. Data of wind velocity, wind direction, ambient temperature, relative humidity, cloud cover and atmospheric pressure were recorded at hourly intervals along with rainfall for 24 hours throughout the monitoring period.

3.3.1 Temperature

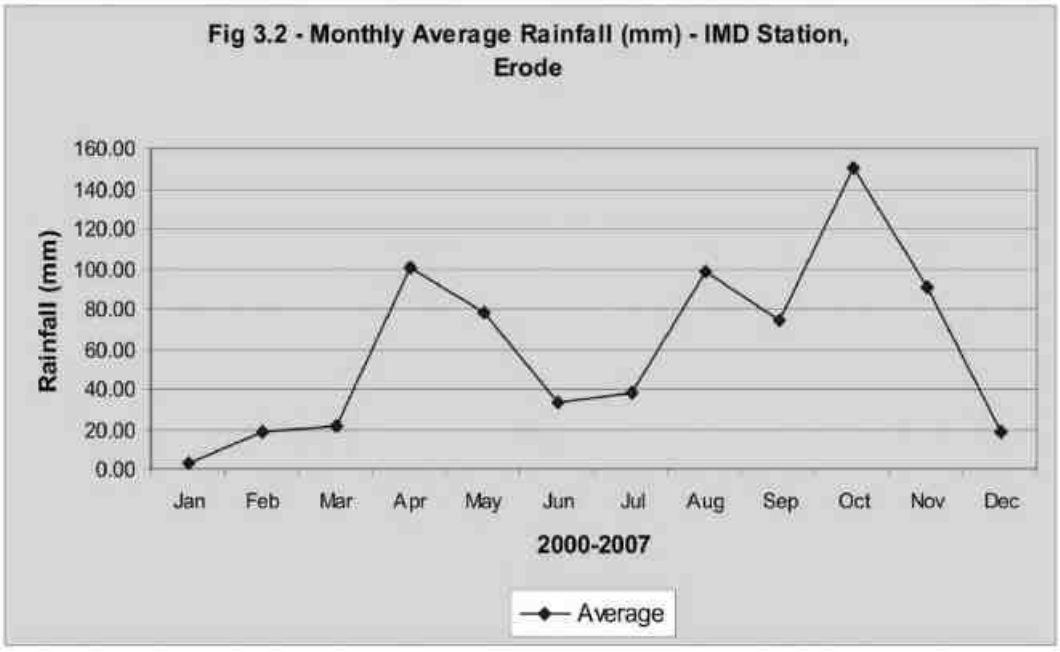
The average daily maximum and minimum temperature for each of the 12 months for the period of 2000-2007 recorded at IMD Erode station have been furnished in the Table 3.2 & 3.3 and graphically presented in Fig. 3.1. May is the hottest month with maximum monthly mean temperature of 39 ^{0}C. December is the coolest month with minimum monthly mean temperature of 17.40 ^{0}C.

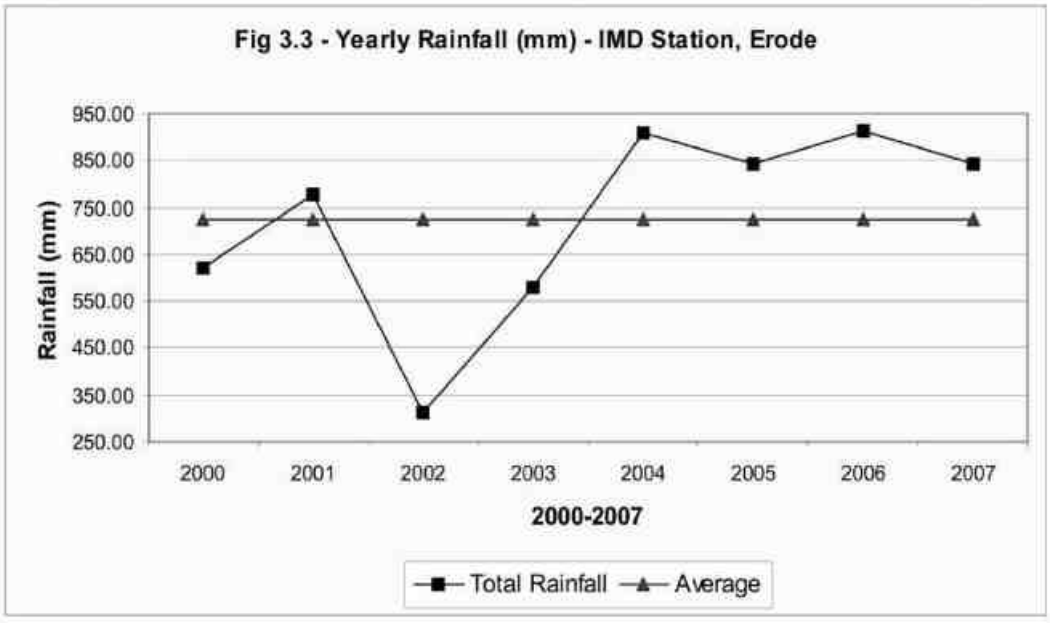
Fig 3.1 - Yearly Mean Maximum & Minimum Temperature - IMD Station, Erode



3.3.2 Rainfall

The monthly rainfall recorded at IMD station Erode, is summarized in Table 3.4 and presented in Fig.3.2. The monthly rainfall variation and average annual rainfall is presented in Fig. 3.3. While the predominant rainy season is the northeast monsoon (Oct-Dec). The region is also influenced to some extent by southwest monsoon (Jun-Sep). While maximum total rainfall of 270 mm is received during the month of November (2006), the minimum of traces is received during February 2004. The mean value of annual rainfall is 725 mm.





3.3.3 Relative Humidity

The minimum and maximum mean relative humidity for 0830 hrs observed in this area during the year 2003 and 2007 is 55% and 87% respectively, whereas minimum and maximum mean relative humidity for 1730 hrs observed in this area during the year 2001 and 2005 is 27% and 81% respectively is summarized in Table 3.5 & 3.6.

3.3.4 Wind Direction

The wind rose diagram based on the data for the period of 1969-1990 for Salem have been obtained from IMD station Erode. The morning (08:30) and evening (17:30) wind roses for the period are shown in the Fig.3.5 and Fig.3.6 respectively. Morning and evening wind roses shows a similar trend. In the month of May to September the predominant wind direction is from SW during both morning and evening hours. During the month of January to March the predominant wind direction is generally from E while for the period from October to December it is from NE.

3.3.5 Wind Speed

The minimum wind speed was 1 km/h and the maximum average speed was 15 km/h. The Pasquill stability class for wind speed is given in Table 3.1.

Table 3.1 Pasquill Stability Class

Surface Wind Speed (m/s) (at 10m)	Day			Night	
	Incoming Solar Radiation				
	Strong	Moderate	Slight	Thinly overcast or ≥4/8 low cloud	≤ 3/8 cloud
< 2	A	A-B	B	E	F
2-3	A-B	B	C	E	F
3-5	B	B-C	C	D	E
5-6	C	C-D	D	D	D
> 6	C	D	D	D	D

Note: A = extremely unstable, B = moderately unstable, C = slightly unstable, D = neutral, E = slightly stable, F = moderately stable. Neutral class D should be assumed for overcast conditions during day or night.

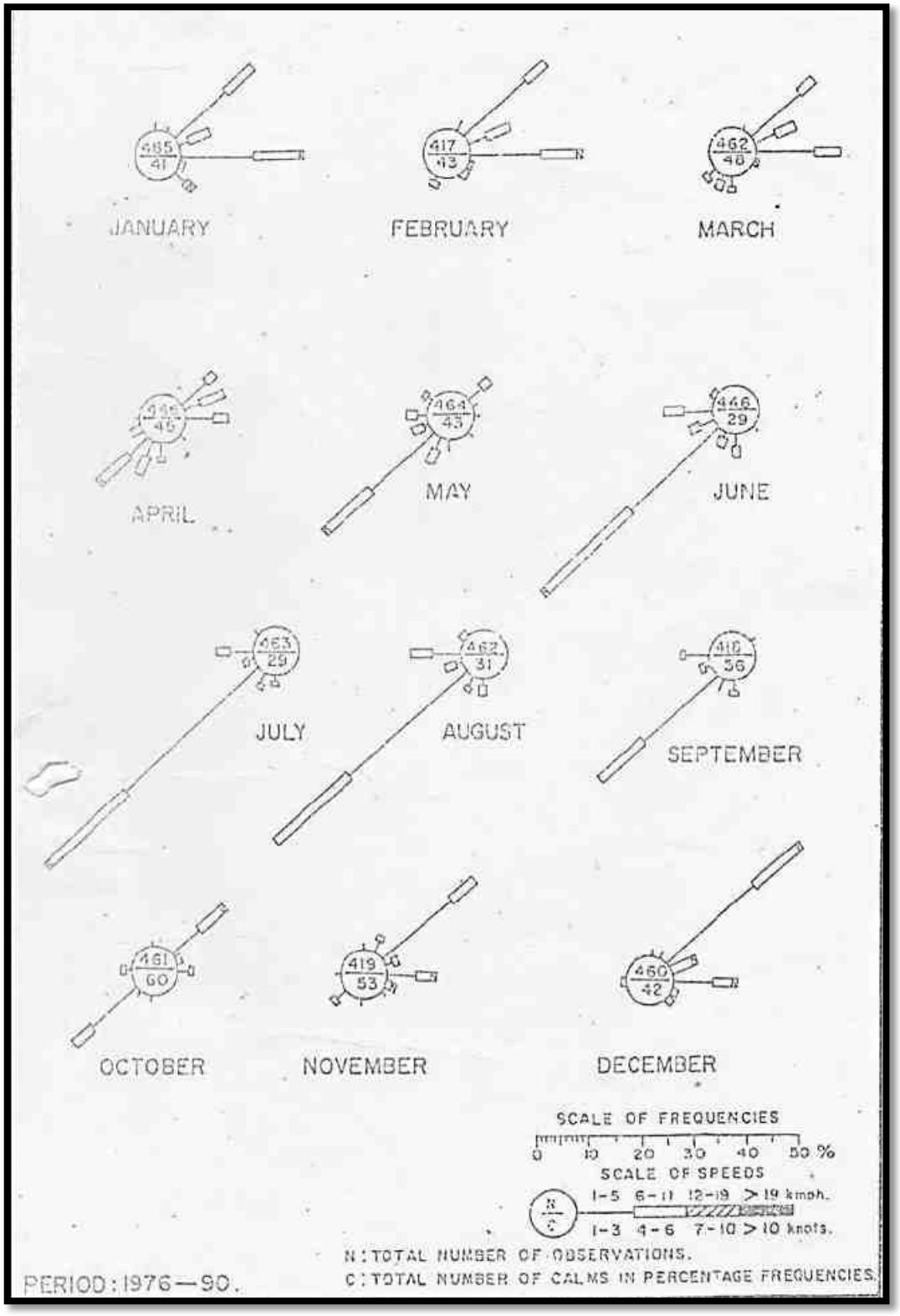


Fig 3.4 Wind Rose Diagram 0830 hrs (1976-90)

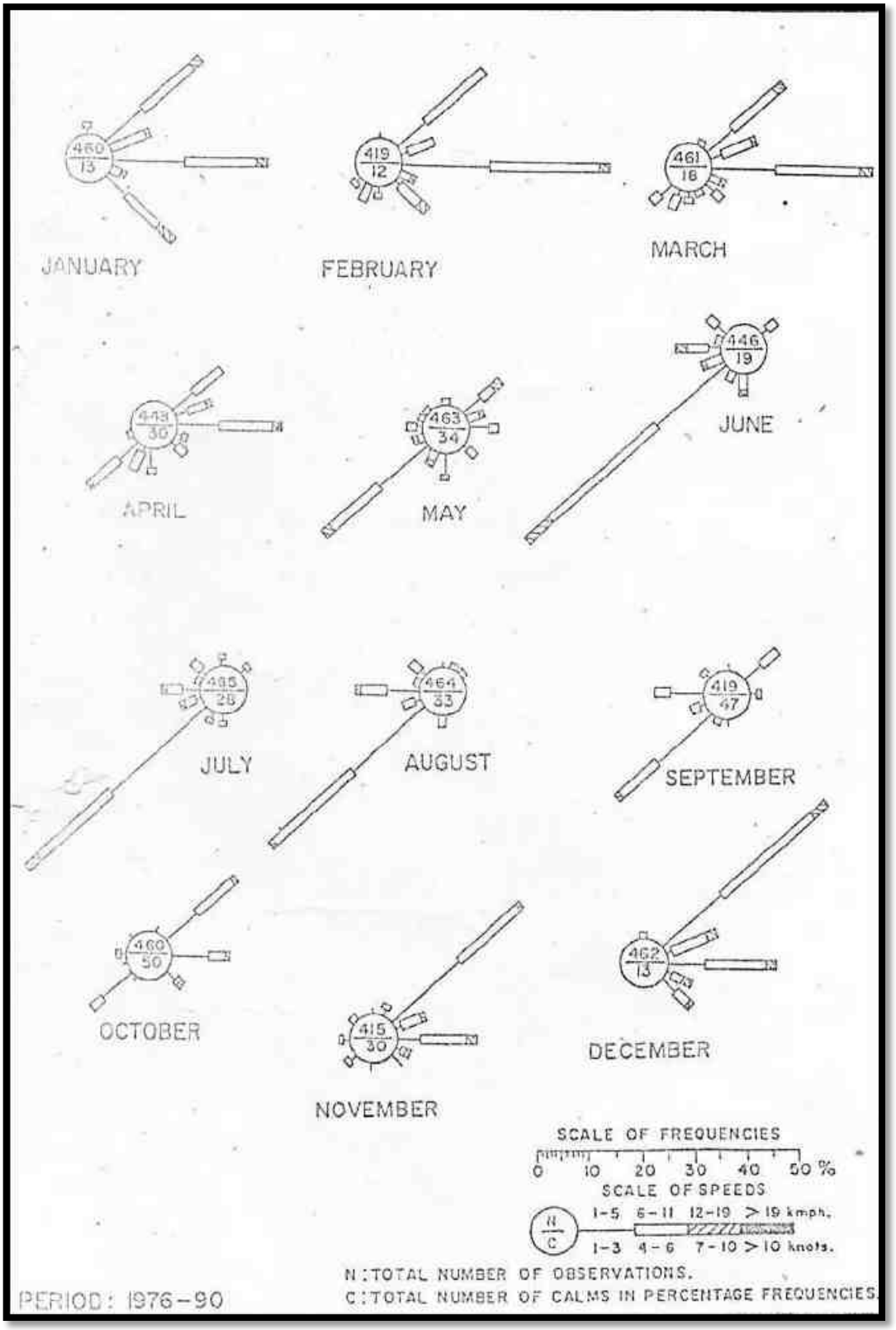


Fig 3.5 Wind Rose Diagram 1730 hrs (1976-90)

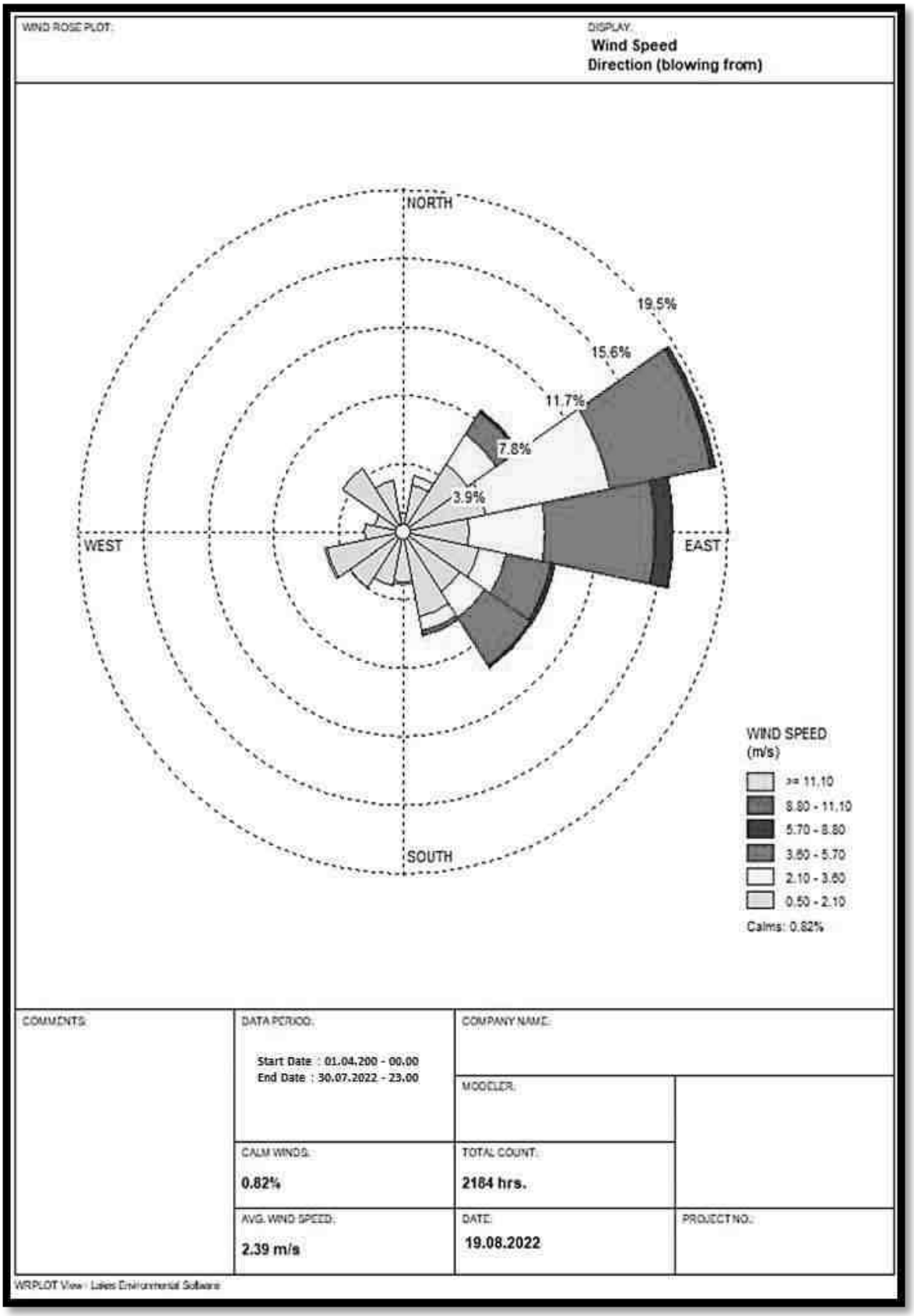


Fig 3.6 Wind Rose Diagram (April - June 2022)

TABLE 3.2 - AVERAGE MINIMUM TEMPERATURE (°C) FOR DIFFERENT MONTHS (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	19.0	19.7	19.5	19.1	20.3	19.8	17.4	20.3	**19.39**
February	20.9	21.0	20.1	19.7	20.6	19.7	17.4	20.6	**20.00**
March	21.6	22.4	22.1	23.6	23.2	21.0	20.2	23.2	**22.16**
April	23.4	23.5	24.2	24.9	26.2	21.1	21.1	26.2	**23.83**
May	23.5	23.6	24.5	24.4	23.7	22.4	20.8	23.7	**23.33**
June	22.0	21.9	22.9	24.3	23.9	22.5	20.6	23.9	**22.75**
July	21.9	21.8	22.5	24.9	23.7	22.2	20.3	23.7	**22.63**
August	21.7	22.0	21.6	23.7	23.8	21.7	20.5	23.8	**22.35**
September	22.1	22.3	23.5	24.0	23.7	21.0	19.4	23.7	**22.46**
October	21.5	22.2	22.8	23.0	22.5	19.9	19.4	22.5	**21.73**
November	20.8	21.7	23.6	22.7	21.5	18.7	18.7	21.5	**21.15**
December	18.0	19.0	20.7	22.2	20.0	17.6	17.7	20.0	**19.40**
Average	**21.4**	**21.8**	**22.3**	**23.0**	**22.8**	**20.6**	**19.5**	**22.8**	**21.76**

NOTE : The average temperatures have been calculated on the basis of data available

Source : Indian Meteorological Department

TABLE 3.3 - AVERAGE MAXIMUM TEMPERATURE (°C) FOR DIFFERENT MONTHS (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	30.6	32.2	31.1	33.7	32.7	33.2	32.8	32.7	**31.07**
February	32.5	34.5	32.1	35.2	34.7	34.8	33.9	34.7	**34.12**
March	34.9	36.2	36.7	34.5	38.2	35.8	35.9	38.2	**36.51**
April	35.8	35.5	35.7	38.7	37.6	35.5	37.5	37.6	**36.83**
May	35.8	35.0	33.2	39.0	32.7	37.6	37.5	32.7	**35.13**
June	32.3	31.6	32.7	38.4	33.5	35.6	36.0	33.5	**34.12**
July	32.3	31.8	31.6	36.0	33.2	35.1	36.2	33.2	**33.62**
August	31.2	32.0	31.1	35.6	33.8	36.1	36.3	33.8	**33.74**
September	32.3	33.4	30.4	36.8	32.3	34.5	34.3	32.3	**33.18**
October	31.6	32.0	33.3	33.2	31.3	32.5	33.0	31.3	**32.17**
November	31.0	30.6	32.5	31.6	30.2	30.0	31.2	30.2	**30.83**
December	29.5	29.0	30.6	34.1	31.7	31.3	31.3	31.7	**31.21**
Average	**32.5**	**32.8**	**32.6**	**35.6**	**33.5**	**34.3**	**34.7**	**33.5**	**33.55**

NOTE : The average temperatures have been calculated on the basis of data available

Source : Indian Meteorological Department

TABLE 3.4 - MONTHLY RAINFALL DATA (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	2.4	0.2	0.0	0.0	0.0	0.0	20.0	0.0	**2.8**
February	111.7	0.1	0.3	2.0	0.0	18.0	0.0	18.0	**18.8**
March	0.0	2.5	5.8	2.2	0.0	71.0	19.0	71.0	**21.4**
April	45.4	192.2	17.5	14.0	71.8	190.0	81.0	190.0	**100.2**
May	23.7	13.8	15.4	49.2	168.1	149.0	57.0	149.0	**78.2**
June	15.0	29.5	17.2	8.0	59.2	16.0	107.0	16.0	**33.5**
July	7.8	13.5	4.2	76.2	66.4	66.4	1.0	66.4	**37.7**
August	182.1	6.9	15.1	129.2	216.7	78.2	79.0	78.2	**98.2**
September	117.0	67.7	116.1	14.2	113.6	34.4	96.0	34.4	**74.2**
October	27.8	269.1	46.3	204.8	164.7	159.4	172.8	159.4	**150.5**
November	60.7	158.5	58.1	73.2	46.6	30.6	270.0	30.6	**91.0**
December	27.3	23.6	17.5	7.0	0.0	31.1	10.0	31.1	**18.5**
Total	**620.9**	**777.6**	**313.5**	**580.0**	**907.1**	844.1	**912.8**	**844.1**	**725.0**

NOTE : The average rainfall have been calculated on the basis of data available

Source : Indian Meteorological Department

TABLE 3.5 – MONTHLY MEAN RELATIVE HUMIDITY (%) AT 0830 HOURS (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	84.0	81.0	82.0	55.0	74.0	66.0	68.0	74.0	**73.00**
February	83.0	75.0	81.0	60.0	64.0	70.0	64.0	64.0	**70.13**
March	78.0	72.0	78.0	70.0	63.0	66.0	64.0	63.0	**69.25**
April	79.0	80.0	74.0	63.0	68.0	68.0	61.0	68.0	**70.13**
May	77.0	77.0	74.0	66.0	82.0	63.0	60.0	82.0	**72.63**
June	82.0	84.0	78.0	64.0	79.0	61.0	59.0	79.0	**73.25**
July	79.0	84.0	82.0	70.0	81.0	64.0	57.0	81.0	**74.75**
August	85.0	82.0	81.0	69.0	77.0	62.0	61.0	77.0	**74.25**
September	86.0	82.0	80.0	62.0	83.0	64.0	66.0	83.0	**75.75**
October	82.0	82.0	83.0	75.0	87.0	75.0	70.0	87.0	**80.13**
November	81.0	84.0	80.0	71.0	81.0	87.0	74.0	81.0	**79.88**
December	80.0	83.0	79.0	67.0	78.0	79.0	76.0	72.0	**76.75**
Average	**81.3**	**80.5**	**79.3**	**66.0**	**76.4**	**68.8**	**65.0**	**75.9**	**74.16**

NOTE : The average relative humidity have been calculated on the basis of data available

Source : Indian Meteorological Department

TABLE 3.6 - MONTHLY MEAN RELATIVE HUMIDITY (%) AT 1730 HOURS (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	46.0	42.0	43.0	46.0	46.0	52.0	63.0	43.0	**50.80**
February	45.0	27.0	35.0	43.0	28.0	42.0	52.0	28.0	**36.44**
March	31.0	32.0	33.0	51.0	31.0	43.0	55.0	31.0	**37.56**
April	52.0	47.0	36.0	50.0	46.0	54.0	46.0	46.0	**47.00**
May	50.0	54.0	58.0	51.0	69.0	49.0	50.0	69.0	**57.67**
June	66.0	69.0	62.0	55.0	57.0	56.0	53.0	57.0	**59.11**
July	60.0	67.0	65.0	68.0	61.0	59.0	52.0	61.0	**61.56**
August	70.0	66.0	64.0	68.0	49.0	49.0	54.0	49.0	**57.56**
September	70.0	61.0	66.0	49.0	63.0	59.0	59.0	63.0	**61.44**
October	67.0	64.0	63.0	70.0	71.0	66.0	62.0	71.0	**67.22**
November	56.0	63.0	58.0	68.0	70.0	81.0	69.0	70.0	**67.22**
December	50.0	55.0	56.0	57.0	48.0	71.0	67.0	48.0	**55.56**
Average	**55.3**	**53.9**	**53.3**	**56.3**	**53.3**	**56.8**	**56.8**	**53.0**	**54.93**

NOTE : The average relative humidity have been calculated on the basis of data available

Source : Indian Meteorological Department

TABLE 3.7 - MONTHLY AVERAGE WIND SPEED, 24 HRS (KMPH) (2000-2007) FROM IMD STATION ERODE

Month	2000	2001	2002	2003	2004	2005	2006	2007	Average
January	5	6	5	2	3	1	7	3	**4.0**
February	6	6	6	2	3	2	1	3	**3.6**
March	6	8	7	2	4	2	2	4	**4.4**
April	9	4	7	2	3	1	1	3	**3.8**
May	11	11	12	2	1	2	3	1	**5.4**
June	13	13	15	5	2	3	3	2	**7.0**
July	14	14	14	5	1	3	3	1	**6.9**
August	11	13	11	3	2	3	3	2	**6.0**
September	9	11	11	4	1	2	2	1	**5.1**
October	7	7	5	5	1	0	1	1	**3.4**
November	5	2	4	1	1	0	1	1	**1.9**
December	4	3	2	2	1	0	1	1	**1.8**
Average	**8.3**	**8.2**	**8.3**	**2.9**	**1.9**	**1.6**	**2.3**	**1.9**	**4.4**

NOTE : The average wind speed have been calculated on the basis of data available

Source : Indian Meteorological Department

3.4 TOPOGRAPHIC STUDY OF THE AREA

3.4.1 Introduction

The project site is located in Namakkal District of Tamil Nadu State, lies at a distance of 14 km from Tiruchengode and 30 km from Erode. The hottest month of Namakkal is May (33^0 C) and coldest month is January (26^0 C). Namakkal is hailed as the hub of everything. It is one of the finest industrial and educational centres in Tamilnadu. Namakkal is a developing city in Tamilnadu that share its boarders with Salem district in the north and Karur district in the south. In the east, it is bounded by Attur taluk of Salem district and from the west by Erode district. This district is parted into four sub-divisions, namely Tiruchengode, Namakkal, Rasipuram and Velur. Apart from agriculture, Namakkal is famous for the mass poultry production. Namakkal was formerly a part of Salem district, and later in the year 1997 Namakkal was officially declared as a separate city. The area of Namakkal district covers about 3,368 sq.km, the area of paramathi velur taluk covers about 525 sq.km, the area of Nallur village covers 13.79 sq.km and the area of our project site is 3.39 hectares.

3.4.2 Rainfall and Climate

The study area receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the study area. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal. The southwest monsoon rainfall is highly erratic and summer rains are negligible.

Rainfall data from six stations over the period 1901-2000 were utilized and a perusal of the analysis shows that the normal annual rainfall over the district varies from about 640 mm to 880 mm. It is the minimum around Paramathi (640.50 mm) in the southwestern part of the district. It gradually increases towards north, northeast and east and attains a maximum around Rasipuram (880.5 mm) in the northern part.

The district enjoys a tropical climate. The weather is pleasant during the period from November to January. Mornings in general are more humid than the afternoons, with the humidity exceeding 78% on an average. In the period June to November the afternoon humidity exceeds 66% on an average. In the rest of the year the afternoons are drier, the summer afternoons being the driest.

The hot weather begins early in March, the highest temperature being felt in April and May. Weather cools down progressively from about the middle of June and by December, the mean daily maximum temperature drops to 30.2°C, while the mean daily minimum drops to 19.2°C and 19.6°C in January in Salem and Mettur Dam respectively. Though the maximum temperatures in February are about the same as in July, the nights are much cooler in February. Being an interior district, the diurnal range of temperature is large, particularly in the dry and hot seasons. In February-March the mean diurnal range of temperature is as high as 13.7°C while in October-November it is only about 9°C.

3.4.3 Drainage

Cauvery river, which is perennial in nature, flows along the western and southern boundaries of the district. Tirumanimuttar river, which is the most important tributary of Cauvery in the district, has its origin in Manjavadi area of Shevroy hills in Salem district and traverses the district before its confluence with Cauvery at Nanjai Edayar village of Paramathi taluk. A small area in the northeastern part, which is drained mainly by Vasista Nadi and Sweta Nadi rivers, which are tributaries of Vellar River.

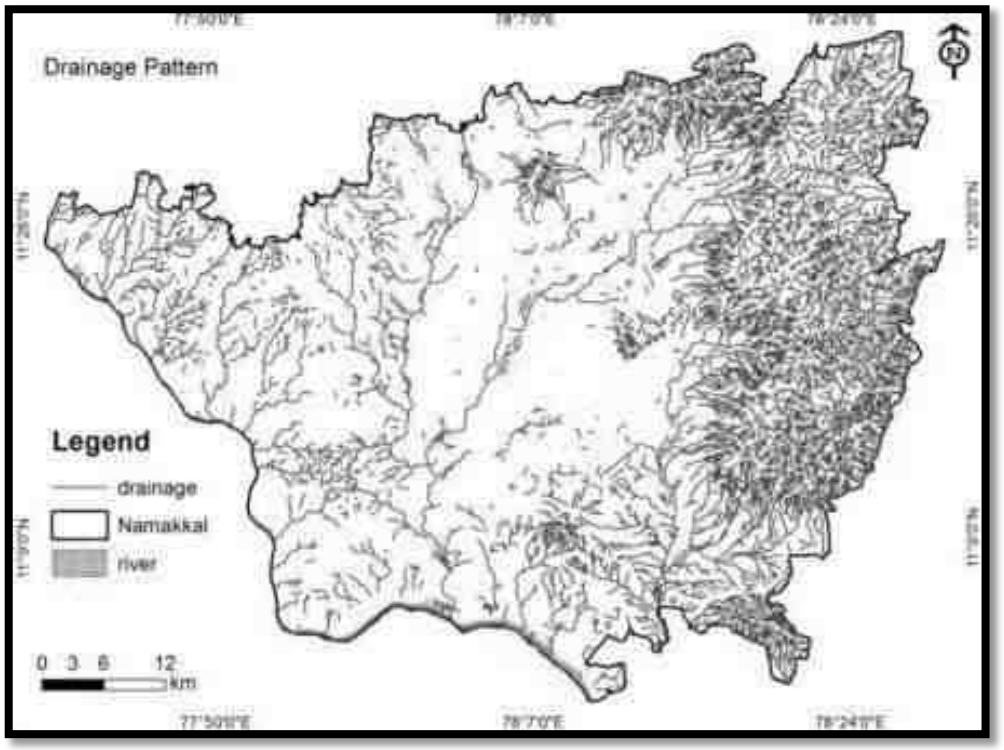


Fig. 3.7 Drainage Pattern

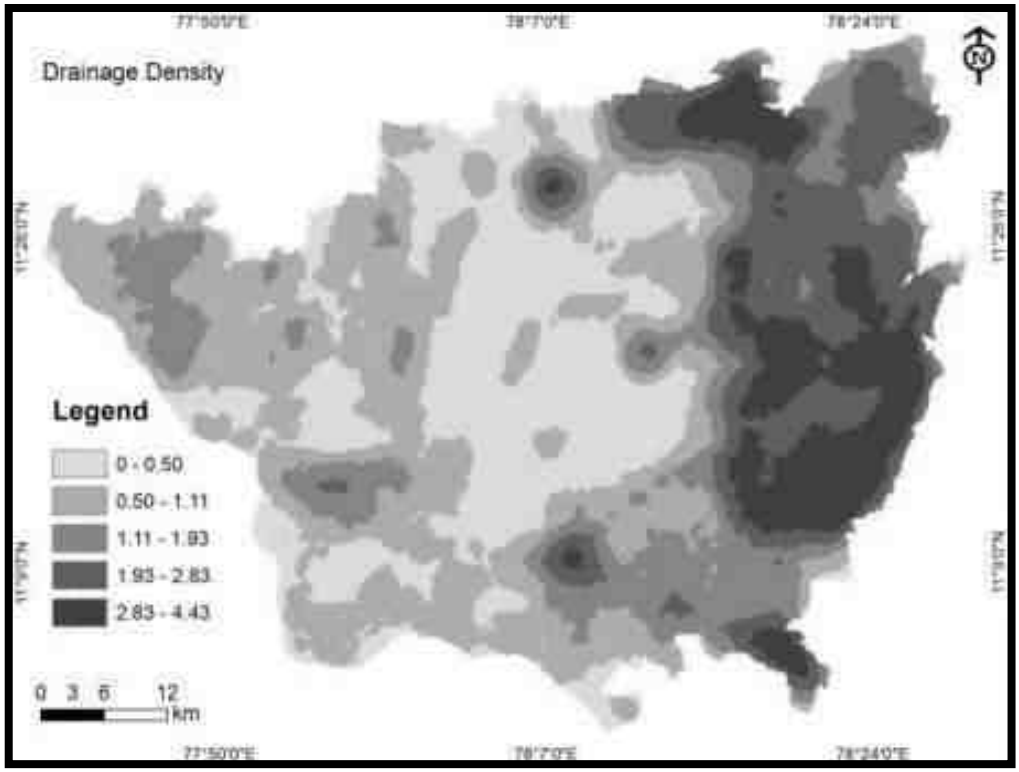


Fig. 3.8 Drainage Density

3.4.4 Irrigation Practices

The nine - fold land use classification for the district is given below (2005 - 2006)

Table 3.8 Land Use

S.No	Classification	Area (Ha)
1	Forests	43909
2	Barren & Uncultivable Lands	24743
3	Land put to Non-Agricultural uses	38302
4	Cultivable Waste Lands	4781
5	Permanent Pastures & other grazing lands	6684
6	Groves not included in the area sown	3854
7	Current Fallows	28375
8	Other Fallow Lands	9143
9	Net Area sown	176544
Total		**336335**

(Source: Department of Economics & Statistics, Govt. of Tamil Nadu)

The data available indicate that an area of about 74318 ha (22%) is under irrigated agriculture. Dug wells are the major source of water for irrigation in the district, accounting for about 55% of the total area irrigated in the district. Tube wells accounting for about 29% of the total area irrigated in the district. Canals and tanks account for about 8% each.

The block wise and source wise net area irrigated in Hectares is given below (2005-06).

Table 3.9 Block wise & Source wise Net Area Irrigated

S.No	Block	Net Area Irrigated by					TotalNet Area Irrigated
		Canals	Tanks	Tube Wells	Ordinary Wells	Other Sources	
1	Elachipalayam	0.00	0.00	2410	1506	0.00	3916
2	Erumaipatti	0.00	1268	1120	5622	218	8228
3	Kabilarmalai	3149	0.00	0.00	3507	3050	9706
4	Kolli hills	0.00	0.00	6.00	0.00	788	794
5	Mallasamudram	0.00	2724	142	1567	0.00	4433
6	Mohanur	412	206	757	5318	8.00	6701
7	Namagiripet	0.00	0.00	291	4893	20.00	5204
8	Namakkal	0.00	0.00	96	1667	0.00	1763
9	Pallipalayam	1209	0.00	296	2383	986	4874
10	Paramathi velur	337	0.00	95	5983	0.00	6415
11	Puduchatram	0.00	0.00	258	4059	0.00	4317
12	Rasipuram	0.00	0.00	496	1711	0.00	2207
13	Sendamangalam	0.00	0.00	130	5413	1057	6600
14	Thiruchengode	1040	0.00	406	4564	0.00	6010
15	Vennandur	0.00	0.00	242	2908	0.00	3150
Total		**6147**	**4198**	**6745**	**51101**	**6127**	**74318**

(Source: Department of Economics & Statistics, Govt. of Tamil Nadu)

3.4.5 Geomorphology

Namakkal district forms part of the upland plateau region of Tamil Nadu with many hill ranges, hillocks and undulating terrain with a gentle slope towards east. The prominent geomorphic units identified in the district through interpretation of Satellite imagery are,

- Structural hills,
- Bazada zone,
- Valley fill,
- Pediments,
- Shallow Pediments and
- Deep Pediments.

A number of hill ranges are located in the eastern and northeastern parts of the district, whereas the southern, western and northern parts of the district are plain to undulating, dotted with a few isolated hillocks. The important hill ranges in the district are Kollimalai hills, Bodamalai hills, Naraikinaru hills and Pachamalai hills. The highest peak in the district is the Kollimalai hill peak with an elevation of 1293m. above MSL. Other important peaks are Kedda Malai (1284 m) and Melur hill in the Bodamalai hill range.

Table 3.10 Types of Geomorphology

S.No.	Types of Geomorphology	Area (Sq.km)
1.	Structural Hill	513.35
2.	Plateau	237.519
3.	Flood Plain	179.936
4.	Composite Slope	275.366
5.	Bazada Zone	82.79
6.	Shallow Pediment	2115.339
Total Area		**3404.3**

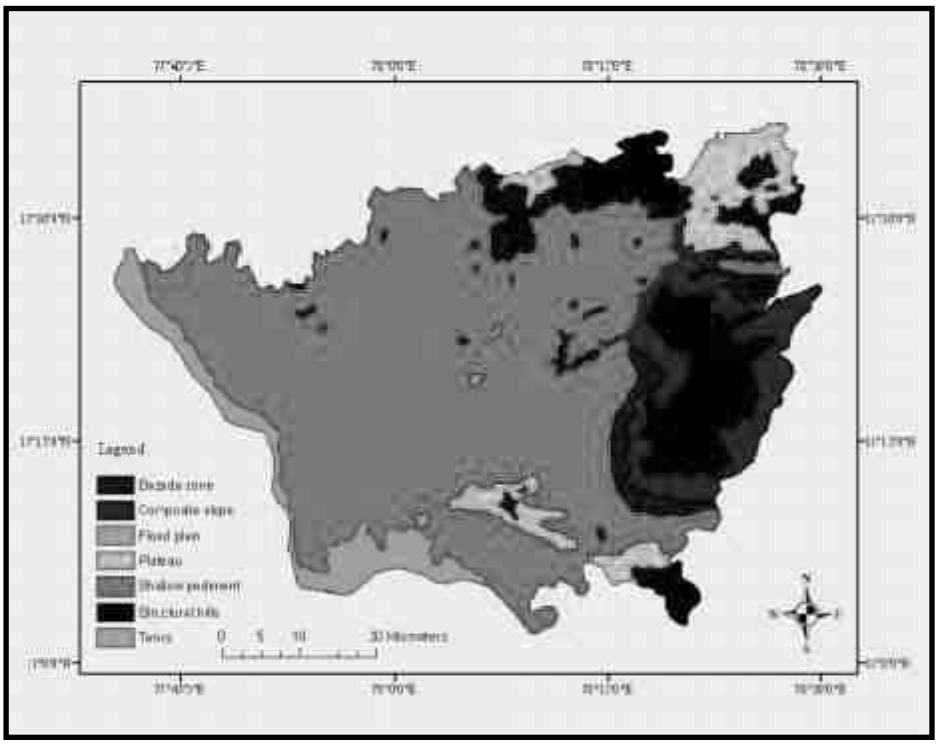


Fig. 3.9 Geomorphology Map

3.4.6 Soils

The soils of Namakkal district can be broadly classified into 5 major soils types viz., Red Soil, Black Soil, Brown soil, Alluvial and Mixed Soil. Major part of the district covered by Red Soil. Block soils are mostly seen in Namakkal taluk. Brown Soil occupies only a small portion of Tiruchengode taluk and the Alluvial Soil is seen along the river courses in Namakkal, Paramathi and Tiruchengode taluks. Mixed soil is the second major soil type occurring all the taluks of the districts.

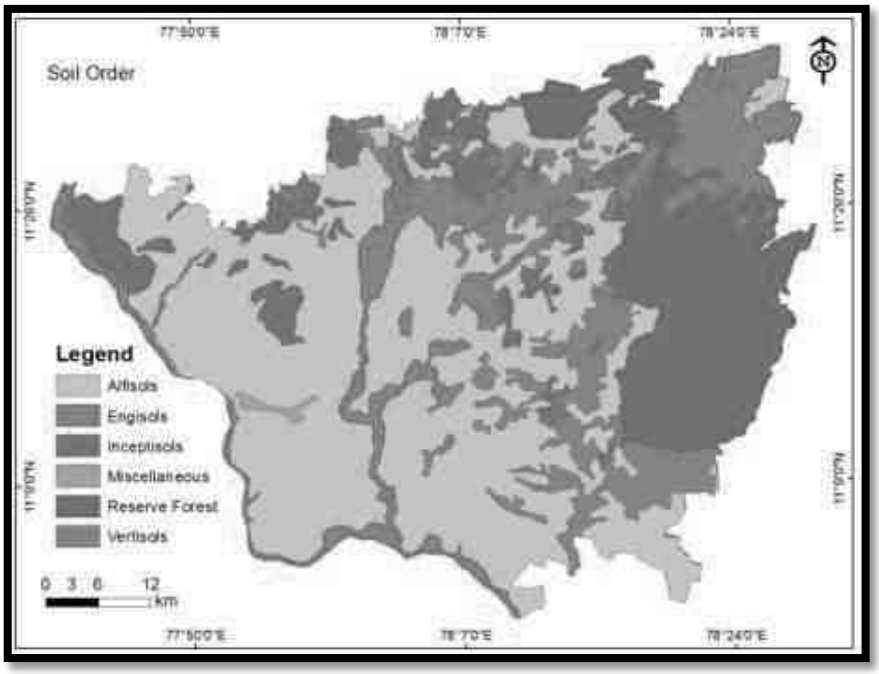


Fig. 3.10 Soil Order Map

3.4.7 Geology

Namakkal is well endowed with substantial mineral resources and a high geological potential which is yet to be fully explored and exploited. Namakkal currently produces different types of minerals and rocks. The gap between projected demand and supply is widening in respect of number of minerals. Though Namakkal exports a number of raw processed minerals and rocks.

Calcite quartzites and crystalline limestone's are exposed in patches in north and central parts of the district. The thickness of these bands varies from a few

metres to ten metres and the length extends to few kilometres. Massive and poorly jointed anorthosites bearing rocks are also found. They are associated with wide range of Chromite, Pyroxenite, Anthophyllite, Diopside, etc. There are number of basic intrusive of Dolerite dykes present in the study area. Granites and Syenites types of rocks are found in some parts of the district. They are massive and jointed poorly (PWD 2001). Thin veneer of alluvium is found along the course of the Cauvery and Thirumanimuthar. However, alluvium of few metres thickness is found near the junction of river Thirumanimuthar and river Cauvery. Several faults and shears are occurring mostly with north east-south west trend. The structure of the study area is highly tectonised and is complex is structure. As described earlier gneisses show well foliation in the NE-SW to SSW direction with sub vertical to vertical trending NNE-SSW and NE-SW direction in the eastern part. There are a number of folds, faults, shears and joints in the area, with has experienced at least three district phase of the tectonic movement. The different types of geology of the study area are summarized below,

Table 3.11 Types of Rocks

S.No.	Types of Rocks	Area (Sq.km)
1.	Zone of Breciation	26.40
2.	Ultrabasic with Magnesite	12.79
3.	Pyroxene Granulite	195.77
4.	Granitoid Gneiss & Granitoid Gneisswith Pegmatie	96.02
5.	Dolerite	5.66
6.	Charnocite	1052.88
7.	Alluvium	196.43
8.	Gneissic Rocks	1812.46
Total Area		**3398.40**

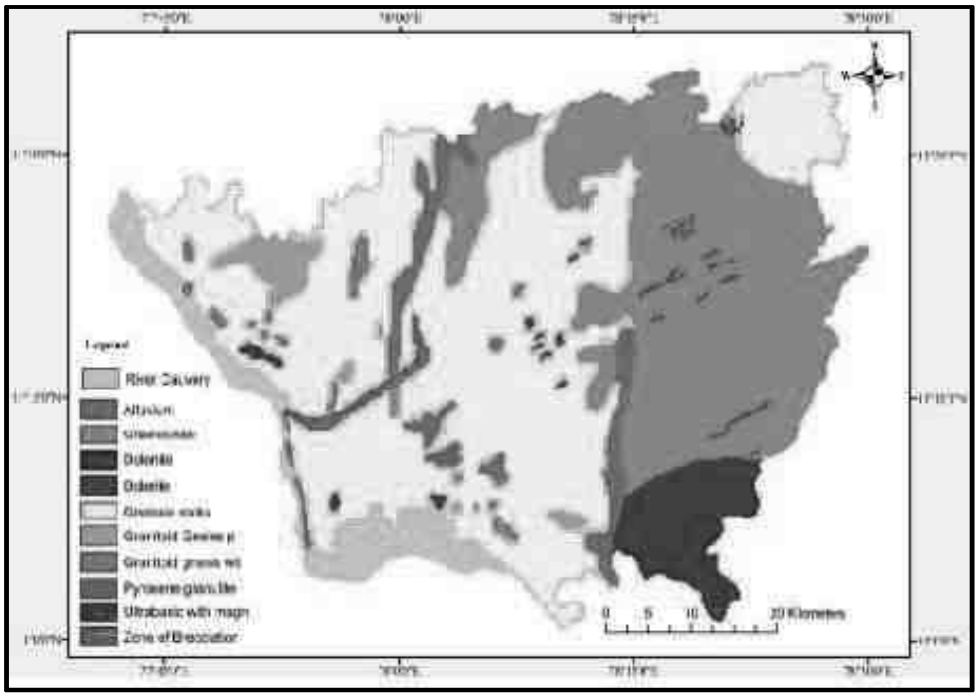


Fig. 3.11 Geology Map

3.4.8 Hydrogeology

Namakkal district is underlain entirely by Archaean Crystalline formations with Recent alluvial deposits occurring along the river courses and Colluvium at the foot hills. The important aquifer systems in the district are constituted by weathered & fractured crystalline rocks and Colluvial deposits. The porous formations in the district are represented by alluvium and colluvium. The alluvial deposits are confined to the major river courses only. Ground water occurs under phreatic conditions. The maximum saturated thickness of these aquifers is up to 5 m depending upon the topographic conditions. The area lying at the foot hill zones which are seen in the northern parts of the district is underlain by the colluvial material derived from the nearby hill ranges comprising sands and gravels. The maximum saturated thickness of these aquifers is up to 20 m depending upon the topographic conditions. Ground water occurs under phreatic conditions. The hard consolidated crystalline rocks of Archaean age represent weathered and fractured formations of Granite Gneiss, Granite, Charnockite and other associated rocks. Ground water occurs under phreatic conditions in the weathered mantle and under semi-confined

conditions in the fractured zones. The thickness of weathered zone in the district ranges from <1m to 30m. It is within the depth of 20 m in major part of the district while in the western and extreme north-north-eastern parts of the district, they are more than 20 m. The depth of the dug wells ranged from 7 to 45m BGL. The yield of the open wells range from <50 to 200 m3/day in weathered crystalline rocks and up to 400 m3/day in Recent alluvial formations along major drainage courses.

The Specific capacity of large diameter wells tested in crystalline rocks from 59 to 270 LPM/M of drawdown. The yield characteristics of wells vary considerably depending on the topographic set-up, lithology and the degree of weathering. The yield of bore wells drilled down to a depth of 40 to 100 m, by various state agencies mainly for domestic purposes ranged from 90 to 360 litres per hour (< 1 LPS). The yield of successful bore wells drilled down to a depth of 300 m BGL during the ground water exploration programme of Central Ground Water Board ranged from < 1 to 15 LPS. The aquifer and well parameters of the wells show wide variation.

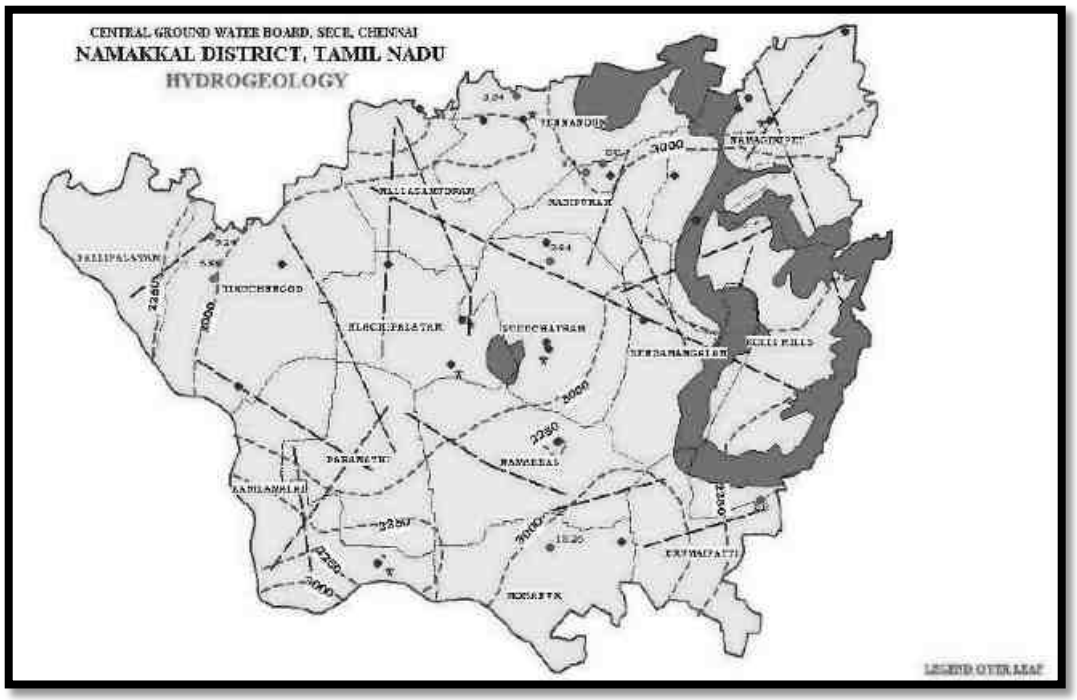


Fig. 3.12.a Hydrogeology Map

The depth to water level in the district varied between 1.20 – 14.33 m BGL during pre- monsoon depth to water level (May 2006) and varied between 0.86 – 16.60 m BGL during post monsoon depth to water level (Jan 2007). The seasonal fluctuation shows a rise in water level, which ranges from 0.03 to 3.51 m BGL. The piezometric head varied between 1.35 to 9.40 m BGL (May 2006) during pre-monsoon and G.L to 13.00 m BGL during post monsoon

3.4.8.1 Long Term Fluctuation (1998-2007)

The long-term water level fluctuation for the period 1998-2007 indicates both rise and fall in water level in different parts of the district. The rise is of the order of 0.0335 - 0.6159 m/year, while the fall in water level range between 0.0186 - 0.9738 m/year.

3.4.8.2 Aquifer Parameters

Aquifer Parameters	Weathered Residuum	Fractured Aquifer
Transmissivity (m^2/day)	<1 - 100	2 -106
Storativity	-	9.6×10^{-5} - 4.3×10^{-2}
Specific yield	0.015	-

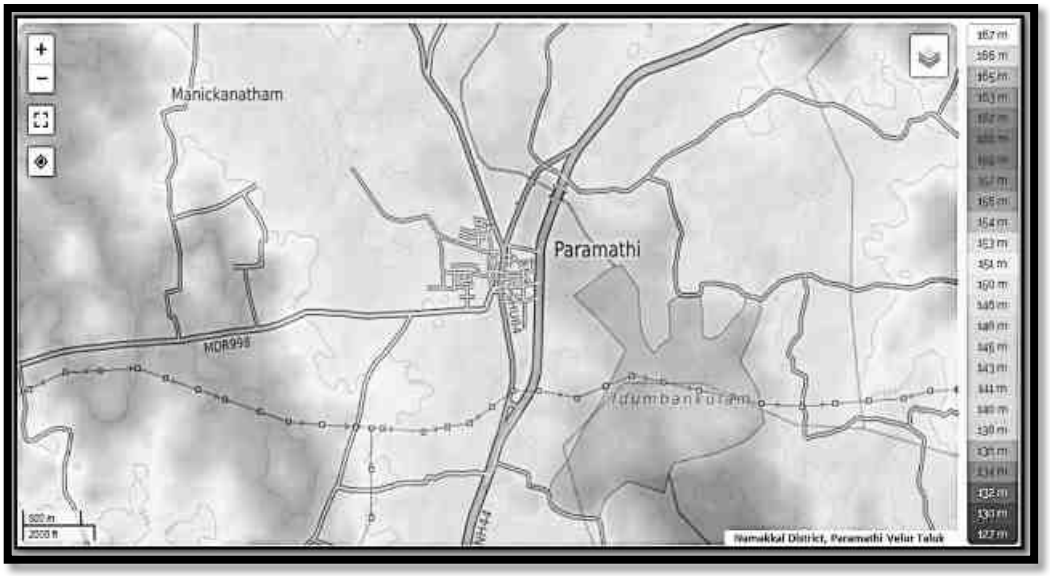


Fig. 3.12.b Elevation Model Map of the Study Area

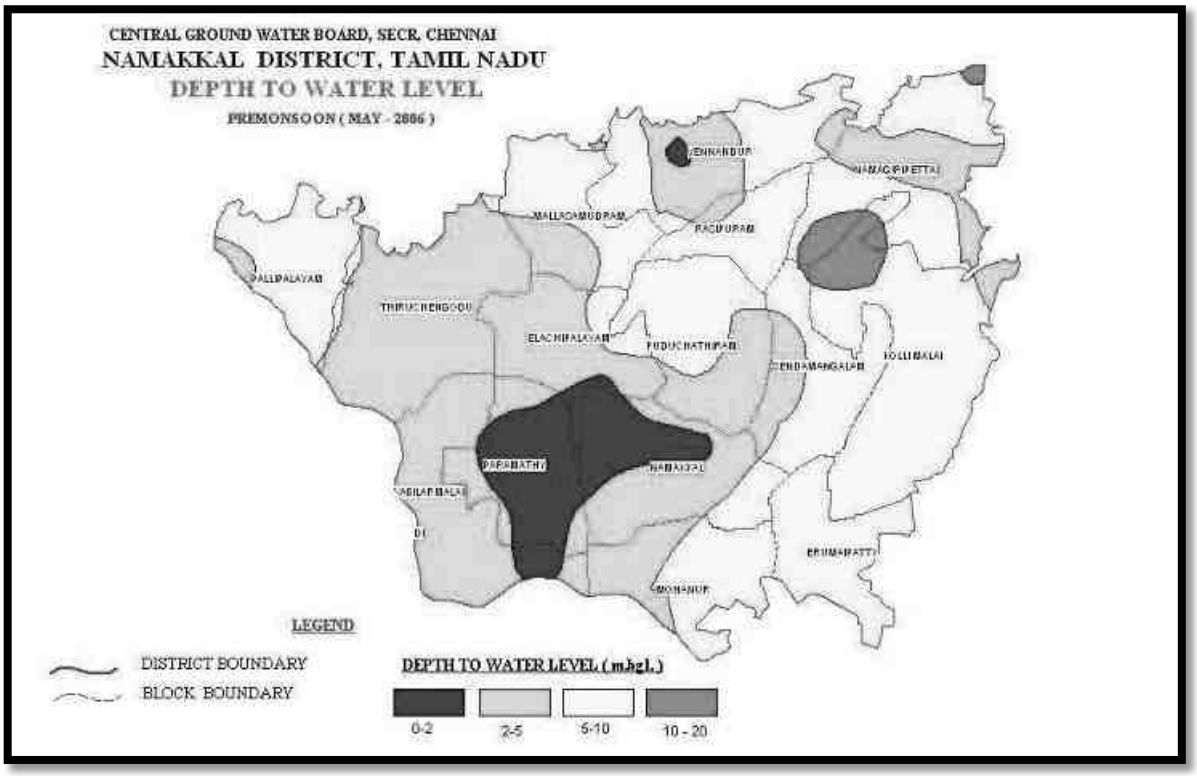


Fig. 3.13 Depth to Water Level (Pre-Monsoon)

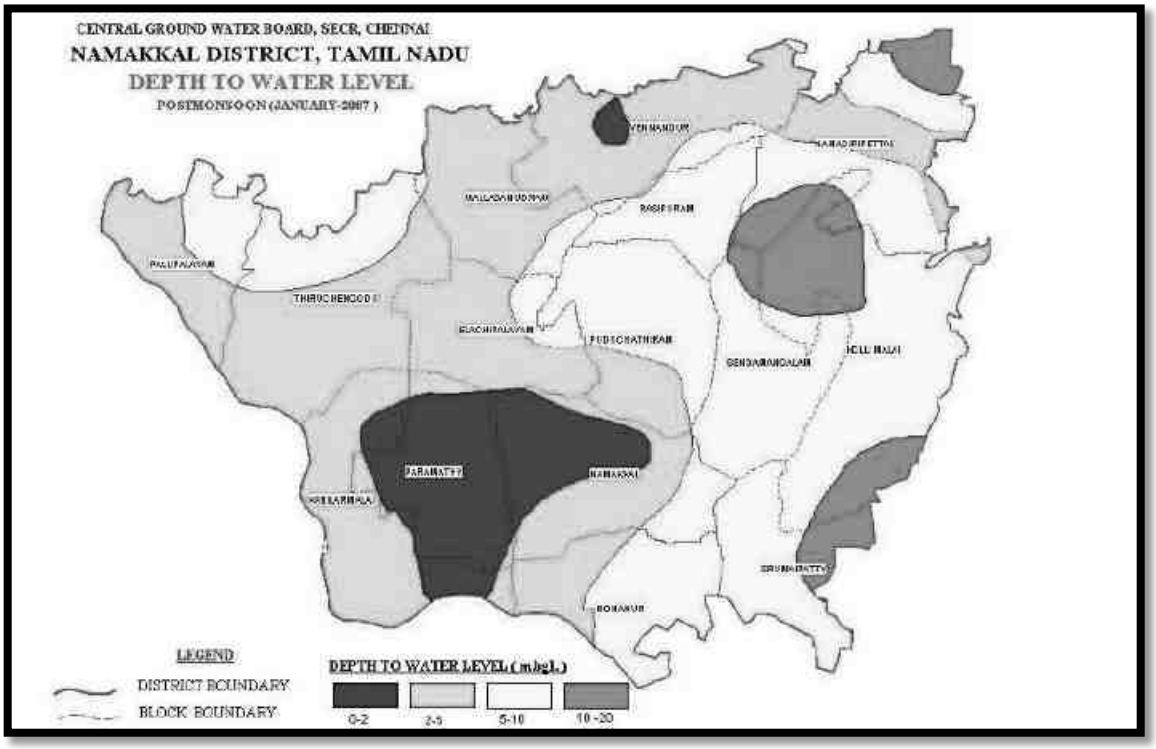


Fig. 3.14 Depth to Water Level (Post-Monsoon)

3.5 STATUS OF GROUND WATER DEVELOPMENT

The estimation of groundwater resources for the district has shown that 8 blocks are over exploited and 2 blocks are under "critical" category. Tamil Nadu Water Supply and Drainage (TWAD) Board is the Government agency responsible for providing drinking water supplies to the urban and rural populace in the district. The water requirements of the habitations are met with either through surface water sources or through various Mini Water Supply Schemes or Integrated water supply schemes utilising the available ground water resources.

The status of urban and rural water supply in the district as in March 2007 is furnished below,

Total Number of Rural Habitants	:	2875
Not Covered	:	395 (0-9 LPCD)
Partly Covered	:	1422 (10-39 LPCD)
Fully Covered	:	1058 (>40 LPCD)

The habitants of 5 Municipalities of the district are provided with 70 - 90 LPCD water and the habitants 19 Special Panchayats are provided with 20 – 70 LPCD water. Dug wells have traditionally been the most common ground water abstraction structures used for irrigation in the district, with yields ranging from <50 to 200 m^3/day in weathered crystalline rocks and up to 400 m3/day in recent alluvial formations along major drainage courses.

3.5.1 Groundwater quality

Ground water in phreatic aquifers in Namakkal district is in general colorless, odorless and predominantly alkaline in nature. The specific electrical conductance of ground water in phreatic zone (in Micro Seimens at 25°C) during May 2006 was in the range of 1300 to 7080 in the district. It is between 2000 and 4000 µS/cm at 25°C in the major part of the district. It is observed that only in selected places of the district, the ground water is suitable for drinking and domestic uses in respect of all the constituents. The total Hardness as CaCO3 as well as nitrate is observed to be in excess of permissible limits in about 66 and 86

percent of samples analysed. Fluoride in excess of the drinking water limit of 1.5 mg/L is observed in 30 percent of the samples. In about 14 percent of the samples sulphates was in excess of the drinking water limit of 400 mg/L. The incidence of high total hardness and fluoride is attributed to the composition of lithounits constituting the aquifers in the district, whereas the nitrate pollution is most likely due to the use of fertilizers and other improper waste disposal. Excess of fluoride is observed in places such as Venandur, Udaiyarpalayam, Talamabadi, V.G.Patti and Mohanur. With regard to irrigation suitability based on specific electrical conductance and sodium Absorption Ratio (SAR), it is observed that ground water in the phreatic zone may cause high to very high salinity hazard and medium to high alkali hazard when used for irrigation. Proper soil management strategies are to be adopted in the major part of the district while ground water for irrigation.

3.6 Land Use change between 1971-2011

In general, every place developing any one of the factor, may be the growth of industrial activities, or infrastructure, economic importance of the activities, in other factors for better employment, education, and atmost the commercial points one. Namakkal is one of the growing industrial sector among the Tamilnadu. The overall concentration between 1971-2011, based on the Land sat image, in 1971, based on the SOI , the concentration of the settlement in the core portion of the town, seen scatter in radial pattern, than 1981, just few places only expanding toward in the S-W direction. In 1991 year, the growth means were randomly seen in the entire urban town. Again the 2001, S-S, S-W direction and 2011, is comparatively more concentration of the growth in the all direction. In other uses like, education, health, Recreational is more concentration the core of the town. The overall the urban land use, transport and pattern of settlement is concentration around the Namakwa fort and southern portion of the town.

3.6.1 Land Use

The Land use classification is given in Table 3.12

Table 3.12 Land Use Classification

S. No.	Land Classification	Area (Hectares)			
		2015-2016	2016-2017	2017-2018	2019-2020
1	Geographical Area	3,36,719			
2	Forest	1401.39			
3	Reserve Forest	42507.602			
4	Barren and Uncultivable Lands	24454.355	24454.355	24539.015	24539
5	Area under Non-Agricultural Use	38738.32	38738.015	38763.849	63557
6	Cultivable Waste Lands	4759.73	4759.73	4776.74	4777
7	Permanent Pastures and other Grazing Land	6663.29	6663.29	6663.99	6663
8	Land under miscellaneous Tree Crops and Groves not included in the Net Area Sown	3767.74	3767.74	3271.25	3200
9	Current Fallow	49130.62	65726.3	52265.73	37017
10	Other Fallow Lands	9321.455	9321.455	14084.136	22850
11	Net Area Sown	155974.93	139330.555	147995.730	154746
12	Total Cropped Area	207844.835	165910.085	202844.296	212768
13	Area sown more than once	51869.905	26579.525	54848.566	58022

Source : District Statistics Handbook

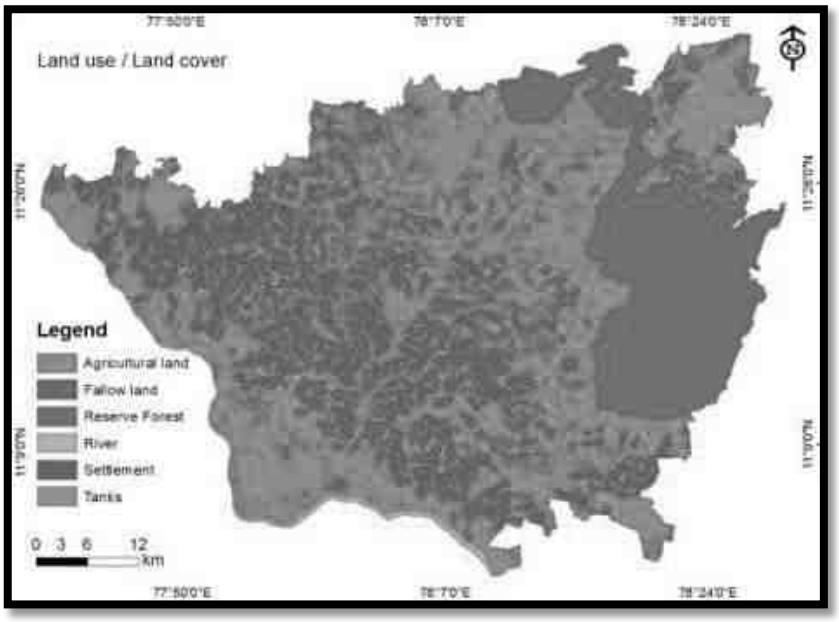


Fig. 3.15 Land Use / Land Cover Map

3.7 SEISMICITY

There are four major zones (zones II, III, IV, V) in India, based on the seismic-tectonic parameters, history of seismicity and certain geophysical parameters. Here, the Namakkal district falls under the Zones II & III. Of these two zones, our project site located in Nallur Village falls under the Seismic zone II.

Fig 3.16 Seismic Zonal Map of Tamil Nadu

3.8 AMBIENT AIR QUALITY

The ambient air quality with respect to the study zone of 10 km radius around the project site forms the baseline information. The prime objective of the baseline air quality study was to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed project. The study area represents mostly residential environment. This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The results of monitoring carried out for study period of April to June 2022.

3.8.1 Ambient Air Quality Standards

Ambient Air Quality standards has been notified by the MoEF vide Gazette Notification dated 18th November 2009 are presented in Table 3.13.

No.B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No. 14 of 1981), and in super session of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect namely,

Table 3.13 National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighte daverage	Concentration in AmbientAir		Methods of Measuremen t
			Industrial, Residentia l,Rural and Other Area	Ecologically sensitive area (notified by Central Govt.)	
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m^3	Annual*	50	20	• Improved West andGeake • Ultraviolet fluorescenc e
		24 hours**	80	80	
2	Nitrogen Dioxide (NO_2), µg/m^3	Annual*	40	30	• Modified Jacob & Hochheiser (Na-Arsenite) • Chemiluminescence
		24 hours**	80	80	
3	Particulate Matter(size less than 10 µm) or PM_{10} µg/m^3	Annual*	60	60	• Gravimetric • TOEM • Beta attenuation
		24 hours**	100	100	
4	Particulate Matter (size less than 2.5 microns) or $PM_{2.5}$ µg/m^3	Annual*	40	40	• Gravimetric • TOEM • Beta attenuation
		24 hours**	60	60	
5	Ozone (O_3) µg/m^3	8 hours **	100	100	• UV photometric • Chemiluminescence • Chemical method
		1 hour **	180	180	
6	Lead (Pb) µg/m^3	Annual*	0.5	0.5	• ASS / ICP method after sampling on EPM 2000 or equivalent filter paper • ED – XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide(CO) mg/m^3	8 hours**	2	2	Non Dispersive InfraRED (NDIR) Spectroscopy
		1 hour**	4	4	

8	Ammonia (NH_3) µg/m^3	Annual* 24 hours**	100 400	100 400	• Chemiluminescence • Indophenol bluemethod
9	Benzene (C_6H_6) µg/m^3	Annual*	5	5	• Gas chromatography based continuousanalyser • Adsorption and desorption followed by GC analysis
10	Benzo (a) Pyrene(BaP) – particulate phaseonly ng/m^3	Annual*	1	1	Solvent extraction followed by HPLC / GC analysis
11	Arsenic (As) ng/m^3	Annual*	6	6	AAS / ICP method aftersampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng/m^3	Annual*	20	20	AAS / ICP method after sampling on EPM 2000or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular sitetaken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

3.8.2 Selection of Sampling Locations

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

- Meteorological conditions are synoptic scale
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representatives of likely impact areas

Ambient Air Quality Monitoring (AAQM) stations were set up at eight locations with due consideration to the above mentioned points. The AAQM locations are depicted in Figure 3.17.

Particulate Matter (PM_{10} & $PM_{2.5}$)

The PM_{10} and $PM_{2.5}$ among the eight sampling stations covering the study region varied from 46 to 73 µg/m^3 and 21 to 33 µg/m^3 respectively. These results are presented in Table 3.14

Sulphur Dioxide (SO_2)

During the present study SO_2 concentration is from 7 to 18 µg/m^3 presented in Table 3.14.

Oxides of Nitrogen (NO_X)

Nitrogen dioxide was in the range of 13 to 31 µg/ m^3 presented in Table 3.14.

Table 3.14.a Air Quality Results

CODE	Locations	PM_{10}, µg/m³				$PM_{2.5}$, µg/m³				SO_2, µg/m³				NO_X, µg/m³			
		Min	Max	Avg	98 per	Min	Max	Avg	98 per	Min	Max	Avg	98 per	Min	Max	Avg	98 per
AAQ1	Project Site	65	73	69	71.54	30	33	31.5	32.34	13	18	15.5	17.64	23	31	27	30.38
AAQ2	Devanampalayam	59	66	62.5	64.68	27	30	28.5	29.4	8	13	10.5	12.74	17	20	18.5	19.6
AAQ3	Rama Devam	57	61	59	59.78	25	29	27	28.42	7	10	8.5	9.8	13	16	14.5	15.68
AAQ4	Kunnamalai	59	63	61	61.74	28	32	30	31.36	9	14	11.5	13.72	15	21	18	20.58
AAQ5	Tidunal	61	68	64.5	66.64	26	29	27.5	28.42	11	15	13	14.7	17	24	20.5	23.52
AAQ6	Kolaram	53	59	56	57.82	21	24	22.5	23.52	7	12	9.5	11.76	14	18	16	17.64
AAQ7	Sittampundi	48	54	51	52.92	21	26	23.5	25.48	12	17	14.5	16.66	21	30	25.5	29.4
AAQ8	Kodur	46	51	48.5	49.98	23	27	25	26.46	10	16	13	15.68	18	28	23	27.44
CPCB / MoEF & CC Standards																	
Industrial / Residential/ Rural and Other Area		**100**				**60**				**80**				**80**			

Code	Location	Latitude	Longitude	Direction	Distance (km)
AAQ1	Project Site	11°14'52.45"N	77°57'5.53"E	-	-
AAQ2	Devanampalayam	11°18'0.30"N	77°56'21.50"E	N	5.94
AAQ3	Rama Devam	11°15'38.77"N	77°59'0.61"E	NE	3.77
AAQ4	Kunnamalai	11°14'23.59"N	77°57'56.64"E	SE	1.78
AAQ5	Tidunal	11°11'39.35"N	77°55'26.08"E	SW	6.65
AAQ6	Kolaram	11°17'49.72"N	77°58'44.57"E	NE	6.22
AAQ7	Sittampundi	11°14'28.36"N	77°55'36.63"E	SW	2.73
AAQ8	Kodur	11°15'44.82"N	78° 2'17.03"E	E	9.55

Table 3.14.b Air Quality Results

CODE	Location	Ammonia, µg/m3	Ozone, µg/m³				CO, mg/m³	Lead, µg/m3	Benzene, µg/m3	Benzo[a]pyrene, ng/m3	Arsenic, ng/m3	Nickel, ng/m3
			Min	Max	Avg	98 per						
AAQ1	Project Site	BDL (<5)	8.1	13	10.5	12.7	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ2	Devanampalayam	BDL (<5)	8.9	14.3	11.6	14.0	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ3	Rama Devam	BDL (<5)	6.4	10.2	8.3	9.9	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ4	Kunnamalai	BDL (<5)	9.4	14.3	11.8	14.0	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ5	Tidunal	BDL (<5)	7.4	11	9.2	10.7	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ6	Kolaram	BDL (<5)	10.4	18.1	14.2	17.7	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ7	Sittampundi	BDL (<5)	7.9	12.9	10.4	12.6	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
AAQ8	Kodur	BDL (<5)	8.5	12.5	10.5	12.2	BDL (<0.2)	BDL (<0.1)	BDL (<0.1)	BDL (<0.01)	BDL (<1)	BDL (<1)
CPCB / MoEF & CC Standards												
Industrial / Residential/ Rural and Other Area		**400**	**100**				**2**	**1**	**5**	**1**	**6**	**20**

Code	Location	Latitude	Longitude	Direction	Distance (km)
AAQ1	Project Site	11°14'52.45"N	77°57'5.53"E	-	-
AAQ2	Devanampalayam	11°18'0.30"N	77°56'21.50"E	N	5.94
AAQ3	Rama Devam	11°15'38.77"N	77°59'0.61"E	NE	3.77
AAQ4	Kunnamalai	11°14'23.59"N	77°57'56.64"E	SE	1.78
AAQ5	Tidunal	11°11'39.35"N	77°55'26.08"E	SW	6.65
AAQ6	Kolaram	11°17'49.72"N	77°58'44.57"E	NE	6.22
AAQ7	Sittampundi	11°14'28.36"N	77°55'36.63"E	SW	2.73
AAQ8	Kodur	11°15'44.82"N	78° 2'17.03"E	E	9.55

BDL - Below Detection Limit

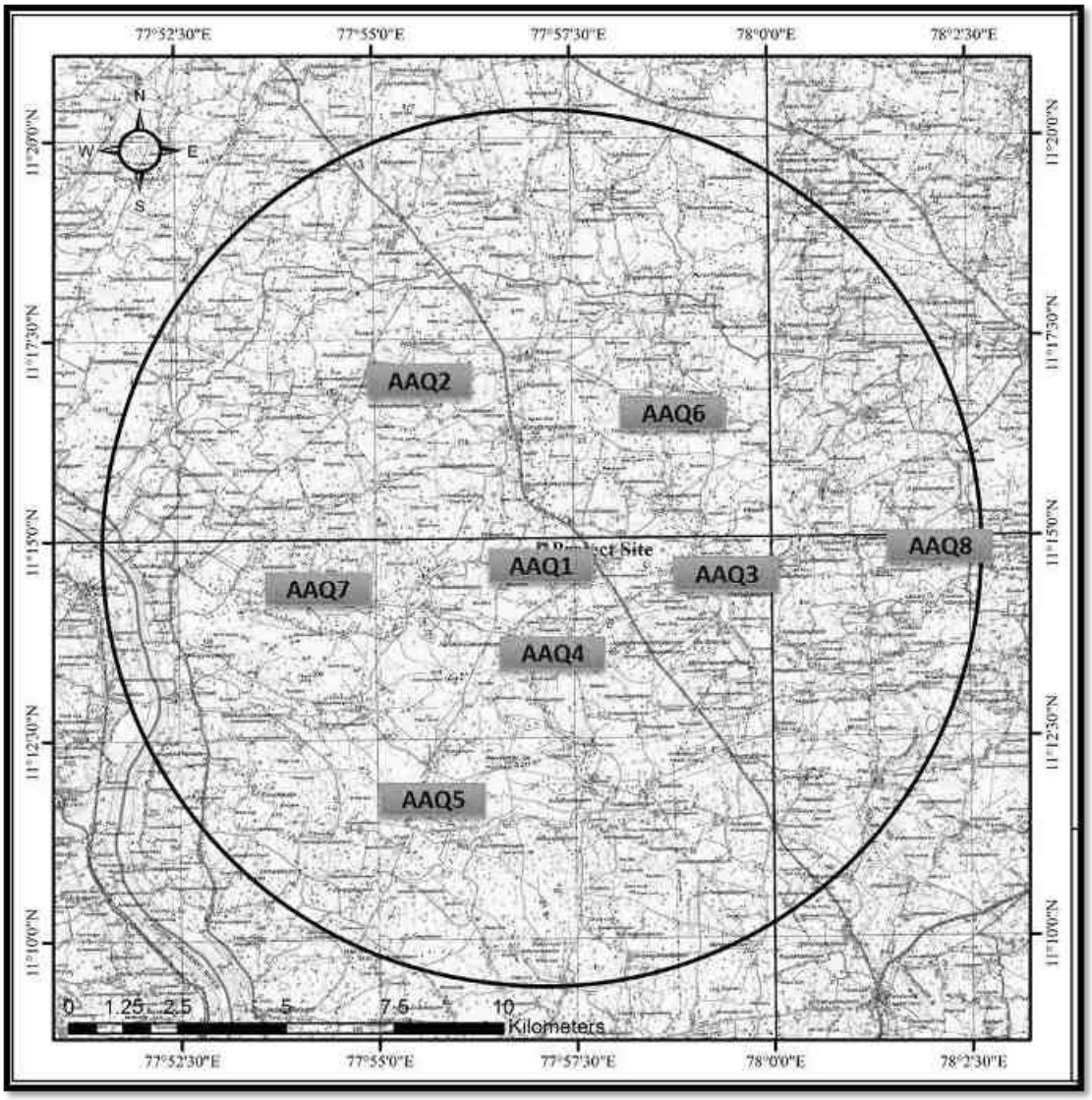


Fig 3.17 AAQ Sampling Location Map

3.9 NOISE ENVIRONMENT

The noise monitoring has been conducted for determination of noise levels at eight locations around the study area. Levels of noise have been monitored during 6am to 10 pm and night levels during 10pm to 6am. In the residential cum rural areas equivalent day and night noise levels ranges from 44 to 64 dB(A). The details of sampling locations with respect to the plant site and the equivalent day night levels are tabulated in Table 3.16.

3.9.1 Ambient Noise Standards

Ambient Noise level standards have been notified by the MoEF vide Gazette Notification dated 26th December 1989 and also in the Schedule III of the Environmental (Protection) Rules 1986. It is based on the 'A' weighted equivalent noise level (Leq). These are presented in Table 3.15.

Table 3.15 National Ambient Noise Standards

Category of Zones	Leq in dB(A)	
	Day *	Night+
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone **	50	40

Source: Central Pollution Control Board

* *Day Time is from 6.00 AM and 9.00 PM.*

\+ *Note –2: Night Time is reckoned between 9.00 PM and 6.00 AM*

** *Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.*

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

3.9.2 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the study area. Noise at different noise generating sources have been identified based on the activities in the village area, ambient noise due to small scale industries, traffic and noise at sensitive areas like hospitals and schools.

Table 3.16 Equivalent Day-Night Noise Level Details

CODE	Location	Bearing *	Distance (km)	Equivalent Levels dB(A)	
				Day	Night
N1	Project Site	--	--	64	55
N2	Devanampalayam	NW	4.7	58	51
N3	Rama Devam	SE	3.2	55	48
N4	Kunnamalai	SE	2.8	58	51
N5	Tidunal	SW	5.6	60	53
N6	Kolaram	NE	3.3	57	49
N7	Sittampundi	SW	3.5	51	44
N8	Kodur	E	9.55	52	48

* With respect to project site

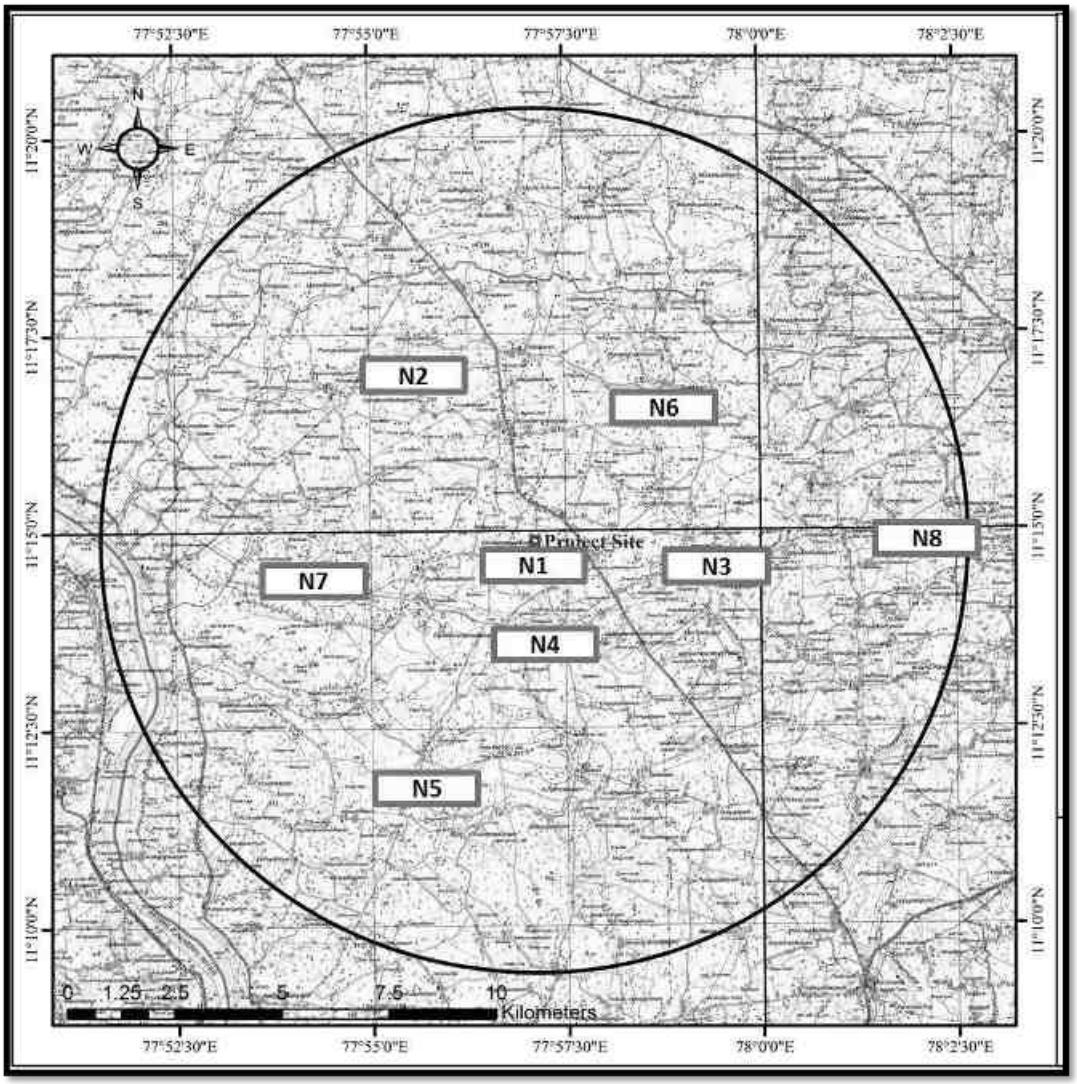


Fig 3.18 Noise Sampling Location Map

Code	Location	Latitude	Longitude	Direction	Distance (km)
N1	Project Site	11°14'52.45"N	77°57'5.53"E	-	-
N2	Devanampalayam	11°18'0.30"N	77°56'21.50"E	N	5.94
N3	Rama Devam	11°15'38.77"N	77°59'0.61"E	NE	3.77
N4	Kunnamalai	11°14'23.59"N	77°57'56.64"E	SE	1.78
N5	Tidunal	11°11'39.35"N	77°55'26.08"E	SW	6.65
N6	Kolaram	11°17'49.72"N	77°58'44.57"E	NE	6.22
N7	Sittampundi	11°14'28.36"N	77°55'36.63"E	SW	2.73
N8	Kodur	11°15'44.82"N	78° 2'17.03"E	E	9.55

3.10 WATER QUALITY

The water samples are collected from eight locations in the study area. We have submitted the permissible limit for the drinking purposes as well as the permissible limits in the absence of alternative sources. Generally, the desirable limit is obtained by the river water only, whereas we have received the water samples from ground water. The water from sampled location falls in the range mentioned for drinking water when there is no alternative source. In case, water for drinking purposes to be used is no alternative source.

3.10.1 Testing Method for Various Parameters

Table 3.17 Testing Method

S.No.	Paramaeters	Unit	Test Method
1	Colour	Hazen	APHA 22nd EDITION
2	Odour	-	APHA 22nd EDITION
3	pH at 25 degree C	-	IS : 3025 Part 11 - 1983 (Reaff : 2002)
4	Electrical Conductivity	µS/cm	IS : 3025 Part 14 - 1984 (Reaff : 2002)
5	Turbidity	NTU	IS : 3025 Part 10 - 1984 (Reaff : 2002)
6	Total Dissolved Solids	mg/L	IS : 3025 Part 10 - 1984 (Reaff : 2002)
7	Total Hardness as CaCO3	mg/L	IS : 3025 Part 21 - 2009
8	Total Alkalinity as CaCO3	mg/L	IS : 3025 Part 23 - 1986 (Reaff : 2003)
9	Chloride as Cl	mg/L	IS : 3025 Part 32 - 1988 (Reaff : 2003)
10	Sulphate as SO4	mg/L	APHA 22nd EDN - 4500 SO4 ^ 2- E
11	Fluoride as F	mg/L	APHA 22nd EDN - 4500 -F B&D
12	Nitrate as NO3	mg/L	APHA 22nd EDN - 4500- NO3 ^- B
13	Calcium as Ca	mg/L	IS : 3025 Part 40 - 1991 (Reaff : 2003)
14	Magnesium as Mg	mg/L	APHA 22nd EDN - 3500, Mg -B
15	Iron as Fe	mg/L	IS : 3025 Part 21 - 2009

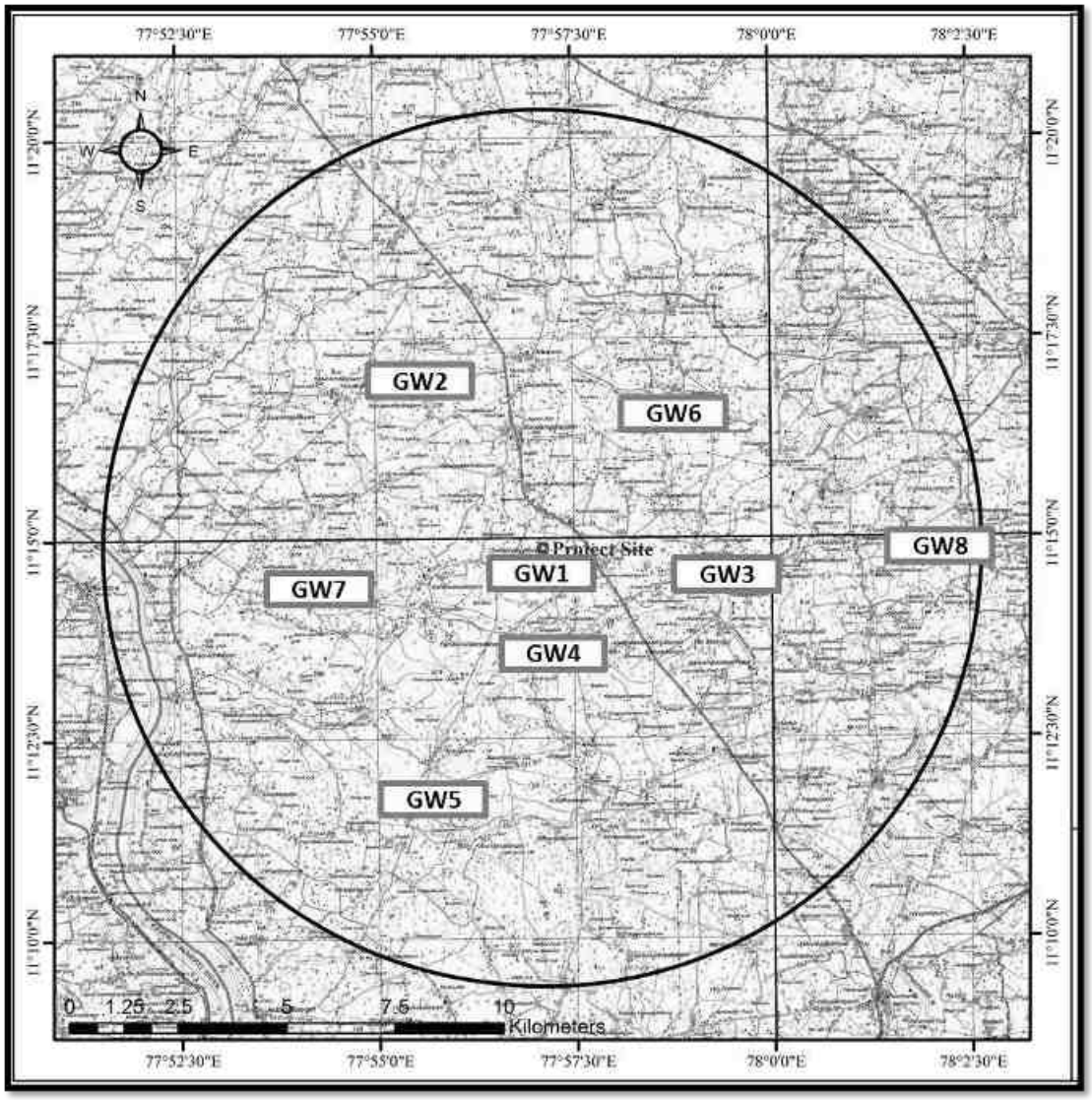


Fig. 3.19 Water Sampling Locations

Code	Location	Latitude	Longitude	Direction	Distance (km)
GW1	Project Site	11°14'52.45"N	77°57'5.53"E	-	-
GW2	Devanampalayam	11°18'0.30"N	77°56'21.50"E	N	5.94
GW3	Rama Devam	11°15'38.77"N	77°59'0.61"E	NE	3.77
GW4	Kunnamalai	11°14'23.59"N	77°57'56.64"E	SE	1.78
GW5	Tidunal	11°11'39.35"N	77°55'26.08"E	SW	6.65
GW6	Kolaram	11°17'49.72"N	77°58'44.57"E	NE	6.22
GW7	Sittampundi	11°14'28.36"N	77°55'36.63"E	SW	2.73
GW8	Kodur	11°15'44.82"N	78° 2'17.03"E	E	9.55

Table 3.18 Water Quality Results

S.No.	Parameters	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1.	pH	-	7.5	7.2	7.5	7.5	7.1	7.6	7.3	7.1
2.	Colour (Visual)	-	Colour less	Colour less	Colour less	Colour less	Colour less	Colour less	Colour less	Colour Less
3.	Odour	-	Decent	Decent	Decent	Decent	Decent	Decent	Decent	Decent
4.	Turbidity (NTU)	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5.	Electrical conductivity	(µS/Cm)	1114	1703	1206	1970	1348	1622	1611	2055
6.	Total alkalinity ($CaCo_3$)	mg/L	216	190	164	290	164	290	208	184
7.	Total hardness ($CaCo_3$)	mg/L	428	644	304	536	446	514	572	834
8.	Calcium (Ca)	mg/L	91	183	77.3	149	177	129	139	199
9.	Magnesium (Mg)	mg/L	61	65	21	58	49	65	79	94
10.	Iron (Fe)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
11.	Chlorides (Cl)	mg/L	132	335	321	434	228	327	370	422
12.	Sulphates (SO_4)	mg/L	53	131	91.7	75	97	68	45	65
13.	Fluorides (F)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.	Nitrates (NO_3)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.	Total dissolved solids	mg/L	724	1090	772	1300	876	1038	1047	1356

3.11 SOIL QUALITY

It is essential to determine the potential of soil in the area and identify the impacts of urbanization and industrialization on soil quality. Accordingly, a study of assessment of the soil quality has been carried out.

The type of soils identified in Namakkal District are Red soil, Black soil, Brown soil, Alluvial Soil and Mixed soil.

3.11.1 Data Generation

For studying soil profile of the region, sampling location was selected to assess the existing soil condition in and around the plant representing various land use conditions. The physical, chemical and heavy metal concentrations were determined. The samples were collected by ramming a core-cutter into the soil up to a depth of 90 cm. Simultaneously, in-situ infiltration test using double ring infiltrometer was carried out at all location to determine the permeability. The present study on the soil profile establishes the baseline characteristics and identifies the incremental concentrations if any, due to the existing and proposed activities.

The sampling locations have been identified with the following objectives:

- To determine the baseline soil characteristics of the study area;
- To determine the impact on soil more importantly from agricultural productivity point of view.

Eight locations within 10 km radius of the plant site were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm, and 90 cm below the surface and homogenized. The homogenized samples were taken during April – June 2022 to identify soil conditions.

Table 3.19 – Soil Quality

PARAMETERS		SAMPLING LOCATIONS							
		S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**
pH		6.3	6.9	6.8	6.3	6.7	6.8	6.7	6.5
EC Decisiements / mmhos / cm		19.0	13.0	11.0	12.0	13.0	9.0	16.0	8.0
Macro Nutrient (Kg/acre)	N	127	108	99	126	96	88	121	89
	P	5.9	6.1	4.7	6.9	5.5	4.6	7.3	5.4
	K	46	49.6	39	54	62	49	68	60
Micro Nutrient Ppm	Zn	1.3	1.2	0.8	1.2	1.0	0.8	1.2	1.0
	Cu	1.0	1.4	0.9	1.3	1.0	0.9	1.3	1.3
	Mn	1.8	1.6	1.5	2.2	1.9	1.8	3.3	1.0
	Fe	3.4	3.1	2.7	2.5	2.8	2.6	2.1	1.8
Natural Moisture Content (%)		1.4	5.6	0.90	1.1	0.8	1.7	3.7	2.7
Grain Size Distribution									
Gravel (%)		1	-	2	-	-	1	-	1
Sand (%)		31	32	23	26	37	21	24	33
Slit (%)		48	42	42	46	39	45	50	47
Clay (%)		20	26	33	28	24	33	26	19
Textural Class		Silty Loam	Silty Clay Loam	Sandy Silty Loam	Silty Loam	Sandy Silty	Sandy Loam	Silty	Silty Loam

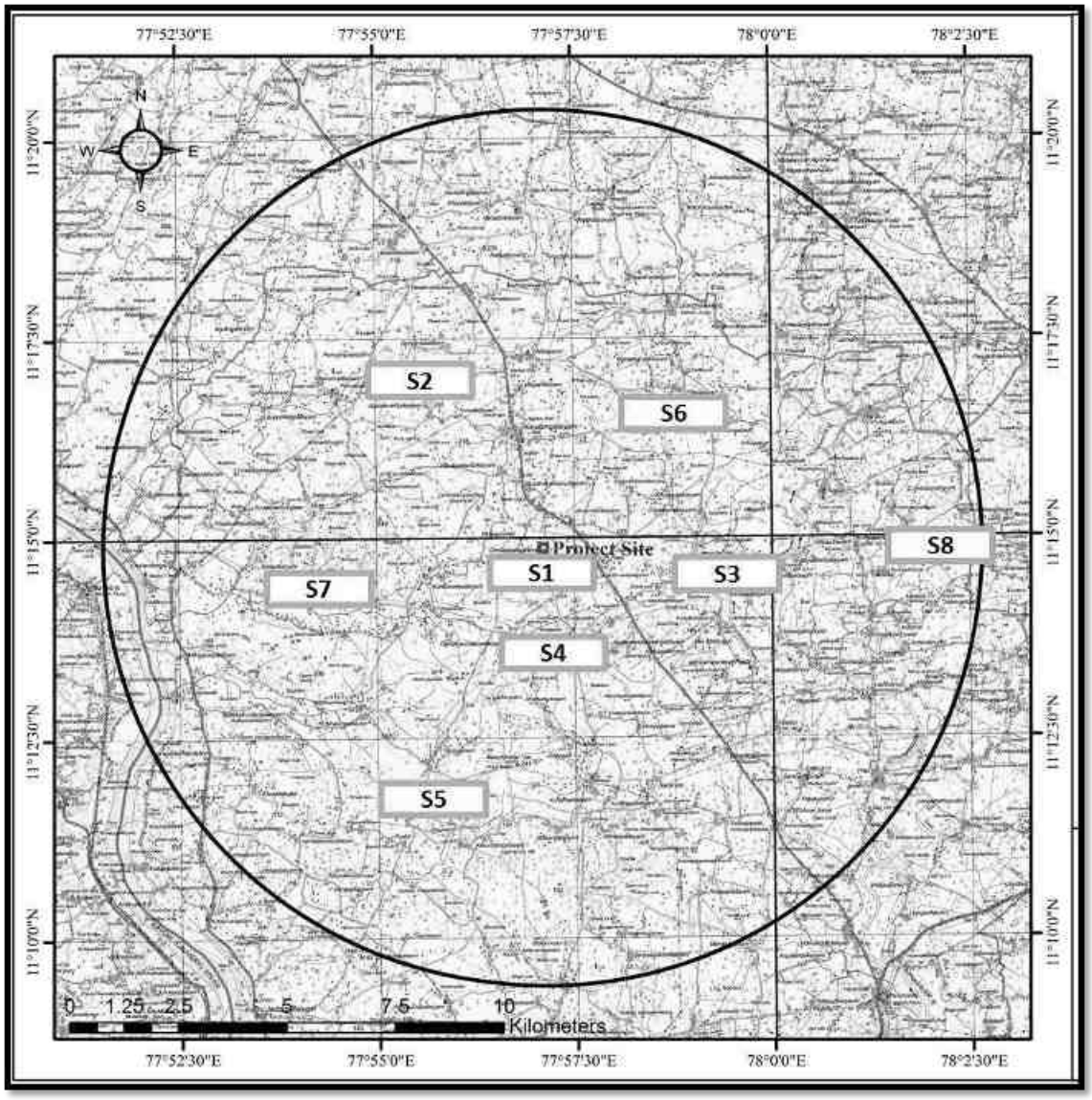


Fig.3.20 Soil Sampling Locations

Code	Location	Latitude	Longitude	Direction	Distance (km)
S1	Project Site	11°14'52.45"N	77°57'5.53"E	-	-
S2	Devanampalayam	11°18'0.30"N	77°56'21.50"E	N	5.94
S3	Rama Devam	11°15'38.77"N	77°59'0.61"E	NE	3.77
S4	Kunnamalai	11°14'23.59"N	77°57'56.64"E	SE	1.78
S5	Tidunal	11°11'39.35"N	77°55'26.08"E	SW	6.65
S6	Kolaram	11°17'49.72"N	77°58'44.57"E	NE	6.22
S7	Sittampundi	11°14'28.36"N	77°55'36.63"E	SW	2.73
S8	Kodur	11°15'44.82"N	78° 2'17.03"E	E	9.55

3.12 BIOLOGICAL ENVIRONMENT

3.12.1 Biological Environment Assessment

A habitat or an area comprises of different kinds of plants and animals within its boundary. The distribution of flora and fauna in the given area represents the biological environment. The biological portion of the environment includes, what is present in the study area, its values, and its responses to impacts description of community uniqueness, the dominant species, and an evaluation of rare or endangered species.

Natural vegetation is mostly a barren land and the bio-diversity of the area is low. Species diversity and food web index of the surrounding area will be negligible. However, the proposed proper re-vegetation techniques and development of green belt around the ultimate pit limit, the impact on the terrestrial environment will be nominal.

The unit has earmarked more than 33% of total area of for developing the Green Belt and Lawns as per the existing Environmental Quality Policy of the Company. The proposed Green Belt will have significant long term impact during the Operation Phase.

3.12.2 Ecological Survey

An ecological survey of the study area was conducted particularly with reference to recording the existing biological resources. The objectives of the survey were intended to:

- Generate baseline data from field observations from various terrestrial ecosystems,
- Collect secondary data from Government records,
- Compare the data so generated with authentic past records to understand changes,
- Understand the impact of the proposed activity on vegetational structure in the site.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius area was conducted. The locations were identified for Phyto-sociological aspects to assess the current status. Phyto-sociological studies were carried out by using least count quadrate method. Trees species were surveyed by taking quadrates of 100m x 10m distributed randomly. Shrub species were surveyed by taking quadrates of 10m x 10m. Herb species were surveyed by taking quadrates of 1m x 1m. The data obtained was further used to estimate Relative Dominance, Relative Density (RD), Relative Frequency (RF) and Importance Value Index (IVI) as per the formula.

Faunal survey covers the Terrestrial Fauna, Avian Fauna and Aquatic Fauna. The survey was based on Personal observation, Enquiry with local population and Records available. This survey will include identification of endangered and rare species as per Red Book.

3.12.3 Flora and Fauna

Survey Methodology

An ecological survey of the study area was conducted particularly with reference to recording the existing biological resources. The objectives of the survey were intended to:

- Generate baseline data from field observations from various terrestrial ecosystems,
- Collect secondary data from Government records,
- Compare the data so generated with authentic past records to understand changes,
- Understand the impact of the proposed activity on vegetation structure in the site.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius area was conducted. The locations were identified for phyto-sociological aspects to assess the current status. Phyto-sociological studies were carried out by using least count quadrate method. Trees species were surveyed

by taking quadrates of 100 m x 10 m distributed randomly. Shrub species were surveyed by taking quadrates of 10 m x 10 m. Herb species were surveyed by taking quadrates of 1 m x 1 m. The data obtained was further used to estimate Relative Dominance, Relative Density (RD), Relative Frequency (RF) and Importance Value Index (IVI) as per the formula.

Faunal survey covers the Terrestrial Fauna, Avian Fauna and Aquatic Fauna. The survey was based on Personal observation, Enquiry with local population and Records available. This survey will include identification of endangered and rare species as per Red Book.

The flora and fauna studies were carried out in the entire study area of 10 km radius around the proposed site. The diversified plant genera distributed in this area. The natural vegetation of the study area had more population with variety of species. Many varieties of plant species were growing naturally.

The overall aerial and close observations lead to the conclusion that the diversity of plant species was more in the buffer zone.

3.12.3.1 Flora

The Study of flora involved intensive sample survey of vegetation in the project site and other locations applying standard methods (e.g., Greig-Smith 1983, Caustan 1988). To examine the trees and shrubs, quadrats of 25 x 25 m and for herbs 2 x 2 m were laid. In each of the larger quadrats (i) Species (ii) their number, and (iii) Girth at Breast Height (GBH), were measured. (Chaturvedi and Khanna, 1982). The species of vegetation found in each station were identified and listed according to their families, both in dicotyledons and monocotyledons of the plant kingdom. The plant species were classified as per the classifications of "Bentham and Hooker" and identified by using Gambles book on "Flora of Madras Presidency" and Mathew's book on "Flora of the Tamil Nadu Carnatic".

Baseline Status-Flora

The list of Flora & Fauna is given below

Table 3.20 List of Flora in the Study Area

GRASS			
S.No	**Scientific Name**	**Family**	**Local Name**
1	Heteropogon contorlus	Poaceae	Oosipullu
2	Arundo donax	Poaceae	Common needle, grass
3	Dendrocalamus strictus	Poaceae	Kalamungil
4	Digitaria cliaris	Poaceae	Arisipul
TREES			
S.No	**Scientific Name**	**Family**	**Local Name**
1	Borassus flabellifer	Arecaceae	Palmyra palm
2	Euphorbia antiquorum	Euphorbiaceae	Kalli, triangular, spurge
3	Lannea coromandelica	Anacardiaceae	Indian Ash Tree, Moya, Wodier
4	Morinda tinctoria	Rubiaceae	Nuna
5	Prosopis juliflora	Fabaceae	Algaroba, Mesquite
6	Pongamia pinnata	Fabaceae	Indian beech, pungam
7	Tamarindus indica	Caesalpiniaceae	Puli
8	Cocus nucifera	Arecaceae	Coconut,thennai
9	musa paradisiaca	Musaceae	Plantain, vazhai
10	Cocus nucifera	Arecaceae	Coconut, thennai
11	Musa paradisiaca	Musaceae	Plantain, vazhai
12	Tectona grandis	Lamiaceae	Teak
13	Acacia chundra	Fabaceae	Karangaali
14	Acacia ferruginea	Fabaceae	Parambai
15	Acacia leucophloea.	Mimosaceae	velvelam
16	Acacia nilotica	Mimosaceae	kaRuvELai
17	Adina cordifolia	Rubiaceae	Manjakadambu
18	Ailanthus excelsa	Simaroubaceae	Perumaram, perumaruntu
19	Albizia lebbeck	Mimosaceae	Siridam
20	Azadirachta indica	Meliaceae	Veppai,
21	Citrus limon	Rutaceae	Lemon
22	Dalbergia paniculata	Fabaceae	Porapachalai

23	Dalbergia sissoo	Fabaceae	nukkam totakatti
24	Delonix regia	Caesalpiniaceae	Flame Tree, Royal Poinciana
25	Erythrina indica	Fabaceae	Mullu murungai
26	Erythrina variegata	Fabaceae	Kalyana murungai
27	Eucalyptus globulus	Mytaceae	Blue gum
28	Ficus benghalensis	Moraceae	Krishna Fig, Krishna's
29	Ficus religiosa	Moraceae	Peepal, arasamaram
30	Psidium gujava	Myrtaceae	Guava
31	Punica granatum	Lythraceae	Pomegranate, mathulai
32	Samanea saman	Mimosodeae	Thoongumoonjj maram
33	Syzygium cumini	Myrtaceae	Nagai
34	Terminalia chebula	Combretaceae	kaDukkaay
35	Thespesia lampas	Malvaceae	Common mallow,kattupparuthi
HERBS			
S.No	**Scientific Name**	**Family**	**Local Name**
1	Abutilon indicum	Malvaceae	Country Mallow, Tutti Herb
2	Acalypha indica	Euphorbiaceae	koli-p-puntu, kuppai-meni
3	Achchyranthes aspera	Amaranthaceae	Prickly chaff flower, nayuruvi
4	Aerva lanata	Amaranthaceae	ciru-pula,ulinai
5	Agave americana	Agavaceae	Anaikathalai
6	Amaranthus spinosus	Amaranthaceae	mullukkeerai
7	Amaranthus viridis	Amaranthaceae	kuppai-k-kirai
8	Cleome viscosa	Cleomaceae	Tickweed, naikkaduku
9	Cynodon dactylon	Poaceae	Bermuda, grass, arugampul
10	Datura metal	Solanaceae	Thom, apple, oomathai
11	Euphorbia hirta	Euphorbiaceae	Ammam Paccharisi
12	Leucas aspera	Lamiaceae	Thumbai
13	Mimosa pudica	Mimosaceae	Sensitive Plant, Touch-me-not

14	Phyllanthus nirurii	Phyllanthaceae	Keelanelli, seed under leaf
15	Tribulus terrestris	Zygophyllaceae	Puncture vine, nerunji
16	Tridax procumbens	Asteraceae	Tridax daisy, vettukkaayapoondu
17	Vemonia cinerea	Asteraceae	Purplefleabane, mookuthipoondu
18	Oryza sativa	Poaceae	Rice
19	Phaseolus mango	Fabaceae	Black gram
20	Zea mays	Poaceae	Maize, Corn
21	Capsicum frutescens	Solanaceae	Tezpur Chilli
22	Acalypha indica	Euphorbiaceae	koli-p-puntu, kuppai-meni
23	Aerva lanata	Amaranthaceae	ciru-pula,ulinai
24	Agave angustifolia	Asparagaceae	Caribbean agave
25	Agave sisalana Perrine	Agavaceae	Sisal Agave, agave, century plant
26	Aloe vera	Liliaceae	Kathalai
27	Amaranthus viridis	Amaranthaceae	kuppai-k-kirai
28	Bauhinia racemose	Fabaceae	Athi, jhinja
29	Blumea lacera	Asteraceae	Kattumullangi, narakkarandai
30	Boerhavia diffusa	Nyctaginaceae	Red hogweed, Tar Vine
31	Bulbostylis barbatta	Cyperaceae	Mukkutikorei
32	Chloris dolichostachya	Poaceae	Finger grass, kuruthupillu
33	Croton saparsiflorus	Euphorbiaceae	Reilpoondu
34	Helianthus annus	Asteraceae	Sunflower
35	Ocimum americanum	Lamiaceae	Hoary basil, nai thulasi
36	Ocimum sanctum	Lamiaceae	Holy basil, thulasi
37	Partheniumhysterophorus	Asteraceae	Congress grass
38	Sesamum indicum	Pedaliaceae	Korai, pullu
39	Sida cordifolia L.	Malvaceae	Heart-Leaf Sida
40	Thespesia populnea	Malvaceae	Indian tulip tree poovarasu
41	Vinca rosea	Apocynaceae	Nithyakalyani
SHRUBS			
S.No	**Scientific Name**	**Family**	**Local Name**

1	Argemone Mexicana	Papaveraceae	Prickly poppy, kudiyotti
2	Capparis sepiaria	Capparaceae	Karindu
3	Cassia auriculata	Fabaceae	Aavarampoo
4	Gossyplum arboretum	Malvaceae	Cotton, paruthi
5	Opuntia vulgaris	Cactaceae	Sappattukkalli
6	Solanum trilobatum	Solanaceae	Thoodhuvalai
7	Vitex negundo.	Verbenaceae	Nocchi
8	Ziziphus oenoplia.	Rhamnaceae	Suraimullu, Surai ilantai
9	Calotropis gigantea R.Br.	Fabaceae	tuvarai,adhaki, iruppuli,
10	Calotropis procera	Asclepiadaeae	Vellerukku
11	Canna indica	Cannaceae	Indian Shot, Wild canna
12	Carica papaya	Caricaceae	pappALi
13	Jasminum angustilfolium	Oleaceae	Kundumalligai
14	Jasminum arborescens	Oleaceae	Tree jasmine
15	Jatropha glandulifera	Euphorbiaceae	Kaatuamanakku
16	Lantana camara	Verbenaceae	Unnichedi
17	Lawsonia inermis	Lythraceae	Henna, maruthondri
18	leucaena		
19	Phoenix acaulis	Arecaceae	Stemiess date palm
20	Ricinus communis	Euphorbiaceae	Castor bean plant
21	Solanum torvum	Solanaceae	Sundaikkai
22	Tabernaemontana coronarial	Apocynaceae	Nandiyarvattam
CLIMBERS			
S.No	**Scientific Name**	**Family**	**Local Name**
1	Cissus quadrangularis	Vitaceae	Perandai
2	Abrus precatorius	Fabaceae	Coral bead, vine, rosary pea
3	Cucurbita pepo	Cucurbitaceae	Parangi
4	Cucurbita pepo	Cucurbitaceae	Parangi
5	Ipomea hederifolia	Convolvulaceae	Kanavali kkodi
6	Passiflora foetida	Passifloraceae	Stinking passion flower
7	Pergularia daemia	Asclepiadaceae	Uttamani, Seendhal kodi

Source: DFO

3.12.3.2 Fauna

Both direct and indirect observation methods were used to survey the fauna. Visual encounter (search) method was employed to record vertebrate species. Additionally survey of relevant literature was also done to consolidate the list of vertebrate fauna distributed in the area (Smith 1933-43, Ali and Ripley 1983, Daniel 1983, Prater 1993, Murthy and Chandrasekhar1988). Since birds may be considered as indicators for monitoring and understanding human impacts on ecological systems (Lawton, 1996) attempt was made to gather quantitative data on the group.

Point Survey Method: Observations were made in each site for 15 minutes duration.

Road Side Counts: The observer traveled from site to site, all sightings were recorded (this was done both in the day and night time). An index of abundance of each species was also established.

Pellet and Track Counts: All possible animal tracks and pellets were identified and recorded (South Wood, 1978).

Based on the Wildlife Protection Act, 1972 (WPA 1972, Anonymous 1991, Upadhyay 1995, Chaturvedi and Chaturvedi 1996) species were short-listed as Schedule II or I and considered herein as endangered species.

Species listed in Ghosh (1994) are considered as Indian Red List species.

Baseline Status-Flora

The list of Flora & Fauna is given below:

Table 3.21 List of Fauna in the Study Area

MAMMALS				
S.No.	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Felis rubiginosa	Felidae	Rusty spotted Cat	LC – IV
2	Funambulus palmarum	Squirrel	Indian Palm squirrel	LC – IV
3	Herpertes edwardrii	Mongoose	Indian grey mongoose	LC – IV
4	Macaca radiata	Cercopithecidae	Bonnet macaque	LC – IV
5	Cynopterus brachyotis	Old World fruit bats	Short nosed fruit bat	LC – V
6	Lepus nigricollis	Leporids	Hare	LC – IV
7	Ovis aries	Bovidae	Sheep	-
8	Paradoxurushermaphroditus	Viverrids	Common palm civet	LC – II
9	Rattus norvegicus	Murids	Field mouse	LC – IV
10	Rattus rattus	Murids	House rat	LC – IV
11	Sorex caerulescens	Soricidae	Common mush shrew	LC – IV
12	Sus scrofa	Suidae	Wild boar	--
13	Indian fox	Canidae	Vulpus benfhalensis	LC – II
14	Eryx johni	Boidae	Mannuli paambu	--
BIRDS				
S.No	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Dicrurus macrocerus	Drongos	Black Drongo	LC – IV
2	Egretta garzetta	Heron	Little egret	LC – IV
3	Eudynamys scolopacea	Cuckoos	Koel	LC – IV
4	Francolinus pondicerianus	Phasianidae	Grey Partridge	LC – IV
5	Passer domesticus	Sparrow	House Sparrow	LC – IV
6	Ploceus Philippines	Ploceidae	Weaver bird	LC – IV
7	Prinia subflava	Cisticolidae	Plain Wren-Warbler	LC – IV

8	Psittacula krameri	Parrots	Rose Ringed Parakeet	LC – IV
9	Pycnonotus cafer	Bulbul	Redvented BulBul	LC – IV
10	Quills contronix	Bulbul	Grey qua	LC – IV
11	Saxicoloides fulicata	Muscicapidae	Indian Robin	LC – IV
12	Streptopelia decaocto	Pigeons and doves	Indian Ring Dove	LC – IV
13	Streptopelia tranquebarica	Pigeons and doves	Red collared dove	LC – IV
14	Sturnus pagodarum	Starling	Brahminy starling	LC – IV
15	Merops orinetalis	Bee-eater	Common bee eater	LC – IV
16	Nectarinia asiatica	Sunbird	Purple sunbird	LC – IV
17	Shikra	Accipitridae	Astur badius	LC – IV
REPTILES				
S.No	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Ahaetulla nasuta	Colubridae	Common Green Whip Snake	LC – IV
2	Bangarus caeruleus	Elapid snakes	Acrid weed, kalluruvi	LC – II
3	Boiga spp.	Colubridae	Cat snake	
4	Calotes versicolor	Agamid lizards	Common Garden lizard	LC – IV
5	Chameleon zeylanicus	Chameleons	Indian chamaeleon	LC – II
6	Daboia russelii	Vipers	Russels viper	LC – III
7	Gongylophis conicus	Boidae	Rough tailed Sand boa	LC – IV
8	Hemidactylus flaviviridis	Geckos	House gecko	LC – IV
9	Lissemys punctata	Softshell turtles	Indian mud turtle	LC – IV
10	Naja naja	elapid snakes	Indian Cobra	LC – IV
11	Passerita mycterizaris	Colubrid Snakes	Common Green Snake	LC – IV
12	Ptyas mucosus	Colubrid Snakes	Common rat snake	LC – IV
13	Dendrelaphis	Colubrid Snakes	Common Bronzeback	LC – IV

14	Brahminy skink	Scincidae	Mabuya carinata	LC – II
15	Varanus benegaiensis	Varanidae	Udumbu	LC – IV
INSECTS				
S.No	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Agrion sp & Petalura sp	Anisoptera	Dragon fly	LC - IV
2	Apis indica	Apidae	Honey bee	LC - IV
3	Aranea sp	Crambidae	Spider	LC - IV
4	Carausius sp	Lonchodinae	Stick insect	LC - IV
5	Coccinella septenpunctata	Ladybird beetle	Lady bird beetle	LC - IV
6	Eumenus	Vespidae	Wasp	LC - IV
7	Hamitermes silvestri		Termite	LC - IV
8	Hieroglyphus sp	Acrididae	Grasshopper	LC - IV
9	Praying mantis	Mantids	Mantis religiosa	LC - IV
10	Ant	Formicidae	Monomorium indicum	LC - IV
11	Scorpion	Scorpionoidea	Palamnaeus swammerdam	LC - IV
12	Centipede	House Centipedes	Scolopendra	LC - IV
13	Cicada sp	Cicadidae	Cicade	LC - IV
14	Coenagrion sp & ischnura	Coenagrionidae	Damsel fly	LC IV
15	Mantis religiosa	Mantids	Praying mantis	LC IV
BUTTERFLIES				
S.No	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Acraea terpsicore	Nymphalidae	Tawny coster	LC - IV
2	Danaus chiysippus	Brush-footed butterflies	Plain tiger	LC - IV
3	Danaus plexipppus	Brush-footed butterflies	Striped tiger	LC - IV
4	Euthalia nais	Nymphalidae	Baronet	LC - IV
5	Graphium Agamemnon	Swallowtail butterfly	Tailed jay	LC - IV
6	Ixias marianne	Pieridae	White orange tip	LC - IV

7	Juninia almanac	Nymphalidae	Peacock pansey	LC - IV
8	Junonia atlites	Nymphalidae	Grey pansey	LC - IV
9	Neptis hylas	Brush-footed butterflies	Common sailor	LC - IV
10	Pachiopta hector	Swallowtail butterfly	Crimson rose	LC - IV
11	Papilio demoleus	Swallowtail butterfly	Lime butterfly	LC - IV
12	Parantica aglea	Brush-footed butterflies	Glassy tiger	LC - IV
13	Precis hierta	Violaceae	Yellow pansy	LC - IV
14	Terias hecabe	Pieridae	Grass yellow	LC - IV
15	Triodes minos	Papilionidae	Southern birdwing	LC - IV
16	Papilio polytes	Swallowtail butterfly	Common Mormon	LC - IV
17	Papilo polymnstor	Papilionidae	Blue Mormon	LC – IV
FISH				
S.No	**Scientific name**	**Family**	**Common name**	**IUCN /WPA**
1	Amblypharyngodon Sp	Cyprinidae	Carplet	LC – IV
2	la catla	Minnows and Carps	Catta	LC – IV
3	Chela sp		Trout	LC – IV
4	Cirthinus mrigala	Minnows and Carps	Mrigal	LC – IV
5	Cyprirus earpio	Minnows and Carps	Common carp	LC – IV
6	Labeo rohita	Cyprinidae	Rohu	LC – IV
7	Ophiocephalus	Snakehead	punctatus	LC – IV
8	Oreochromis mossambicus	Cichlid	Tilapia	LC – IV

Source: DFO

3.13 TERRESTRIAL ECOLOGY

The site is proposed in a remote dry agricultural and predominantly barren lands covered with some thorny bushes in patches. There is no tree cutting or removal of plantations is anticipated. There is no forest land is involved. There is no Wild Life Sanctuary or National Park or Biosphere or Hotspots within the study area of 10 km.

3.14 SOCIOECONOMIC ENVIRONMENT

The assessment of socio-economic environment forms an integral part of an EIA study. Socio-Economic status of the population is an indicator for the development of the region. Any developmental project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole. Similarly, the proposed project site will have its share of socio-economic influence in the study area. The section delineates the overall appraisal of society relevant attributes. The data collection for evaluation of impact of proposed project site on socio-economic aspects in in the study area has been done through primary household survey and through the analysis of secondary data available for study area.

3.14.1 Methodology

The methodology adopted in assessment of socio-economic condition is as given below;

- To assess socio-economic conditions of the Population.
- Analysis of the identified social attributes like population distribution, availability of public utilities etc., through Census of India 2011.
- Primary household survey to assess the present status of population of the study area.

3.14.2 Sources of Information

As per the scope of this study, the information on socio-economic aspects has been gathered and compiled from several secondary sources. These include Taluk Office, Collectorate, Agriculture Department, Irrigation Department, Central Ground Water Board, Directorate of Census Operation, Tamil Nadu etc. The demographic data has mainly been compiled from the Census of India 2011. The socio-economic details are briefly described in following sections. This section includes the present status of the socio-economic environment in the study area. To determine the baseline socio-economic pattern, at and around the project site, the required data have been obtained from the published data.

Socio-economic base line data were collected for the following indicators:

- ❖ Demographic Structure
- ❖ Economic Structure
- ❖ Availability of Basic Amenities

The major demographic and economic structure of the study area are classified into population, literacy rate and workers details.

a. Settlement Pattern

The proposed project is at Nallur village, Namakkal District, Tamil Nadu. The area within 10 km radius from the proposed project site has been considered as study area.

b. Population

According to the 2011 census, Namakkal district has a population of 1,726,601. The district has a population density 505 people per square kilometer. Its population growth rate over the decade 2001-2011 was 15.61%. Namakkal has a sex ratio of 986 females for every 1000 males and an average literacy rate of 74.63 %.

c. Demography

Almost all villages in the study area are experiencing a rapid growth of population, which may be due to the process of urbanization and industrialization. According to 2011 census, Namakkal district had a population of 1,726,601, with a sex-ratio of 986 females for every 1,000 males. A total of 1,50,699 were under the age of six, constituting 78,754 males and 71,945 females. Scheduled Castes and Scheduled Tribes accounted for 3,45,392 and 57,059 of the population respectively. Average literacy rate of Tirunelveli in 2011 were 74.63% compared to 67.41% of 2001. The district had a total of 4,75,511 households. The district has a population density of 505 inhabitants per square kilometer.

d. Average Household Size

The study area had a family size of 3.63 as per census records. This lower family size could be attributed to a high degree of urbanization with migration of people with higher literacy levels who generally opt for smaller family size with family welfare measures and also due to the prevalence of single member families, a common phenomenon in mining and industrial areas.

e. Social Structure

Census records show that about 20% of the population belonged to Scheduled Castes (SC) and 3.3% to Scheduled Tribes (ST). This indicates that this particular of section people work out to about 23.3% of the total population and the remaining 76.7% people belong to Other Backward Castes and forward castes.

f. Occupational Structure

The occupational structure of residents in the study area is studied with reference to main workers and non-workers. The main workers include 10 categories of workers defined by the Census Department consisting of cultivators, agricultural labourers, those engaged in livestock, forestry, fishing, mining and quarrying; manufacturing, processing and repairs in household industry; and other than household industry, construction, trade and commerce, transport and communication and other services. In Namakkal district out of total population, 898,245 were engaged in work activities. 93.4% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 6.6% were involved in Marginal activity providing livelihood for less than 6 months. Of 898,245 workers engaged in Main Work, 152,497 were cultivators (owner or co-owner) while 228,614 were Agricultural labourers.

Table 3.22 Occupational Structure of Namakkal District

Particulars	Total	Male	Female
Main Workers	839,152	505,257	333,895
Cultivators	152,497	82,157	70,340
Agriculture Labourers	228,614	102,673	125,941
Household Industries	35,156	17,783	17,373
Other Workers	422,885	302,644	120,241
Marginal Workers	59,093	26,206	32,887
Non-Working	828,356	337,817	490,539

g. Availability of Infrastructure

Availability of infrastructure and facilities denote the level of overall development in the study area. The list of industries, schools, colleges and hospitals located near the study area are given below,

Industries

- Ran India Steels UNIT-I
- Saraswati Udyog India Limited (Paper Division) - Paper mill
- K.C.A. Fibre Industries
- Sun Bharat Industries
- Sakthi Carton Industries

Institutions

- Gandhi College of Arts and Science for Women
- SVSt Kongunadu Polytechnic College
- SKV Educational Institution

Tourist & Pilgrim

- Sellappampalayam Arulmigu Sri Maariyamman Thirukkovil
- NALLUR Mariamman Kovil
- RC Church (Maniyanur)
- Church near Nallur
- Masjid near Kandampalayam
- Pudupalayam Masjid

k. Study of Villages around the project site

Total population of the 9 villages within 10 km radius from the project site is 21126. The male to female ratio is 100:99. The population in the age group of 6 constitutes about 9.2% of the population. The detail of population is given in the below table.

Table 3.23 Villages Selected for Population Study

S.No.	Villages Selected within 10 Km Study Area
1	Nallur
2	Ramadevam
3	Kunnamalai
4	Kodur
5	Sittampoondi
6	Sullipalayam
7	Melsathambur
8	Nadandai
9	Devanampalayam

Table 3.24 Details of Villages (As Per 2011 Census)

S.No	Name of the Villages	No. of House Holds	Male	Female	Total	Literates		Cultivators		Agriculture Labours	
						Male	Female	Male	Female	Male	Female
1.	Nallur	1524	2725	2520	5245	2150	1472	304	303	345	456
2.	Ramadevam	611	957	949	1906	658	452	219	245	167	281
3.	Kunnamalai	655	1076	1081	2157	790	428	163	193	154	250
4.	Kodur	470	677	722	1399	477	330	143	150	141	234
5.	Sittampoondi	1007	1550	1581	3131	1108	796	434	432	393	454
6.	Sullipalayam	527	909	899	1808	599	460	230	228	179	236
7.	Melsathambur	425	650	634	1284	451	306	94	77	152	182
8.	Nadandai	882	1424	1414	2838	1024	687	153	167	332	424
9.	Devanampalayam	366	679	679	1358	536	430	219	253	123	160

Table 3.25 Population Status of Nallur

Population	Persons	Males	Females
Total	5245	2725	2520
In the age group 0-6 years	451	217	234
Scheduled Castes (SC)	1673	838	835
Scheduled Tribes (ST)	2	1	1
Literates	3622	2150	1472
Illiterate	1623	575	1048
Total Worker	2689	1588	1101
Main Worker	2559	1550	1009
Main Worker – Cultivator	607	304	303
Main Worker - Agricultural Labourers	801	345	456
Main Worker - Household Industries	66	32	34
Main Worker – Other	1085	869	216
Marginal Worker	130	38	92
Marginal Worker – Cultivator	10	3	7
Marginal Worker - Agriculture Labourers	88	17	71
Marginal Worker - Household Industries	9	2	7
Marginal Workers – Other	23	16	7
Marginal Worker (3-6 Months)	119	34	85
Marginal Worker - Cultivator (3-6 Months)	9	3	6
Marginal Worker - Agriculture Labourers (3-6 Months)	83	17	66
Marginal Worker - Household Industries (3-6 Months)	8	2	6
Marginal Worker - Other (3-6 Months)	19	12	7
Marginal Worker (0-3 Months)	11	4	7
Marginal Worker - Cultivator (0-3 Months)	1	0	1
Marginal Worker - Agriculture Labourers (0-3 Months)	5	0	5
Marginal Worker - Household Industries (0-3 Months)	1	0	1
Marginal Worker - Other Workers (0-3 Months)	4	4	0
Non Worker	2556	1137	1419
Number of Households	1524		

Table 3.26 Population Status of Ramadevam

Population	Persons	Males	Females
Total	1906	957	949
In the age group 0-6 years	154	86	68
Scheduled Castes (SC)	640	321	319
Scheduled Tribes (ST)	0	0	0
Literates	1110	658	452
Illiterate	796	299	497
Total Worker	1245	625	620
Main Worker	1237	621	616
Main Worker – Cultivator	464	219	245
Main Worker - Agricultural Labourers	448	167	281
Main Worker - Household Industries	4	3	1
Main Worker – Other	321	232	89
Marginal Worker	8	4	4
Marginal Worker – Cultivator	3	1	2
Marginal Worker - Agriculture Labourers	3	2	1
Marginal Worker - Household Industries	0	0	0
Marginal Workers – Other	2	1	1
Marginal Worker (3-6 Months)	8	4	4
Marginal Worker - Cultivator (3-6 Months)	3	1	2
Marginal Worker - Agriculture Labourers (3-6 Months)	3	2	1
Marginal Worker - Household Industries (3-6 Months)	0	0	0
Marginal Worker - Other (3-6 Months)	2	1	1
Marginal Worker (0-3 Months)	0	0	0
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	0	0	0
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	661	332	329
Number of Households	611		

Table 3.27 Population Status of Kunnamalai

Population	Persons	Males	Females
Total	2157	1076	1081
In the age group 0-6 years	207	117	90
Scheduled Castes (SC)	442	226	216
Scheduled Tribes (ST)	0	0	0
Literates	1218	790	428
Illiterate	939	286	653
Total Worker	1283	682	601
Main Worker	1204	648	556
Main Worker – Cultivator	356	163	193
Main Worker - Agricultural Labourers	404	154	250
Main Worker - Household Industries	57	29	28
Main Worker – Other	387	302	85
Marginal Worker	79	34	45
Marginal Worker – Cultivator	10	7	3
Marginal Worker - Agriculture Labourers	33	13	20
Marginal Worker - Household Industries	1	0	1
Marginal Workers – Other	35	14	21
Marginal Worker (3-6 Months)	78	34	44
Marginal Worker - Cultivator (3-6 Months)	10	7	3
Marginal Worker - Agriculture Labourers (3-6 Months)	33	13	20
Marginal Worker - Household Industries (3-6 Months)	1	0	1
Marginal Worker - Other (3-6 Months)	34	14	20
Marginal Worker (0-3 Months)	1	0	1
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	0	0	0
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	1	0	1
Non Worker	874	394	480
Number of Households	655		

Table 3.28 Population Status of Kodur

Population	Persons	Males	Females
Total	1399	677	722
In the age group 0-6 years	93	50	43
Scheduled Castes (SC)	444	222	222
Scheduled Tribes (ST)	0	0	0
Literates	807	477	330
Illiterate	592	200	392
Total Worker	851	426	425
Main Worker	846	425	421
Main Worker – Cultivator	293	143	150
Main Worker - Agricultural Labourers	375	141	234
Main Worker - Household Industries	28	17	11
Main Worker – Other	150	124	26
Marginal Worker	5	1	4
Marginal Worker – Cultivator	0	0	0
Marginal Worker - Agriculture Labourers	4	0	4
Marginal Worker - Household Industries	0	0	0
Marginal Workers – Other	1	1	0
Marginal Worker (3-6 Months)	5	1	4
Marginal Worker - Cultivator (3-6 Months)	0	0	0
Marginal Worker - Agriculture Labourers (3-6 Months)	4	0	4
Marginal Worker - Household Industries (3-6 Months)	0	0	0
Marginal Worker - Other (3-6 Months)	1	1	0
Marginal Worker (0-3 Months)	0	0	0
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	0	0	0
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	548	251	297
Number of Households	470		

Table 3.29 Population Status of Sittampoondi

Population	Persons	Males	Females
Total	3131	1550	1581
In the age group 0-6 years	253	125	128
Scheduled Castes (SC)	1030	499	531
Scheduled Tribes (ST)	45	26	19
Literates	1904	1108	796
Illiterate	1227	442	785
Total Worker	2141	1074	1067
Main Worker	1992	1004	988
Main Worker – Cultivator	866	434	432
Main Worker - Agricultural Labourers	847	393	454
Main Worker - Household Industries	80	43	37
Main Worker – Other	199	134	65
Marginal Worker	149	70	79
Marginal Worker – Cultivator	46	24	22
Marginal Worker - Agriculture Labourers	48	17	31
Marginal Worker - Household Industries	6	1	5
Marginal Workers – Other	49	28	21
Marginal Worker (3-6 Months)	148	70	78
Marginal Worker - Cultivator (3-6 Months)	46	24	22
Marginal Worker - Agriculture Labourers (3-6 Months)	47	17	30
Marginal Worker - Household Industries (3-6 Months)	6	1	5
Marginal Worker - Other (3-6 Months)	49	28	21
Marginal Worker (0-3 Months)	1	0	1
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	1	0	1
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	990	476	514
Number of Households	1007		

Table 3.30 Population Status of Sullipalayam

Population	Persons	Males	Females
Total	1808	909	899
In the age group 0-6 years	174	97	77
Scheduled Castes (SC)	729	380	349
Scheduled Tribes (ST)	0	0	0
Literates	1059	599	460
Illiterate	749	310	439
Total Worker	1147	620	527
Main Worker	1107	603	504
Main Worker – Cultivator	458	230	228
Main Worker - Agricultural Labourers	415	179	236
Main Worker - Household Industries	8	5	3
Main Worker – Other	226	189	37
Marginal Worker	40	17	23
Marginal Worker – Cultivator	8	2	6
Marginal Worker - Agriculture Labourers	10	4	6
Marginal Worker - Household Industries	5	0	5
Marginal Workers – Other	17	11	6
Marginal Worker (3-6 Months)	35	15	20
Marginal Worker - Cultivator (3-6 Months)	7	1	6
Marginal Worker - Agriculture Labourers (3-6 Months)	7	3	4
Marginal Worker - Household Industries (3-6 Months)	4	0	4
Marginal Worker - Other (3-6 Months)	17	11	6
Marginal Worker (0-3 Months)	5	2	3
Marginal Worker - Cultivator (0-3 Months)	1	1	0
Marginal Worker - Agriculture Labourers (0-3 Months)	3	1	2
Marginal Worker - Household Industries (0-3 Months)	1	0	1
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	661	289	372
Number of Households	527		

Table 3.31 Population Status of Melsambuthur

Population	Persons	Males	Females
Total	1284	650	634
In the age group 0-6 years	109	66	43
Scheduled Castes (SC)	403	203	200
Scheduled Tribes (ST)	0	0	0
Literates	757	451	306
Illiterate	527	199	328
Total Worker	830	430	400
Main Worker	625	345	280
Main Worker – Cultivator	171	94	77
Main Worker - Agricultural Labourers	334	152	182
Main Worker - Household Industries	16	12	4
Main Worker – Other	104	87	17
Marginal Worker	205	85	120
Marginal Worker – Cultivator	10	3	7
Marginal Worker - Agriculture Labourers	179	71	108
Marginal Worker - Household Industries	3	2	1
Marginal Workers – Other	13	9	4
Marginal Worker (3-6 Months)	202	85	117
Marginal Worker - Cultivator (3-6 Months)	10	3	7
Marginal Worker - Agriculture Labourers (3-6 Months)	176	71	105
Marginal Worker - Household Industries (3-6 Months)	3	2	1
Marginal Worker - Other (3-6 Months)	13	9	4
Marginal Worker (0-3 Months)	3	0	3
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	3	0	3
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	0	0	0
Non Worker	454	220	234
Number of Households	425		

Table 3.32 Population Status of Nadandai

Population	Persons	Males	Females
Total	2838	1424	1414
In the age group 0-6 years	226	117	109
Scheduled Castes (SC)	644	331	313
Scheduled Tribes (ST)	0	0	0
Literates	1711	1024	687
Illiterate	1127	400	727
Total Worker	1616	884	732
Main Worker	1533	848	685
Main Worker – Cultivator	320	153	167
Main Worker - Agricultural Labourers	756	332	424
Main Worker - Household Industries	18	8	10
Main Worker – Other	439	355	84
Marginal Worker	83	36	47
Marginal Worker – Cultivator	1	1	0
Marginal Worker - Agriculture Labourers	35	9	26
Marginal Worker - Household Industries	3	1	2
Marginal Workers – Other	44	25	19
Marginal Worker (3-6 Months)	72	35	37
Marginal Worker - Cultivator (3-6 Months)	1	1	0
Marginal Worker - Agriculture Labourers (3-6 Months)	29	9	20
Marginal Worker - Household Industries (3-6 Months)	3	1	2
Marginal Worker - Other (3-6 Months)	39	24	15
Marginal Worker (0-3 Months)	11	1	10
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	6	0	6
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	5	1	4
Non Worker	1222	540	682
Number of Households	882		

Table 3.33 Population Status of Devanampalayam

Population	Persons	Males	Females
Total	1358	679	679
In the age group 0-6 years	104	54	50
Scheduled Castes (SC)	441	226	215
Scheduled Tribes (ST)	0	0	0
Literates	966	536	430
Illiterate	392	143	249
Total Worker	928	461	467
Main Worker	850	417	433
Main Worker – Cultivator	472	219	253
Main Worker - Agricultural Labourers	283	123	160
Main Worker - Household Industries	8	4	4
Main Worker – Other	87	71	16
Marginal Worker	78	44	34
Marginal Worker – Cultivator	21	10	11
Marginal Worker - Agriculture Labourers	23	7	16
Marginal Worker - Household Industries	0	0	0
Marginal Workers – Other	34	27	7
Marginal Worker (3-6 Months)	78	44	34
Marginal Worker - Cultivator (3-6 Months)	21	10	11
Marginal Worker - Agriculture Labourers (3-6 Months)	23	7	16
Marginal Worker - Household Industries (3-6 Months)	0	0	0
Marginal Worker - Other (3-6 Months)	34	27	7
Marginal Worker (0-3 Months)	0	0	0
Marginal Worker - Cultivator (0-3 Months)	0	0	0
Marginal Worker - Agriculture Labourers (0-3 Months)	0	0	0
Marginal Worker - Household Industries (0-3 Months)	0	0	0
Marginal Worker - Other Workers (0-3 Months)	430	218	212
Non Worker	1358	679	679
Number of Households	366		

3.15 BASELINE STATUS SUMMARY

The findings of baseline environmental status of the study area are summarized below,

a. The average daily maximum and minimum temperature for each of the 12 months are 39 ^{0}C and 17.40 ^{0}C respectively.

b. The maximum total rainfall of the study area is 270 mm and the mean value of annual rainfall is 725 mm.

c. The minimum and maximum mean relative humidity for 08:30 hrs observed in this area during the year 2003 and 2007 is 55% and 87% respectively, whereas minimum and maximum mean relative humidity for 17:30 hrs observed in this area during the year 2001 and 2005 is 27% and 81% respectively.

d. The predominant wind direction is from SW at the month of May to September during both morning and evening hours. During the month of January to March the predominant wind direction is generally from E while for the period from October to December it is from NE.

e. The minimum wind speed was 1 km/h and the maximum average speed was 15 km/h.

f. The maximum saturated thickness of these aquifers is up to 5 m depending upon the topographic conditions.

g. The type of soils identified are Red soil, Black soil, Brown soil, Alluvial Soil and Mixed soil.

h. The seismicity of Namakkal district falls under the Zones II & III. Of these two zones, our project site located in Nallur Village falls under the Seismic zone II.

i. The PM_{10} and $PM_{2.5}$ among the eight sampling stations covering the study region varied from 46 to 73 µg/m^3 and 21 to 33 µg/m^3 respectively.

j. The SO_2 concentration is from 7 to 18 µg/m^3, whereas the NO_X concentration is in the range of 13 to 31 µg/m^3.

k. The Water and Soil qualities are within the permissible limit.

l. The noise levels ranges from 44 to 64 dB(A) at equivalent day and night in the residential cum rural areas.

m. Natural vegetation is mostly a barren land and the bio-diversity of the area is low. Species diversity and food web index of the surrounding area will be negligible.

n. The total population of the 9 villages within 10 km radius from the project site is 21126.

CHAPTER - 4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

In this chapter, identification of environmental impacts and the proposed mitigation measures for the proposed expansion foundry have been described. Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly to the project. Secondary impacts are those, which are indirectly induced and typically include the associated investment and changed patterns of social and economic activities by the proposed expansion activities. The impacts have been prepared for the proposed project, assuming that the status of existing site conditions has already been covered under baseline environmental monitoring and continue to remain same during the operation of the project.

4.1 IMPACTS DUE TO PROJECT SITING

The construction and operation of the proposed project comprises of various activities each of which will have an impact on same or other environmental parameters. Various impacts during the operation phase on the environment parameters have been studied to estimate the impact on the environment and are discussed briefly below and elaborated in the subsequent sections. The proposed expansion is located in the premises of existing foundry of Ran India Steels. The existing roads will be used for transportation during construction and operation phase.

4.2 IMPACTS DURING CONSTRUCTION PHASE

This includes the activities related to leveling of site, construction of additional buildings for scrap melting plant and other related structures and installation of equipment.

4.2.1 LAND USE AND SOIL QUALITY

4.2.1.1 IMPACT ON LAND USE

The proposed expansion project does not involve any removing of vegetation and reshaping topography as the land is vacant under Unclassified Area land use category. Thus, the overall impact will be beneficial in nature.

4.2.1.2 IMPACT ON SOIL QUALITY

The soil at the plant site predominantly consists of Red Soil. The construction activities will results in minimum loss of top soil to some extent in the plant area. The top soil requires proper handling like separate stacking so that it can be used for green belt development. Apart from localized constructional impacts at the proposed plant site, no significant adverse impact on soil in the surrounding area is anticipated.

4.2.1.3 MITIGATION MEASURES

As soon as construction is over, construction debris and surplus earth will be utilized to fill up low-lying areas. The rubbish will be cleared and all un-built surface reinstated. During construction phase, the top soil from excavated areas shall be preserved in separate stack for reuse during additional plantation. Development of green belt shall be taken up along with construction works, so plantation will grow to adequate height by the time of plant commission. Thus green belt will be effective.

4.2.2 AIR IMPACT

4.2.2.1 IMPACT ON AIR QUALITY

During the construction phase, suspended particulate matter will be the main pollutant which would be generated from the site development activities and vehicular movement on the road. Further concentration of NO_x and CO may also slightly increase due to increased vehicular traffic movement. However the increase in ambient concentrations of air quality will be negligible. As most of the construction equipment will be mobile, the emissions are likely to be fugitive. The dust generated will also be fugitive in nature which will be controlled by sprinkling of water.

4.2.2.2 MITIGATION MEASURES

To mitigate the constructional impacts, regular sprinkling of water will be done at the site. The approach roads will be black carpeted and vehicle kept in good order to minimize automobile exhaust. Construction equipment shall be maintained and serviced regularly such that the gaseous emissions from this equipment are maintained within the design specification. Sufficient vegetation around the site is some of the measures will be taken to reduce the impacts during the construction phase.

4.2.3 NOISE IMPACT

4.2.3.1 IMPACT DUE TO NOISE LEVEL

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, pumps, compressors, pneumatic tolls, vibrators etc. The operation of these equipments will generate noise ranging between 85-90 db (A) near the source at 1.0 m distance. These noises will be generated within the plant boundary and will be transient in nature.

4.2.3.2 MITIGATION MEASURES

Equipments will be maintained appropriately to keep the noise level within 85 db (A). Whenever possible, equipment will be provided with silencers and mufflers. Construction activities will be restricted to day time only. Green belt will be developed from construction stage. Further, workers working in high noise areas will be provided with necessary protective devices example ear - plug, ear - muffs etc.

4.2.4 WATER IMPACT

4.2.4.1 IMPACT ON WATER QUALITY

The estimated water requirement during construction phase will be met from Bore-wells and rain water. The wastewater generation during construction phase will be from sanitary units provided for the workers. This wastewater will be treated in the existing sewage treatment plant and used for greenbelt. Hence there will not be any impact on the water regime due to discharge of sanitary treated waste water.

4.2.4.2 MITIGATION MEASURES

The earthwork (cutting and filling) will be avoided during rainy season and will be completed during summer season. Soil binding and fast growing vegetation will be grown within the plant premises to arrest the soil erosion.

4.2.5 ECOLOGICAL IMPACT

The expansion activities will be carried out in the existing plant premises. In addition, the topographical map shows that the surroundings of the plant area are barren and vacant land. There is no fauna habitat recorded in the proposed project area. The site is neither an ecologically sensitive nor a place of ecological importance. Therefore, it is envisaged that the expansion activities doesn't make significant impact on biotic and abiotic environment.

4.2.6 SOCIO-ECONOMIC IMPACT

The construction workers will be mainly employed from the adjacent villages. There will be considerable beneficiary impact on social life of the people around the site. Displacement of the people is not required, as site is free of habitation. Therefore, livelihood of the people will not alter. Hence rehabilitation & resettlement (R&R) is not required.

4.3 IMPACTS DURING OPERATIONAL PHASE

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

- Land Use
- Soil
- Topography and Climate
- Air Quality
- Water Resources and Quality
- Noise Levels
- Terrestrial and Aquatic Ecology and
- Demography and Socio – Economics

4.3.1 LAND USE

No significant change in land use was observed in the project site. The existing plant features the good infrastructure development and hence, any additional impact on land use will be insignificant.

4.3.2 SOIL QUALITY

The soil quality remains the same as the proposed expansion project doesn't involve a change in land use pattern. The solid waste generated from the plant includes the following.

4.3.3 SOLID WASTES

Runners & risers will be re-used in the process and slag from furnace will be pulverized for metal recovery and sizing disposed for earth filling and aggregate use.

4.3.4 HAZARDOUS WASTES

The spent oil will be sent to authorized HW recyclers. The exhaust air or gas cleaning residue will be packed in HDPE bags and stored in closed shed with impervious platform and disposed to authorized HW pre-processors.

4.3.5 AIR QUALITY

4.3.5.1 IMPACTS ON AIR QUALITY

Being a scrap melting plant, the major source of air pollution is from melting machineries like furnace. The furnaces generate pollutant like SO_2, NO_x, and PM. Air pollution dispersion modeling has been carried out for SO_2, NO_x, and PM. These emissions will disperse in the atmosphere depending on the atmospheric conditions. The atmospheric conditions that affect the dispersion of pollutants are:

- Wind direction and wind speed
- Ambient temperature
- Atmospheric stability: Atmospheric stability depends on the wind speed and solar radiation intensity or cloud cover. During night time, the cloud cover, wind speed is considered for the stability calculation. More unstable condition will lead to better dispersion and stable condition will have less dispersion.

- Mixing Height: Mixing height is the region between the bottom of the inversion layer and the ground. The inversion layer is a dynamic region, which changes depending on the atmospheric condition.

A. INPUTS USED FOR DISPERSION MODELING

The important pollutant of the proposed scrap melting plant is mainly SO_x, NO_x, and SPM. Therefore, predictions of GLCs are considered for SO_2, NO_x, and PM. The emission from the stack is considered to be constantly distributed throughout the day for the dispersion analysis. The stacks considered for the model are as follows,

Table 4.1 Sources of Emissions

Existing

Stack No.	Sources of Emission	Details of APC measures
1	Induction Furnace 10 TPH (2 Crucible)	42 m height 0.8 m dia of stack with wet scrubber has been provided.
2	DG SET (250 KVA)	Stack height of 2.3 m with acoustic enclosures has been provided.

After Expansion

Stack No.	Sources of Emission	Details of APC measures
1	Induction Furnace 20 TPH (2 Crucible)	42 m height 0.8 m dia of stack with wet scrubber has been provided.
2	DG SET (250 KVA)	Stack height of 7.5 m with acoustic enclosures has been provided.

Stack Height Calculation

The minimum height of stack to be provided with each generator set can be worked out by using the following formula:

$$H = h + 0.2 \times \sqrt{KVA}$$

Where,

H = Total height of stack in meter

h = Height of the building in meters where the generator set is installed

KVA = Total generator capacity of the DG set in KVA.

H = 4 + (0.2 x √250)

= 4 + (0.2 x 15.81)

= 7.162 m

Required Height of Stack = 7.162 m

An exhaust pipe **height of 7.5 m** with acoustic enclosure will be provided for the DG Set.

B. METEOROLOGICAL PARAMETERS

The surface meteorological parameters for the site were monitored from April – June 2022. The air pollutant dispersion modeling was done for this season.

MODELING PROCEDURE

US-Environmental Protection Agency's (US-EPA) Industrial Source Complex Short Term Model (ISCST3) was used for the air quality dispersion analysis.

DESCRIPTION OF THE MODEL

The Industrial Source Complex Short-Term (ISCST-3) model provides options to model emissions from a wide range of sources that might be present at a typical industrial source complex. The basis of the model is the straight-line steady state Gaussian Plume equation, which is used with some modifications, to model simple point source emissions from stacks.

The ISCST-3 model accepts hourly meteorological data records to define the conditions for plume rise, transport, diffusion and deposition. The model estimates the concentration or deposition value for each source and receptor combination for each hour of input meteorology, and calculates user-selected short-termaverages.

Table 4.2 Predicted Maximum and Resultant Concentration of the Study Area

Code	Location	Maximum Ambient Concentration during the study period (µg/m³)				Predicted Maximum Incremental Concentration (µg/m³)				Resultant Concentration (µg/m3)			
		PM_{10}	$PM_{2.5}$	SO_2	NO_X	PM_{10}	$PM_{2.5}$	SO_2	NO_X	PM_{10}	$PM_{2.5}$	SO_2	NO_X
AAQ1	Project Site	73	33	18	31	4.63	3.42	1.245	2.49	77.63	36.42	19.245	33.49
AAQ2	Devanampalayam	66	30	13	20	3.85	3.41	0.855	1.71	69.85	33.41	13.855	21.71
AAQ3	Rama Devam	61	29	10	16	4.42	2.71	1.14	2.28	65.42	31.71	11.14	18.28
AAQ4	Kunnamalai	63	32	14	21	3.78	2.16	0.82	1.64	66.78	34.16	14.82	22.64
AAQ5	Sirapalli	68	29	15	24	2.87	1.12	0.365	0.73	70.87	30.12	15.365	24.73
AAQ6	Kolaram	59	24	12	18	3.36	2.89	0.61	1.22	62.36	26.89	12.61	19.22
AAQ7	Sittampundi	54	26	17	30	3.47	1.78	0.665	1.33	57.47	27.78	17.665	31.33
AAQ8	Tidunal	51	27	16	28	4.12	1.12	0.99	1.98	55.12	28.12	16.99	29.98
NAAQ Standards, 2009										**100**	**60**	**80**	**80**

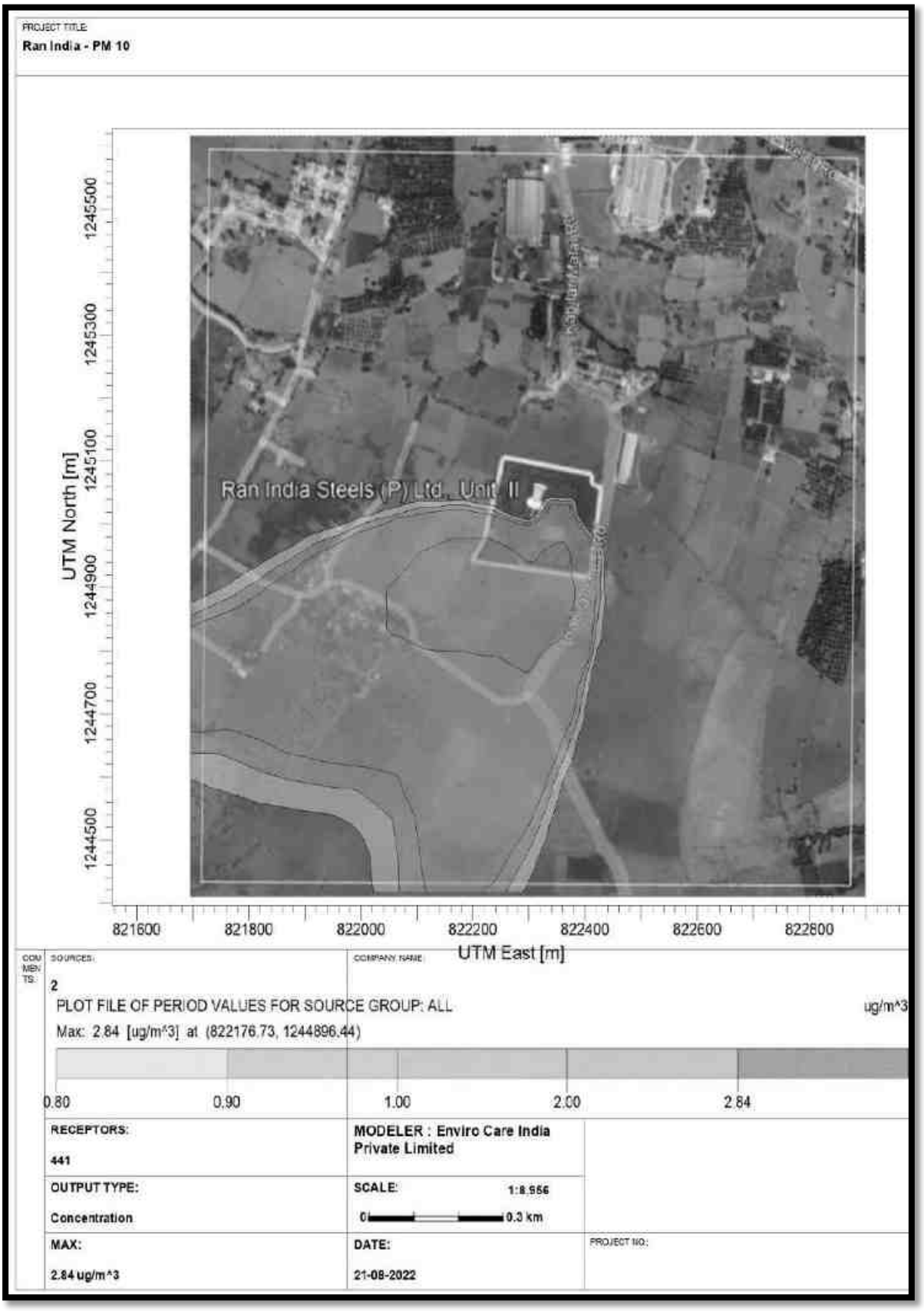


Fig. 4.1 PM_{10} Isopleths

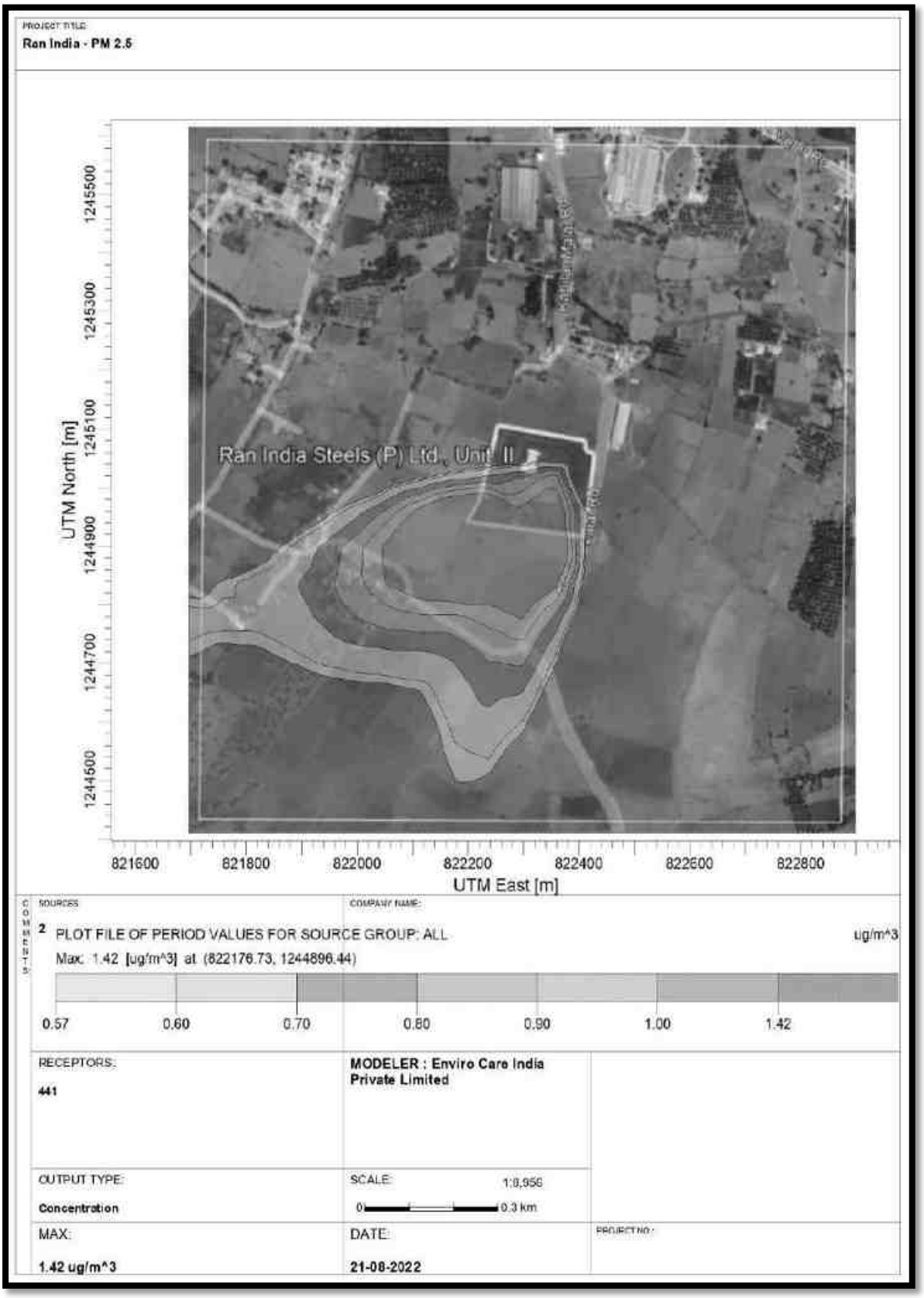


Fig. 4.2 $PM_{2.5}$ Isopleths

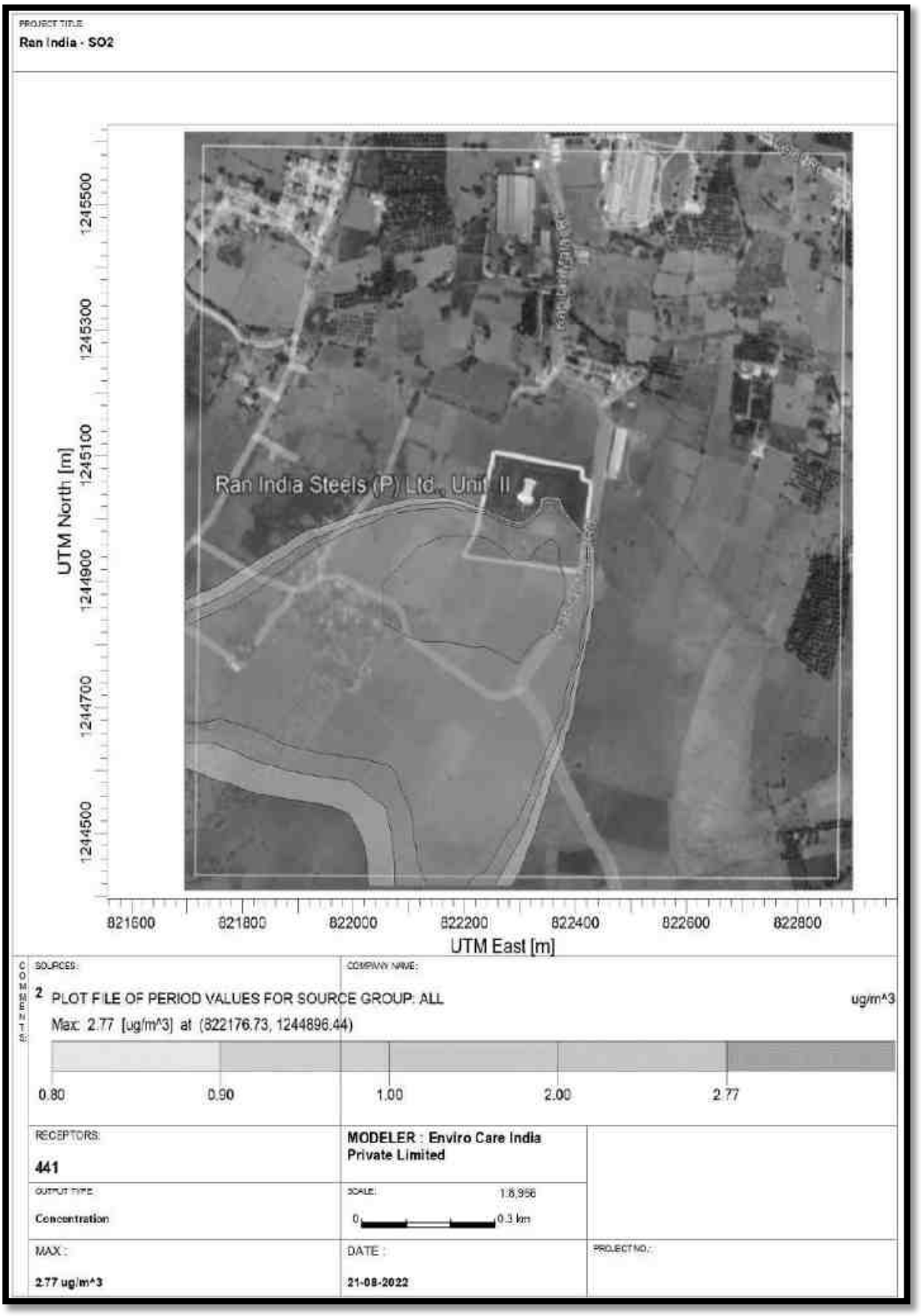


Fig. 4.3 SO_2 Isopleths

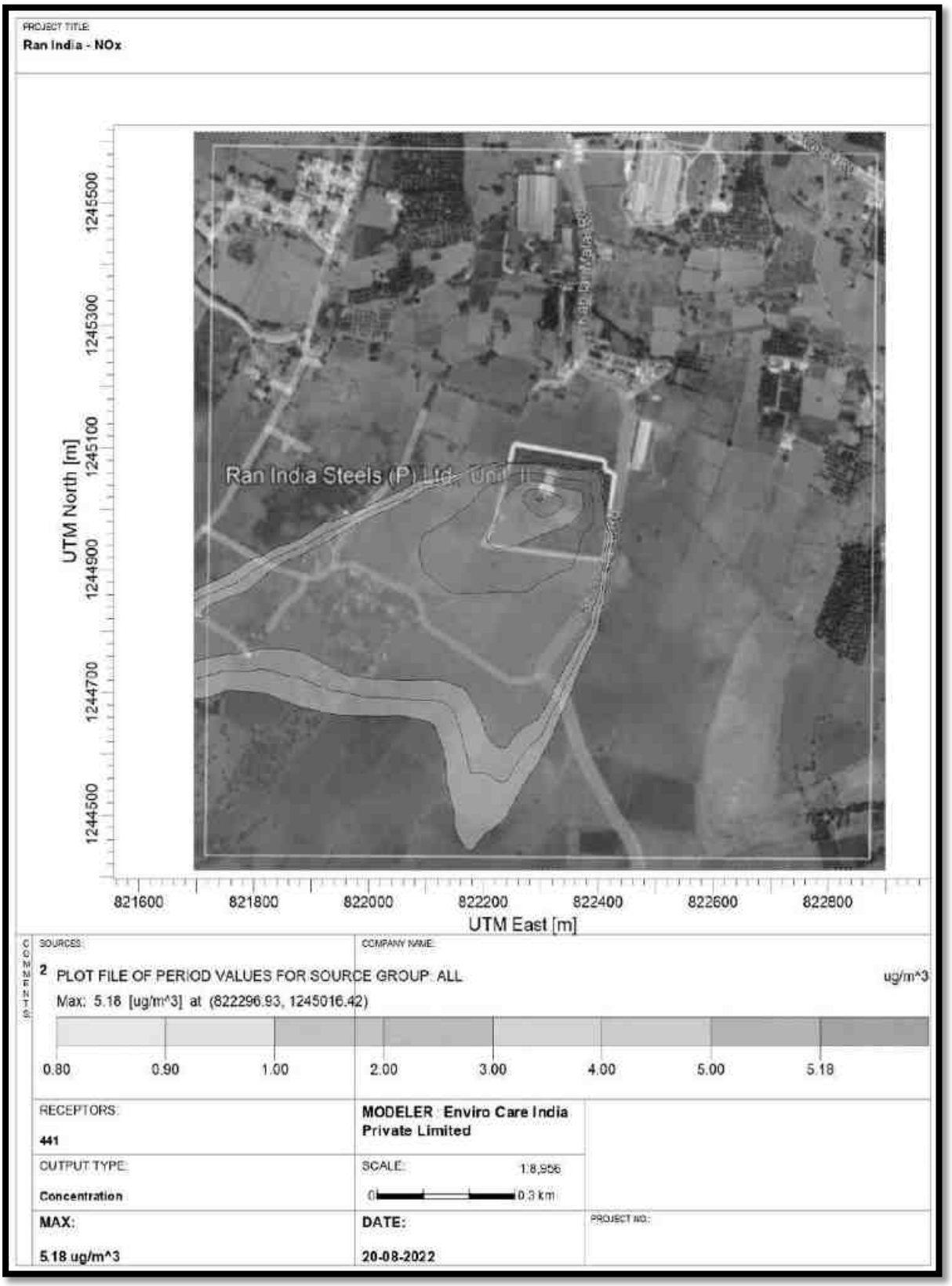


Fig. 4.4 NO_X Isopleths

C. Sources of Fugitive emission

The major source of fugitive emission will be due to general transportation activity of workers and due to trucks carrying equipments, raw material and product. Vehicular emissions will principally arise out of emissions from the exhausts of vehicles used for the transport of Raw materials and product. Dust generated from raw material unloading areas will be controlled by providing dust suppression system. Required quantities of M.S. scraps from the stock yard are transported through Containers into the furnace yard. By the electro magnet and crane fed into furnace. A minimum manual shoveling is required.

4.3.5.2 MITIGATION MEASURES

Wet scrubber is proposed to be installed to control the emissions from the Induction Furnaces. Common stack of 42 m height, bag filters and dust collectors are installed in the process. Stack height of 7.5 m has been provided for exiting DG set of capacity 250 KVA. The DG set is provided with acoustic enclosure to reduce the noise level.

4.3.6 WATER RESOURCES & WATER QUALITY

4.3.6.1 WATER RESOURCES

Water requirement for the proposed expansion of plant will be 17 KLD. The entire water will be met from Bore-wells and rain water.

4.3.6.2 IMPACT ON WATER QUALITY & MITIGATION MEASURES

As scrap melting plant will be operated on the process, water is mainly used at certain stages in the process like cooling tower make up. No wastewater is generated from the process and there is no cooling blow down and the entire quantity of makeup water lost into the atmosphere due to evaporation. The wastewater from the wet scrubbers will be sent solar evaporation pans.

Sewage wastewater of 4 KLD will be generated from the domestic uses and will be treated in the Sewage Treatment Plant which is a septic tank followed by a dispersion trench.

4.2.7 NOISE IMPACT

4.3.7.1 IMPACT ON NOISE

The major source of noise in a process will be due to furnace operation, motor, engine, DG sets etc. No worker is working continuously at high noise generating source, however the workers going for the inspection of such machines are provided with earplugs. For computing the noise levels due to the proposed project at various distances with respect to the plant site, noise levels are predicted using a user-friendly model.

Input for the Model

The prediction of incremental noise levels due to the operation phase of the proposed plant has been carried out using mathematical model. The noise sources have been defined with respect to plant.

Work Zone Noise Levels

The damage risk criteria as enforced by OSHA (Occupational Safety and Health Administration) to reduce hearing loss, stipulates that noise level up to 90 dB (A) are acceptable for 8-hour working shift per day. It was observed from the existing plant, noise level ranging from 71 - 73 dB (A) are limited to work zone only. At the corners of the plant boundary, a noise level is varying between dB (A) to dB (A).

Community Noise Levels

Day and Night sound pressure levels Ldn is often used to describe the community noise exposure, which includes 10 dB (A) night time penalty. The predicted noise levels at a distance of 0.5 Km and above from plant site, would be less than <45.0 dB (A). Most of the human settlements are at a distance greater than 0.5 km from the plant site. Hence, impact on general population would be insignificant.

Vibration

In this unit there is some minor source of vibration in existing and in after expansion. So there will not be any impacts due to the vibration in the surrounding.

4.3.7.2 MITIGATION MEASURES

Adequate protective measures in the form of ear muffs/ear plugs will be provided to personnel working in high noise areas. All the necessary noise protective

equipment will be supplied to workmen operating near high noise generating sources. In addition, reduction in noise levels in the high noise machinery areas could be achieved by adoption of suitable preventive measures such as suitable building layout in which the equipment are to be located. The greenbelt proposed around the boundary of the plant will attenuate the noise emitted by the various sources in the plant.

4.4 IMPACT ON ECOLOGY

The baseline flora and fauna has been described in chapter 3. There are no ecologically sensitive areas like wildlife sanctuaries in 10 km radius from the plant. Similarly there is no endangered or rare species of flora and fauna are reported or observed in the study area.

The impact on terrestrial ecology will be due to emission of pollutants like SPM, NOx and SO2. However, the incremental concentrations of these pollutants are less and the impacts on terrestrial ecology will be insignificant.

4.4.1 Mitigation Measures

Land area of 2.71 acres from the total land is allotted for extensive greenbelt to reduce the impact on ecological environment. Greenbelt is a set of row of trees planted in such a way that they form an effective barrier between the working zone and the surroundings.

Plantation Species

The plantation species will be considered based on the following

- Adoption to the geo-climatic condition of the area;
- Mix of round, spreading, oblong and conical canopies;
- Different height ranging from 4m to 20m
- Preferably green trees;
- Fast growing type;
- A thick canopy cover;
- Preferably of native origin; and
- Having large leaf area index.

4.5 SOCIO-ECONOMIC IMPACT

It is obvious to assume that the activities of the proposed scrap melting plant will produce some improvements in the Socio – economic levels in the study area. The anticipated impact of this project on various aspects is described in the following sections.

4.5.1 Impact on Human Settlements

The proposed project will be carried in the existing plant area and hence no impact on human settlement is envisaged.

4.5.2 Impact on Population Growth

This project will not have any impact on the population growth, as there is no increase in manpower for the expansion project. Hence, increase in the population and related strain on infrastructure of the study area is not anticipated.

4.5.3 Impact on Economic Aspects

The impact of industrialization on the economic aspects was clearly observed. The existing plant activities already provided the employment to persons of different skills and trades. The local population is the largest beneficiary among the employees. The proposed expansion will enhance the opportunities in both directly and indirectly in the area surrounding the project site.

4.5.4 Impact on Human Health

Impact on health, if any, will be primarily due to air pollution i.e. emissions of PM, NOX and SO2 and noise generation. Adequate air pollution and noise pollution control measures will be provided to conform to regulatory standards. Employees working in high noise work place will be provided protective with Personal Protective Equipments (PPEs) like ear plugs/ear muffs for ensuring minimum impact on human health. The environmental management and emergency preparedness plans are proposed to ensure that the probability of undesired events

and consequences are greatly reduced and adequate mitigation is provided to face any emergency.

4.6 TRAFFIC STUDY

4.6.1 Methodology Adopted

Traffic analysis is basically the process of intercepting and examining the number of vehicles on the road and deducing the pattern of traffic movement. Manual counting was done so as to count the vehicles in the form of cycle, scooter, car, bus, truck, jeep, etc. The safe and time efficient movement of the people and goods is dependent on Traffic flow, which is directly, connected to the traffic characteristics. For better understanding of the present status of traffic flow at the junction, traffic survey is conducted. Thereafter, value of Passenger Car Units (PCU's) is calculated for different vehicular types and accordingly value of LOS is calculated for existing scenario. In order to calculate the traffic load after expansion of project, additional traffic is assumed based on projects that are being expanded. Subsequently, modified PCUs are calculated and LOS is being checked whether it is sufficient to cater the load after expansion.

Traffic study measurements were performed to assess the impact on local transport infrastructure due to the expansion of M/s. Ran India Steels at Nallur village, Namakkal District. The traffic data count was done at significant points of the road. Google Earth Image showing location of project and its existing approach road along with locations wherein traffic study was conducted is shown below in **Fig. 4.5**

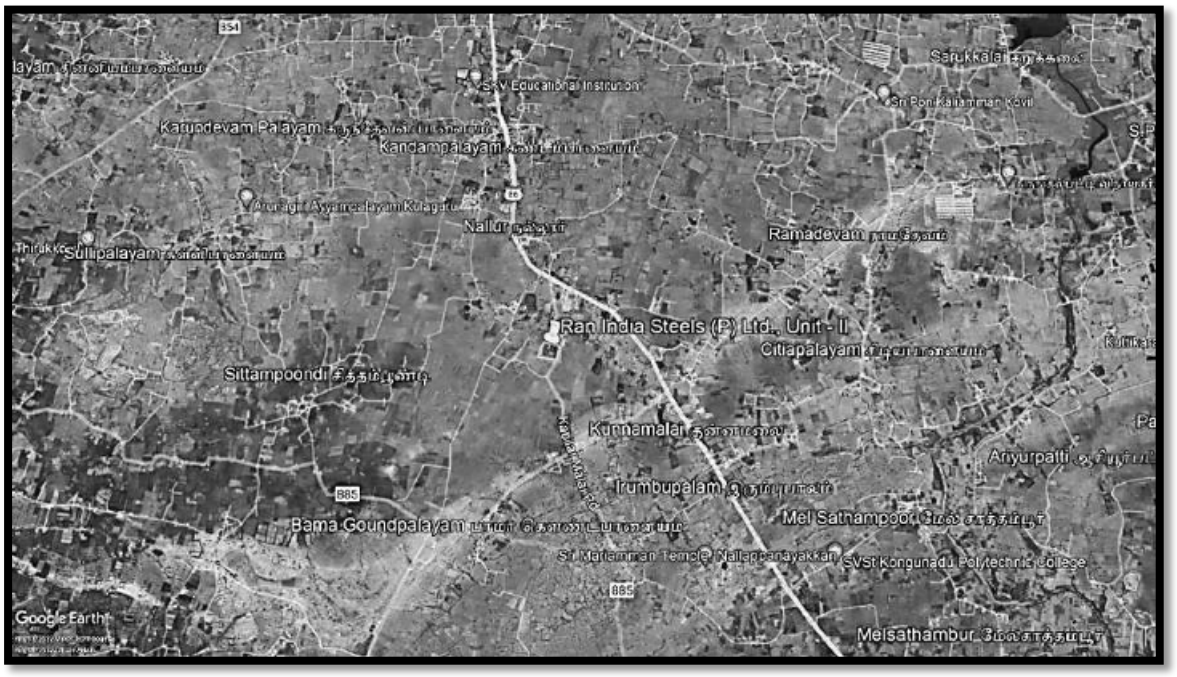


Fig. 4.5 Existing approach road along with project location

4.6.2 Construction Phase Impact

The existing buildings/area will be utilized for the proposed project there is no additional construction activity for the proposed project. Hence, no anticipated traffic impact due to this expansion project.

4.6.3 Operation Phase

Table 4.3 Existing and Proposed Traffic Level

Sl. No	Type of Vehicle	Total No. of Vehicles (Ave/h)	
		Existing	Proposed
1	Car/Jeep	18	21
2	Motor Cycle/Scooter	38	43
3	Truck	7	11
4	Lorry	8	13
5	Container	7	9

4.6.4 Mitigation Measures

The increase in traffic will not have any significant effect. A traffic management plan for the area will be developed to ease the situation. The following arrangement would be made to ease the situation.

- The roads will be strengthened, if required, for transportation of material, goods etc.
- Drivers of trucks /dumpers engaged in construction work will be instructed to give way to passenger buses, cars etc.
- Transport of construction materials and machineries will be carried out during lean traffic period of the day or during night.
- Truck/tippers shall be parked in designated parking area only.
- Minimize use of roads at any particular time by planning vehicles movements.
- Advise traffic police about the activities.
- Road crossings to be used will be well marked.

From above statements, it can be concluded that proposed expansion will have insignificant effect on the traffic and proper management plan will further reduce the negative impacts.

CHAPTER - 5 ANALYSIS OF ALTERNATIVES

5.0 INTRODUCTION

Alternative sites and design process should be critically examined to maintain the positive environmental impact, socio-economic benefits & profitability and minimize the temporary adverse impact. Normally, the extent of displacement of people, the loss of agricultural land, relocation of flora & fauna and irreversible loss of natural resources permanently, will be deciding factors in selection/rejection of site. Project planning and the design process need to be flexible enough to adopt the modified basic project alternatives. The following steps will help in this process.

5.1 ANALYSIS OF ALTERNATIVE SITE

Since this project is to be developed in the existing facility and proposes to continue the similar process along with manufacture of MS Ingots for expansion phase, the site chosen in the existing premises is most suitable and the project site is in accordance with MoEF&CC guidelines.

- Nallur Village at a distance of 1.28 Km. from the Plant.
- There are no National Parks, Wild life Sanctuaries and Bird Sanctuaries within 10 Km radius.
- No forest land is involved in the plant.
- There are no Reserve Forests within 10 Km. radius.

Hence there is no alternative site considered.

5.2 ANALYSIS OF ALTERNATIVE TECHNOLOGIES

Induction Furnace to produce MS Ingots are well proven technologies all over the world. Hence no technological failures are anticipated. Hence no alternative technologies are considered.

CHAPTER - 6 ENVIRONMENTAL MONITORING PROGRAM

6.0 GENERAL

This Chapter includes the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules). The details include summary matrix of environmental monitoring during construction and operation stage; requirement of monitoring facilities and frequency, location, parameters of monitoring; compilation and analysis of data; comparison with base line data and compliance to accepted norms and reporting system and plantation monitoring programme.

6.1 ENVIRONMENTAL MANAGEMENT SYSTEM

Environmental policy at Industry level is yet to be defined formally. Standards are stipulated by various regulatory agencies to limit the emission of pollutants in air and water. Similarly, a mandatory practice is recommended for preparing an Environment Statement each year in order to encourage the industries to allow efficient use of resources in their production processed and reduce the quantities of waste per unit of product. This in itself is not sufficient since this does not provide an assurance that its Environmental performance not only meets, will continue to meet, legislative and policy requirements.

Hence Environmental Management System (EMS) are suggested at the industry level for ensuring that the activities, products and services of the region conform to the carrying capacity (Supportive and Assimilative capacity) of the Environment. Since this is more in line with the quality systems, it is proposed to develop one as outlined in the following sub sections. The EMS- its set-up, role and responsibilities – is given below.

6.2 FORMATION OF AN ENVIRONMENTAL MANAGMENT SYSTEM

The environmental management system for the scrap melting plant will enable it to maximize its beneficial effects and minimize its adverse effects with emphasis on prevention. It will:

- Identify and evaluate the environmental effects arising from the plant's activities;
- Identify and evaluate the environmental effects arising from incidents, accidents and potential emergency situations;
- Identify the relevant legislative and regulatory requirements;
- Enable priorities to be identified and pertinent environmental objectives and targets to be set;
- Facilitate planning, control, monitoring, auditing and review of activities to ensure that the policy is compiled with; and
- Allow periodic evaluation to suit changing circumstances so that it remains relevant.

6.3 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

The top management of the scrap melting plant is committed to develop its activities in an environmentally sound manner and supports all efforts in achieving this objective. In pursuance of this, formal environmental management system shall be established during the operating phase of the plant which shall carry out periodic environmental review, covering the following four areas:

- Legislative and regulatory requirements;
- Evaluation and registration of significant parameters and their environmental impacts;
- Review of environmental management practices and procedures being proposed; and

- Assessment of feedback from investigation of previous environmental incidents and non-compliance with legislation, regulations or existing policies and procedures.

The environmental review shall address the following:

- The nature and extent of problems and deficiencies;
- The priorities to be accorded to rectify them; and
- An improvement program designed to ensure that the personnel and material resources required are identified and made available.

Environment Management Records

The plant shall establish and maintain a system of records to demonstrate compliance with the environmental management systems and the extent of achievement of the environmental objectives and targets. In addition to the other records (legislative, audit and review reports), management records shall address the following:

- Details of failure in compliance and corrective action;
- Details of complaints and follow-up action
- Appropriate contractor and supplier information;
- Inspection and maintenance reports;
- Monitoring data; and
- Environmental training records

Environmental Management Reviews

The senior management shall periodically review the Environmental Management System (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement shall be ascertained and revisions made accordingly.

Implementation Schedule of Mitigation Measures

The mitigation measures suggested in Chapter – 4 shall be implemented so as to reduce the impact on environment due to the operations of the proposed project. In order to facilitate easy implementation of mitigation measures, the phased priority of implementation is given in the below Table.6.1.

Table.6.1. Implementation Schedule

S. No.	Recommendations	Time Requirement	Schedule
1	Air Pollutions Control Measure	Before Commissioning of respective units	Immediate
2	Water Pollution control measures	Before Commissioning of the plant	Immediate
3	Noise Control Measures	Along with the commissioning of the plant	Immediate
4	Ecological Preservation and up gradation	Stage wise implementation	Immediate & Progressive

6.4 ENVIRONMENTAL MONITORING

(a) A technical plan which spells out in detail the methodologies for measurement, the required frequencies of measurement, the planned location of measurement, data storage and analysis, reporting schedules and emergency procedures, and

(b) Detailed budgets and procurement schedules for, necessary equipment and supplies, technical and administrative manpower.

The environmental monitoring for the proposed plant operations shall be conducted as follows:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development.

6.5 ENVIRONMENTAL MONITORING CELL

A Centralized environmental monitoring cell will be established for monitoring of important and crucial environmental parameters which are of immense importance to assess the status of environment during Plant operation. With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environmental conditions due to operation of the plant, and helps in planning suitable mitigatory steps that of control of pollution since the efficiency of control measures can only be determined by monitoring. The following routine monitoring program will be implemented under the post-project monitoring in the proposed plant. The Monitoring program proposed to be implemented is given below.

6.6 POST PROJECT MONITORING SCHEDULE

Environmental Monitoring Programme

The environment, safety and health monitoring programme in the factory are as follows:

Table 6.2 Environmental Monitoring

Particulars	Parameter	Frequency of Monitoring
Stack Emissions	SPM, SO_2, NOx, CO	Once in a month
Ambient Air Quality	PM10, $PM_{2.5}$, SO_2, NO_2	Once in a month
Waste water	pH, TDS	Continuous
Noise monitoring	Noise Levels	Monthly (Industrial Noise) Seasonal (Ambient Noise)
Ecology	Vegetation density and Biodiversity	Once a year
Safety and Occupational Health	--	Once a year

6.7 MONITORING EQUIPMENTS AND CONSUMABLES

A well-equipped laboratory (NABL Certified) with consumable items will be provided for the monitoring of Environmental parameters. The following equipments will be provided for the monitoring of Environmental parameters.

Table 6.3 Equipment Details for Environmental Management

Name of the Equipment	Purpose
High Volume/ Respirable Dust Sampler	AAQ Monitoring
Stack Monitor	Particulates, SO_2, NOx and Fluoride
Automatic Weather monitor	Meteorological data collection at Site
Sound level meter	Noise levels
UV-Spectrophotometer	Chemical Analysis
Atomic Absorption Spectrophotometer (AAS)	Chemical Analysis
Micro Balance	Chemical Analysis
BOD Incubator	BOD Estimation
COD Reflux set up	COD Estimation
Refrigerator	Preserving Samples
Oven	Heating
pH Meter	pH Analysis
Distilling Unit	Distilled water
DO Analyser	DO Analysis
Burette & Pipette Box	Chemical Analysis
Titration Setup & Chemicals	Chemical Analysis

Table 6.4 Budgetary Allocation for CER Activities

Description	Rs. In Lakh
Toilet Facility for nearby government school	10.0
Water treatment plant for nearby government school	2.0
Electrification including solar power & Roads	4.0
Avenue Plantation	2.0
Total	**18.0**

Table 6.5 Budgetary Allocation for Environmental Management programme

Category	Capital Investment	Annual Operating Costs
	(Rupees in lakhs)	
Air Pollution Management	15.00	2.0
Water and Wastewater Management	2.0	0.5
Solid Waste Management	3.00	0.5
Greenbelt	10.00	5.0
Environmental Monitoring and Training	15.00	7.5
Total	**45.00**	**15.5**

CHAPTER - 7 ADDITIONAL STUDIES

7.0 GENERAL

Any new industrial activity involving any hazardous chemical named or classified in the various schedules under the Environment (Protection) Act, 1986/Hazardous Waste (Management and Handling) Rules 1989 attracts compliance with the rules. A brief risk assessment study was undertaken for the proposed unit.

The major elements of the Risk Assessment include:

- Hazard & Operability (HAZOP) Studies for identification of hazards and vulnerable sections of the storage,
- Consequence Analysis for various release scenarios,
- Presentation of damage contour for worst damage from fire or explosion,
- Risk Assessment and
- Provision of guidelines for emergency preparedness based on the findings of the risk analysis.

The details of the present study are:

1. Hazard Identification and Visualization of Credible Accident Scenarios
   - Identification of hazards,
   - Analysis of past accident data to develop the credibility of worst accident scenarios and
   - Visualization of Credible Accident scenarios (CAS).
2. Analysis of CAS

   Analysis of identified CAS and quantification of effects pertaining to the cases of:

   - Outflow and releases
   - Heat radiation
   - Explosion
   - Application of damage criteria for heat radiation and explosion.
   - Presentation of damage contours for worst damages from fire or explosion.
   - Effect of the proposed project on neighboring areas (including cascade effects if any).
3. Guidelines for emergency planning and other safety recommendations based on the studies.

7.1 Hazard Classification Based on External Factors

The extent of the consequences of an accident in a MS Ingot manufacturing Plant installation depends on type and quantity of the product stored, handled, mode of containment, and external factors like location, density of population in the surrounding area, etc. In many cases realization of hazard and its potential also is depended on prevailing meteorological conditions and availability of ignition source. Thus the most serious consequence would arise from a large inventory of products located in a density populated area.

7.1.1 Analysis of past accidents

To establish the credibility of accident scenarios, a scientific analysis of past accidents has been made. This helps to check the soundness of the engineering analysis.

7.1.2 Based on Fire & Explosion Index

The next stage of hazard identification involves the estimation of Fire & Explosion Indices (F and EI) for all the units in the facility to give the relative severity of the units from the fire angle. These are evaluated from the knowledge of the Material Factor (MF), General Process Hazard (GPH) and Special Process Hazard (SPH) factors. Material Factor (MF) is the measure of the energy potential of a particular chemical or its mixture with other chemicals. GPH and SPH are evaluated by taking into account the exotherm or endotherm of a reaction, material handling and transfer hazards, accessibility, severity of process conditions and possibilities, dust and other explosions, inventory level of flammable material, etc. The F & El value is then calculated as the product of MF, (GPH and SPH). Detailed fire and explosion Indices were carried out for the major sections of the unit.

7.1.3 Analysis of F & EI Results

A summary of the results including the material factors for each of the chemicals or metals processed on site. From the results of the F & EI studies, it can be observed that all the manufacturing units having F & EI values with index of

Steel Bars & rods and MS Ingots is under the light degree of fire and explosion hazard index.

Material factor for iron metal is derived from NFPA ratings as 14.

NH (Health) - 1
NF (Flammability) - 2
NR (Reactivity) - 1

} **Ferro** for Iron

Material factor is the measure of energy potential of the most hazardous material. Material factor is the number in the range 1 to 40 and it is determined using only two properties, the flammability and reactivity.

Table 7.1 Tabulation for Material Factor

Nr / *Nf*	*Material Factor*				
	0	1	2	3	4
0	1	14	24	29	40
1	4	14	24	29	40
2	10	14	24	29	40
3	16	16	24	29	40
4	21	21	24	29	40

7.1.4 Toxicity Index (TI)

The toxicity index is calculated for the purpose of evaluating the process exposure level for Toxic hazard.

It is expressed as,

$$TI = \frac{T_h}{100} (P+S)$$

Where T_h is the factor for the most hazardous material in the process that is present in an appreciable quantity with lowest threshold limit value (TLV), P the total GPH and S the total SPH penalties used.

The chart for the T_h value is

N_h	--	T_h
0	--	0
1	--	50
2	--	125
3	--	250
4	--	325

Add to the above T_h value if TLV value is less than 100 ppm. The chart is

TLV	--	Add to T_h
≤ 5 ppm	--	125
5 - 50 ppm	--	75
50 - 100 ppm	--	50

From the above Toxic Index values, category of Toxic hazard is prepared as follows

Category	--	Toxity Index (TI)
Category – I	--	< 6
Category – II	--	6 to 10
Category – III	--	> 10

Category – I is less toxic hazard,

Category – II is medium toxic hazard,

Category – III is highly toxic hazard.

By Toxic Calculation, the Toxic Index value for MS Ingots manufacturing process, is Nil. Hence it comes under non-toxic hazard category.

Fire & Explosion Indices (F & EI) for all the storage units in the facility have been estimated to give the relative degree of severity of the units using the criteria given below,

Table 7.2 Fire & Explosion Indices

Index Range	Degree of Hazard
1 – 20	Mild
21 – 40	Light
41 – 60	Moderate
61– 75	Moderately heavy
76-90	Heavy
91 – 115	Extreme
116 – 150	Very Extreme
151 – 200	Potentially catastrophic
> 200	Highly catastrophic

7.1.5 Hazard and Operability Study (HAZOP)

A HAZOP study identifies hazards and operability problems. The concept involves investigating how the plant might deviate from the design intent. If, in the process of identifying problem during a HAZOP study, a solution becomes apparent, it is recorded as part of the HAZOP result; however, care must be taken to avoid trying to find solutions which are not so apparent, because the prime objective for the HAZOP is problem identification. Although the HAZOP study was developed to supplement experience-based practices when a new design or technology is involved, its use has expanded to almost all phase of a plant's life. HAZOP is based on the principle that several experts with different backgrounds can interact and identify more problems when working together than when working separately and combining their results.

The success or failure of the HAZOP depends on several factors,

- The completeness and accuracy of drawings and other data used as a basis for the study
- The technical skills and insights of the team
- The ability of the team to use the approach as an aid to their imagination in visualizing deviations, causes and consequences

- The ability of the team to concentrate on the more serious hazards which are identified.

The process is systematic and it is helpful to define the terms that are used,

a. STUDY NODES – The locations (on piping and instrumentation drawings and procedures) at which the process parameters are investigated for deviations.
b. INTENTION – The intention defines how the plant is expected to operate in the absence of deviations at the study nodes. This can take a number of forms and can either be descriptive or diagrammatic: e.g., flow sheets, line diagrams, P & IDs.
c. DEVIATIONS – These are departures from the intention which are discovered by systematically applying the guide words.
d. CAUSES – these are the reasons why deviations might occur. Once deviations has been shown to have a credible cause. It can be treated as a meaningful deviation. These causes can be hardware failures, human errors, an unanticipated process state, external disruptions, etc.
e. CONSEQUENCES – These are the results of the deviations
f. GUIDE WORDS - These are simple words which are used to qualify or quantify the intention in order to guide and to discover deviations. The guide words are the ones most often used in a HAZOP: Each guide word is applied to the process variables at the point in the plant (study node).

Guide words	Parameter	Deviation
No	Flow	No flow
More	Pressure	More pressure
Less	Pressure	Less pressure
As well as	Temperature	Less temperature
Part of	Temperature	Less temperature
Reverse	Flow	Reverse flow
Others	Composition	Other material

These guide words are applicable to both the more general parameters (e.g. react, transfer) and the more specific parameters (e.g., pressure, temperature).

Table 7.3 HAZOP Guide Words & Meanings

Guide words	Meaning
No	Negation of the Design intent
Less	Quantitative Decrease
More	Quantitative Increase
Part of	Quantitative Increase
As well As	Quantitative Increase
Reverse	Logical Opposite of the Intent
Other Than	Complete substitution

7.1.6 Guidelines for using procedure

The concepts presented above are put into practice in the following steps:

1. Define the purpose, objectives, and scope of the study
2. Select the team
3. Record the results

It is important to recognize that some of these steps can take place at the same time. For example, the team reviews the design, records the findings, and follows up on the findings continuously. Each step will be discussed below as separate items.

7.1.6.1 Purpose, objectives, and scope of the study

The purpose, objectives, and scope of the study should be made as simple as possible. These objectives are normally set by the person responsible for the plant or project, assisted by the HAZOP study leader. It is important that this interaction take place to provide the proper authority to the study and to ensure that the study is focused. Also, even though the general objective is to identify hazards and operability problems, the team should focus on the underlying purpose or reason for the study.

Examples of reasons for a study might be to,

- Check the safety of a design
- Decide whether and where to build

- Check operating / safety procedures
- Improve that safety of an existing facility
- Verify that safety instrumentation is reacting to best parameters

It is also important to define what specific consequences are to be considered,

- Employee safety
- Loss of plant or equipment
- Loss of production
- Public safety
- Environmental impacts

7.1.6.2 Select the team

The team leader should have experience in leading a HAZOP. The rest of the team should be experts in areas relevant to the plant operation. For example, a team might include,

- Design engineer
- Process engineer
- Operations supervisor
- Instrument design engineer
- Chemist
- Maintenance supervisor
- Safety engineer

The team leader's most important job is to identify problems, not necessarily to solve them.

7.1.6.3 Record the results

The recording process is an important part of the HAZOP. It is impossible to record manually all that is said, yet it is very important that all ideas are kept. It is very useful to have the team members review the final report.

Hazard work sheet for MS Ingots is attached.

Table 7.4 HAZOP WORK SHEETS

Node : Induction furnace (Proposed)

Guide words	Deviation	Causes	Consequences	Safety guards	Recommendations
More	More flow of material	Over flow	Spillage	Controlled transfer	Limit switch for controlled flow
Less	Less flow of material	Less flow	Less weight	Controlled transfer	-
More	Higher Temperature of molten metal	Over melting of Iron ingots	Process upset	Temperature indicator	-
Less	Lesser Temperature of molten metal	Induction Furnace	Molten metal freeze	Temperature indicator	-

7.2 ONSITE EMERGENCY PLAN

7.2.1 Introduction

Disaster may be defined as a sudden' occurrence of such magnitude as to affect normal pattern of life inside or in the vicinity of plant which have the potential to cause extensive injury or loss of life and/or damage to property, and which tend to cause disruption inside/outside the site.

Although a great deal of efforts and money are spent to reduce the scale and probability of accidents, there always remain a finite but small probability that disaster may occur. The accidents of Bhopal, Texas City, Mexico and Feyzin are grim reminders to the necessity of an effective emergency planning. There have been many cases where, because of effective action taken, the full potential loss has been avoided or minimized.

Disaster Management Plan is an essential part of the loss prevention strategy. This is a preplan to handle any emergency situation effectively — so as to reduce the possibility of serious loss/damage to public, plant, machinery, documents etc. Losses can be measured in both human and monetary terms.

The plan is a comprehensive one detailing the procedures to tackle an emergency situation both on-site and off-site depending upon the magnitude of the disaster. Hence Disaster Management Plan is outlined in TWO parts, viz.

a) On-site Emergency Plan utilizing only internal resources,
b) Off-site Emergency Plan utilizing the combined resources.

Disaster Management Plan assumes great importance particularly in case of a plant like ours, which handles MS Scrap, Ferro Alloys and Sponge Iron into mold as MS Ingots.

Effective and timely action can be taken to tackle a major disaster, only if a comprehensive and practiced procedure in line with the Disaster Management Plant is existing.

7.2.2 Main Objective of the Plan

- Provide resources & method for effective control of emergency,
- Prevent emergency turning into disaster,
- Synchronize actions from all coordinating agencies in the least possible time.
- Minimize damage to people, property & environment,
- Timely execution of rescue operations & treatment of casualties,
- Restore normality in least possible time.

Table 7.5 Possible Causes for Disasters

S.No.	Nature of Disaster	Causes
1.	Fire	Static Electricity
		Friction
		Lightning
		Smoking
		Naked Electrical Connection
		Unapproved Hot Work
2.	Explosion	Bursting of Pipelines
		Failure of Valves, Joints
		Rise of temperature
3.	Other Disasters	Earthquakes
		Not using protection equipments
		Flouting operating procedures
		Lack of proper inspection and Preventive maintenance
		Lack of alertness
		Unsafe walkways & driveways
		Poor Housekeeping
		Unsafe design & constructions
		Poor illumination of workplace
		Unguarded equipments
		Violating Safety Precautions.

Scope

This Plan is expected to provide general guidelines for handling cases of emergencies inside the Plant – Involving molten metal and Al / Mg granules. It must be kept in mind that any unusual incident may develop into a major emergency, if remedial & controlling measures are not taken in time. The emergency response, therefore are planned in such a fashion as to adequately avert this eventuality.

Appointment of Key Personnel

Key Persons are the Site Controller, Incident Controller, Administrative Coordinator, Fire & Safety Coordinator and Communications & Maintenance Coordinator who are designed as follows,

Site Controller : Plant Manager, Also Designated as the Chief Coordinator

Incident Controller	:	Senior Operations Officer
Administrative Coordinator	:	Accounts Officer
Fire & Safety Coordinator	:	Safely officer & Operations officer
Communication & Maintenance	:	Maintenance Officer, Operations Coordinator Officer
Security Controller	:	Security Supervisor

Emergency Control Centre

The Administrative Office is our Emergency Control Centre. This Centre will be the pivotal point in case of an emergency from where the operation to handle the emergency will be directed and coordinated. It is having the facilities of external & internal telephones and furnished with important information like List of Key Persons, their Addresses with Telephone Nos. and a copy of the Material Safety Data Sheet. This centre will also act as an operating point for Public Address System.

Assembly Points

Assembly Points are the place inside plant premises where pre-designated persons from the plant, contractors and visitors would assemble in case of emergency. Obviously, these are set up farthest from the location of likely hazardous events. In our plant, following area is identified as the Assembly Point:

1. Open Area

Escape Route

Following are the escape routes provided for evacuees in case of emergencies:

1. Emergency Gate
2. Main Gate

7.3 Responsibilities of Key Personnel

7.3.1 Site Controller or, Chief Coordinator

- Analyse & review the possible impact of the emergency
- Clarify & declare emergency
- Assess the magnitude of the situation and decide whether the staff need to be evacuated from the Assembly Points
- Establish contact with District Emergency Authorities like Police, Fire Brigade, Hospital, District Collector, Inspector of Factories etc.
- Monitor and review the events and also the possible developments in consultation with Incident Controller, Administrative, Safety and Maintenance Coordinators.
- Contact Mutual Aid partners, and alert them for any possible assistance, if needed,
- Ensure that record of all events, decisions taken, Government directives etc. are preserved for future analysis.
- Assess the damage after the Emergency is over.

7.3.2 Incident Controller

- On hearing the emergency alarm/siren, he will rush to the incident spot and taken overall charge, and report to the Site Controller.
- Direct all operations within the affected area with the priorities for safety of personnel minimize damage to the plant, property and environment and minimize loss of materials.
- Pending arrival of Site Controller, assume the duties of his post and in particular
  a. Direct closure and evacuation of plant areas likely to be adversely affected by the emergency, and
  b. Ensure that all key personnel and outside help are called in.
- Provide information and assistance to the Fire & Safety Officer and the local fire Brigade, as and when they arrive at the plant.

- Ensure that all non-essential workers/staff of the areas affected are evacuated to the appropriate Assembly Points, and the areas are searched for casualties.
- Report on all significant developments to the Communication Coordinator.

7.3.3 Administrative Coordinator

- Handle, under the direction of Site Controller, Police, Press and other enquiries.
- Receive reports from Assembly Points, and pass on the information to the Incident Controller.
- Ensure that casualties receive adequate attention, and arrange additional help, if required and inform relatives.
- Control traffic movements into the plant, and ensure that alternate transport is available when need arises.
- Make arrangements for relief of personnel and organise refreshments/catering facility.

7.3.4 Communication and Maintenance Coordinator

- On hearing the alarm, proceed to Control Centre and maintain communication with incident Controller.
- Advise Site Controller of the situation recommending, if necessary evacuation of staff from Assembly Points.
- Recruit suitable staff to act as runners between Incident Controllers and himself (if the telephone and other mode of Communications fail).
- Maintain a log of the Incident.
- In case of prolonged emergency involving risk to outside areas by wind flown materials, contact Police & Fire Brigade for warning, and if necessary, evacuating the nearby localities.

7.3.5 Fire & Safety Coordinator

- On heating the alarm, reach the emergency spot immediately, and analyse & review the situation.
- Organize and give instructions to the plant staff to fight emergency.
- Advise the Site Controller, Incident Controller & Communication Coordinator through intercom/messengers about the nature and spot of the incident.
- Ensure adequate materials and manpower to handle the emergency.
- Review the situation periodically, and inform the Site Controller.
- Advise Site Controller to seek help, if necessary from outside agencies like Police, Fire Brigade, and Medical etc.

7.3.6 Security Controller

- Coordinate with Police, Ambulance and Fire Brigade, as required
- Ensure protection to all corporation personnel and their property, Close public traffic on Corporation roads as advised by Site Controller.
- Assist in evacuating personnel from affected areas.
- Control law & order in Corporation premises.

7.4 OFF-SITE EMERGENCY PLAN

An integral part of the Disaster Management Plan is the Off-site Emergency Plan, which is based on assessment of those incidents, which have the potential to affect the environment outside the plant premises. Obviously, the plan is mainly dependent upon a very close coordination and assistance from the local administration like Police, Fire Brigade, Medical Service etc.

Though according to the 'Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989' categorically states that responsibility to prepare and keep up-to-date an adequate 'Off-site Emergency Plan' solely rests with the District Emergency Authority' (Item No. 9 of Schedule –5), the Plant has developed a realistic Off-site Plan detailing the responsibility of local agencies during such emergencies.

7.4.1 Off-site Action

The Chief Coordinator will inform about the incidents like fire, explosion to

1. Police,
2. Fire Brigade,
3. Medical Services,
4. Technical Agencies,
5. Rehabilitation Agencies.

7.4.2 Responsibilities of the Service

I. Police

- Traffic & mob control by cordoning of the area,
- Arrangement for evacuation of people on advice from the Chief Coordinator/Chief Executive of local authority,
- Inform relatives about details of injured and casualties.

II. Fire Brigade

- Fighting fire & preventing its spread,
- Rescue and salvage operation.

III. Medical/Ambulance

- First Aid to the injured persons.
- Shifting critically injured patients to the hospitals,
- Providing medical treatment.

IV. Technical

- Factory Inspectorate, Pollution Control Board, Technical Experts from Industries, Research & Training Institutions.
- Provide all technical information's to the emergency services, as required,
- Investigate the cause of the disaster.

V. Rehabilitation

- Local Administration
- Arrange for rehabilitation of persons evacuated, and arrange for their food, medical and hygienic requirements,

- Coordinating with the Insurance Companies for prompt disbursement of compensation to the affected persons,
- Maintain communication channels of the affected industry like telephone, telex etc. in perfect working condition.

7.4.3 CONCLUSION

Since the unit does not have any toxic or flammable gases in large quantity, the off-site emergency plan does not arise at all.

7.5 RECOMMENDATIONS

7.5.1 Worker's safety

It is gratifying to note that the workers safety have been given importance in M/s. Ran India Steels. It is advisable to provide adequate training for the workers to keep the plant clean. The fire extinguishers should be provided in important sections and it is necessary that the workers are given training in handling them during emergency.

7.5.2 Conclusion

M/s. Ran India Steels (P) Ltd., Unit-II will follow the recommendations and design the plant area to keep the plant to minimize fire, if it occurs to eliminate the damage to men, mechanics and materials.

7.6 Risk Assessment Studies

The study includes risk assessment by estimating maximum damage distance by Maximum Credible Accident (MCA) analysis. The study helps in drawing damage contours to assess the consequence of an event. The analysis does not consider probability of occurrence. The probability is therefore rated on experience and previous similar experience elsewhere.

7.6.1 Risk Assessment for Boilers

The risk associated with boiler operation and turbine operations and its appropriate mitigation measures are as given in Table 7.7.

Table 7.6 Risk Associated with Furnace Operation and Mitigation Measures

Identified hazard	Precautions taken	Mitigation measures
Fire & explosion	• Furnaces will be equipped with safety valves used to release excess pressure. • All the steam lines will be insulated. • Silencers will be provided for all start up vent lines and safety valves.	• Portable fire extinguishers will be fixed at strategic points. • Wet risers will be provided with suitable hose reel at strategic points. • Fire hydrant pump will be connected with an independent power source (D.G) to provide uninterrupted service in case of emergency.

Other risks from boiler operation are detailed below

Bursting of tubes:

The steam generated in the boiler goes to the turbo-generator to drive the prime mover, i.e., the turbine. In this turbine, the steam is condensed and that condensate is returned back to the boiler again. This process is repeated continuously. Due to this, the dissolved salts present initially in small amount in the water gets concentrated, which attains its threshold limit over a period of time. This results in scale formation in the tubes, which drastically reduces the heat transfer rate. This in turn leads to the localized overheating of the tubes. This overheating makes the tube material soft and starts bulging, eventually leading to bursting of the tubes. Control is periodical steam blow and periodical inspection and maintenance.

Bursting of pipeline joints:

The water required for boiler is pumped and transferred by using high-pressure pumps. Also, the high-pressure steam generated in the boiler is sent to the turbine through the pipelines. This pipeline will have flanged joints, with sandwich gaskets in between for better sealing. At times, due to water hammering this gasket fails and leads to bursting of the flange joint. Therefore, proper design of the pipeline is necessary for avoiding water hammering.

Table 7.7 Risk Associated with Turbine Operation and Mitigation Measures

Identified hazard	Precautions taken	Mitigation measures
Fire & noise	•Smoke detector system provided. • All the turbines will be covered in acoustic enclosures reduce noise. • Noise level in the turbine area will be monitored regularly. Efforts will be made to control the noise wherever possible by installing noise generating sources inside the building, providing double air lock doors, double frame glass windows reducing the noise of blower etc. Use of ear plugs/muffs will be mandatory for the workers working in high noise zones and caution boards will be displayed.	• Portable fire extinguishers will be fixed at strategic points. • Fire alarm system will be installed. • PPEs will be provided as required. • Fire-fighting training will be imparted to employees.

Compressor: It used for operation of Various Pneumatic Devices

Table 7.8 Risk Associated with Compressor Operation & Mitigation Measure

Impacts Identified	Precautions taken	Mitigation measures
Explosion/ Noise	• All compressors will be installed in room/s. • Pressure test of all compressor tanks, wall thickness tests and hydro tests will be conducted as per statutory requirements and guidelines by competent persons. • All compressor vessels will be equipped with safety	• To reduce noise compressor room doors will be provided with door closers. • Warning signs will be displayed at entrance of compressors room. • All compressor vessels are equipped with pressure gauges and safety valves. • The test date and due testing date will be painted on compressors vessel. • Un-authorized entry will be restricted in compressor room/s.

7.6.2 Inference

According to the ALOHA simulation analysis, the consequential impacts from each incident scenarios can be though flammable vapour cloud and thermal radiation. The damage distance indicates the distance of consequential impacts for flammable vapour cloud release would on plant personnel, equipment and machinery. All scenarios will be within the plant site.

Table 7.9 Risk Mitigation Measure

Identified Hazard	Precaution Taken	Mitigation Measures
Fire and Explosion	• There shall not be any electrical overhead lines in storage area. • All storage area pipelines will have jumper for avoiding static electricity. • All tank thickness tests will be done by competent person. • All tanks and motors will have proper earthing system and double earthing. • Flameproof type lighting system will be provided for controlling of spark.	Portable fire extinguishers will be provided at identified locations in section. • Sand buckets will be provided. • Entire plant will be covered with fire hydrant line and foam monitor system. • Warning and informatory signage's will be displayed.
Fire and Noise	• Mobile usage prohibited in the plant. • No smoking allowed in factory premises. •Flameproof motors will be provided in section. • Welding and gas cutting prohibited in premises. .	• Fire-fighting training will be provided to all employees. • Mock drill will be conducted once in 2 months.

7.6.3 Risk Mitigation Measures

- Follow standard loading and unloading procedure for safe loading of chemicals into tanker.
- Provide static earthing provision for tanker.
- Provide display boards on all storage tanks to communicate the material of construction, name of the chemical stored and MSDS.
- Provide on-site detectors for fire & smoke detection with alarm system as required.
- Provide relevant fire extinguishers at accessible places
- Provide first aids boxes in all control rooms/cabins.
- Declare the entire premises as "NO SMOKE ZONE".
- Ensure that, hazardous material handling is done by using all requisite PPEs, with proper ventilation and under supervision.

7.6.4 Safety Measures to Prevent Spillage/Leakage of Toxic Chemicals

- Provide requisite PPEs like goggles, gloves, protective clothes to those handling toxic chemicals.
- Store finished products under safe condition.
- All tanks storing hazardous chemicals tested periodically for the thickness.
- All pipe joints provided with heavy duty gaskets to prevent any leakage.
- Dyke wall to areas where hazardous chemicals are stored.
- Provide spare barrels of sufficient quantity kept ready for any emergency spillage or leakage.
- All storage tanks to be constructed in line with PESO guidelines.

7.6.5 Specific Recommendations Based on Hazards

The specific engineering or management recommendations based on the simulation analysis are as under:

Mechanical and Equipment Integrity

Following are the engineering recommendations:

- ✓ The material of construction and thickness of storage vessels are designed to accommodate the maximum pressure.
- ✓ The tanks are located in isolated areas where there is no/minimum personnel would be working in the downwind direction at any given point of time.
- ✓ To ensure no equipment sensitive to thermal radiation are installed in the downwind direction of these tanks.
- ✓ The tanks will be provided with dyke wall with arrangement to recover the spillage/leakage.
- ✓ Provide with high pressure detector with interlock to the incoming material.
- ✓ Provide high temperature alarm with an interlock to cut off the heat source.

Management Approach

Following are the management recommendations:

- ✓ The operating personnel are trained on the consequential impacts and the action to be taken under different scenarios.
- ✓ The operating personnel have relevant PPEs.
- ✓ List of do's and don'ts will be displayed.
- ✓ These storage tanks are tested every 6 months to confirm that there is no loss of material of construction and the tank thickness is intact. Record of such testing is maintained for reference.

7.7 RISK ANALYSIS

Steel plant being hazardous industry, it is expected to harbor major hazards which warrant for a details Risk analysis study. Talking in to account the fact that the plant is handling Toxic gases, molten metal, fuel oils & chemical the Risk analysis is made. The Risk analysis is made both for existing plants & future projects.

7.7.1 Risk analysis purpose

Risk analysis will help to identify & quantify the area of strengths & weakness & provide actions for controlling risks & provide a basis for developing safety programs & fire prevention & protection measures.

Risk analysis involves study of:

i) Identification of major hazards.
ii) Identifying failure scenario of release of gas or situations such as spillage of chemicals or leakage of molten metal etc.
iii) Carrying out of effect and damage calculations.
iv) Deciding who are at risk – employees, contractors, visitors etc.,
v) Evaluate the risk in terms of likelihood & severity.
vi) Deciding whether the existing precautions / measures are adequate.

7.7.2 Method of Risk assessment

This includes studying various hazards and control measures adopted to prevent accidents. Wherever possible the estimation of DOW Explosion and toxicity Index were also done in addition to PHA and other studies. Maximum Credible Scenario (MCA) with a maximum damage potential is studied.

7.7.3 Fire and Explosion Index

This Index helps to categorize the hazardous substances into lower or higher hazard potential and help to design safety measures for storing and handling.

- For determination of Toxicity and Fire and Explosion Index, the various factors are considered.
- Material Factors :Fire load, Flash point, Flammability, heat of Combustion,
- Vapor pressure
- General Process Hazards: Exothermic, endothermic reactors, process involving mixing, burning, charging etc.
- Special process hazards: Process Temperature, Pressures, Operation, correction, Erosion etc, Engineering Judgment, Analysis of past accidents are also taken into consideration.

7.7.4 Risk identified in iron & steel plant

The risks involved in operation & maintenance of an integrated steel plant are broadly classified in to following categories.

a) Mechanical Risks.
b) Electrical Risks.
c) Fire & explosion Risks.
d) High/low temperature exposure risks.
e) Toxic gases exposure risks.
f) Corrosive/reactive chemical exposure risks.

Mechanical & Electrical Risks

These two types of risks are of universal nature associated with any industrial activity not specific to a particular plant & process.

Mechanical risks are generally encountered with injuries to head, limbs, eyes etc. Usually as a result of negligence on the part of operating or maintenance personnel in the use of improper tools, bypassing safety procedure, neglect of personal protective wear & risk associated with rotating machinery.

Electrical risks which results in shock or burns are most of them a consequence of poor maintenance, handling by unauthorized personnel & use of improper / substandard electrical equipment for cables.

The above two types of risks normally do not cause Emergency situation.

2. Other types of Risks such as Fire & explosions, Toxic gas release, Chemical spills involve the handling of molten metal, fuel oils, toxic gases & chemicals can create emergency situations.

3. The details of materials involved, emergency scenario, consequence of incidents, employee's exposure & the level of risk associated with these activities are given in summary of Risk analysis.

Table 7.10 Summary of Risk Analysis

Sl. No	Scenario Envisaged	Risk / causes	Consequence	Probability Of occurrence
1.	Release of Toxic gas such as BF gas & cokeoven gas	Inhalation of "CO"	Health Hazard (Unconsciousnessetc.)	Occasional
2.	Fire in fuel oil storage	Ignition of Oil	Major Fire	Occasional
3.	Catastrophic Ruptureof LDO / FO storage Tank	Ignition of LDO / FO oil	Jet fire	Remote
4.	Chemical spills (HCl / FO storageTank)	Ignition of LDO / FO oil	Exposure to corrosive Fumes of HCL & H2SO4 & chemical burns	Remote
5.	Bursting / Explosion ofLPG / Acetylene cylinder	Ignition of gas	Explosion & injuries tomen working	Remote
6.	Molten metal explosionin Blast furnace & SMS	Puncture of ladle / furnace shell	Explosion & injuries tomen working	Remote
7.	Fire in Underground Cable galleries	Insulation failure & short circuit	Major Fire	Remote
8.	Furnace Explosion	Over pressure dueto failure of safety devices	Pressure wave / missile effect of exploded pieces	Remote
9.	Catastrophic rupture of steam line	Over pressure	Burns to Personnel	Remote

7.7.5 Risk Management Measures

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

7.7.5.1 Furnace

Preventive Measures

If any job is to be undertaken in EOF & BOF areas where the EOF & BOF gases are toxic, the following procedure has to be laid down to ensure safety of men and the equipment.

- Gas Safety man will accompany the team and will test the atmosphere for the presence of CO, before starting the work.
- If 'CO' concentration is found exceeding the safe limit, the job will be undertaken using necessary safety appliances viz., Oxygen Breathing Apparatus/ Blower type Gas mask.
- Any gas cutting/welding job will be undertaken with the clearance from Gas Safety man.

7.7.5.2 Gas Explosion, Prevention & Preventive Measures

The following actions will be taken to prevent any gas explosions in case of gas leakage.

a) For jobs on gas lines/equipment, non-sparking copper tools will used. If such tools are not available, grease coated steel tools will be used. Electrical drill & other electrical equipment will not be used as these can give rise to sparks.

b) The gas line will be thoroughly purged with steam before undertaking the job on the same.

c) Naked lights will not be used near any de-pressurized gas main or equipment unless the same has been thoroughly purged.

d) In case of profuse leakage of gas, action will be taken for water sealing and isolating that portion.

e) The approach road to the gas line complex will be kept free from any obstructions.

f) If gas catches fire due to some leakage, it will be extinguished with plastic clay, steam or water. The portion of gas main affected will be cooled down with water. The valve will not be closed when fire is still there and the pressure in the main will be maintained at minimum 100 mm (WC).

g) Gas tapping points of flow or pressure measurement will be cleaned with wooden stick or grease coated wire.

h) If lighting is necessary near gas line, portable spark proof electric lamps of low voltage or explosion proof torchlight will be used for enclosed areas.

7.7.5.3 Hot Metal & Slag

Sudden break out of molten metal & slag may result in heavy explosions, due to their coming in contact with water, thereby causing serious burn injuries to persons and damage to equipment.

Preventive Measures

a) Any accumulation of water will be prevented in such vulnerable areas.

b) In case of minor leakages, the flow of molten metal & slag will be controlled.

c) If there is major breakout, the area will be cut off and cordoned.

d) Vital connections e.g. water, gas, compressed air, oxygen etc. will be cut off or regulated, as per requirement.

7.7.5.4 Respiratory Hazards

Dust and Gases

Dust generated in integrated pig iron complex includes iron and metallic dusts, which are mainly present in BF, continuous casting buildings and sinter plants; and mineral dusts which are mainly present in raw material storage, BF. In the former case, workers may be exposed to iron oxide and silica dust that can be contaminated with heavy metals such as chromium (Cr), nickel (Ni), lead (Pb), and manganese (Mn), zinc (Zn), and mercury (Hg). The most significant is the dust present in the melting and casting processes (e.g. BF, continuous casting), where the dust, which is generated by high temperature operations, is finer and more easily inhaled than in the rolling processes. In raw material storage, blast furnace and coke oven plant, workers are exposed to mineral dust, which may contain heavy metals. In addition, BF tapping results in graphite release.

In the melting and casting processes where high temperature operations are conducted, workers may be exposed to gas inhalation hazards, which may contain heavy metals. In the BF, workers may be exposed to gas inhalation hazards of carbon monoxide. To prevent exposure to gas and dust, the steps taken include the following,

- Sources of dust and gases will be separated and enclosed;
- Designing the facility ventilation to maximize air circulation. Outlet air will be filtered before discharge to the atmosphere;
- Exhaust ventilation will be installed at the significant point sources of dust and gas emissions, particularly the BF topping area
- Providing a sealed cabin with filtered air conditioning if an operator is needed in a contaminated area;
- Providing separated eating facilities that allow for washing before eating;
- Providing facilities that allow work clothes to be separated from personal clothes, and for washing / showering after work;
- Implementing a policy for periodic health checks.

Respiratory hazard control technologies will be used when exposure cannot be avoided with other means, such as manual operations such as grinding or use of non-enclosed machine-tools; and during specific maintenance and repair operations. Necessary steps/ precautions for respiratory protection include the following:

- Use of filter respirators when exposed to heavy dust (e.g. fettling works);
- For light, metallic dust and gases, fresh-air supplied respirators will be used. Alternatively, a complete facial gas mask (or an "overpressure" helmet) may be used, equipped with electrical ventilation;
- For carbon monoxide (CO) exposure, detection equipment will be installed to alert control rooms and local personnel. In case of emergency intervention in areas with high levels of CO, workers will be provided with portable CO detectors, and fresh-air supplied respirators.

Heat & Hot Liquid

High temperatures and direct infrared (IR) radiation are common hazards in pig iron complexes. High temperatures can cause fatigue and dehydration. Direct IR radiation also poses a risk to sight. Potential contact with hot metal or hot water may occur from the cooling spray zone of continuous casting, from splashes of melted metal, and from contact with hot surfaces. Precautionary measures for prevention and control of exposure to heat and hot liquids / materials include the following,

a. Shielding the surfaces where close contact with hot equipment or splashing from hot materials is expected (e.g. blast furnaces, BOF, continuous casting and heating oven, and ladles);
b. Implementing safety buffer zones to separate areas where hot materials and items (e.g. billets, thick slabs, or ladles) are handled or temporarily stored. Rail guards around those areas will be provided, with interlocked gates to control access to areas during operations;

c. Using appropriate PPE (e.g. insulated gloves and shoes, goggles to protect against IR and ultraviolet radiation, and clothing to protect against heat radiation and liquid metal splashes);
d. Installing cooling ventilation to control extreme temperatures;
e. Implementation of work rotations providing regular work breaks, access to a cool rest area, and drinking water.

7.7.5.5 Physical Hazards

Potential physical hazards in these industries are related to handling of large and heavy raw materials and product (e.g. blast furnace and storage and movement of billets and thick slabs, movement of large ladles containing molten metal); heavy mechanical transport (e.g. trains, trucks and forklifts); grinding and cutting activities (e.g. contact with scrap material ejected by machine-tools); and work at heights (e.g. platforms, ladders, and stairs).

Heavy Loads / Grinding & Cutting / Rolling

Lifting and moving heavy loads at elevated heights using hydraulic platforms and cranes presents a significant occupational safety hazard in pig iron plant. Measures taken to prevent and control potential worker injury include the following;

- Clear signage in all transport corridors and working areas;
- Appropriate design and layout of facilities to avoid crossover of different activities and flow of processes;
- Implementation of specific load handling and lifting procedures, including:
- Description of load to be lifted (dimensions, weight, position of center of gravity)
- Specifications of the lifting crane to be used (maximum lifted load, dimensions)

- Train staff in the handling of lifting equipment's and driving mechanical transport devices
- The area of operation of fixed handling equipment (e.g. cranes, elevated platforms) will not cross above worker and pre-assembly areas;
- Material and product handling will remain within restricted zones under supervision;
- Regular maintenance and repair of lifting, electrical and transport equipment will be conducted.

Prevention and control of injuries related to grinding and cutting activities, and use of scrap, include the following,

- Locating machine-tools at a safe distance from other work areas and from walkways;
- Conducting regular inspection and repair of machine-tools, in particular protective shields and safety devices /equipment;
- Training staff to properly use machines-tools, and to use appropriate personal protection equipment (PPE).

7.7.5.6 Musculoskeletal Disorders

Musculoskeletal disorders are injuries that affect muscles, tendons, ligaments and nerves. These injuries can develop when the same muscles are used over and over again or for a long time without taking time to rest. The chance of getting this type of injury increases if the force exerted is high and/or the job requires an awkward posture. Some examples of musculoskeletal disorders include back pain, carpal tunnel syndrome, tendonitis and tenosynovitis.

Preventing musculoskeletal disorders requires recognition, assessment and control of the hazards that cause them. Keep in mind that the most knowledgeable person about problems with a job is usually the person doing it.

Control Hazards, Preferably at their Source

Consider changes to,

- Mechanizing a repetitive task or process
- Designing workstations and work processes using ergonomic principles
- Using well maintained tools and equipment that decrease force or awkward position
- Providing lifting devices to eliminate heavy lifting
- Ensuring that all employees receive comprehensive training on how to do their job safely

Using ergonomic principles, to avoid,

- ✓ Awkward body positions
- ✓ Overextended and awkward reaches
- ✓ Repetitive or heavy bending, twisting, reaching, lifting, lowering, pushing and pulling
- ✓ Sustained or static exertions

7.8 OCCUPATIONAL HEALTH AND SAFETY

The project proponent strongly believes in the safety and health of the workers. The company will conduct regular medical check-ups of the workers and for the safer side there will always be a rotation of the workers where the exposure to dust and chemicals is high.

Table 7.11 Preventive Action and Corrective Action for Impacts

Sl. No.	Activity	Aspect	Impact	Preventive action	Corrective action
1	Fuel Handling	Air borne dust	On respiratory system like chronic obstructive pulmonary disease (COPD)	i. To provide close conveyor system ii. To sprinkle water over Coal/Husk	Periodic Medical Examination – Spirometer/PFT /Pulse oximetry

				iii. To transport fly-ash in closed trucks	
2	DG sets operation/ compressors	Noise	Noise Induced Hearing Loss (NIHL) / cardiovascular disease/ hypertension	i.Reduce noise at source by changing design / proper maintenance/ providing acoustic enclosures ii.Provide PPE	Audiometry
3	Furnace operation	Exposure to heat	Heat exhaustion	Proper location/design of operator cabin	Job rotation

7.8.1 Occupational Health and Safety Precautions

Provision of all necessary equipment like portable detectors, online detectors and other laboratory equipment for regular monitoring of workplace air and other conditions (temperature, humidity and light intensity etc.) shall be made. All the work places will be provided with MSDS of chemicals & materials being handled. The concerned employees will be trained and all the employees will be made aware of the hazards in handling chemicals.

- ✓ Inspection and preventive & breakdown maintenance of all the equipment including pollution control equipment will be undertaken.
- ✓ Compulsory use of necessary PPEs.
- ✓ Installation of fire extinguishers at required places.
- ✓ Regular work place monitoring.
- ✓ Provision of part time qualified medical officer as per factories act guidelines.

- ✓ Regular medical check-up of employees by qualified medical practioners.
- ✓ Monitoring of occupational hazard parameters like noise, ventilation, chemical exposure at frequent intervals.
- ✓ Display of various instruction boards, cautionary notices etc., at different locations.

7.8.2 Fire Protection and Fighting System

The fire protection system for the unit is to provide for early detection, alarm, containment and suppression of fires. The fire detection and protection system have to be planned to meet the objectives of statutory as well as insurance requirements of the governing bodies. As with any process industry, metallurgy industry also have unique fire risk associated with it. Some of the impacts due to fire in the factory might be damage to the equipment's, process buildings, storage tanks and injury to workers i.e. overall damages are the high economic losses. This type of losses can be avoided by preventing and controlling the fire instantly for which fire fighting group will be established. Metallurgy is classified as a high hazard industrial occupancy and hence there is the need for automatic fire protection systems. Fire protection is also applicable to the storage tanks also where there is the greatest risk of fire and explosion. Fire extinguishing media will be provided in the entire factory at the high-risk areas to prevent and the fire incidents.

7.8.3 Fire Extinguishers/ Fire Hydrants

Liquefied Co2 fire extinguisher shall be upright type of capacity 10 kg having standards marked. The fire extinguisher will be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and all flammable Liquid & Gas. We will provide 10 numbers of portable fire extinguisher and fire hydrants as specified.

7.8.4 Fire Fighting Equipment's

- ✓ Hydrant System
- ✓ Hose Reel System
- ✓ Portable fire extinguishers
- ✓ Medium Velocity Water Spray system
- ✓ Fire Detection and Alarm System

7.8.5 Occupational Health Centre

- Full time round the clock doctor, para-medical staff (nurse and attendant) will be appointed.
- Ambulance with round the clock driver will be provided.
- Medical examination room, bed ward room, record and drugs stores with all the equipments and medicines as prescribed will be provided.

7.8.6 Frequency & Parameters of Health Check-Up

Medical surveillance will be carried out by maintaining the health records.

- Pre-employment health check-up followed by periodical health check-up will be undertaken every year with special attention to occupational health hazards for all the employees.
- Special test like eye, audiometry etc., based on the occupational hazards will be planned.
- This activity will be outsourced to the local hospitals and diagnostic centres.
- Parameters that will be part of pre-employment & annual periodical medical check-up are given in Table 7.12.

Table 7.12 Health check-up parameters

S. No.	Test Details
1	Complete Blood Examination Haemoglobin % (Hb%), WBC, RBC etc.
2	Blood Pressure
3	Pulse
4	Physical Fitness Certificate
5	Central Nervous System (CNS)
6	Cardio Vascular System (CVS)
7	Vision
8	Electro Cardio Gram (ECG)
9	Respiratory System-Lung Function (RS)
10	Chest X-ray
11	Total Leucocyte Count (TC)
12	Differential Leucocyte Count (DLC)
13	Absolute Eosinophil Count (AEC)
14	Complete Urine Examination [Physical / Chemical /Albumin, sugar & bile salt etc.
15	Random Blood Sugar (RBS)

7.9 DISASTER MANAGEMENT PLAN

7.9.1 Introduction

The purpose of this Disaster Management Plan (DMP) is to detail organizational responsibilities, actions, reporting requirement and support resources available to ensure effective and timely management of emergencies at or affecting any of 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 plant.
- Describing the external resources available to the IRG for use in an emergency and how these resources will be coordinated.
- Incident Controller will be authorized to initially control and contain any and all emergency situations.
- Site Controller will be authorized to co-ordinate strategic response to all emergencies associated to the operation.
- EHS management Review Committee will be authorized to co-ordinate the overall strategic response to any emergency at plant.
- It should be clubbed with DMP of existing operation.

7.9.2 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 unit.
- Inform authorities and mutual aid centers 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 media; etc.

7.9.3 Classification of Emergencies

Emergencies can be categorized into the following three 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 partner 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 is done by the District Administration.

Although Level-III emergency falls under the purview of the District Authority but until
the Authority steps in, it should be the responsibility of the concerned unit to manage the
emergency.

Table 7.13 Common causes for emergency/ disaster situation

Man Made	Natural Calamities	Extraneous
Leakage Fire and explosion Failure of critical control system Design deficiency Unsafe acts Inadequate maintenance	Earthquake Excessive rainfall	Riots/civil disorder/mob attack Terrorism Sabotage Bomb threat War/ hit/ missiles

7.9.4 On-Site Emergency Plan

Disaster management plan are prepared with an aim of taking precautionary step to control the hazard propagation, avert disaster, take action after the disaster which limits the damage to the minimum and follow the on-site emergency planning. The onsite emergency is an unpleasant situation that causes extensive damage to plant personnel and surrounding area and its environment due to in operation, maintenance, design and human error. Onsite plan will be applied in case of proposed expansion. Following points are taken into consideration,

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings.
- Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.
- Measures to protect persons and property of processing equipment in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them.

7.9.5 Key Personnel and Their Roles and Responsibility

A team of following Essential persons shall be taking necessary action in case of emergency. The roles and responsibilities of these personnel are defined subsequently,

- Work Incident Controller (WIC)
- Site Incident Controller(SIC)
- Works Main Controller (WMC)
- Combat Team Leader
- Rescue Team Leader
- Auxiliary Team Leader(Communication Officer)
- Liaison Officer
- In-charge (Security)
- In-charge (Medical)
- Shift In-charge (Security)

Work Incident Controller (WIC)

- The Works Incident Controllers are the departmental heads of respective divisions for DRI, SMS and CPP whose duties include the direction of the efforts and lead to onsite emergency response team to control the situation.

- Since in the initial stages of emergency, the WIC may be called on to take decisions involving the operations of other plants, it is necessary for the person selected to have a thorough knowledge of the overall works situation.
- The person working as shift in-charge/manager i. e., an individual having overall control of the works processes for a shift shall work in the authority of WIC, when the WIC may be off-site or affected by the emergency.

Site Incident controller (SIC)

- Intimate the Works Main Controller (WMC) and proceed to the emergency site.
- Take the necessary information from Combat Team Leader (CTL), assess the situation and call Rescue Team Leader (RTL) and Auxiliary Team Leader (ATL).
- Inform Works Main Controller (WMC) regarding the situation.
- Take necessary steps and provide guidance to Combat Team, Rescue Team, and Auxiliary Team Leaders to mitigate the emergency situation.
- Examine for major emergency shutdown operation activities, decide safe escape route and announce for evacuation to Assembly Point.
- Inform Works Main Controller (WMC) about the status of the situation at regular intervals.

Works Main Controller

- Decide if emergency is to be declared and advise Site Incident Controller (SIC) accordingly and reach Emergency Control Room (ECR)
- Take decision to shut-down the plant if necessary to take up repair and other combating measures.
- Advise Rescue Team Leader (RTL)/Security Gate to blow the 'emergency siren' with appropriate code for declaration of emergency. Emergency Siren: Twenty Seconds with a pause of Five Seconds for 5 times.

- Advice (Auxiliary Team Leader) ATL for communication to statutory authorities and for mutual aid as required.
- Through Auxiliary Team Leader (ATL) shall ensure constant communication to statutory authorities and to mutual aid partners as required.
- Maintain continuous communication with Site Incident Controller (SIC) to review the situation and assess the possible course of action for emergency operations.
- To declare normalcy at the end of operation and advise Rescue Team Leader
- (RTL)/Security Gate to blow 'All clear siren'. All Clear Siren will be blown for 1 minute continuously.
- Ensure the record keeping of emergency operations chronologically.

Essential Personnel

- Shutdown of Plants
- Isolation, repairing of the affected equipment /pipeline etc.
- First Aid and removal of the injured persons to hospital.

Combat Team Leader

- Immediately rush to the site and lead the rescue team to control the situation.
- Inform Site Incident Controller (SIC) about the incident and request him to rush to the spot.
- Give the necessary instructions to the rescue team to combat the situation
- Co-ordinate the activities of team members and combat the emergency, so as to eliminate the root cause of the hazard.
- To arrest the leakage and spillage from various equipment, shut down the concerned equipment.
- Take necessary action to remove unwanted persons from the site of the incident.
- Keep informed about the developments to Site Incident Controller (SIC).

Rescue Team Leader

- Rush to site of emergency through safe route.
- Ensure presence of all his team members, availability of firefighting facilities and take necessary action to arrest the fires/leakage of gas.
- Arrange for safe escape of entrapped persons.
- Make necessary arrangements to send the affected persons for immediately medical attention through the medical officer.
- Search for the missing persons on the basis of role call taken by Auxiliary team leader (ATL).
- Give the feedback to the site incident controller (SIC) about the developments.

Auxiliary Team Leader

- Keep in constant touch with works main controller (WMC) and Site Incident Controller (SIC)
- Inform the Statutory Authorities and District Administration
- Send communications to District Hospital Ramgarh for rendering services
- To arrange for suitable persons to act as runners/messengers in case of failure of
- communication system
- Inform the relatives of causalities and send them to their residence or hospital
- Take care of visit of the authorities to the Emergency site
- Give feed back to work main controller (WMC) about the status with respect to his areas of activities

Liaison Officer

- To contact Fire Brigade, Police, and Medical facilities on intimation from Works Main Controller & arrange for the rescue operation.
- To ensure that the casualties receive attention.
- To inform relatives of the affected employee at the earliest.

- To arrange for additional transport if required.
- To arrange for relief of personnel & organize refreshment/catering facility, in case the duration of emergency is prolonged.
- To issue authorized statements to news media and ensure that evidence is preserved for enquiry to be conducted.

In-charge (Medical)

- He will keep necessary first aid and medicines and artificial respiration equipment ready
- Inform doctors at other places to be ready, for attending serious injury, burn cases and food poisoning

In-charge - Security

- The In-charge (Security) shall guide the crew, according to the condition of emergency site, for the actions required to handle the emergency i.e. for fire-fighting, removal of debris, arresting of dust, removal of oil-soaked earth etc. He shall give instructions to Security Guards to cordon off areas as required by WIC.

He shall be responsible for ensuring the discipline at control points and for preventing the entry of unauthorized persons inside the affected area as well as inside the factory during emergency

Shift In charge – Security

- To arrange the necessary help as requested by WIC
- To inform In-charge (Security)
- To blow emergency siren, if instructed by the WMC
- To send Ambulance near accident area

7.10 ARTIFICIAL RECHARGE AND RAINWATER HARVEST DESIGN

The factors influencing surface runoff at any place is as follows:

- Intensity of rainfall
- Soil moisture condition
- Type of soil in the catchment

- Type of the vegetative cover and interception by vegetation
- Slope and orientation of the catchment
- Amount of infiltration and evaporation
- The annual volume of runoff is computed by using the formula

$$Q = kAP$$

Q = runoff;

k= runoff co-efficient depending upon the surface of the drain area (0.36-0.95);

A=catchment area;

P=Annual rainfall.

7.10.1 Design

This is the most efficient and cost effective technique to recharge unconfined aquifer overlain by poorly permeable strata. Recharge shaft may be dug manually if the strata is of non-caving nature. The diameter of shaft is normally more than 2 m. The shaft should end in more permeable strata below the top impermeable strata. It may not touch water table. The unlined shaft should be backfilled, initially with boulders/ cobbles followed by gravel and coarse sand. In case of lined shaft the recharge water may be fed through a smaller conductor pipe reaching up to the filter pack. These recharge structures are very useful for village ponds where shallow clay layer impedes the infiltration of water to the aquifer.

It is seen that in rainy season village tanks are fully filled up but water from these tanks does not percolate down due to siltation and tube well and dug wells located nearby remains dried up. The water from village tanks gets evaporated and is not available for the beneficial use. By constructing recharge shaft in tanks, surplus water can be recharged to ground water. Recharge shafts of 0.5 to 3 m. diameter and 10 to 15 m. deep are constructed depending upon availability of quantum of water. The top of shaft is kept above the tank bed level preferably at half of full supply level. These are back filled with boulders,

gravels and coarse sand. In upper portion of 1 or 2 m depth, the brick masonry work is carried out for the stability of the structure. Through this technique all the accumulated water in village tank above 50% full supply level would be recharged to ground water. Sufficient water will continue to remain in tank for domestic use after recharge

7.10.2 Design Guidelines

I) Recharge shafts may be dug manually in non-caving strata. For construction of deeper shafts, drilling by direct rotary or reverse circulation may be required.

II) The shafts may be about 2m in diameter at the bottom if manually dug. In case of drilled shafts, the diameter may not exceed 1m.

III) The shaft should reach the permeable strata by penetrating the overlying low permeable layer, but need not necessarily touch the water table.

IV) Unlined shafts may be back-filled with an inverse filter, comprising boulders/cobbles at the bottom, followed by gravel and sand. The upper sand layer may be replaced periodically. Shafts getting clogged due to biotic growth are difficult to be revitalized and may have to be abandoned.

The effective catchment area after applying the runoff coefficient is calculated for the design. Surface run off can be used to recharge the ground water. This is achieved by recharge wells and/or direct tube-well recharge. Following are important Components of Rainwater Harvesting system,

- Conduit / Pipes
- Filtration
- Storage Structures
- Recharge Structures

Conduits/Pipes

Rainwater pipes/conduits carry water from the roof top to the ground. These pipes have to be connected and drawn to the required location by providing sufficient slope so that the water flows with gravity and no water is stored in the pipes after rain stops. The pipes can also be laid underground but sufficient care has to be taken in order to avoid damage to the pipe because of the vehicular movement. The cost of piping depends on various factors like quality of pipe and length of piping works to be done and many other site conditions.

Filtration

Rainwater has to be filtered for silt and suspended impurities before allowing into any of the storage structures in order to store it for a longer time. Below are some of the filtration methods which can be implemented. Rainwater pipes/conduits carry water from the roof top to the ground. These pipes have to be connected and drawn to the required location by providing sufficient slope so that the water flows with gravity and no water is stored in the pipes after rain stops. The pipes can also be laid underground but sufficient care has to be taken in order to avoid damage to the pipe because of the vehicular movement. The cost of piping depends on various factors like quality of pipe and length of piping works to be done and many other site conditions.

First Rain Separator

First rain separator is a mechanism where in first few minutes of rain which carries most of the impurities from the roof are not allowed to pass into the filter or storage structures. First rain separators play a major role in rainwater harvesting structures by reducing the amount of silt / debris flowing into the filter or storage structures. This in turn reduces maintenance of filter and cleaning of the storage structure. First rain separators can also act as bypass arrangement if the rain water is not to be collected. Provide a capacity of 0.2 to 0.3 Litres per square meter of the roof area in case the roof is maintained clean.

Filter

Rainwater from the roof carries dust and suspended particles from the roof top. These impurities have to be filtered before allowing the water for storage. This can be achieved by passing the rain water through a chamber having layers of graded aggregates and a layer of charcoal. The suspended particles get trapped in the aggregate bed and charcoal adsorbs gases and odour if any. Filter also reduces the velocity of water and hence helps in sedimentation of fine particles in the filter. The size of the filter depends on the roof area and the cleanliness of the roof. The filter can be designed to a capacity of 0.5 to 0.8 Liters per square meter of the roof area.

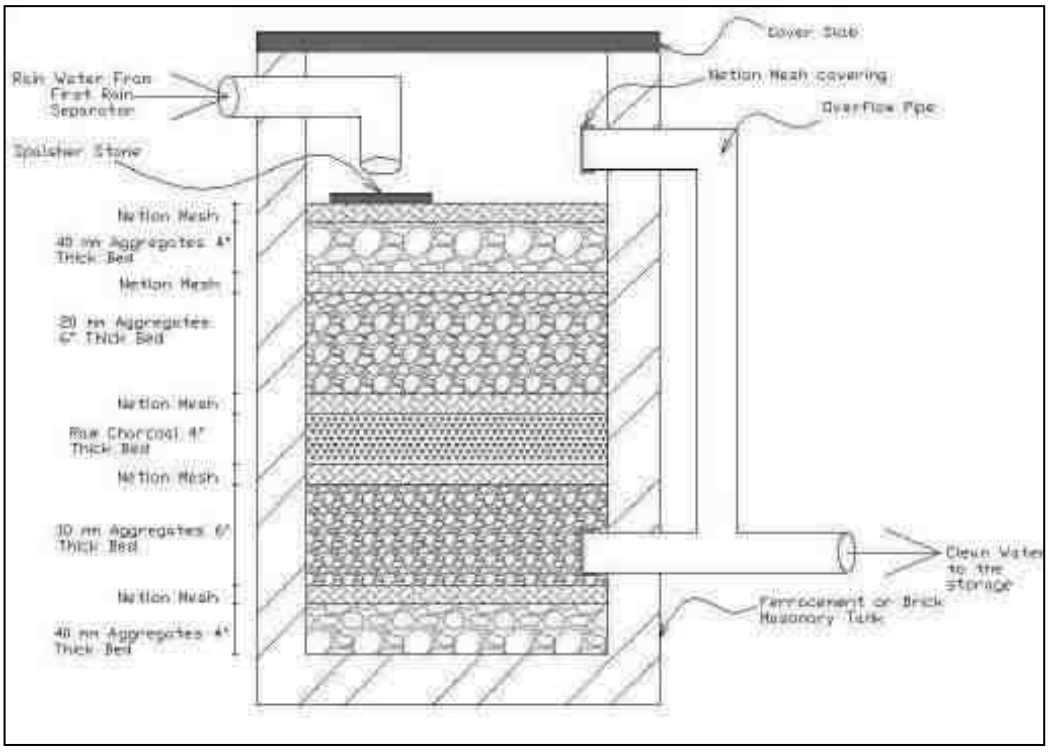


Fig 7.1 Schematic Diagram of Filter

7.10.3 Groundwater Recharge with Rain Water Harvesting

There is generation of surface run-off from the plant facility during monsoon season. The run-off will be of two types, i.e., run-off from the pervious area of the facility site and run-off from the built-up area of the facility.

7.10.4 Run-off from the Built-up Areas

The run-off from the paved surfaces of the proposed facility will be routed through a carefully designed storm water drainage network and collected in storm water collection sump and excess rainwater will be discharged to bore wells constructed on these internal drains.

7.10.5 Run-off from the Pervious Area

The run-off from the pervious area will be routed directly to the rainwater harvesting structures constructed at suitable locations as per the contours. For augmenting the ground water resources in the plant premises, number of rainwater harvesting pits will be constructed and the internal drains where excess rain water flowing in drain will be diverted to these pits. These structures will facilitate percolation of water into the ground and thus augmenting the groundwater sources. The roof top water will be routed to the storm drains. This will result in increase in groundwater tables and to some extent the improvement of ground water quality. The size and the locations of rainwater harvesting pits will be decided during detailed engineering of the project.

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

Q	=	C x I X A
Q	=	Run-off in m3/hr
A	=	Catchment Area (ha)
C	=	Coefficient of Run-off
I	=	Intensity of Rainfall (m/day)

7.10.6 Storage Structures

Source: Rain water from terrace & open areas

RWH system includes:

- Rainwater down take pipes
- Storm water manholes/channels
- Sumps

Table 7.14 Rain Water Harvest - Area & Run Off Calculation

Run Off Calculation From CIA, Formula	Catchment Area (m^2)	Runoff Coefficient	Intensity Of Rainfall (m/Day)	Run Off (m^3/Day)
Run-off calculation, Q = (C x I x A)	A	C	I	Q
Roof Area	1730	0.9	0.01	15.57
Landscape Area	5800	0.5	0.01	29
Road / Other Area	5100	0.8	0.01	40.8
Total Run off				**85.37**

The storage of rain water on surface is a traditional techniques and structures used were underground tanks, ponds, check dams, weirs etc. Recharge to ground water is a new concept of rain water harvesting and the structures generally used are,

Pits Size

- Percolation Pits - 7 nos (1.2 m x 1.2 m x 1.2 m)
- Percolation Pits - 1 no (1.2 m x 1.2 m x 0.9 m)
- Percolation Pits - 1 no (0.9 m x 0.9 m x 0.9 m

CHAPTER - 8 PROJECT BENEFITS

8.0 GENERAL

This chapter includes the benefits accruing to the locality, neighborhood, region and nation as a whole. It should bring out details of benefits by way of:

- Improvements in the physical infrastructure by way of addition of project infrastructure, ancillary industries that may come up on account of the project.
- Improvements in the social infrastructure like roads, railways, townships, housing, water supply, electrical power, drainage, educational institutions, hospitals, effluent treatment plants, improved waste disposal systems, improved environmental conditions, etc.
- Employment potential -skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project on a long term basis i.e., during operational and maintenance stages of the project and,
- Other tangible benefits like improved standards of living, health, education etc.

8.1 ROLE OF METALLURGICAL INDUSTRY

The metallurgical industry has played a significant role in India's economic growth. India produces 95 minerals, 4 fuel related minerals, 10 metallic minerals, 23 nonmetallic minerals, 3 atomic minerals and 55 minor minerals including building and another type of minerals (FICCI, 2018). The mineral production in India has shown significant growth at CAGR of 5.72% between 2013-14 and 2017-18 to reach an estimated amount of US $ 17.62 billion in 2017 -18. With the emergence of economies driven by industrialisation at the beginning of the twentieth century, countries with sound steel industries benefited from a first-

mover advantage. India became independent in the middle of this century and looked to become self-reliant under its newly adopted model of a mixed economy. To achieve this goal, the primary (raw materials), secondary (manufacturing) and tertiary (services) sectors had to be developed simultaneously. As a raw material and intermediate product, steel was the common link between all three sectors. Apart from being a product of the primary sector, steel is probably the most extensively used input in manufacturing. Due to its high corrosion resistance, steel finds wide usage in many today, the steel industry contributes slightly more than 2% to the GDP of the country. This percentage accounts for direct contribution. The indirect contribution of steel is much larger, owing to the dependence of other sectors. The steel industry employs nearly half a million people directly and two million people indirectly. The output effect of steel on Indian economy is approximately 1.4x with an employment multiplier of 6.8x. As per the World Steel Association, globally, for every two jobs created in the steel industry, 13 more jobs are created across the supply chain.

India is currently the world's second largest producer of crude steel, with 110.92 MT produced in 2018–19 (up from 103.13 MT in 2017–18). The country has strengthened its domestic steel industry considerably over the last decade. It became a Source: GDP data: World Bank, steel production data: World Steel Association complex industries dealing with various reactive/non-reactive elements. Immense strength, low weight, durability and ductility at a low cost make steel the most valuable raw material of the manufacturing sector. Steel has contributed immensely towards India's economic growth. This is evident from the similar growth patterns of India's GDP and steel production in the country, which also highlights the economy's dependence on steel. National consumption of finished steel rose from 6.5 MT in 1968 to 98.71 MT in 2018, while GDP (at constant price, 2010) grew from USD 0.25 trillion in 1968 to USD 2.7 trillion today.

8.2 THE STEEL INDUSTRY OF INDIA

The metallurgical industry in India can be segmented into various sub-industries such as aluminium, Copper, lead, iron, zinc, steel etc. Among the various industries, the steel and aluminium are the key industries that have displayed a substantial growth in the past few years. Steel Industry is acting as a key industry because all other industries depend on the iron and steel industry for machinery. Moreover, steel is required to manufacture a wide variety of engineering goods and defence equipment. In terms of the growth of the steel industry, India has emerged as the third largest steel producer with a production of 101.4 million tons of crude steel in 2017. In addition to this, India is also the largest producer of steel mica in the world. Furthermore, the growth of iron core production in the country increased from 129.32 million tons in 2015 to 210, 47 million in 2017. Lastly, the steel industry in India also contributes about 2% of India's GDP and employs about 600,000 people.

Indian exports have grown from 3.46 million tons of finished steel during the year 2010-11 to 4.91 billion in 2011-12 and reached 10.91 billion in 2017). The exports mainly comprise plates, hot rolled coils, coated sheets, pig iron and iron ore. U.S and China are the main recipients of India steel exports. In terms of imports, India has shown a declining trend, the imports declined from 9.8 million tons in 2017 to 8.9 million tons in 2017.

8.3 THE GROWTH OF THE METALLURGICAL INDUSTRY

The growth in the metallurgical industry can be attributed to the rise in infrastructure development and automotive production. The vast mineral potential has offered mining leases granted for 20 to 30 years. Amongst all industries, the Indian iron and steel industry enjoys a fair advantage in terms of cost of production, availability of raw material and cheap labour. The strong demand for iron and steel is derived from various other industries like automobile, consumer durables and infrastructure. In addition to this, the

growth in the production of iron mica is driven by large bauxite reserves that exist in India.

The government has adopted a vast number of measures to boost the growth in the metallurgical sector, particularly in the iron and steel industry. The government has allowed 100% FDI through the automatic route. In addition to this, the government has reduced the duty payable on the finished steel products through a streamlined process. Furthermore, to encourage R & D activities, the ministry of steel has been by funding through steel development fund and plan scheme. Under this scheme, the government has approved 8 projects with a total cost of Rs. 123.27 crore ($20.38 million, FICCI, 2018).

8.4 DEMAND FOR STEEL

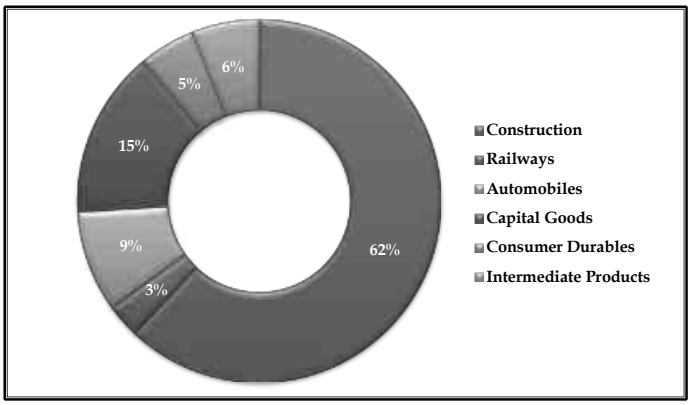


Fig. 8.1 Sector Wise demand for Steel

8.4.1 Construction sector

The sector includes physical infrastructure (excluding railways) and real estate, and contributes roughly 62% of India's steel use or steel demand. The sector grew by 8.6% in 2018. Although growth is expected to slow down to 5.4% in 2019, the sector is again expected to pick up in 2020 and beyond, growing by

around 7% till 2024. The construction sector was estimated to be worth around USD 500 billion in 2018. India will become the world's third largest construction market by 2025. The infrastructure sector, currently a huge focus area of the government, will drive growth in this sector as well as overall steel demand.

8.4.2 Railways

This sector, which contributes 3% of steel demand, is growing at a fast pace. It grew by 13.4% in 2018 and is expected to grow by more than 20% in 2019.15 Projects like 100% track electrification (electrification of 16,540 track km by 2021–22), dedicated freight corridors (of over 3350 km) he real estate sector is growing at a CAGR of over 4% and the affordable housing and smart cities initiatives will drive growth in this sub-segment connecting industrial hubs in western and eastern India and high-speed rail corridors are expected to boost steel demand significantly

8.4.3 Automobiles

The Indian automotive industry is the fourth largest in the world. It contributes to around 9% of steel demand in India. India is the largest manufacturer of two-wheelers, three-wheelers and tractors, the fourth largest producer of passenger vehicles, and the seventh largest in commercial vehicles in the world. Two-wheelers occupy a dominant position with an 81% market share and overall passenger vehicles compose 13% of the market. India's automobile sector is domestic market oriented, with domestic sales accounting for over 80% of sales.16 After rapid growth in the last few years, the sector is currently undergoing a slowdown. All the sub-segments have witnessed de-growth in 2019. However, growth normalization is expected in 2020. The automobile sector, including component parts, is expected to cross USD 250 billion by 2026. India's auto and auto component export markets are also expected to grow at a CAGR of 3% until 2026.

8.4.4 Capital goods

The sector contributes about 15% of steel demand. It has several sub-segments, of which machinery and equipment are the most prominent. The machinery and equipment segment can be further divided into construction and earth-moving machinery, plant machinery, heavy electrical machinery and machine tools. Therefore, the sector is obviously dependent on construction, mining, and heavy and light industries. In other words, the capital goods sector is dependent on economic growth in general and the secondary sector's performance in particular. Machinery and equipment, a subset of the capital goods sector, accounts for roughly 23% of total manufacturing and about 4% of India's total gross value added (GVA). However, the sector's growth has been uneven in the past and it is hugely dependent on imports, especially for the large machinery segment. Significant gaps exist in technology capabilities due to low acceptance of domestically manufactured products, leading to a lower capacity utilisation ratio, weak support infrastructure and inadequate R&D spending.

8.4.5 Consumer durables

The sector contributes about 5% of India's steel demand. India is a consumption-driven economy and traditionally this sector has witnessed robust growth. In 2018, for example, the sector grew by 21.7%. However, in line with declining GDP growth, there was a slowdown in this sector's growth performance in 2019. The liquidity crisis in the shadow banking sector, high interest rates and uncertainty during the general elections led to a significant decline in consumer durables.

8.4.6 Intermediate products

The sector contributes the remaining 6% of India's steel demand. This segment is closely linked to the auto sector as well as the oil and gas sector, besides industrial activity. So, on the one hand, a weaker automotive sector has negatively impacted the demand for gear boxes, bearings, etc., on the other

hand, demand for pipes, especially large diameter pipes, continues to grow with ongoing pipeline projects. However, with economic growth slowing down, demand in the packaging segment (drums and barrels) has witnessed a slowdown, while exports have also seen muted growth. The outlook for the sector is positive in the medium term as a revival is expected in the auto sector and the oil and gas sector will continue to grow with government-led spending. Overall, the demand prospects of steel-using sectors remain positive, with steel demand set to grow. Nevertheless, it is pertinent that India returns to a 7% plus GDP growth rate for steel demand to grow at more than 7%, which in turn would enable market-led conditions to increase steel-making capacity and production.

8.5 IMPROVEMENTS IN THE SOCIAL INFRASTRUCTURE

The location is rural and economically backward. Creation of job opportunity and scope for transport, civil works and supply of material and services and other petty business activity associated to the project will improve. With this the economic status and purchasing power of public will improve. This will result in improved attitude of the public towards education and health. This may cause in creation of education and health care facilities in this rural area. It will not disturb the existing pattern of social relations and democratic setup. In rural areas much of the time and energy is wasted in reaching from one place to another. This is due to lack of swift mode of transport. By the establishment of this industry, movement of vehicles in this area will generally improve (both private and public-owned). With establishment of the In the study zone of 10 km radius, the purchasing power of people is very less. The agricultural implements, agro-chemicals and vehicles will be in more demand as also village grown milk products, vegetables and agricultural produce. Present level of education and literacy (especially rural and women) is very poor and it needs improvement. The establishment of this industry will play a catalytic role in this. Education level will go up with flow of funds and avenue of livelihood.

Likewise the healthcare facilities are also said to improve. Living in harmony is an important aspect of the society. This can happen only if all the components are comfortably placed. Persons engaged in their respective vocation and accruing job satisfaction leads to this. This will become possible by this venture.

8.6 CONNECTIVITY

The Industrial site is well connected by road and rail. The nearest Highway is SH-86 which is 770 m away. The setting up of this unit will not harm the traffic and unwanted settlement in the vicinity of highway. The important townships falling within 60 km radius are Namakkal, Erode, Velur, Truchengode, and Sankari. The nearest major railway station is Sankari (22 km) and Airport is Trichy (95 km).The site is connected by the Tiruchengode – Velur road. The raw material can be conveniently transported by road.

8.7 EMPLOYMENT POTENTIAL

The industry and its supporting activities need people from manual to managerial strength. The production activities, transportation, maintenance of machineries and civil works associated with the project will need unskilled and skilled workers. people on tractors and tractor repairers as skilled ones. So in manufacturing activity all three types i.e skilled, semi-skilled and unskilled people are required. The overall potential including the garages, loading-unloading actions, eateries, small shop owners is substantial. The local people can get a good share out of this. In the factory, science and technology prevails and there some outsiders will have to be engaged at least for the time being. If the second generation local people acquire that skill, they too will be able to fill the gap and accrue benefit of higher jobs. If the activity of manufacturing becomes stable by that time, perhaps expansion may become possible further and then employment availability may further enhance.

8.8 OTHER TANGIBLE BENEFITS

Both tangible and non-tangible benefits will result from this activity and many of those are described above. Apart from direct employment, other benefits are listed below.

I. Time saving by quicker transport
II. Aesthetics improvement by general greening with emphasis on biodiversity
III. Availability of nursery facilitates
IV. Developed economy brings with it literacy and healthy living.
V. Improved safety-security in surrounding with better Law and Order.
VI. Symbiosis and sustainable development will be the ultimate objective.

The rural economy is found generally dwindling because they depend only on one single source of livelihood namely conventional agriculture. With the activities of the present industry the local population will become aware of alternative means for livelihood and utilize such opportunities to improve their living standard.

8.9 CHALLENGES IN THE METALLURGICAL INDUSTRY

Despite the progress within various industries, India struggles to face supply challenges. This is due to the huge cost incurred in the production of coal. They have continuously grown to reach $39.6 million in 2017. In addition to this, the lack of capital investment has hindered the growth of other metal industries. Overall, the rapid growth in demand from the steel industry, power production and demand for coal has a positive influence on the metal and mining industry. But, limited availability of coal can hinder the growth process. Therefore, India needs to focus on improving competitiveness through expansion of renewables by increasing the contribution of solar and wind energy.

The scope of future growth in the metallurgical industry indicates that India can achieve high development in iron, ore, and bauxite. In addition to this, the metal and mining industry is expected to create employment for about half a million skilled and unskilled labour force. Furthermore, the future prospects indicate that India's steel consumption is forecasted to grow annual by about 5-6% to reach 300 million tonnes by 2025-26. Furthermore, India has a strong economic outlook and fast-track growth in steel production to reach the second largest steel producer in a few years.

8.10 INDUSTRIAL AREA

The industrial processing premise will be provided with internal roads, road side gutters, Storm water gutters, sewage lines, Street lights, Flood lights, parking area.

- Landscaping, lawn and greenery will be developed in the premise.
- Rain water harvesting and rain water reservoir of adequate capacity will be built.
- Fire Firefighting and disaster management facility will be provided

8.11 SCOPE FOR EMPLOYMENT

This field is extremely diverse and it offers exciting and a wide variety of career opportunities for young and bright individuals. But the students who pursue this course must have an equal interest in science, technology and engineering. Metallurgical engineers are virtually employed in every sector, which buys, produces or sells metals or metallic products.

Metallurgy is a basic science and it has applications across all manufacturing sectors. This proves the fact that infrastructure development of a country is related to Metallurgical engineering.

Some common Metallurgical jobs are:

- Safety engineer
- Welding engineer

- Quality planning engineer
- Plant equipment engineer
- Aluminum casting metallurgist
- Researcher
- Consultant

Employment areas for Metallurgical engineers are:

- Electrical companies
- Construction companies
- R & D labs
- Engineering workshops
- Metal extraction units
- Metallurgical industries
- Fabrication units

Thus, we can relate the importance of Metallurgical engineering to the growth and development of a country.

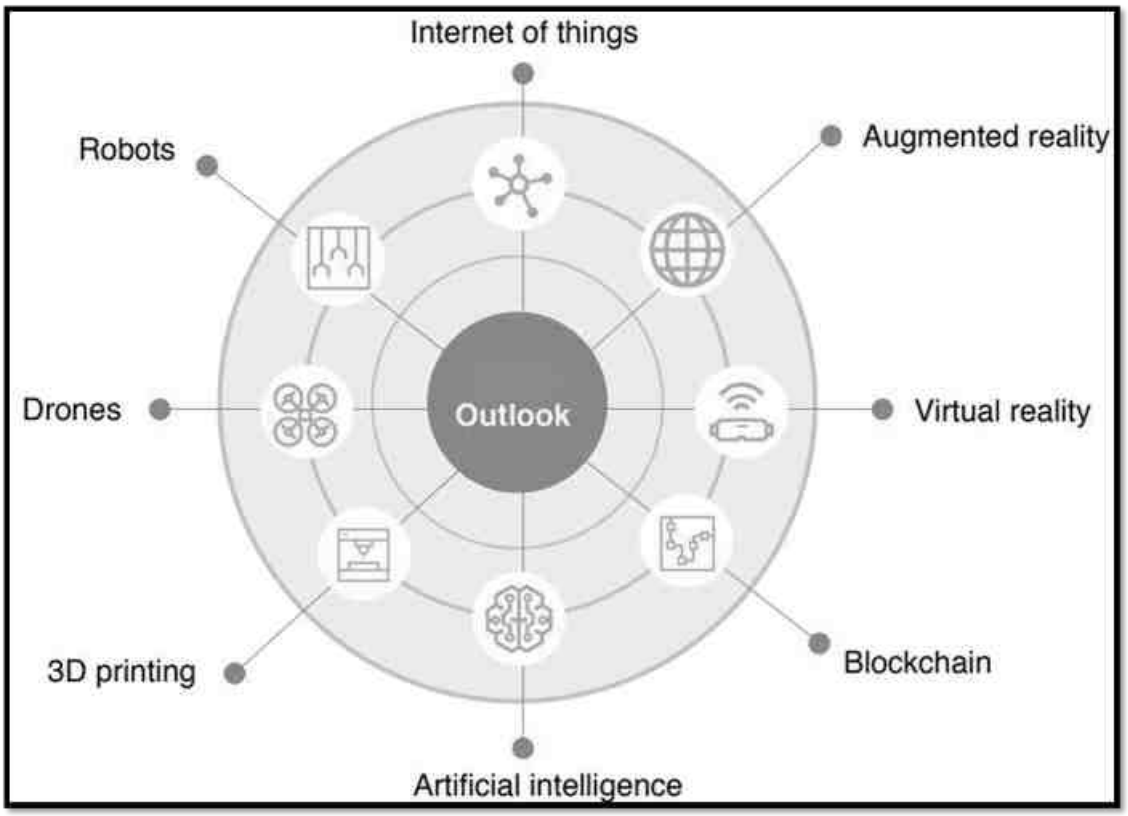


Fig. 8.2 Application of Emerging Technologies in Steel Industry

8.12 CONCLUSION

Metallurgical engineering is closely related to the infrastructure of a country. It is a field that deals with the supply of metals in every other engineering field. That makes it possibly the most important field in engineering sciences. Three-fourths of all chemical elements are metals, so metals play an important role in our daily lives. These metals are used in a variety of industries. From Defense, Construction, Steel to Consumer electronics, every industry needs metals. In the construction industry, there is a heavy usage of metals and glass nowadays. No building is built nowadays without metals being used in them. So, we can say that whether it is ports, railway stations, power generating companies, all require metals in various forms. That is why, Metallurgical engineering is so important for the infrastructure development of a country.

CHAPTER - 9 ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping Stage.

As per the ToR issued by MoEF&CC for the project, vide letter no. SEIAA-TN/F.No.9175/SEAC/3(a)/ToR-1183/2022 dated 17.06.2022, the Environmental Cost Benefit Analysis is not required.

CHAPTER - 10 ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

The chapter deals with the Environmental management Plan for construction and operational phase of the proposed expansion of foundry. The construction and operation phase environmental management plan has been aimed to achieve the following objectives:

- To ensure that the environmental control systems installed at the plant and are operating satisfactorily
- To ensure that quality of pollutants discharged from the plant is within the stipulated standards
- To ensure that pollutants concentration in the surrounding area does not exceed NAAQS
- To monitor impacts on the surrounding environment and the effectiveness of mitigation measures during the construction and operation

10.1 CONSTRUCTION PHASE

The following construction engineering practices are recommended to minimize construction phase impacts:

a. Proper disposal of construction wastes
b. Minimize noise by using appropriate noise control measures
c. Spraying of dust suppressants at regular intervals

10.2 OPERATION PHASE

Important features of the Environmental Management Plan are the following:

a. Environment management cell
b. Ambient air and noise quality monitoring
c. Water quality monitoring

d. Meteorological data collection

e. Periodic preventive maintenance & Occupational safety & health

10.3 ENVIRONMENT MANAGEMENT CELL

The major environmental considerations involved in the construction and operation will be taken up by a full-fledged multidisciplinary Environment Management Cell with key functions of environmental, safety and occupational health for management of the entire plant and surrounding environment. The Environment Management Cell will comprise a team of environmental engineers, chemists, safety specialists and well-trained staff for operation and maintenance of pollution control equipment. Staff training program in the areas of environment, ambient air, water quality monitoring, solid waste management, noise abatement, safety and health aspects would be conducted. The pollution control equipment would be provided with spares and maintenance facilities. Staff would be trained to operate ESP and other pollution control equipment at optimum efficiency. Environment Management Cell will be headed by a senior manager, assisted by a team of engineers, chemists, operating staff, etc. This management cell will take up additional responsibility of environmental functions related to proposed expansion of foundry.

10.4 WASTE MINIMIZATION

The waste minimization forms a part of the Environmental Management Plan to minimize waste load. The management commitment is one of the important factors deciding waste management plan.

10.5 MANAGEMENT COMMITMENT

Management initiative, commitment and involvement are key elements in any waste reduction programme and include activities such as:

- Employee awareness and participation
- Improved operating procedures

- Employee training
- Improved scheduling of processes

Employee training, awareness and participation are critically important and can be problematic aspects of waste minimization programmes. Total commitment and support of management and employees are needed for any waste minimization programme to succeed. This includes the evaluation, implementation and maintenance of techniques and technologies to minimise waste. It is advised to use mass balances around the facilities and processes to identify areas where waste is occurring, perhaps unknowingly. The use of good process is also recommended.

The technical personnel should continuously educate themselves to keep abreast of improved waste-reducing, pollution preventing technology. Information sources to help inform companies about such technology include trade associations and journals, chemical and equipment suppliers, equipment expositions, conferences and industry newsletters. By implementing better technology, the factory can often take advantage of the dual benefits of reduced waste generation and a more cost efficient operation.

10.6 ENVIRONMENTAL MONITORING PROGRAM

An environmental monitoring program is required to provide scientifically defensible information for determining the status of the environmental quality of the surrounding area of the project and to check whether the levels of critical pollutants are within the environmentally acceptable limits. This will help to obtain an early warning of unacceptable environmental conditions so that control measures can be taken immediately. It also helps to determine in a timely fashion, changes in local environmental quality.

10.6.1 Air Environment

The major emission sources are,

- Roads within the plant are properly maintained and water spraying will be done regularly.
- Mobile sweeper bobcat is continuously engaged for sweeping the roads.
- Saplings will be provided
- All storage and material handling system will be properly enclosed.
- All leakage point to be plugged thoroughly.
- In short, the fugitive emission shall be controlled by installation of dust extraction and / or dust suppression systems.
- An ambient air quality monitoring will be carried out on a regular basis throughout the year for the parameters PM_{10}, $PM_{2.5}$, SO_2, NO_x.
- Suitable sampling ports will be provided at the stack for in-situ monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_x emissions in the flue gas discharged through the stack.

Table 10.1 Source of Emission & Air Pollution Control Measures

Existing

Stack No.	Sources of Emission	Details of APC measures
1	INDUCTION FURNACE – 10 TPH (2 CRUCIBLE)	42 m height 0.8 m dia of stack with wet scrubber has been provided.
2	DG SET (250 KVA)	Stack height of 2.3 m with acoustic enclosures has been provided.

After Expansion

Stack No.	Sources of Emission	Details of APC measures
1	INDUCTION FURNACE – 12 TPH (2 CRUCIBLE)	Existing 42 m height 0.8 m dia of stack with wet scrubber will be used.
2	DG SET (250 KVA)	Stack height of 7.5 m with acoustic enclosures will be provided.

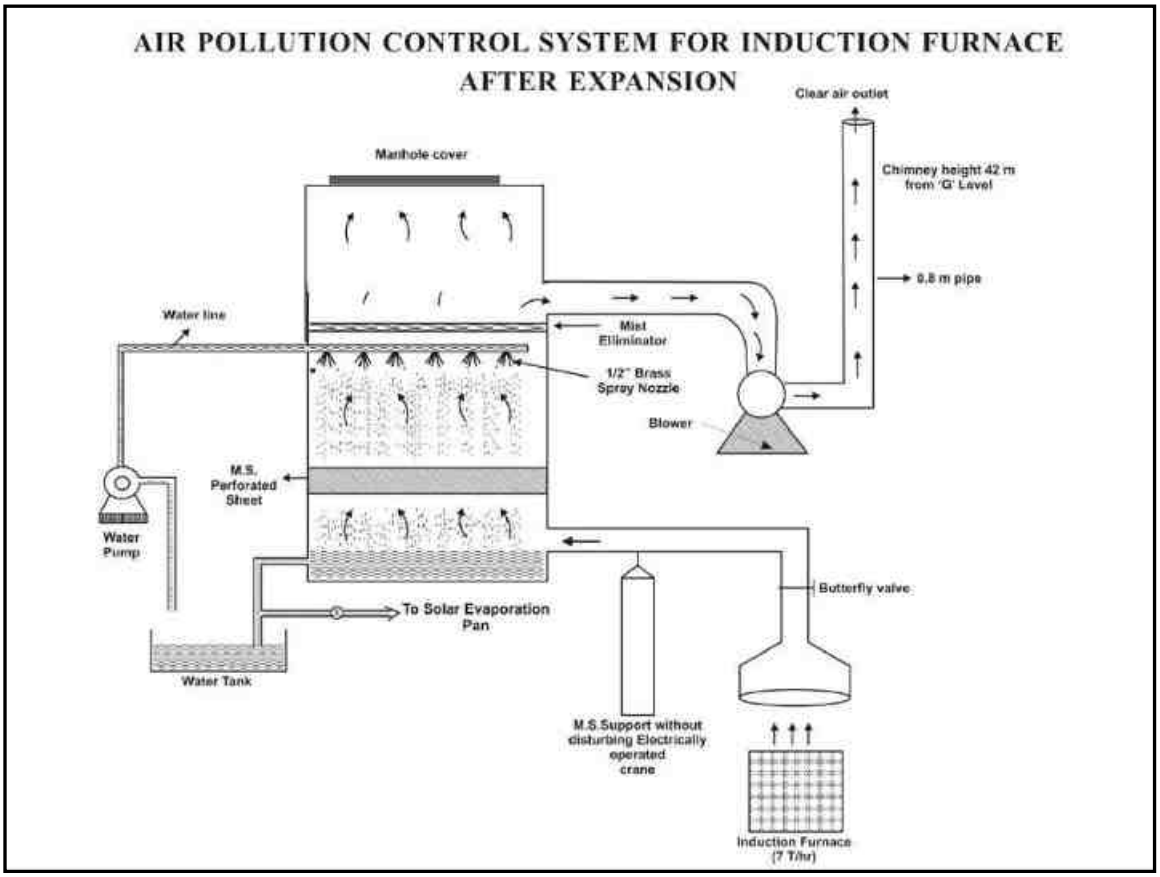


Fig. 10.1 Air Pollution Control System

10.6.2 Noise Environment

The major sources of noise in the plant are blowers, compressor, furnace operation, DG set etc., Several noise suppression and attenuation features shall be designed into the plant for the protection of personnel at all normally

accessible locations within the plant boundary, both inside and outside the plant and for the protection of the inhabitants living in the vicinity of the plant.

10.6.3 Water Environment

The water quality monitoring program consists of parameters monitoring prior to discharge. The pH, BOD and TSS will be monitored in sewage treatment plant.

Table 10.2 Wastewater Generation Details

Wastewater	Existing (KLD)	After Expansion (KLD)	Method of Treatment
Sewage	4.0	4.0	Septic Tank Size : 5.0 x 2.1 x 4.0 m – 1 No Dispersion Trench Size: 2. 2.5 x 2.0 x 2.4 m
Trade Effluent	0.1	0.2	Solar Evaporation Pan 4.8 x 3.4 – 2 Nos 12.6 x 1.1 – 1 No
Total	**4.1**	**4.2**	

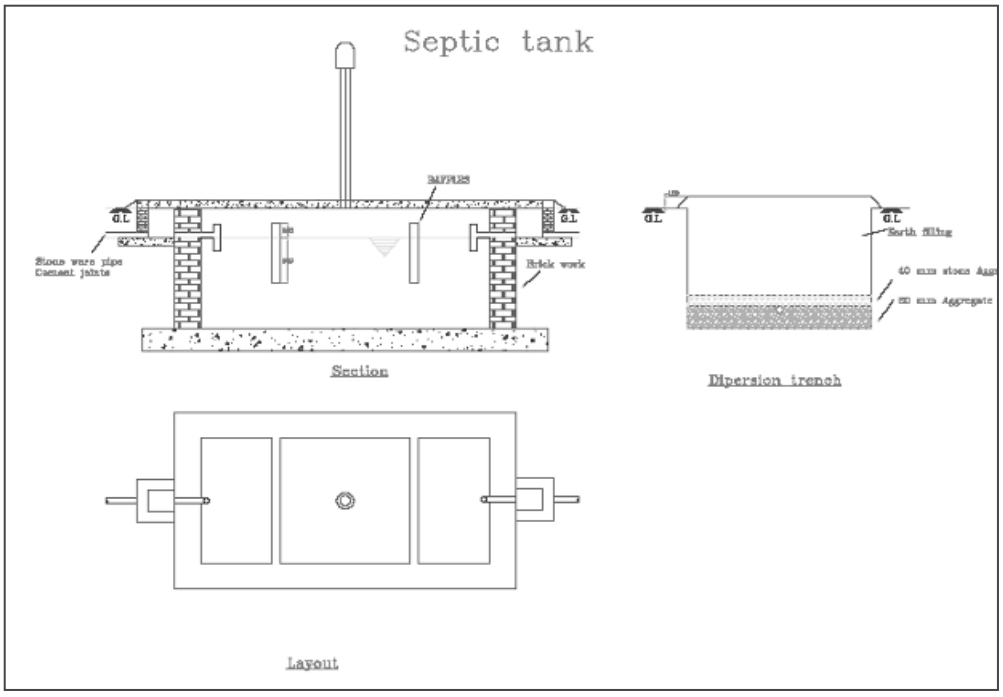


Fig 10.2 Design of Septic tank followed by Dispersion Trench

10.6.4 Solid Waste Generation

Table 10.3 Solid Waste Generation Details

S.No.	Solid Wastes	Quantity (TPM)		Method of Disposal
		Existing	After Expansion	
1	Runners and Riser	200	240	Re-used in the Process
2	Slag from Furnace	300	360	Pulverized for metal recovery and sizing disposed for earth filling and aggregate use

10.6.5 Hazardous Waste Generation

Table 10.4 Hazardous Waste Generation Details

S.No.	Description	Quantity (T/A)		Method of Disposal
		Existing	After Expansion	
1	5.1-Used or spent oil	0.2	0.2	Send to authorised HW recyclers
2	35.1-Exhaust Air or Gas cleaning residue	5.0	5.5	Packed in HDPE bags and storage in closed shed with impervious platform and disposed to Authorised HW pre-processors
3	35.3-Chemical sludge from waste water treatment	0.3	0.5	Packed in HDPE bags and storage in closed shed with impervious platform and disposed to Authorised HW pre-processors.

10.6.4 Land Environment

- It should be ensured that there is no industrial solid waste from the Plants.
- Solid wastes from STP Plant shall be used as manure for Green Belt.

Green Belt

Green belt will be developed in lines with "CPCB Guidelines for Developing Greenbelts".

Design

The greenbelt development contribute remarkable advantages especially in pollution abatement process like arresting various pollution sources like control of mist, fume, noise etc., an increasing the ecological and aesthetic characteristics of the area. Forests help to intercept incoming and outgoing radiation. Besides, it helps to block the harmful effects of heavy precipitation due to soil washout etc. The area allocated for green belt development is 1.1 hectares.

The project authorities will plant trees to greenbelt development in peripheral portions and inside vacant plots of the plant for afforestation. The selection of appropriate plant species for this purpose is based upon the following criteria.

- The plant should be fast growing.
- The plant should have thick canopy cover.
- Preferably perennial and ever green.
- Having large leaf area index.
- Resistance to specific air pollutant.
- Should have maximum height.
- Indigenous and should maintain ecological, land and hydrological balance of the region.

The greenbelt development plan for the particular industry depends on the following.

- Nature and extent of pollution.
- Sink capacity of the eco-system.

- Climatic factors.
- Soil and water quality.
- Specific site background.

In any greenbelt development, monoculture is not advisable due to its climatic factor and other environmental constraints. Greenbelt with varieties of species is preferred to maintain species diversity, rational utilization and for maintaining health of the trees.

Well-developed greenbelt will develop a favourable micro-climatic to support different micro-organisms in the soil as a result of which soil quality will be improved further. In greenbelt bird's nest may be introduced to encourage more birds in those areas. In this unit greenbelt development will be undertaken in all available areas and also in the earmarked affectation zone, and also along the roads around the plant and plant infrastructure, etc.

Tall and leafy trees like Azadirachta Indica, Polyalthia, Longifolia, Pongamia galbrae, etc., will be developed in these areas. Around administrative office, ornamental varieties like Gulmohar, Peltaphorum, Jacarandah will be planted will the backdrops of lawns. As far as possible the following guidelines will be considered in greenbelt development. Shrubs and trees will be planted in encircling rows within the plant site.

The short trees (10 m height) will be planted in the first two rows and the tall trees (>10 m) in the outer rows around the purview of the project site. Planting of trees in each row will be in staggered pattern. In the front row, shrubs consisting of Alibizia sp. Peltoforum etc will be grown. Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion. Spacing between the trees will be slightly maintained facilitating effective height of greenbelt.

Table 10.5 Greenbelt Development for Existing & After Expansion

Existing	
Categories	**Number of Trees**
Cocunut Tree	57
Chavuku Tree	21
Pungai Tree	85
Poovarsu Maram	50
Guava Tree	1
Mango Tree	1
Neem Tree	45
Ashoka Tree	11
Sapota Tree	4
Total	**275**

Proposed	
Categories	**Number of Trees**
Pungai Tree	95
Poovarsu Maram	75
Neem Tree	145
Ashoka Tree	11
Arasa Maram	4
Total	**330**

10.6.5 Socio-Economic Environment

The unit is located in an area exclusively ear-marked by the Government of Tamil Nadu and no additional land is required for this unit. Hence no land is being acquisitioned from the local residents as well as external agencies.

10.6.6 Occupational Health, Safety & Protective measures

For protective of Occupational and relative hazards the Management already implemented the following measures to protective its works forces.

1. Occupational Health Centre.
2. Pre-employment Medical Examination.
3. Periodical Medical Examination.
4. Provision of First-Aid and treatment of common ailments.
5. Counseling and Health education to the employees and their wards.

Occupational Health Centre

The Management maintaining in good order an Occupational Health Centre with a services and facilities as per the Rules 62 – O Tamil Nadu Factories Rules 1950 is Occupational Health Centre headed by the Factory Medical Officer acting as residential Medical Officer. Our work force can availing Medial Assistance round the clock.

Occupational Health Safety

- Pre-periodic post medical checks for Employees
- Occupational health and Audit surveillance will be carried for workers
- Medical surveillance as prescribed in the section 41C of Factories act 1948
- For safety of working personnel the following steps will be undertaken
- Training for all working personnel
- All moving parts will be freely fenced

- Arrangement for prompt power cut from transmission equipment
- Hoist Crane etc., maintained and examined at intervals
- All working places will have safe means of access and exit
- Emergency fresh water for hazardous chemical handling areas
- PPEs use will be mandatory in the required places
- Furnaces will be examined in proper manner by Authority as per statutory requirement.

Safety

Well planned and systematic safety management practices will provide safe working conditions. Careful storage and handling of chemicals will ensure safety in the unit. Accident reviews and monitoring will be done strictly and regularly to prevent accidents. Provision of personal protective equipment for body, legs, eyes, face, arms etc., will be supplied. All the prescribed safety practices will be strictly observed for transport, storage and handling of chemicals and other toxic materials. Periodic checking, with standing tests will be done for electrolytic bath, rectifier etc.

Safety reviews and meetings will be held periodically and accident reviews and safe practices will be conducted. Safety training will be imparted to staff frequently. Safety officer will be appointed to oversee and be responsible for safe status of operations and equipment. From point of view of safety, all the materials will be transported in covered manner.

Systems & Procedures

The following guidelines will be followed for ensuring safety:

1. Issuance of standing instructions of safety;
2. Preparation and issuance of material safety data sheet and safety manuals
3. Regular inspection of all aspects of safety;

4. Conducting regular safety audits;
5. Reporting of accidents, failures and 'near-misses';
6. Database and documentation of all safety related information;
7. Inspection of storage, transport and safety measures;
8. Inspection and maintenance of all safety equipment including personnel protection gear and especially that relating to fire-fighting;
9. Identification of personnel who will co-ordinate and take charge during an emergency;
10. Risk analysis preparation to identify possible risk prone areas and processes;
11. Identify personnel to co-ordinate and take charge of various functions and train them in safety measures required in the event of disaster;
12. Identify and establish communication lines with local and state authorities to meet the challenges of disaster;
13. Ensure that the necessary equipment such as boots, ear muffs helmets, protective overalls, gloves, goggles etc are readily available;
14. Maintain adequate inventory of first aid kits and essential drugs;
15. Display posters, indicating action plan in case of disaster;
16. Immediate reaction to disaster shall be evacuation of all persons except those equipped with safety appliances, from the place of disaster;
17. Take precautionary measures such as providing wet towels and respirators.

10.6.7 Corporate social responsibilities

The unit will carry out various Socio Measures as follows

1. Road side plantation in nearby areas,
2. Construction and renovation of school & hospital buildings,
3. Laying and maintenance of local village roads,
4. Construction and renovation of temples,
5. Street lights fittings,
6. Free Medical Camps.

10.6.8 Post Project Monitoring

Periodical monitoring of the ambient air quality, stack emissions, noise levels, water and soil quality, etc. in and around the Plants shall be undertaken as per the MoEF/TNPCB Norms either departmentally or by appointing external agencies wherever necessary.

10.6.9 Monitoring Programme

Table 10.6 Environment, Safety & Health Monitoring Programme in the Site

Particulars	Parameter	Frequency
Stack Emissions	SPM, SO_2, NOx	Once in a month
Ambient Air Quality	PM_{10}, $PM_{2.5}$, SO_x, NO_x	Once in a month
Waste water	pH, BOD, TSS	Continuous
Noise monitoring	Noise Levels	Monthly (Industrial Noise) Seasonal (Ambient Noise)
Ecology	Vegetation density and Biodiversity	Once a year
Safety and Occupational Health	--	Once a year

Table 10.7 Budgetary Allocation for Environmental Management

Category	Capital Investment	Annual Operating Costs
	(Rupees in lakhs)	
Air Pollution Management	15.00	2.0
Water and Wastewater Management	2.0	0.5
Solid Waste Management	3.00	0.5
Greenbelt	10.00	5.0
Environmental Monitoring and Training	15.00	7.5
Total	**45.00**	**15.5**

Table 10.8 Budgetary Allocation for Corporate social responsibilities

Sl..No.	Particulars	Amount in Lakhs
1.	Skill development for unskilled Labours	7.5
2.	Government school - Infra Structure Development	10.0
3.	Free Medical Camp	7.5
4.	Construction and renovation of temples	10.0
5.	Construction of over bridge	25.0
	Total	**60.0**

CHAPTER - 11 SUMMARY & CONCLUSION

11.0 SUMMARY & CONCLUSION

The proposed expansion of plant has certain level of marginal impacts on the local environment. However, with the implementation of the proposed control and environment management measures, even the minor impacts anticipated due to construction and operation of the proposed unit will be mitigated. There will not be any displacement of population due to the proposed expansion project. The proposed expansion will enhance the opportunities in both directly and indirectly in the area surrounding the project site. This project will also generate indirect employment to a considerable number of families, who will render their services for the employees of the project.

Project Feasibility as a Sustainable Development Model,

- This project is very essential in-view of production of high value downstream products.
- The local people desire the setting up of the industry to create additional direct & indirect job opportunities as well as business opportunities.
- Water, power, Raw material and Market are available.
- Adequate precautions will be taken for Pollution Control, Resource Conservation and Environmental Protection.
- This is cost effective and aims Sustainable Development.
- The project is proposed in economically & industrially backward / rural area of Tamil Nadu State.

The steel industries in general are on priority list as they contribute in overall development of the country. Integrated steel industries in particular will produce steel and steel products at economic cost and also has export potential to earn/save foreign exchange.

- ✓ The product mix includes MS Scraps, Ferro Alloys and Sponge Iron. Based on market demand and pricing capacity utilization of these plants can be varied.
- ✓ The power will be drawn from the TNEB will be utilized as captive source. The power thus generated will be used in the industry as a captive source.
- ✓ Water requirement will be met from bore-wells and rain water. Proper Rainwater Harvesting Methods are followed for conservation of water.
- ✓ This industry does not produce any toxic products and does not have significant adverse effect on the quality of land, water and air. The industry has taken all the necessary preventive measures to mitigate even the small effects which might be caused by industrial activities.
- ✓ Gaseous emissions will be generated from furnaces, boiler, fume exhaust will be treated in suitable APC system and vented through the stacks of adequate height.
- ✓ The runners and risers will be reused again in the process and the slag from the furnaces will be pulverized for metal recovery and sizing disposed for earth filling and aggregate use.
- ✓ The concept of Reduce, Reuse and Recycle is also practiced in the industry as per the eco-policy of Govt. of India. This will result in high performance, and minimal resource utilization..
- ✓ Wastewater generated in the industry will be sent to Solar Evaporation Plants and the sewage will be treated in Sewage treatment Plant and sent to Gardening.
- ✓ The industry will adopt an effective environment management system and environment management plan to protect the environment. Due priority will be given for greenery development and rain water harvesting at the factory premises.

- ✓ The site is connected to supply of raw material and product utilizers through well laid state high ways. The traffic on these lines is within the permissible limits.

The project will also encourage ancillary industries in the region, which will not only increase the employment potential but also the economic base of the region will be further strengthened. The overall assessment shows that the adverse effects on environment are insignificant when compare with their benefits and advantages through its proposed activity. In the view of considerable benefits from the project, the proposed project is most advantageous to the region as well as to the nation.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, the proposed expansion project will be beneficial to the society and will help to reduce the demand – supply gap.

CHAPTER - 12 DISCLOSURE OF CONSULTANT ENGAGED

12.0 PROFILE OF THE CONSULTANT

Enviro Care India Private Limited is the consultant involved in the EIA/EMP study and report preparation based on the TOR issued by SEAC, Tamil Nadu. Enviro Care India Private Limited (ISO 9001:2008 certified company) is a fast track project engineering organization started in the year 2004, dedicated to the field of Environmental Engineering with professionally qualified and experienced team of Environmental Engineers, Chemists, etc. with a client base of more than 1000+ industries in South India. By having more than 10 years of experience in providing environmental services and solutions we have completed hundreds of projects in different domains. The laboratory is accredited by NABL (National Accreditation Board for Testing and Calibration Laboratories).

12.1 CONSULTANCY SERVICES

Enviro Care India Private Ltd undertakes,

- EIA/EMP Studies
- Risk analysis and assessment
- Life Cycle Assessment Study
- Design details of air pollution control equipments
- Feasibility Study for Hazardous waste management
- Preparation of detailed project report for municipal solid waste management, water & waste water treatment plant
- Water and waste water audit for industries
- Environmental awareness training for industries

Enviro Care India Private Limited is accredited by NABET as EIA Consultant for the following sectors.

Sector Number	Name of the Sector	Category	Project or Activity as per Schedule of MoEF Notification dated September 14, 2006 and subsequent amendments
1	Mining of minerals including opencast/ Underground mining	A	1 (a) (i)
4	Thermal Power Plants.	B	1(d)
8	Metallurgical Industries (ferrous and non-ferrous) – both primary and secondary.	B	3(a)
22	Distilleries.	A	5(g)
33	Ports, harbours, break waters and dredging	A	7 (e)
38	Building and large construction project including shopping malls, multiplexes, commercial complexes, housing estates, hospitals, institutions.	B	8(a)

Declaration by Experts contributing to the EIA

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

EIA Coordinator:
Name: Dr.S.Rajamohan

Signature
Date:
Period of involvement:
Contact information: 43, 2nd Street, Harvey Nagar, Madurai – 625 016.

Functional Area Experts:

S. No.	Functional Areas	Name of the expert/s	Involvement (Period & Task**)	Signature & Date
1.	**AP***	Mr. Nedunchezhian		
2.	**WP***	Dr.S.Rajamohan		
3.	**SHW***	J. Vivek		
4.	**SE***	Dr. S.Thulasi Brindha		
5.	**EB***	Dr. Venkat ramanan		
6.	**HG***	Dr.S.Rajamohan		
7.	**GEO***	Dr.S.Rajamohan		
8.	**SC***	Mr. Nedunchezhian		
9.	**AQ***	Dr.S.Rajamohan & J. Vivek		
10.	**NV***	Dr.S.Rajamohan		
11.	**LU***	Dr.S.Rajamohan		
12.	**RH***	Mr. Nedunchezhian		

**Please attach additional sheet if required

Declaration by the Head of the Accredited Consultant Organization

I, **Dr.S.Rajamohan,** hereby, confirm that the above mentioned experts prepared the EIA for **M/s. Ran India Steels (India) Private Limited – UNIT II**, I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature:

Date :
Name: **Dr.S.Rajamohan**
Designation: **Managing Director**
Name of the EIA Consultant Organization: **M/s. Enviro Care India Private Limited**
NABET Certificate No. & Issue Date: **Date of Accreditation** _____

12.2 LABORATORY

Our laboratory Services Division is a state of the art analytical laboratory accredited by Department of Science and Technology, Government of India under National Accreditation Board for Testing and Calibration Laboratories as per ISO/IEC 17025:2005 in the field of chemical and environmental testing.

Water Analysis

- Packaged drinking water analysis as per IS 14543:2004
- Suitability of water for portability as per IS 10500:2001
- Suitability of water for Construction as per IS 456:2000
- Toxic trace metals analysis
- Surface, Ground, Sea water analysis
- Effluent/Sewage/Waste water analysis as per TNPCB norms
- Microbiological testing of water

Ambient/Workplace Air Quality Survey

- Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Particulate Matter ($PM_{2.5}$), Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_x), Carbon monoxide (CO), Lead (Pb), Hydrocarbons (HC), Volatile Organic Compounds (VOCs), Ammonia (NH_3), Acid Mists, Oil Mist, etc).

Stack Monitoring

- Velocity & Volume of Flue Gas discharge, Dust/Particulate Emissions (PM), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_x), Volatile Organic Compounds (VOCs), Orsat Analysis (CO, CO_2 and O_2) and Toxic trace metals.

Weather Monitoring

- Wind Speed, Wind Direction, Minimum Temperature, Maximum Temperature, Relative Humidity, Dew Point, Atmospheric Pressure, Solar Radiation, Rainfall, etc.

Noise Monitoring

- Test the noise levels at various industrial operations.

Soil Testing

- Texture, Lime Status, Moisture, Organic Carbon, pH, EC, Sodium as Na, Nitrogen as N, Phosphorous as P, Potassium as K, Iron as Fe, Zinc as Zn, Copper as Cu, Manganese as Mn and Toxic heavy metals.

12.3 TURNKEY PROJECTS

Effluent Treatment Plant with Recycling System

- Zero Liquid Discharge System
- Chemical Treatment
- Electro Coagulation
- Packaged Treatment System
- Biological Treatment System

WTP and Drinking Water Plant

- Sand and Carbon Filtration
- Reverse Osmosis Plants
- Drinking water plant as per IS 14543 on BOOSC basis
- Industrial
- Softening Plants
- De-mineralized Plants
- Iron removal filters

Air Pollution Control Equipments

- Wet/Dry Scrubbers
- Caustic Scrubbers
- Dust Collectors
- Electro Static Precipitator (ESP)

Evaporator

- Single Stage
- Multi Stage

Secured Land Filling

- Completing the secured landfill facility as per CPCB norms
- Landfill facility for Hazardous sludge, Biomedical waste, etc

Sewage Treatment Plant with Recycling System

- Moving Bed Biological Reactor (MBBR)
- Fluidized Aerobic Bio Reactor (FAB)
- Activated Sludge Process
- Extended Aeration Process
- Sewage Recycle Process (SRP)
- Sand and Carbon Filtration
- Chlorination, UV and Ozonator
- Packaged Treatment System

12.4 OPERATION AND MAINTENANCE TREATMENT PLANT

- Sewage Treatment Plants
- Effluent Treatment Plants
- Reverse Osmosis Plants
- Softening Plants
- Sugar Process Laboratory

QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality

NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Enviro Care India Private Limited
Plot No. 43, 2nd Street, Harvey Nagar, Madurai,
Tamil Nadu - 625016

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

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/ Underground mining	1	1 (a) (i)	A
2	Thermal power plants	4	1 (d)	B
3	Metallurgical industries (ferrous and non-ferrous)	8	3 (a)	B
4	Distilleries	22	5 (g)	A
5	Ports, harbours, break waters and dredging	33	7 (e)	A
6	Building and construction projects	38	8 (a)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RA AC minutes dated June 30, 2022 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2501 dated August 30, 2022. The accreditation needs to be renewed before the expiry date by Enviro Care India Private Limited, Madurai following due process of assessment.

NABET

Sr. Director, NABET Dated: August 30, 2022	Certificate No. NABET/EIA/2124/RA 0249	Valid up to December 14, 2024

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

ANNEXURE-I

INSPECTION REPORT PREPARED BY TNPCB

IR.No : F.0409NML/OM/AE/NML/2017 dated 12/04/2017

TAMIL NADU POLLUTION CONTROL BOARD

Inspection Report for Renewal of Consent orders

1.	[a]	Name and Designation of the Inspecting Officer	:	RAVICHANDRAN G AE
	[b]	District Office	:	NAMAKKAL
2.		Date of Inspection	:	04/04/2017
3.	[a]	Industry Name	:	RAN INDIA STEELS (P) LTD., UNIT - II
	[b]	Industry Postal address:		Registered Office address:
		Nallur Village, Kavundipalayam Post, Kandampalayam Via,P.Velur Tk.Namakkal Dt.		510/164, FIRST FLOOR, T T K ROAD, ALWARPET, CHENNAI
		Pincode: 637203		Pincode: 600018
4.		Date of Commissioning	:	05/04/2004
5.		Total Gross Fixed Assets in Lakhs (as on 31/03/2016)	:	827.12
6	[a]	Category-Classification scale	:	ORANGE - Medium
	[b]	Industry Type	:	2042-Industry or processes involving foundry operations having capacity less than 5 MT/hr as such units require coal/coke at less than 500 Kg/hr
7.		Land Status	:	Owned
		Total area(in Hectares)	:	1.764
8.		Representative who accompanied during inspection	:	Thiru.A.Udhaya Kumar, Works Manager

9. **Products manufacured**

SL.No.	Name of the product	Quantity	Unit	End Use
a	Main Products manufactured:			
1.	MS Ingots	3000	T/M	
b	By- Products manufactured:			
c	Intermediate Products manufactured:			

10. [a] **Water Source Details**

SL. No.	Source Type.	Source Name	Quantity in KLD
1.	Ground Water (within premises)	Borewell	13.5

Total :13.50

[b] Water Consumption Details

SL. No.	Consumption Type	Quatity (KL/D)
1.	WC-I : Cooling & Boiler feed	4.5
2.	WC-II: Domestic	4.5
3.	WC-III: Process (Easily Bio degradable)	4.5

Total 13.50

11. [a] **Sewage generation Details**

S.No.	Source	Quantity(KLD)
1.	Sewage	4.0

Total 4.00

[b] Trade effluent generation Details

S.No.	Source	Quantity(KLD)
1.	Trade Effluent	0.1

Total 0.10

12. [a] **Details of Sewage Treatment plant Details**

Treatment status: Septic Tank and SP/DT

IR.No : F.0409/NML/OM/AE/NML/2017 dated 12/04/2017

TAMIL NADU POLLUTION CONTROL BOARD

Inspection Report for Renewal of Consent orders

1.	[a]	Name and Designation of the Inspecting Officer	:	RAVICHANDRAN G AE
	[b]	District Office	:	NAMAKKAL
2.	Date of Inspection		:	04/04/2017
3.	[a]	Industry Name	:	RAN INDIA STEELS (P) LTD., UNIT - II
	[b]	Industry Postal address:		Registered Office address:
		Nallur Village, Kavundipalayam Post, Kandampalayam Via,P.Velur Tk.Namakkal Dt Pincode: 637203		510/164, FIRST FLOOR, T T K ROAD, ALWARPET, CHENNAI Pincode: 600018
4.	Date of Commissioning		:	05/04/2004
5.	Total Gross Fixed Assets in Lakhs (as on 31/03/2016)		:	827.12
6.	[a]	Category-Classification scale	:	ORANGE - Medium
	[b]	Industry Type	:	2042-Industry or processes involving foundry operations having capacity less than 5 MT/hr as such units require coal/coke at less than 500 Kg/hr
7.	Land Status		:	Owned
	Total area(in Hectares)		:	1.764
8.	Representative who accompanied during inspection		:	Thiru.A.Udhaya Kumar, Works Manager

9. **Products manufacured**

Sl. No.	Name of the product	Quantity	Unit	End Use
a	Main Products manufactured:			
1.	MS Ingots	3000	T/M	
b	By Products manufactured:			
c	Intermediate Products manufactured:			

10. **[a] Water Source Details**

Sl. No.	Source Type.	Source Name	Quantity in KLD
1.	Ground Water (within premises)	Borewell	13.5

Total :13.50

[b] Water Consumption Details

Sl. No.	Consumption Type	Quatity (KL/D)
1.	WC-I : Cooling & Boiler feed	4.5
2.	WC-II: Domestic	4.5
3.	WC-III: Process (Easily Bio degradable)	4.5

Total 13.50

11. **[a] Sewage generation Details**

S.No.	Source	Quantity(KLD)
1.	Sewage	4.0

Total 4.00

[b] Trade effluent generation Details

S.No.	Source	Quantity(KLD)
1.	Trade Effluent	0.1

Total 0.10

12. **[a] Details of Sewage Treatment plant Details**

Treatment status: Septic Tank and SP/DT

1

17. **Details of consent fee demand and consent fee remittance**

[a] Consent Fee Demand by TNPCB Details :

Financial Year	Consent Fee Type	Water Act	Air Act	Total	Total Gross Fixed Assets in Lakhs	As On
2017-27	Current	186100.0	186100.0	372200.0	827.12	31/03/2016
Total : 372200.0						

[b] Consent Fee Remittance by the industry Details :

Date	CR No/Bank Ref No	Amount	Reason/Remarks on rising the demand	District Office of TNPCB
12/04/2017	803006	372200.0	10 Years Renewal	NAMAKKAL
Total : 372200.0				

Total consent fee Demand Rs.	372200.0
Consent fee remitted by the industry Rs.	372200.0
Balance to be remitted Rs.	0.0

18. **TNEB power connection available and address status**

TNEB Section name and location	Service Connection No.	Connected load in HP	As on	Address of Section Head(AE) with Phone No
AE,TANGEDCO(O& M),NALLUR,P.VELU R TK,NAMAKKAL DT	230	5255	23/11/2015	AE,TANGEDCO(O& M),NALLUR,P.VELU R TK,NAMAKKAL DT

19. **Details of complaint**

Whether there are any complaints against the unit? No

Date of receipt of complaint	Name of the Complainant	Nature of Complaint	Details of Investigation	Action taken on the complaint

20. **Details of Legal Action**

Whether any court case filed against the unit? No

Nature of the case	Date of filing	Case Number	Name and place of the Court	Present stage of the case

21. **Status of actual production with respect to consented quantity of products manufactured with details.**

Within the consented quantity.

22. **Status of operation and performance of ETP/APC measures provided.**

ETP and APC measures were under operation.

23. **Status of Compliance of Conditions stipulated in the previous Consent Order/ Renewal Consent Order**

24. **Any other information**

The unit of M/s. Ran India Steels Pvt Ltd Unit - 2, S.F. 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District was issued its latest CTO Expansion for manufacturing MS Ingots – 3000 MT/Month vide Board's Proc.dated: 26.05.2004 valid up 31.03.2005 under Red Category. The consent was renewed up to 31.03.2017 Under Red Category. Further the unit has obtained consent to discharge the following.

(i)Sewage – 4 KLD – On Industry own Land

(ii)Trade Effluent – 0.1 KLD – Solar Evaporation Pans.
Previously, the unit was in Red Medium Category.

Now, the unit has applied for renewal of consent through OCMMS on 30.03.2017 under Orange Category Sl.No:2042-Industry or processes involving foundry operations having capacity less than 5 MT/hr as such units require coal/coke at less than 500 Kg/hr. Further, the unit in its letter dated: 24.03.2017 has request the Board to change and issue the renewal from Red to Orange as per the revised categorization of industries vide B.P.06 dated: 02.08.2016. Based on the application the unit was inspected on 04.04.2017. During inspection, the following were noticed.

1.The unit was under operation.

2.The unit has installed a electrical furnace with two crucible with a capacity of 10 MT/each crucible and the Panel Board Capacity is 4000 KVA. The crucibles are single track operation and the unit has obtained TNEB power connection load is 4900 KVA. Further, the time taken for the batch operation for melting in a crucible is 2 Hours and 30 minutes and the average production capacity per hour is 4.17 Tons. Hence, the unit is complied the production capacity conditions and falls under Orange Category Sl.No:2042 as per the revised Categorization B.P.No: 06 dated: 02.08.2016.

3.Solid waste such as slag is collecting and disposing for land fill within the premises.

4.Air Pollution measures provided such suction hood with ID Fan, Bag Filters – 2 nos, Wet Scrubber – 2 Nos and stack attached to the furnace and stack attached to the DG set 250 KVA was under operation. The unit has installed online continuous stack emission monitoring system to the Furnaces and the same was under operation. Online reading for the PM10 at the time of inspection was – 42.55 mg/Nm3. ROA dated: 18.11.2016 of the AAQ / SM / ANL survey reveals that all the parameters are within the standards prescribed by the Board. Copy of ROA is attached in the documents sheet. Further, The unit has provided energy meter to ID fan and maintain log book for energy consumption.

5.Trade effluent generated from the wet scrubber bleed off 0.1 KLD is disposed through Solar Evaporation Pans provided and the same was under operation.

6.Authorization under Hazardous Waste and Other Wastes (M & TB) Rules, 2016 was issued to the unit vide Board Proc.dated: 28.12.2016 valid for a period of 5 years for the following category for import and captive consumption.

(i)B1010 – Metal and metal alloy wastes in metallic, non – dispersible form – Iron and steel scrap – 21257.426 Tons/Year.

7.The unit has remitted consent fee for the year 2017- 2027 (5 Terms) under Orange Category of Rs.3,72,200/- vide C.R.No: 15783 dated: 28.03.2017.

8.The name and occupier of the unit is Thiru R.Nagarajan, Executive Director.

25. **Specific recommendations on the issue of consent under Water (P & CP) Act, 1974 as amended and Air (P & CP) Act, 1981 as amended.**

It is submitted and recommended that the renewal of consent order to the unit may be considered subject to the following conditions,

Under Water Act

1.The unit shall ensure that no trade effluent is generated from its manufacturing activity.

2.The unit shall dispose the wet scrubber bleed off in the solar evaporation pan and ensure that there shall not be any overflow/leakage/seepage from it at any point of time.

3.The unit shall maintain log book for the generation and dispose of the solid waste per day etc.

Under Air Act

1.The unit shall operate and maintain the Air Pollution Control Measures efficiently and continuously so as to achieve the National Ambient Air Quality standards prescribed by MOEF in 2009.

2.The unit shall operate and maintain the online continuous stack emission monitoring system provided for the induction furnace.

3.The unit shall continue to develop greenbelt by planting tree saplings at the rate of 400 Nos/Hect in 25% of total area of the unit.

4.The unit shall maintain good housekeeping practices within the premises.

RAVICHANDRAN G/AE
(Name and Designation)

DEE Recommendations

Renewal of consent is being issued to the unit subject to the conditions mentioned in the IR

Gopalakrishnan G/DEE
(Name and Designation)

5

ANNEXURE-II

LAND USE CLASSIFICATION

அனுப்புநர்

திரு க.நாகராஜன், டி.சி.இ.,
நகர் ஊரமைப்பு துணை இயக்குநர்(பொ),
சேலம் மண்டலம்,
6 சக்தி தெரு, சுப்ரமணிய நகர்,
சூரமங்கலம், சேலம் 636 005.

பெறுநர்

நிர்வாக இயக்குநர்,
ரான் இந்தியா ஸ்டீல் (பி) லிமிடெட்,
ஐய்யப்பா டவர், முதல் தளம்,
காவல், வேலூர் ரோடு,
திருச்செங்கோடு,
நாமக்கல் மாவட்டம் 637 211.

ந.க.எண்.2734/2008/சேம-3/ நாள்.19.12.2008.

(மார்கழி 4, திருவள்ளுவர் ஆண்டு 2039)

ஐயா,

பொருள்: நில வகைப்பாடு - நகர் ஊரமைப்பு - சேலம் மண்டலம் - நாமக்கல் மாவட்டம் - பரமத்தி வட்டம் - நல்லூர் கிராமம், நில அளவை எண்.254/1எ1, 254/2எ1எ, 255/4பி,255/5எ, 255/5பி, 255/6எ1, 255/6எ2-ல் உள்ள நிலத்திற்கு நில வகைப்பாடு (Land Classification) சான்று வழங்குதல் - தொடர்பாக.

பார்வை: மனுதாரர் கடிதம் எண். RIS /TNPCB/2008-09, நாள்.06.12.2008.

பார்வையில் குறிப்பிட்டுள்ள கடிதத்தில் கோரியபடி, நாமக்கல் மாவட்டம், பரமத்தி வட்டம், நல்லூர் கிராமம், நில அளவை எண்.254/1எ1, 254/2எ1எ, 255/4பி, 255/5எ, 5பி, 255/6எ1, 255/6எ2-ல் உள்ள நிலத்திற்கு நகர் ஊரமைப்பு சட்டம் 1971-ன்கீழ் முழுமைத் திட்டம் மற்றும் விரிவு அபிவிருத்தித் திட்டம் எதும் தயாரிக்கப்படவில்லை. எனவே மேற்கண்ட இடத்திற்கு நில வகைப்பாடு (Land Classification) எதும் செய்யப்படவில்லை எனத் தெரிவித்துக் கொள்ளப்படுகிறது.

மேலும் பிரஸ்தாப இடத்தில் நிலையில் உள்ள கட்டிடம் அல்லது உத்தேச கட்டிடங்களின் நிறுவல் அமைக்கும்பொழுது இத்துறையின் அனுமதி பெறவேண்டும்.

நகர் ஊரமைப்பு துணை இயக்குநர்(பொ),
சேலம்.

ANNEXURE-III

WATER AGREEMENT

EXISTING & AFTER EXPANSION

கோலாரம் ஊராட்சி மன்றம்
பரமத்தி வேலூர் வட்டம், நாமக்கல் மாவட்டம்.

பெறுதல்:

R. நாகராஜன்,
செயல் இயக்குநர்,
ரேண் இந்தியா ஸ்டீல்ஸ் பி லிமிட்டெட்,
S.C.No: 254/1A1, 254/2A1A, 255/4B,255/5A,255/5B,255/6A1 & 255/6A2
நல்லூர் கிராமம், பரமத்தி வேலூர் வட்டம்,
நாமக்கல் மாவட்டம்.

பொருள்:- ரேண் இந்தியா ஸ்டீல்ஸ் பி லிமிட்டெட், S.C.No: 254/1A1, 254/2A1A,255/4B, 255/5A,255/5B,255/6A1 & 255/6A2 நல்லூர் கிராமத்தில் இயங்கிவரும் இரும்பு உருக்கு தொழிற்சாலையின் உபயோகத்திற்கு தேவையான தண்ணீரை கிராம பஞ்சாயத்து குடிநீர் குழாய் இணைப்பிலிருந்து - தினசரி சுமார் 17,000 KLD தண்ணீர் வழங்குவது - தொடர்பாக

பார்வை:- ரேண் இந்தியா ஸ்டீல்ஸ் பி லிமிட்டெட், பொது மேலாளர் M. கணேசன் அவர்களின் 29.07.2022-ம் தேதிய கடிதம்.

அன்புள்ள ஐயா,

பார்வையில் கண்டுள்ள ரேண் இந்தியா ஸ்டீல்ஸ் பி லிமிடெட் கடிதத்தில் கோரியுள்ள கோரிக்கை கவனமுடன் பரிசீலிக்கப்பட்டு அவர்களின் இரும்பு உருக்கு தொழிற்சாலையின் உபயோகத்திற்கு தினசரி தேவையான சுமார் 17,000 KLD தண்ணீரை உள்ளாட்சியின் நிபந்தனைக்குட்பட்டு, தமிழ்நாடு குடிநீர் வடிகால் வாரியத்தால் நிர்ணயிக்கப்படும் கட்டணத்தை செலுத்தவும் மற்றும் பஞ்சாயத்து குடிநீர் குழாய் இணைப்பிலிருந்து தண்ணீர் எடுத்து உபயோகித்துக் கொள்ளவும் அனுமதி வழங்கப்படுகிறது.

M. Manimegalai
தங்கள் அன்புள்ள
தலைவர்.
கோலாரம் ஊராட்சி

இடம்: கோலாரம்
நாள்: 17.8.2022

ANNEXURE-IV

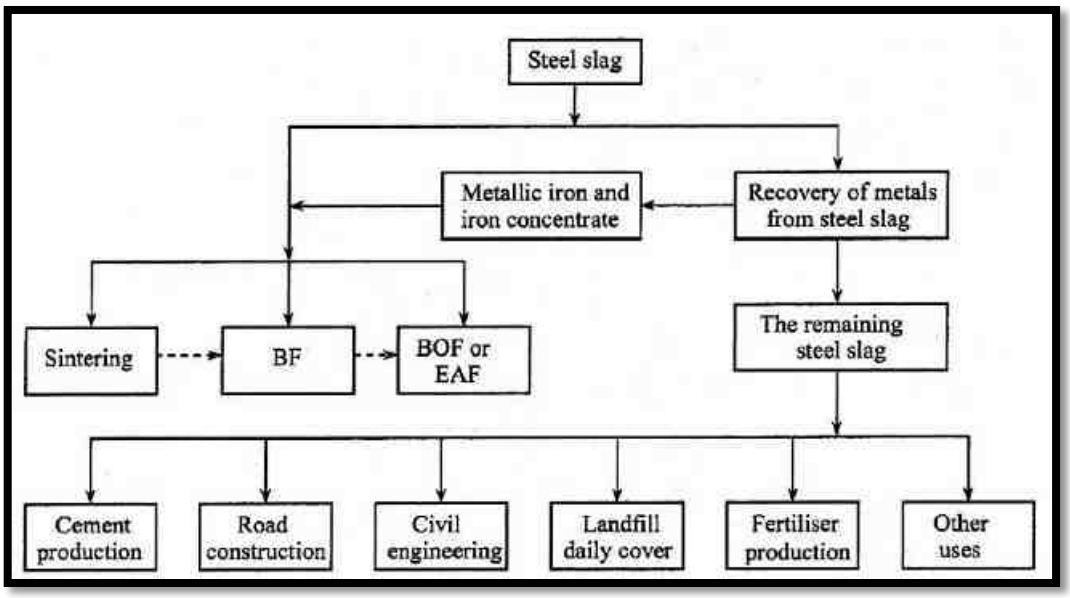
PLAN FOR UTILIZATION OF SLAG AND OFF-GASES

Application of steel slag

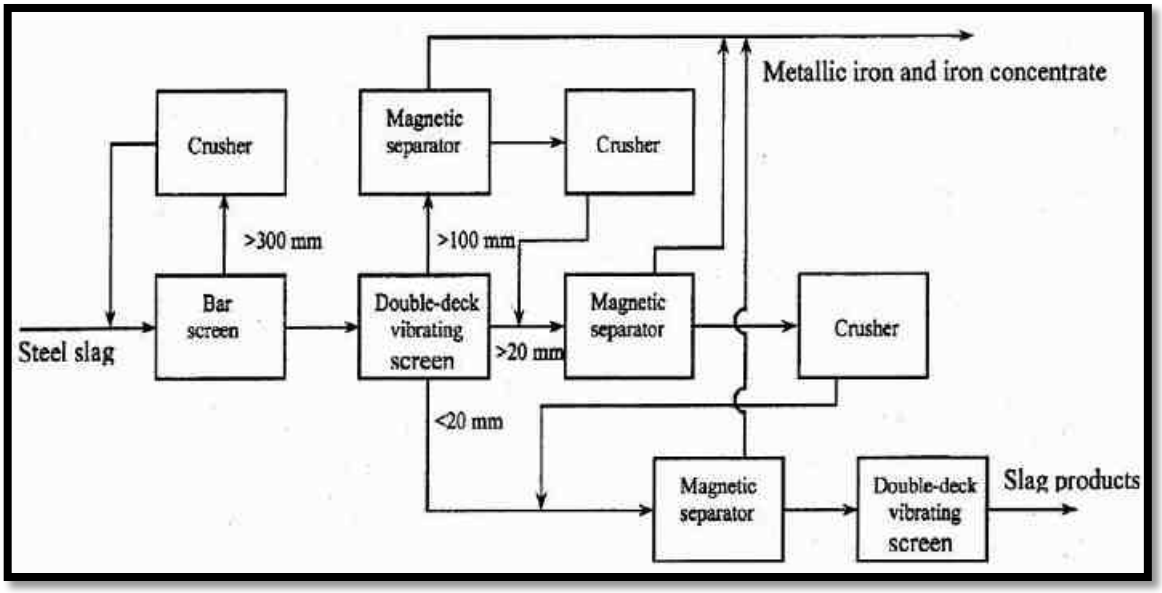
Steel slag has been applied in many areas. Basically, the application can be divided into two parts. One is the direct application of steel slag in the iron and steel making process; the other includes recovery of metals from steel slag and then the application of the remaining steel slag outside the iron and steel making process. Steel slag contains about 30–50% CaO and 3–10% MgO. It can be directly used as a flux in sintering, blast furnace or steel making process for substitution of a part of limestone and dolomite. In this process, Fe in the steel slag is recovered too. In addition, the use of steel slag in the iron and steel making process can also save manganese ore and improve the process because there is some MnO in the steel slag. However, since some steel slags contain a notable amount of Phosphorous and Sulphur, which are harmful to iron and steel making, and approximately 10–18% SiO2, the amount of direct use of steel slag in the iron and steel making process is limited. The other part of steel slag (50–90% of the total steel slag) is usually subjected to metal recovery and then applied outside the iron and steel making process.

Recovery of metal from steel slag

Steel slag is usually subjected to metal recovery prior to its application outside iron and steel making process. The methods for slag processing are different, depending on the cooling method, chemical and mineralogical composition of steel slag, and its application. In general, steel slag processing includes crushing or grinding, screening and magnetic separation, and sometimes removal of Phosphorous.



Utilization of Slag

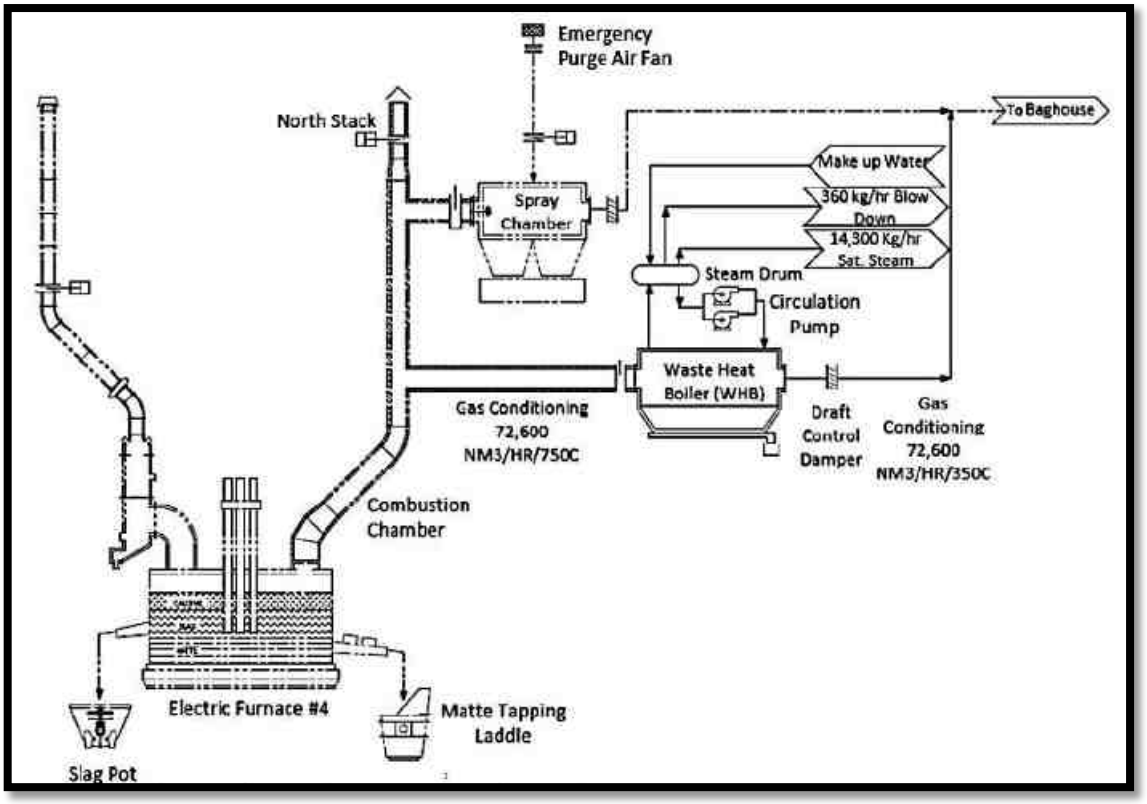


Recovery of metal from slag

Recovery of Off-gases

To recover waste heat from the electric furnace by utilizing heat energy from the exhaust gas before entering the spray chamber. The heat energy from the exhaust gas will be utilized to produce saturated steam by using Waste Heat Recovery Boiler (WHRB) by heating the water and converting the water into saturated steam.

Since the electric furnace contain dust, it is very important to arrange the boiler cleaning mechanism. Two cleaning mechanism were widely used in boiler and considered for the waste heat boiler: rappers and soot blowers. Rapper provide the following advantages in horizontal boiler application since it better cleaning of dry dust, low operating cost with no steam loss, continuous operation (no dust to build up between cleaning cycles as with soot blowers), better control of cleaning with adjustable rapping speed. Rapper may require more maintenance but wear components are simple to replace, and rappers do not accelerate abrasion wear of tube. The boiler tube construction is carbon steel. More corrosion resistance materials should not be required since the process gas is maintained above the acid the dew point and the unit will be insulated. The boiler will include a de-aerator, a high pressure dosing system, and a low pressure dosing system to remove oxygen, carbon dioxide, and impurities from the boiler feed water. Steam produced is collected and separated from the boiler water in a steam drum and distributed to the existing process steam system.

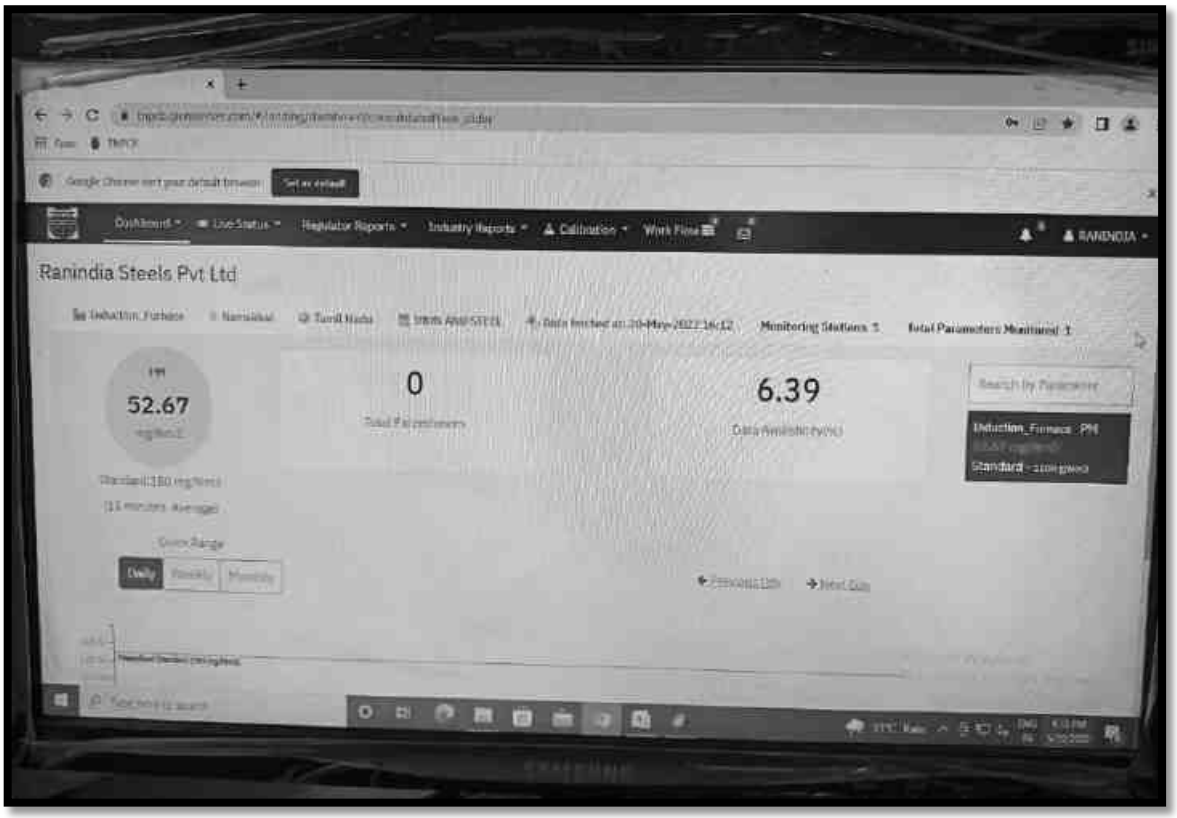


ANNEXURE-V

ONLINE MONITORING SYSTEM

Online monitoring system is installed and connections to TNPCB/CPCB have been provided.

Sl. No	Attribute	Constituents	Details of calibration of OCMS	Status of OCMS functioning	Date of connection to the servers of CPCB
1	Emission	PM_{10}	Model: DCEM-2100, Serial No: 658	Online	Data's uploaded in online server



Online Pollution Monitoring Portal

Ranindia Steels Pvt Ltd

Average Report

From Date: 19-05-2022T16:47:11Z To Date: 20-05-2022T16:47:11Z

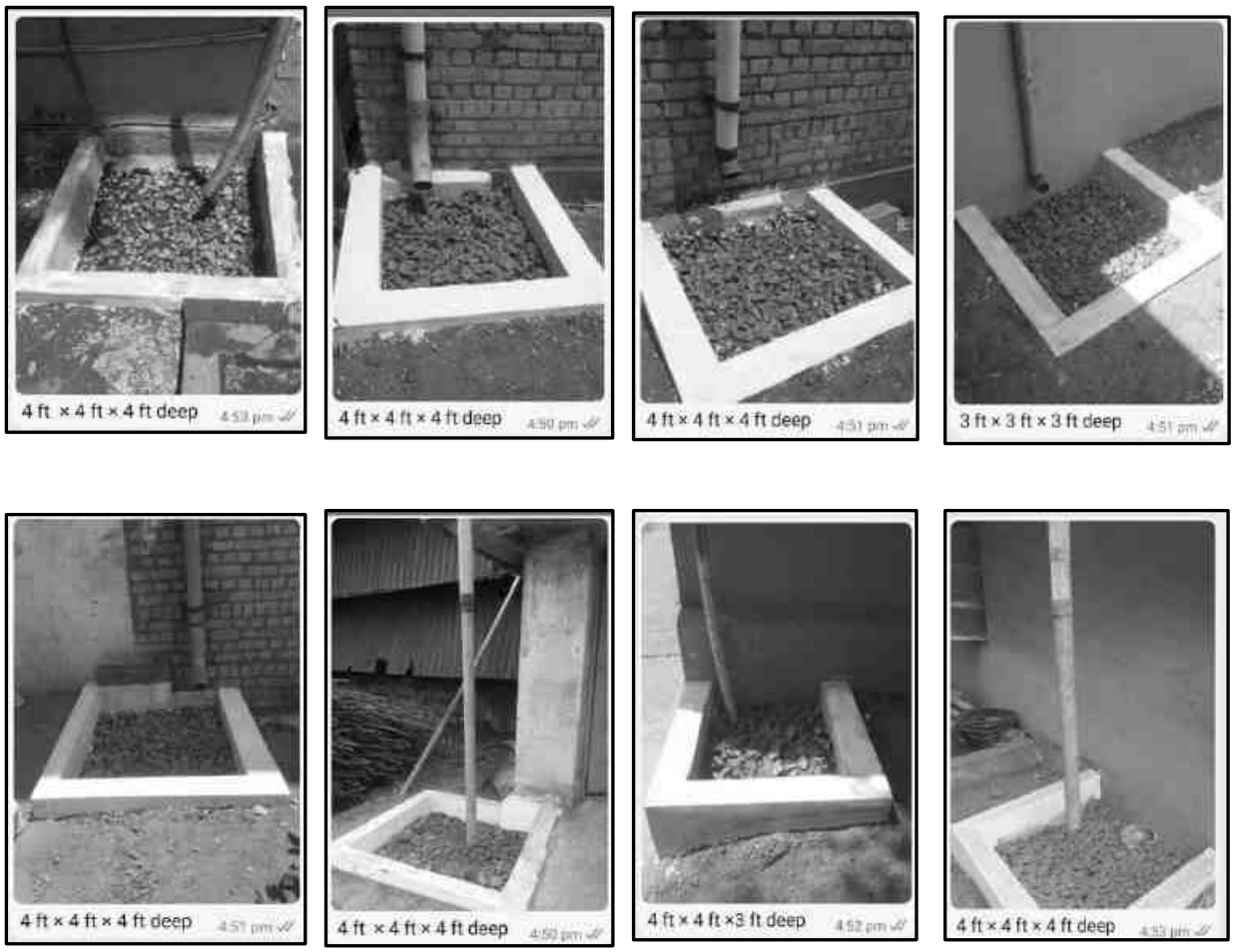
Report Created by RANINDIA on 2022-05-20 16:48:17

Sl No.	Time	Induction_Furnace-PM(mg/Nm3)
24	2022-05-19 22:30:00	38.13
29	2022-05-19 23:45:00	37.84
31	2022-05-20 00:15:00	40.98
33	2022-05-20 00:45:00	40.89
37	2022-05-20 01:45:00	41.12
38	2022-05-20 02:00:00	45.2
39	2022-05-20 02:15:00	47.44
43	2022-05-20 03:15:00	39.27
49	2022-05-20 04:45:00	40.41
50	2022-05-20 05:00:00	44.12
53	2022-05-20 05:45:00	33.29
69	2022-05-20 09:45:00	45.23
70	2022-05-20 10:00:00	42.46
71	2022-05-20 10:15:00	42.73
72	2022-05-20 10:30:00	44.47
73	2022-05-20 10:45:00	42.62
74	2022-05-20 11:00:00	43.07
75	2022-05-20 11:15:00	43.37

76	2022-05-20 11:30:00	45.26
77	2022-05-20 11:45:00	42.46
78	2022-05-20 12:00:00	42.3
79	2022-05-20 12:15:00	42.31
80	2022-05-20 12:30:00	40.72
81	2022-05-20 12:45:00	40.9
82	2022-05-20 13:00:00	43.06
83	2022-05-20 13:15:00	44.74
84	2022-05-20 13:30:00	43.9
85	2022-05-20 13:45:00	43.78
86	2022-05-20 14:00:00	44.72
87	2022-05-20 14:15:00	42.38
88	2022-05-20 14:30:00	43.95
89	2022-05-20 14:45:00	43.44
90	2022-05-20 15:00:00	41.27
91	2022-05-20 15:15:00	42.41
92	2022-05-20 15:30:00	43.88
93	2022-05-20 15:45:00	44.07
94	2022-05-20 16:00:00	44.68
95	2022-05-20 16:15:00	41.97
96	2022-05-20 16:30:00	40.79
97	Prescribed Standards	0 - 150
98	Maximum Value	47.44
99	Maximum Value At	2022-05-20 02:15:00
100	Minimum Value	33.29
101	Minimum Value At	2022-05-20 05:45:00
102	Geometric Mean	42.45
103	Median	42.62
104	Standard Deviation	2.5
105	Valid Data Points	39
106	Total Data Points	96
107	Data Availablity %	40.62

ANNEXURE-VI

RAIN WATER HARVESTING



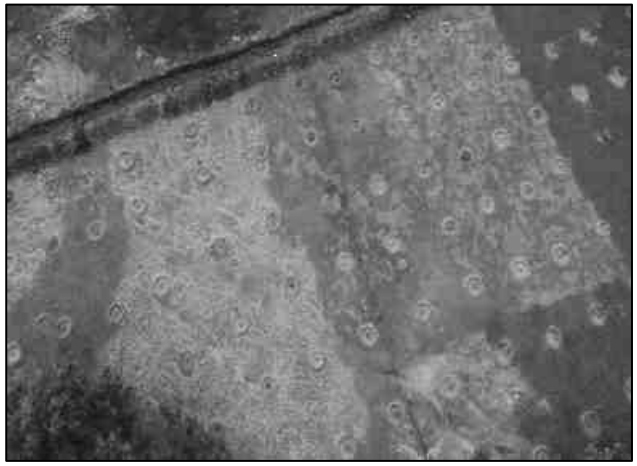
Rain Water Harvesting Available:

- **Percolation Pits - 7 nos (1.2 m x 1.2 m x 1.2 m)**
- **Percolation Pits - 1 no (1.2 m x 1.2 m x 0.9 m)**
- **Percolation Pits - 1 no (0.9 m x 0.9 m x 0.9 m)**

ANNEXURE-VII

GREENBELT DEVELOPMENT








ANNEXURE-VIII

CONSENT ORDER (Air)

TAMIL NADU POLLUTION CONTROL BOARD

CONSENT ORDER NO. 170828503707 DATED: 12/04/2017.

PROCEEDINGS NO.F.0409NML/OM/DEE/TNPCB/NML/A/2017 DATED: 12/04/2017

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT –M/s. RAN INDIA STEELS (P) LTD., UNIT - II , S.F.No. 255/6A2, NALLUR village, Paramathi velur Taluk and Namakkal District - Renewal of Consent for the operation of the plant and discharge of emissions under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) –Issued- Reg.

REF: 1.Proc.No:T4/TNPCB/F.0409NML/RM/NML/W&A/2016 dated:14.06.2016.
2.Unit's Application for Renewal of Consent dated: 30.03.2017.
3.I.R.No: F.0409NML/OM/AE/NML/2017 dated:12.04.2017.

RENEWAL OF CONSENT is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Director
M/s.RAN INDIA STEELS (P) LTD., UNIT - II,
S.F.No. 255/6A2,
NALLUR village,
Paramathi velur Taluk,
Namakkal District.

Authorizing the occupier to operate the industrial plant in the Air Pollution Control Area as notified by the Government and to make discharge of emission from the stacks/chimneys.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2027

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
NAMAKKAL

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	MS Ingots	3000	T/M

2. This renewal of consent is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.

I	**Point source emission with stack :**			
Stack No.	**Point Emission Source**	**Air pollution Control measures**	**Stack height from Ground Level in m**	**Gaseous Discharge in Nm3/hr**
1	Induction Furnace(2 Crucibles,1 standby)	Suction Hood with ID Fan,Bag Filters 2 numbers,Wet scrubber 2 Numbers and Stack	42	
2	DG Set 250 KVA	Acoustic enclosures with stack	2.3	
II	**Fugitive/Noise emission :**			
Sl. No.	**Fugitive or Noise Emission sources**	**Type of emission**	**Control measures**	
1.	Furnace Area	Fugitive	Suction hoods 3 Nos with ID Fan ,Wet Scrubber	
2.	Slag Crushing Section	Fugitive	Duct,IDFan,Cyclone Separator,Water Contact Chamber	

Additional Conditions:

1.The unit shall operate and maintain the Air Pollution Control Measures efficiently and continuously so as to achieve the National Ambient Air Quality standards prescribed by MOEF in 2009.
2.The unit shall operate and maintain the online continuous stack emission monitoring system provided for the induction furnace.
3.The unit shall continue to develop greenbelt by planting tree saplings at the rate of 400 Nos/Hect in 25% of total area of the unit.
4.The unit shall maintain good housekeeping practices within the premises.
5."In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification.Failing to remit the consent fee, this consent order will be withdrawn any notice and further action will be initiated against the unit as per law".

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
NAMAKKAL

To
The Director,
M/s.RAN INDIA STEELS (P) LTD., UNIT - II,
Nallur Village, Kavundipalayam Post, Kandampalayam Via,P.Velur Tk,Namakkal Dt.,
Pin: 637203

Copy to:

1.The Commissioner, PARAMATHI-Panchayat Union, Paramathi velur Taluk, Namakkal District .
2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
3. Copy submitted to the JCEE-Monitoring, Tamil Nadu Pollution Control Board, Coimbatore for favour of kind information.
4. File

** This consent order is computer generated by OCMMS of TNPCB and no signature is needed**

CONSENT ORDER (Water)

TAMIL NADU POLLUTION CONTROL BOARD

CONSENT ORDER NO. 170818503707 DATED: 12/04/2017.

PROCEEDINGS NO.F.0409NML/OM/DEE/TNPCB/NML/W/2017 DATED: 12/04/2017

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT – M/s. RAN INDIA STEELS (P) LTD., UNIT - II , S.F.No. 255/6A2, NALLUR village, Paramathi velur Taluk and Namakkal District - Renewal of Consent for the operation of the plant and discharge of sewage and/or trade effluent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act 6 of 1974) – Issued- Reg.

REF: 1.Proc.No:T4/TNPCB/F.0409NML/RM/NML/W&A/2016 dated:14.06.2016.
2.Unit's Application for Renewal of Consent dated: 30.03.2017.
3.I.R.No: F.0409NML/OM/AE/NML/2017 dated:12.04.2017.

RENEWAL OF CONSENT is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act, 6 of 1974) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Director
M/s.RAN INDIA STEELS (P) LTD., UNIT - II,
S.F.No. 255/6A2,
NALLUR village,
Paramathi velur Taluk,
Namakkal District.

Authorising the occupier to make discharge of sewage and /or trade effluent.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2027

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
NAMAKKAL

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	MS Ingots	3000	T/M

2. This renewal of consent is valid for operating the facility with the below mentioned outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Sewage	4.0	On Industrys own land
Effluent Type : Trade Effluent			
1.	Trade Effluent	0.1	Solar Evaporation Pans

Additional Conditions:

1.The unit shall ensure that no trade effluent is generated from its manufacturing activity.
2.The unit shall dispose the wet scrubber bleed off in the solar evaporation pan and ensure that there shall not be any overflow/leakage/seepage from it at any point of time.
3.The unit shall maintain log book for the generation and dispose of the solid waste per day etc.
4."In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification.Failing to remit the consent fee, this consent order will be withdrawn any notice and further action will be initiated against the unit as per law".

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
NAMAKKAL

To
The Director,
M/s.RAN INDIA STEELS (P) LTD., UNIT - II,
Nallur Village, Kavundipalayam Post, Kandampalayam Via,P Velur Tk,Namakkal Dt.,
Pin: 637203

Copy to:

1.The Commissioner, PARAMATHI-Panchayat Union, Paramathi velur Taluk, Namakkal District .
2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
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4. File

** This consent order is computer generated by OCMMS of TNPCB and no signature is needed**

ANNEXURE-IX

CORPORATE SOCIAL RESPONSIBILITY

Corporate social responsibility (CSR) is a self-regulating business model that helps a company be socially accountable to itself, its stakeholders, and the public. By practicing corporate social responsibility, also called corporate citizenship, companies can be conscious of the kind of impact they are having on all aspects of society, including economic, social, and environmental .To engage in CSR means that, in the ordinary course of business, a company is operating in ways that enhance society and the environment instead of contributing negatively to them.

As important as CSR is for the community, it is equally valuable for a company. CSR activities can help forge a stronger bond between employees and corporations, boost morale, and aid both employees and employers in feeling more connected to the world around them. Aside from the positive impacts to the planet, here are some additional reasons businesses pursue corporate social responsibility.

Budgetary Allocation for CSR Activities

Description	Rs. In Lakhs
Skill development for unskilled Labours	7.5
Government school - Infra Structure Development	10.0
Free Medical Camp	7.5
Construction and renovation of temples	10.0
Construction of over bridge	25.0
Total	**60.0**


பெரியார் நினைவு சமத்துவபுரம்.குன்னமலை


RANINDIA


அரசு ஆரம்ப சுகாதார நிலையம்

ANNEXURE-X

REPORT OF ANALYSIS OF AAQ

TAMILNADU POLLUTION CONTROL BOARD
Advanced Environmental Laboratory, Salem 636 004

From
Tmt.D.Mohanambigai, M.Sc.,
Assistant Director (Lab),
Advanced Environmental Laboratory,
Tamilnadu Pollution Control Board,
1/276, Meyyanur Main Road,
Salem - 636 004.

To
The Managing Director
M/s. Ran India Steels (P) Limited
Unit – II, Melting Division,
Nallur Village, Kavundipalayam Post
P. Velur Taluk,
Namakkal District – 637 203

Lr. No.TNPCB/AD(L)/AEL - SLM./AAQS/F.No.NKL –Air – 21/O/M/2021 - 22 Dt:03.01.2022

AAQS/SM/ANL SURVEY REPORT FOR 2021 - 22

Sir,

Sub : Furnishing of Report of Analysis of Ambient Air Quality Survey, Stack Monitoring and Noise Level Survey – Regarding.

Ref : 1) T.O.Lr.No.F.TNPCB/AD(L)/AEL - SLM./AAQS/F.No.NKL –Air -21/O/M/2021 -22 Dt:22.04.2021 & 22.11.2021
2) Your Lr.No. Nil. Date : 31.12.2021
3) i) Cash Receipt No. 64656 Dt. 09.06.2021for Rs. 32,900/-
ii) Cash Receipt No. 64802 Dt. 16.12.2021for Rs. 27,900/-

*****

I am to furnish the report of analysis of Ambient Air Quality Survey, Stack Monitoring and Ambient Noise Level Survey conducted in the vicinity of your industry M/s. Ran India Steels (P) Limited, Unit – II, Melting Division, Nallur Village, Kavundipalayam Post, Kavundampalayam (via), P. Velur Taluk, Namakkal District on 22.12.2021 with Invoice for Rs.60,800/- (Rupees Sixty thousand and eight hundred only) towards the above survey/analysis charges and the same has been adjusted vide reference (3) cited.

Kindly acknowledge the receipt of the report without fail.

Encl : As above.

ASSISTANT DIRECTOR (LAB)
AEL,TNPCB,SALEM.

Copy submitted to :
The Deputy Director (Labs), TNPC Board, Chennai, for favour of information please.
Copy to : The District Environmental Engineer, TNPC Board, Namakkal - Dt.
Copy to : File.

Page No.1 of 9

TAMILNADU POLLUTION CONTROL BOARD,
ADVANCED ENVIRONMENTAL LABORATORY,
SALEM – 636 004.

Accredited by NABL – (ISO/IEC 17025:2005)

ULR-TC989921000006911F

TEST REPORT

Report No.1/ 39/AEL - SLM/AAQS/2021 – 22 Dt: 03.01.2022

1. Name of the Industry : M/s. Ran India Steels (P) Limited
2. Address of the Industry : Unit – II, Melting Division, Nallur Village, P. Velur Taluk Namakkal District – 637 203.
3. Date of survey : 22.12.2021
4. Duration of survey : 8 Hours
5. Category : Orange / Medium
6. Land use classification : Residential (Rural)

Meteorological Conditions

Ambient Temperature (°C)	Min	Max	Relative Humidity (%)	Min	Max
	27	30		52	63
Weather Condition	Clear sky		Rainfall (mm)	Nil	
Predominant Wind Direction	E →W & NE →SW		Mean Wind Speed (Km/hr)	--	

Ambient Air Quality Survey Results

Sl. No	Location	Direction *	Distance * (m)	Height from GL (m)	Pollutants Concentration (µg/m³)		
					PM_{10}	SO_2	NO_2
01.	Scaffolding top near the house Premises Thiru. Muthusamy, Periyathottam, Sellappanpalayam	N	200	2	77	14	17
02.	Scaffolding top near the house premises of Thiru.Chettiannan, Muniappan Koil Thottam, Kavundipalayam	ENE	250	2	82	15	18
03.	Scaffolding at Open Agri field belongs to Thiru. Kandasamy, Kavundipalayam	SE	200	2	67	09	12
04.	Scaffolding top near the house premises of Thiru. Kandasamy, Sellappanpalayam	SW	300	2	89	17	21
05.	Scaffolding top near the house premises of Thiru.Periasamy Kaliappanoor	NW	400	2	73	12	15

Note:
* With respect to major emission sources
All the values are restricted to the sampling period of 08.00 Hrs.

Test method:
Respirable Particulate Matter (PM_{10}) : IS 5182: (Part 23) – 2006
Sulphur Dioxide (as SO_2) : IS 5182: (Part 2) – 2001
Oxides of Nitrogen (as NO_x) : IS 5182: (Part 6) – 2006
Sampling Procedure : AEL/SLM/SOP/G-08

CHIEF SCIENTIFIC OFFICER
AEL,TNPCB,SALEM.

ASSISTANT DIRECTOR (LAB)
AEL,TNPCB,SALEM.

-End of Test Report -

Page No.2 of 9

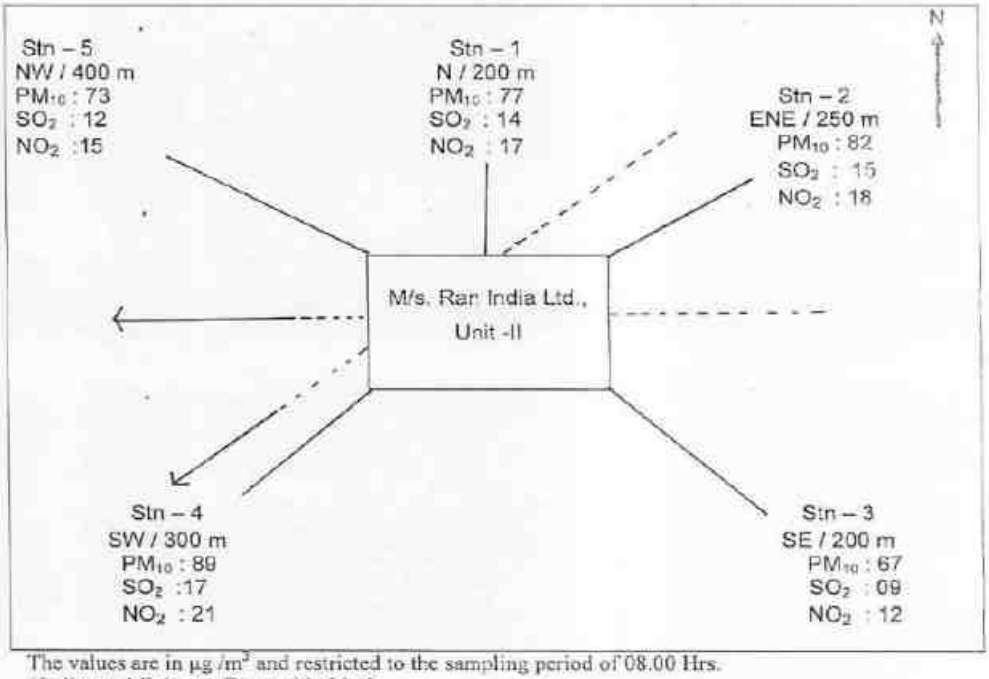
TAMILNADU POLLUTION CONTROL BOARD

Advanced Environmental Laboratory, Salem 636 004

AMBIENT AIR QUALITY SURVEY
Schematic Diagram Showing Location of Sampling

Report No. 39 /AEL - SLM/AAQS/2021 – 22 Dt: 03.01.2022

1.Name and Address of the Industry	:	M/s. Ran India Steels (P) Limited Unit –II, Melting Division Nallur Village, P. Velur Taluk Namakkal District – 637 203.
2. Date of survey	:	22.12.2021



The values are in µg /m³ and restricted to the sampling period of 08.00 Hrs.
*Indicates Minimum Detectable Limit.

METEOROLOGICAL CONDITIONS:-

Predominant Wind Direction : E →W & NE →SW
Weather Condition : Clear sky
Rainfall : Nil

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ASSISTANT DIRECTOR (LAB)
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Page No.3 of 9

TAMILNADU POLLUTION CONTROL BOARD,
ADVANCED ENVIRONMENTAL LABORATORY,
SALEM – 636 004.

Accredited by NABL – (ISO/IEC 17025:2005)

ULR-
TC 98992100000691 F

TEST REPORT

Report No.2/ 39/AEL - SLM/SM/2021 – 22 Dated: 03.01.2022

1. Name of the Industry : M/s. Ran India Steels (P) Limited
2. Address of the Industry : Unit – II, Melting Division
   Nallur Village, P. Velur Taluk
   Namakkal District – 637 203.
3. Date of survey : 22.12.2021

Stack Monitoring Survey Results

Sl. No.	Stack attached to	Stack Temp. °C	Velocity in (m/sec)	Discharge rate in (Nm^3/Hr)	Pollutants Concentration (mg/Nm^3)		
					PM	SO_2.	NOx*
1.	Induction Furnace KW (Eddy current) 2 Crucibles, each 10 Tonnes capacity	76	13.2	20410	94	<0.05	6.5

Note:
* Indicates does not Covered in NABL Scope.

Test Method:
Particulate Matter - IS 11255 (Part 1) – 1985, (RA 2003)

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-End of Test Report -

TAMIL NADU POLLUTION CONTROL BOARD

Advanced Environmental Laboratory, Salem 636 004

STACK DETAILS

Report No. 39 /AEL - SLM/SM/2021 – 22 Dt: 03.01.2022

1. Name and Address of the Industry : M/s. Ran India Steels (P) Limited
Unit – II, Melting Division
Nallur Village, P. Velur Taluk
Namakkal District – 637 203

2. Date of survey : 22.12.2021

Sl. No.	Particulars	1
1	Stack attached to	Induction Furnace
2.	Details of process Stack	Melting of M.S.Scrape, Sponge Iron
3	Height from G Level in (m)	42 mts
4	Diameter in (m) Rectangular duct	0.8 mts
5	Port hole height from Ground Level or bends or ducts in (m)	12 mts
6	Fuel Used (with L% Sulphur Content)	EB current
7	Fuel Consumption rate per day (mention units) during survey	49,180 Units (E.B) on 22.12.2021
8	Boiler type and capacity	N.A.
9	APC measures provided	Dust Collector and Wet Scrubber
10	APC functional status	Dust Collector and Wet Scrubber were in operation
11	Ambient temp in °K	302°K
12	Temp of flue gas in °K	349°K
13	Velocity of flue gas in m/sec	13.2 m/sec
14	Volume of flue gas sampled in m^3	1.008 m^3
15	Gaseous Discharge rate per Hr. in Nm^3/Hr	20,410 Nm^3/Hr

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Page No.5 of 9

TAMILNADU POLLUTION CONTROL BOARD,
ADVANCED ENVIRONMENTAL LABORATORY,
SALEM – 636 004.

Accredited by NABL – (ISO/IEC 17025:2005)

ULR-TC 98992100000691 F

TEST REPORT

Report No.3/ 39/AEL - SLM/NLS/2021 – 22 Dated: 03.01.2022

1.	Name of the Industry	:	M/s. Ran India Steels (P) Ltd.,
2.	Address of the Industry	:	Unit – II, Melting Division Nallur Village, P. Velur Taluk Namakkal District – 637 203.
3.	Date of survey	:	22.12.2021

Category	Orange / Medium
Land Use Classification	Residential (Rural)
Type of Survey	Ambient / Source
Time of Survey	Day
Meteorological Condition	Calm

Logging Parameters

Instrument Used	LARSON DAVIS SOUND LEVEL ANALYSER SLNo.824 A/2008
Ambient Temperature	30°C
Ambient Relative Humidity	55%
Measuring Range	50 -110 dB(A)
Weighing	"A"
Peak Weighing	"C"
Time Weighing	--
Sound Incidence	Random
Time in Hrs	12.40 – 13.20 hrs

Report of Noise Level Monitoring

Sl. No.	Location	Distance (m)	Direction	Sound Level – dB(A)		
				Leq	L_{Max}	L_{Min}
I	**Boundary Line:**					
01.	Open Agri field belongs to Thiru.Muthusamy	150	N	54.1	64.2	46.2
02.	Open Agri field near compound wall belongs to Thiru.Muthusamy	160	NE	54.6	61.1	54.2
03.	At the Main Gate of the Unit	125	E	52.9	57.2	51.1
04.	Behind Stores	125	SE	53.1	56.3	50.8
05.	In Open Agri field belongs to Thiru. Kandasamy	100	W	48.0	51.6	42.2
06.	In Open Agri field belongs to Thiru. Kandasamy	120	SW	51.6	58.8	42.0
II	**INSIDE THE PLANT:**					
01.	Melting Division-Near Induction Furnace	-	-	86.5	89.5	82.5

Note: *Leq Value is the average energy for the measured period.

Test Method: Sound Level (Leq) IS: 9989 - 1981 (RA 2001)
Sampling Procedure - AEL/SLM/SOP/G-08

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-End of Test Report-

TAMILNADU POLLUTION CONTROL BOARD
Advanced Environmental Laboratory, Salem 636 004

GENERAL PARTICULARS

Report No. 39/AEL - SLM/AAQS/SM/NLS/2021 – 22 Dt. 03.01.2022

1. Name and Address of the Industry : M/s. Ran India Steels (P) Limited
Unit – II, Melting Division,
Nallur Village,
P. Velur Taluk,
Namakkal District – 637 203.

2. Date of survey : 22.12.2021

Sl. No.	Head of Particulars	Particulars
1	Process Description	Production of M.S.Ingots by Melting of M.S.Scrap & Sponge Iron
2	Emission Source	Chimney attached with a 2 Nos.of Induction Furnace
3	Fugitive Emission Sources	Frequent Vehicle movements have been observed .
4.	Raw Material Consumptions on 22.12.2021	55.650 M.T (M.S. Scraps, Sponge Iron, Silica Manganese.)
5	Production Capacity as Per Air Consent Order No. & Date	M.S. Ingots = 3000 T/month (100 T/day) Consent Order No. 170828503707 Dt. 12.04.2017 Valid up to March -31, 2027.
6	Production on the day of Survey (i-e) on 22.12.2021	48.100 MT
7	Percent production with Respect to Air Consent Order	100%
8	Air Consent Order No. Validity.upto	Renewal of Consent Order No: 170828503707 Dt. 12.04.2017 Valid up to March -31, 2027.
9	Details of APC	Dust Collector & Wet Scrubber provided
10	Functional status of APC	Working
11	Compliance with Consent Conditions	Complied
12	Field Observations	Heavy vehicles movements were observed during the survey period.

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Page No.7 of 9

TAMILNADU POLLUTION CONTROL BOARD

Advanced Environmental Laboratory, Salem 636 004

INFERENCE REPORT ON AAQS/SM

Report No. 39 /AEL - SLM/AAQS/SM/NLS/2021 - 22 Dt: 03.01.2022

1. Name and address of the Industry : M/s. Ran India Steels (P) Limited
   Unit – II, Melting Division,
   Nallur Village,
   P. Velur Ta uk,
   Namakkal District – 637 203.

2. Pollution Category : Orange / Medium
3. Land use of Classification : Residential (Rural)
4. Date of AAQ survey : 22.12.2021

5 Meteorological Conditions:

(i)	Predominant Wind Direction	: E →W & NE →SW	
(ii)	Weather condition	: Clear sky	
(iii)	Rainfall	: Nil	
(iv)	Temperature (°C)	: min: 27	max: 30
(v)	Relative Humidity (%)	: min : 52	max: 63

STATUS OF POLLUTANTS LEVEL

I. AMBIENT AIR QUALITY:-

1. Total No.of AAQ stations monitored : 5 Nos.
2. No.of AAQ stations in which Pollutants Level exceeded the Boards Standard : NIL

Maximum and minimum value of Pollutants Level observed:

Sl. No.	Pollutant	Values in microgram/m³		Board's Standard (as per consent order) (µg/m³)
		Minimum	Maximum	
1.	Respirable Suspended Particulate Matter: PM_{10}	67	89	100
2.	Gaseous Pollutants:- (i) SO_2	09	17	80
	(ii) NO_2	12	21	80

II. STACK MONITORING:

1. Total No.of Stacks Monitored : 1 No.
2. No.of stacks in which pollutants level Exceeded the Board's Standards : NIL

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Page No.8 of 9

TAMILNADU POLLUTION CONTROL BOARD

Advanced Environmental Laboratory, Salem 636 004

INVOICE

Report No. 39 /AEL - SLM/AAQS/SM/NLS/2021 – 22 Dt: 03.01.2022

Invoice No.	39/AIR/2021 – 22
Date	03.01.2022

To
The Managing Director,
M/s. Ran India Steels (P) Limited,
Unit – II, Melting Division,
Nallur Village,
Kandampalayam (Via),
P. Velur Taluk
Namakkal District – 637 203.

Ref : 1) T.O.Lr.No.F.TNPCB/AD(L)/AEL - SLM./AAQS/F.No.NKL –Air -21/O/M/2021 -22 Dt:22.04.2021 & 22.11.2021
2) Your Lr.No. Nil. Date : 31.12.2021
3) i) Cash Receipt No. 64656 Dt. 09.06.2021for Rs. 32,900/-
ii) Cash Receipt No. 64802 Dt. 16.12.2021for Rs. 27,900/-

.....

Sl. No.	Fees Details	Rate (Rs.)	No.of Stations	Amount (Rs.)
1.	SAMPLING CHARGES			
	1) Ambient Air Quality Monitoring	3500	5	17,500
	2) Source Emission Monitoring	13100	1	13,100
2.	ANALYTICAL CHARGES:			
	i) Ambient Air Quality Samples (PM_{10} : SO_2 : NO_2 (each Rs.1050/-)	3150	5	15,750
	ii) Source Emission Samples			
	a) PM: SO_2: NO_x (each Rs.1050/-)	3150	1	3,150
	b) PM alone – (Rs.1050/-)			
3.	NOISE LEVEL MONITORING CHARGES:			
	i) For first 5 stations	7000	5	7,000
	ii) For each Additional Station	1400	2	2,800
4.	TRANSPORTATION CHARGES	-	-	1,500
Total (Rupees Sixty thousand and eight hundred only)			**Rs.**	
Less: Advance – (Vide ref.No.3)	**i) C.R.No. 64656 Dt. 09.06.2021**		**Rs.**	**32,900/-**
	ii) C.R.No. 64802 Dt. 16.12.2021		**Rs.**	**27,900/-**
			Total Rs.	**60,800/-**
Balance to be paid				**NIL**

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6/1/22

ASSISTANT DIRECTOR (LAB)
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Page No.9 of 9

ANNEXURE-XI

REPORT OF COMPLIANCE

FOR AIR ACT

<table>
<tr><th>S.No</th><th>Conditions of Compliance</th><th>Reply of Compliance</th></tr>
<tr><td>1</td><td>This renewal of consent is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.
<table>
<tr><th>S.No</th><th>Description</th><th>Quantity</th><th>Unit</th></tr>
<tr><th colspan="4">Product Details</th></tr>
<tr><td>1</td><td>MS Ingots</td><td>3000</td><td>T/M</td></tr>
</table></td><td>The below mentioned are our product details, if there is any changes we will be informed to the Board.
<table>
<tr><th>S.No</th><th>Description</th><th>Quantity</th><th>Unit</th></tr>
<tr><th colspan="4">Product Details</th></tr>
<tr><td>1</td><td>MS Ingots</td><td>3000</td><td>T/M</td></tr>
</table></td></tr>
<tr><td>2</td><td>This renewal of consent is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.
<table>
<tr><th>I</th><th colspan="4">Point source emission with stack</th></tr>
<tr><th>Stack No</th><th>Point Emission Source</th><th>Air Pollution Control Measures</th><th>Stack height from Ground Level in m</th><th>Gaseous Discharge in Nm³/hr</th></tr>
<tr><td>1</td><td>Induction Furnace(2 Crucibles,1 standby)</td><td>Suction Hood with ID Fan, Bag Filters 2 numbers, Wet scrubber 2 Numbers and Stack</td><td>42</td><td></td></tr>
<tr><td>2</td><td>DG Set (250 KVA)</td><td>Acoustic enclosures with stack</td><td>2.3</td><td></td></tr>
<tr><th>II</th><th colspan="4">Fugitive/Noise emission</th></tr>
<tr><th>S.No</th><th>Fugitive or Noise Emission sources</th><th>Type of Emission</th><th>Control Measures</th><th></th></tr>
<tr><td>1.</td><td>Furnace Area</td><td>Fugitive</td><td>Suction</td><td></td></tr>
</table></td><td>The below mentioned emission/noise sources along with the control measures and /or stack, if there any changes in the emission source/control measures/changes in the stack height informed to the Board.
<table>
<tr><th>I</th><th colspan="4">Point source emission with stack</th></tr>
<tr><th>Stack No</th><th>Point Emission Source</th><th>Air Pollution Control Measures</th><th>Stack height from Ground Level in m</th><th>Gaseous Discharge in Nm³/hr</th></tr>
<tr><td>1</td><td>Induction Furnace(2 Crucibles,1 standby)</td><td>Suction Hood with ID Fan, Bag Filters 2 numbers, Wet scrubber 2 Numbers and Stack</td><td>42</td><td></td></tr>
<tr><td>2</td><td>DG Set (250 KVA)</td><td>Acoustic enclosures with stack</td><td>2.3</td><td></td></tr>
<tr><th>II</th><th colspan="4">Fugitive/Noise emission</th></tr>
<tr><th>S.No</th><th>Fugitive or Noise Emission sources</th><th>Type of Emission</th><th>Control Measures</th><th></th></tr>
<tr><td>1.</td><td>Furnace Area</td><td>Fugitive</td><td>Suction</td><td></td></tr>
</table></td></tr>
</table>

				hoods 3 Nos with ID Fan, Wet Scrubber					hoods 3 Nos with ID Fan, Wet Scrubber	
	2.	Slag Crushing Section	Fugitive	Duct, ID Fan, Cyclone Separator, Water Contact Chamber		2.	Slag Crushing Section	Fugitive	Duct, ID Fan, Cyclone Separator, Water Contact Chamber	
1)	**Additional Conditions:** The unit shall operate and maintain the Air Pollution Control Measures efficiently and continuously so as to achieve the National Ambient Air Quality standards prescribed by MOEF in 2009					We are operating and maintaining the Air Pollution Control Measures efficiently and continuously so as to achieve the National Ambient Air Quality standards prescribed by MOEF in 2009.				
2)	The unit shall operate and maintain the online continuous stack emission monitoring system provided for the induction furnace.					We are operating and maintaining the online continuous stack emission monitoring system provided for the induction furnace				
3)	The unit shall continue to develop greenbelt by planting tree saplings at the rate of 400 Nos/Hect in 25% of total area of the unit.					We have maintained greenbelt.				
4)	The unit shall maintain good housekeeping practices within the premises.					We are maintaining good housekeeping practices within the premises.				
5)	In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit the consent fee, this consent order will be withdrawn any notice and further action will be initiated against the unit as per law"					Yes Complied.				

<table>
<tr><th colspan="3">FOR WATER ACT</th></tr>
<tr><th>S. No</th><th>Conditions of Compliance</th><th>Reply of Compliance</th></tr>
<tr><td>1</td><td>This renewal of consent is valid for operating the facility for the manufacture of products/by-products (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/by-product and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.
<table>
<tr><th>S.No</th><th>Description</th><th>Quantity</th><th>Unit</th></tr>
<tr><td colspan="4">Product Details</td></tr>
<tr><td>1</td><td>MS Ingots</td><td>3000</td><td>T/M</td></tr>
</table></td><td>The below mentioned our product details, if there is any changes we will be informed to the Board.
<table>
<tr><th>S.No</th><th>Description</th><th>Quantity</th><th>Unit</th></tr>
<tr><td colspan="4">Product Details</td></tr>
<tr><td>1</td><td>MS Ingots</td><td>3000</td><td>T/M</td></tr>
</table></td></tr>
<tr><td>2</td><td>This renewal of consent is valid for operating the facility with the below mentioned outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.
<table>
<tr><th>Outlet No.</th><th>Description of Outlet</th><th>Maximum daily discharge in KLD</th><th>Point of disposal</th></tr>
<tr><td colspan="4">Effluent Type: Sewage</td></tr>
<tr><td>1</td><td>Sewage</td><td>4.0</td><td>On Industry’s own land</td></tr>
<tr><td colspan="4">Effluent Type: Trade Effluent</td></tr>
<tr><td>1.</td><td>Trade effluent</td><td>0.1</td><td>Solar Evaporation Pans</td></tr>
</table></td><td>Our unit of Sewage Treatment Plant and /or Effluent Treatment Plant as indicated below
<table>
<tr><th>Outlet No.</th><th>Description of Outlet</th><th>Maximum daily discharge in KLD</th><th>Point of disposal</th></tr>
<tr><td colspan="4">Effluent Type: Sewage</td></tr>
<tr><td>1</td><td>Sewage</td><td>4.0</td><td>On Industry’s own land</td></tr>
<tr><td colspan="4">Effluent Type: Trade Effluent</td></tr>
<tr><td>1.</td><td>Trade effluent</td><td>0.1</td><td>Solar Evaporation Pans</td></tr>
</table></td></tr>
<tr><td>1)</td><td>Additional Conditions:
The unit shall ensure that no trade effluent is generated from its manufacturing activity.</td><td>We ensure that no trade effluents are generated from the manufacturing activity.</td></tr>
<tr><td>2)</td><td>The unit shall dispose the wet scrubber bleed off in the solar evaporation pan and ensure that there shall not be any overflow/leakage/seepage from it at any point of time.</td><td>We are disposing the wet scrubber bleed off in the solar evaporation pan and we ensure that there will not be any overflow/leakage/seepage from it at any point of time.</td></tr>
<tr><td>3)</td><td>The unit shall maintain log book for the generation and dispose of the solid waste per day etc.</td><td>We are maintaining log book for the generation and dispose of the solid waste.</td></tr>
<tr><td>4)</td><td>In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit the consent fee, this consent order will be withdrawn any notice and further action will be initiated against the unit as per law</td><td>Yes Complied.</td></tr>
</table>

ANNEXURE-XII

PLAN FOR IMPLEMENTATION OF STEEL PLANTS

Description	Mitigation Measures
Emission of Air Pollutants during operation.	Stacks with wet scrubbers and acoustic enclosures are provided.
Water Pollution	Septic Tanks and Solar Evaporation Pans are provided.
Waste Generation	Wastes will be reused in the process. The hazardous wastes will be packed in HDPE bags and sent to the authorized HW recyclers.
Noise Pollution	Several noise suppression and attenuation features shall be designed into the plant for the protection of personnel at all normally accessible locations within the plant boundary, both inside and outside the plant and for the protection of the inhabitants living in the vicinity of the plant.

ANNEXURE-XIII

ADEQUACY REPORT FOR ETP & STP

ADEQUACY REPORT FOR THE PROPOSED SEWAGE TREATMENT PLANT OF 5 KLD CAPACITY AND AIR POLLUTION CONTROL MEASURES OF THE EXISTING SYSTEM IN M/S. RAN INDIA STEELS PVT LTD, NALLUR VILLAGE, PARAMATHI VELUR TALUK, NAMAKKAL DISTRICT, TAMIL NADU.

To

Enviro Care India Pvt Ltd
No.43, 2nd Street, Harvey Nagar
Arasaradi,
Madurai – 625 016.

DECEMBER 2022

Department of Civil Engineering
National Institute of Technology
Tiruchirappalli – 620 015

1

ADEQUACY REPORT FOR THE PROPOSED SEWAGE TREATMENT PLANT OF 5 KLD CAPACITY AND AIR POLLUTION CONTROL MEASURES OF THE EXISTING SYSTEM IN M/S. RAN INDIA STEELS PVT LTD, NALLUR VILLAGE, PARAMATHI VELUR TALUK, NAMAKKAL DISTRICT, TAMIL NADU.

Project Name	:	Proposed Expansion of MS Ingots from 3000 TPM to 4300 TPM at S.F. Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District.
Applicant	:	Mr. R. Nagarajan The Executive Director Ran India Steels(P) Ltd., Unit - II
Consulting Engineer	:	Enviro Care India Pvt Ltd No.43, 2nd Street, Harvey Nagar Arasaradi, Madurai – 625 016.

Ran India Steels (P) Ltd, is a manufacturer of cold twisted deformed (CTD) bars with TOR quality standards and M/s. Ran India Steels (P) Ltd., Unit - II is an existing M.S. Ingots manufacturing unit located at S.F. Nos. 254/1A1, 254/2A1A, 255/4B, 255/5A, 255/5B, 255/6A1 & 255/6A2, Nallur Village, Paramathi Velur Taluk, Namakkal District.

Existing Facility at Site for treating sewage generation

Septic Tank Size - 5.0 x 2.1 x 4.0 m (1 No.)

Dispersion Trench Size - 2. 2.5 x 2.0 x 2.4 m

The unit plans to propose a Sewage Treatment Plant of capacity 5 KLD within the premises to treat the sewage generation of 4 KLD.

I. Proposed Capacity of Sewage Treatment Plant

Actual Sewage Generation : 4 KLD

STP Designed Capacity : 5 KLD

Flow/hr : 1 m^3/hr

2

Raw Sewage Characteristics taken for design basis

S. No.	Description of the Parameter	Value
1.	pH	6.5 - 7.5
2.	BOD (Biological Oxygen Demand)	300-350 mg/lit
3.	COD (Chemical Oxygen Demand)	600-900 mg/lit
4.	TSS (Total Suspended Solids)	150 mg/lit
5.	Oil & Grease	<50 mg/lit

Treated Sewage Characteristics

S. No.	Description of the Parameter	Value
1.	pH	6.5 – 7.5
2.	BOD (Biological Oxygen Demand)	<10 mg/lit
3.	COD (Chemical Oxygen Demand)	<100 mg/lit
4.	TSS (Total Suspended Solids)	<20 mg/lit
5.	Oil & Grease	<5 mg/lit

II. Treatment Scheme

The following treatment steps for achieving required outlet water quality.

A. Primary Treatment

B. Secondary Treatment

C. Tertiary Treatment

1. Primary Treatment

a. Screen Chamber

The sewage enters in to the screen chamber by gravity flow where Screen is fixed in the Screen Chamber to remove the large debris entering into the collection sump.

b. Collection Tank

From the collection sump sewage is let into anoxic and pumped to Aeration Tank

2. Secondary Treatment

a. Aeration Tank

From the collection tank, the sewage flows to the aeration tank by pump or gravity and is mixed with the activated sludge. The aeration tank (or aeration chambers, as

3

they are sometimes called) is normally rectangular tank, 1.0 m deep and about 1.5 m wide. The length is about 2.0 m, and the detention period is up to 12 hours for sewages depending upon the quality and quantity of raw sewage. Air is continuously introduced into these tanks by surface aerators or any suitable device.

Compressed air under a certain pressure is introduced into the aeration chamber, through diffusion plates or other devices, called diffusers or blowers with the capacity of 4.0m^3/hr. The criteria for selection of a particular diffuser are that it should be capable of diffusing air in small bubbles, so as to provide the greatest possible efficiency of aeration.

b. Settling Tank

Then, the sewage enters the settling which is a component of a modern system of water supply or wastewater treatment. Here, the tank allows suspended particles to settle out of wastewater as it flows slowly through the tank, thereby providing some degree of purification

c. Filter Feed Collection Tank

In this chamber, the suspended solids accumulate at the bottom of the tank which is then eliminated into the dual media filter with the help of sludge transfer pump.

3. Tertiary Treatment

d. Dual Media Filter

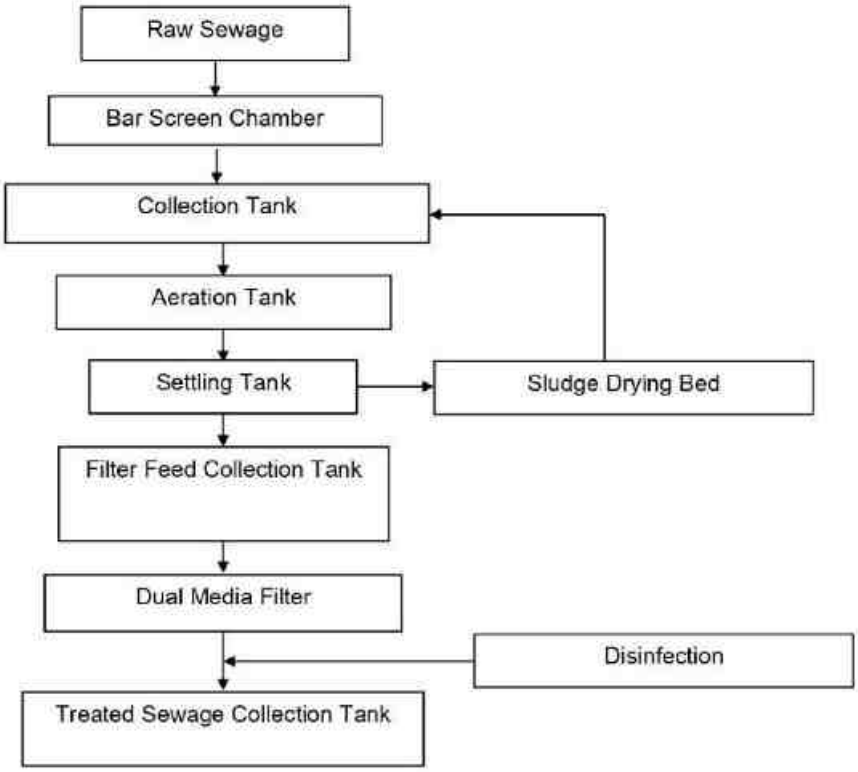
A sand-anthracite filter or dual media filter/multi-media filter is primarily used for the removal of turbidity and suspended solids as low as 10-20 microns. Dual media filters provide very efficient particle removal under the conditions of high filtration rate. Inside a sand-anthracite filter is a layered bed of filter media.

e. UV disinfection

An ultraviolet (UV) disinfection system is an effective way to remove microbial contamination in wastewater. The UV disinfection system is part of the tertiary treatment of wastewater and normally follows a filtration process. In the system, microbes are exposed to UV light that destroys their DNA. Destroying these microbes disinfects the water.

4

4. Flow chart for the Sewage Treatment Plant



F. Processing Units

1. Screen Chamber
2. Collection Tank
3. Aeration Tank
4. Settling Tank
5. Filter Feed Collection Tank
6. Dual Media Filter
7. Sludge Drying Bed

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G. Detailed Specifications Process Units

Actual Flow		:	4 KLD
Design Flow		:	5 KLD
Operation (hrs)		:	5 hrs
Flow		:	1.0 m^3/hr
(i)	**Screen chamber**		
	Flow	:	5 KLD
	Detention time	:	10 Min
	Volume required	:	0.035 m^3/hr
	Size of the tank	:	1.0 x 1.0 x 0.5 m
	Volume to be provided	:	0.5 m^3/hr
(ii)	**Collection Tank**		
	Flow	:	5 KLD
	Detention Period	:	12 hrs
	Volume Required	:	2.5 m^3
	Size of the Tank (2 nos.)	:	2.0 x 1.5 x 1.0 m (SWD)
	Volume to be provided	:	3.0 m^3
(iii)	**Aeration Tank**		
	Flow	:	5 KLD
	Influent BOD	:	300 mg/l
	MLSS concentration	:	2000 mg/l
	MLVSS concentration	:	1600 mg/l
	F/M Ratio	:	0.15
	Detention Period	:	20 Hrs
	Volume required	:	4.17 m^3
	Size of the Tank	:	1.5 x 1.5 x 1.0 m
	Volume available	:	4.5 m^3
	Influent BOD in the Aeration Tank	:	1.5 kg / day
	Capacity of the Blower required	:	3.59 m^3/hr
	Capacity of the Blower	:	4.0 m^3/hr
(iv)	**Settling tank**		
	Flow	:	1.0 m^3/hr

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	Detention Period	:	4 Hrs
	Volume required	:	4.0 m^3
	Size of the tank	:	2.0 x 2.0 x 1.0 m
	Volume to be provided	:	4.0 m^3
(v)	**Filter feed collection tank**		
	Flow	:	1.0 m^3/hr
	Detention Period	:	4 Hrs
	Volume required	:	4.0 m^3
	Size of the tank	:	2.0 x 2.0 x 1.0 m
	Volume to be provided	:	4.0 m^3
(vi)	**Dual Media Filter**		
	Flow	:	1.0 m^3/hr
	Rate of filtration	:	15000 lit/hr/ m^2
	Area of the filter required	:	0.067 m^3/hr
	Size of the tank	:	0.4m dia x 1.5 m hgt
	Area to be provided	:	0.13 m^3/hr
(vii)	**Sludge Drying Bed**		
	Plant Capacity	:	5 KLD
	Inlet BOD	:	300 mg/l
	Outlet BOD	:	30 mg/l
	Sludge Produced per day	:	[((300-30) x 5000) / (1000 x 1000)]
		:	1.35 Kg/day
	Inlet TSS	:	300 mg/l
	Outlet TSS	:	20 mg/l
	Sludge Produced per day	:	[((300-20) x 5000) / (1000 x 1000)]
		:	1.4 Kg/day
	Sludge Produced per day	:	2.75 Kd/day (1 +2)
	Considering sludge density as 6 to 8 %	:	2.75 / 0.06
			45.83 Lit/day
			Approx 50 Lit/day

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	Minimum drying period	:	5 days
	Volume required	:	13.75 Lit
	Size of the tank	:	1.0 x 1.0 x 1.0 m
	Volume of the tank	:	1 KL

H. Civil Works (Clients Scope)

Description	Civil (size in meter)					Qty.	MOC
	L	B	H	F.B	Cap. (m^3)		
Screen chamber	1.0	1.0	0.5	0.30	0.5	1	RCC
Collection tank	2.0	1.5	1.0	0.30	3.0	1	RCC
Aeration tank	1.5	1.5	1.0	0.50	4.5	1	RCC
Settling tank with hopper bottom	2.0	2.0	1.0	0.30	4.0	1	RCC
Filter feed tank	2.0	2.0	1.0	0.30	4.0	1	RCC
Sludge drying bed	1.0	1.0	1.0	-	3.00	1	RCC/BW

I. Specifications of Mechanical Equipments

Specifications of Mechanical Equipment (STP 5 KLD)						
S.NO	Description	Specification		MOC	Qty	Unit
1	Bar Screen	Size	0.5 m x 0.5 m	Frame - SS 304	1	No
		Type	Manual	Screen - SS 304		
2	Sewage Transfer Pumps	Capacity	3.125 m^3/hr	CI	2	No
		Head	10 MWC/1.0 bar			
		Type	Horizontal non-clog type			
		Motor HP	1.0 HP			
		Make	Kirloskar			
3	Aeration System For Aeration Tank, Equalization Tank & Sheet	Capacity	10.0 m^3/hr	CI	2	No
		Head	4.0 MWC/ 0.4 bar			
		Type	Twin lobe type			
		RPM	1200 RPM			
		Drive	1.0 HP			
4	Air grid	Type		UPVC	1	LOT

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	Arrangements For Aeration	Pressure Rating	(15 kg / sq. cm Pr. Rated)			
5	**Biological sludge transfer pumps**	Capacity	0.5 m^3/hr	CI	4	No
		Head	15 MWC/1.5 bar			
		Type	Horizontal Non clog type			
		Motor HP	1.0 HP			
		Make	Kirloskar			
6	**Feed pump for filters**	Capacity	3.125 m^3/hr	CI	2	No
		Head	30 MWC /3 bar			
		Type	Horizontal non clog			
		Motor HP	3.0 HP			
		Make	Kirloskar			
7	**Dual media filter**	Flow rate	3.125 m^3/hr.	FRP	1	No
		Diameter	4000mm			
		Height	1500mm			
		Type of vessel	Vertical			
		Type of valve	MPV with fontal piping			
		Operating pressure	3.0 - 5.0 kg/cm^2			
		Filtering media	Sand, Activated Carbon			
		Supporting media	Various graded pebbles			
8	**UV Disinfection**	**Quartz**	**1 no, 44 watts**	**Housing SS**	**1**	**No**
		Size	75 dia x 900mm			
		Inlet & outlet	1" BSP female Threaded			
9	**Overall Plumbing Works**	Type			1	LOT
		Pressure Rating	(15 kg / sq. cm Pr. Rated)	UPVC & MS	1	LOT
10	**Electrical Panel & Accessories**	Type	Non-Compartment	MSEP	1	No
		Make	L&T / Equal			
11	**Cable trays for electrical cabling works and plumbing works**	Type	Perforated		1	

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Stack No.	Sources of Emission	Details of APC measures
1	**Induction Furnace – 12 TPH (2 Crucible)**	Existing 42 m height 0.8 m dia of stack with wet scrubber will be used.
2	**DG Set (250 KVA)**	Stack height of 7.5 m with acoustic enclosures will be provided.

Enviro Care India Pvt Ltd has furnished the following details in a form of a report.

1. Design basis for sewage treatment plant
2. Raw sewage characteristics
3. Treated sewage characteristics
4. Treatment scheme / Process description
    a. Primary treatment
    b. Secondary treatment
    c. Tertiary treatment
        i. Dual Media Filter
5. Process design details
6. Civil works (without design details)

The following suggestions are to be considered to ensure sustainability of effective treatment.

1. Performance of each unit operations should be checked regularly by analyzing the samples at various treatment units. Proper sampling equipment and safety precautions are to be used when collecting and analyzing the samples.
2. 24 hours' operations of sewage treatment plant should be ensured (continuous pumping from equalization tank to aeration tank) for stabilization of microbial culture.
3. Flexible couplings and pipe fittings should be inspected for leakage during pump operation, and the flexible couplings replaced as required when aging and wear cracking occur.
4. Screenings from the bar screen should be disposed safely.
5. The sewage collection tanks should be cleaned periodically to avoid accumulation of Settleable solids and floating matter.

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6. Disinfection of treated water must be ensured for the complete destruction of microorganisms, especially pathogens before reuse.
7. The sewage treatment plant must be operated by qualified personnel and maintaining complete and accurate operation records. Keeping an accurate record of performance of the wastewater treatment facility is an integral part of good plant operation. Accurate and readily accessible records are necessary for regulator monitoring and for guiding operating personnel in locating and solving operational problems. These records constitute the proof of performance and serve to justify decisions and recommendations.
8. Successful emergency operation of the wastewater facility depends on plant operators knowing the optional flow characteristics designed into the plant facility, and also knowing, through normal operation and maintenance, all the control valves and emergency equipment are working properly and ready for immediate use. Operational flexibility is to be designed into the wastewater treatment facility and can accommodate an expected emergency scenario.

Based on the submitted documents, the designs of the various units for the treatment of wastewater and Air pollution control devices are found to be suitable and adequate for the proposed work.

Under these conditions, it is certified that the treatment units and sizing is found to be adequate for achieving the standards prescribed by TNPCB. The performance of the plant will depend on the proper operation and maintenance of the plant within the design conditions.

S. T. Ramesh

Dr. S. T. Ramesh
Professor
Department of Civil Engineering
National Institute of Technology
Tiruchirappalli – 620 015.

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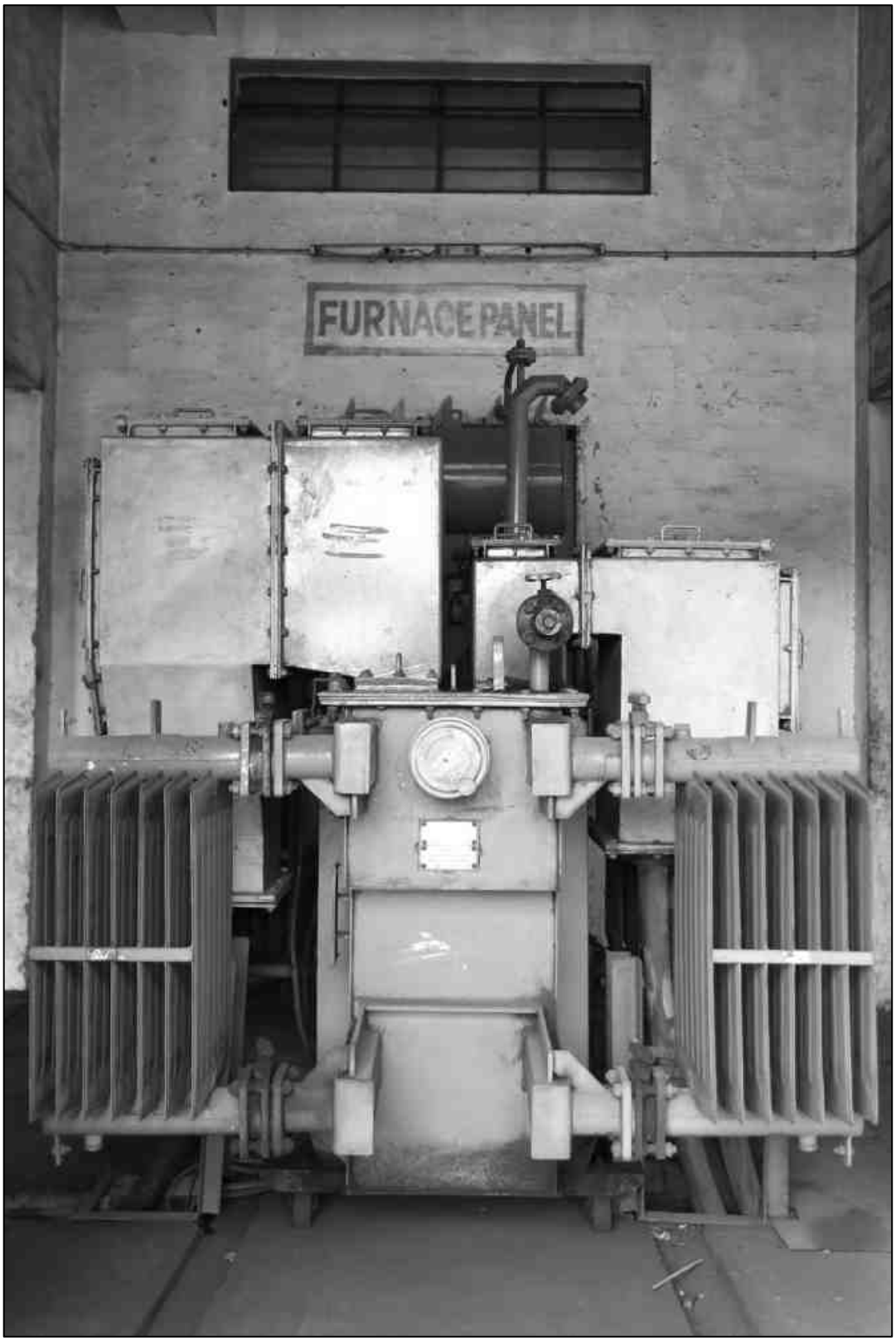
ANNEXURE-XIV

Machineries & Equipment Photographs


FURNACE PANEL