DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR THE

DEVELOPMENT OF INDUSTRIAL PARK AT ADHAGAPADI VILLAGE OF DHARMAPURI TALUK &ADHIYAMANKOTTAI, THADANGAM AND BALAJANGAMANAHALLI VILLAGES OF NALLAMPALLI TALUK, DHARMAPURI DISTRICT, TAMIL NADU OVER AN EXTENT OF 698.205 HA (1724.566 ACRES)

at

Villages: Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli
Taluk: Dharmapuri&Nallampalli
District: Dharmapuri
State: Tamil Nadu
Project -7(c) - Category A
By

M/s .STATE INDUSTRIES PROMOTION CORPORATION OF TAMILNADU LIMITED
19/A, RukmaniLakshmipathyRoad, Egmore,
Chennai – 600 008

CONSULTANT

HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI – Environmental consultant
NABET Certificate No.: NABET/ EIA/ 2224/ SA0190 (Valid up to 27/07/2024)

M/s. ITCOT Limited (ITCOT)-Project consultant

February, 2024

(Baseline monitoring period: March 2023 to May 2023)

(NABL Certificate Number: TC-846 valid till 28.04.2024)

SIPCOT

Date: 14.02.2024

DECLARATION BY THE PROJECT PROPONENT

I, Dr. K. Senthil Raj, I.A.S., Managing Director of State Industries Promotion Corporation of Tamil Nadu Limited (SIPCOT), give the declaration / undertaking that the contents (information and data) of EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) issued for the proposed "Development of Industrial Park at Adhagapadi Village of Dharmapuri Taluk & Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres)" and the information and contents provided in the report are factually correct.

DR. K. SENTHIL RAJ, I.A.S.,
MANAGING DIRECTOR

State Industries Promotion Corporation of Tamil Nadu Limited
(A Government of Tamil Nadu Undertaking)
CIN I U74999TN1971SGC005967
Regd. Office : 19-A, Rukmani Lakshmipathy Road, Post Box No. 7223, Egmore, Chennai - 600 008.
Phone : 4526 1777, Fax : 4526 1796 Website : www.sipcot.tn.gov.in

Declaration by Experts contributing to the EIA for Development of Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres)"

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

EIA Co-ordinator
Name: Mr. Vamsee Krishna Navoroo
Signature: 2/02/24

Period of Involvement :March **2023- February 2024**

Contact Information:

Hubert Enviro Care Systems Pvt. Ltd.,
A-21, Phase III, Behind Lions Club School,
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Functional Area Experts:

S. No.	Functional Area	Name of the Expert	Period of Involvement	Signature
1.	WP	Dr. J R Moses	**Period**: **April 2023- February 2024** **Task:**Selection of water monitoring station, interpretation of analysis results, collection of inputs and development of EMP with respect to the wastewater treatment and produced water management.	6/02/24
2.	EB	Dr. B.C. Nagaraja	**Period**: **March 2023- May 2023** **Task:**Primary ecological survey and assessment of flora and fauna with respect to the core and buffer zone in study area and development of EMP. Collection of data from secondary sources and comparing with field data, compilation of Ecology and bio diversity data.	22/09/23
3.	SE	Mr.V.Dhivakar	**Period:March 2023- May 2023** **Task:** Site visit, Collection of secondary data, discussion with stake holders and Preparation of socio -economic status of the study area. Review of demographic characteristics, and supervision of baseline data collection. Collection and analysis of perception study carried out for the proposed project.	2/2/2024
4.	LU	Mr. VenkateswarluRachala	**Period:March 2023- May 2023** **Task :** Development of land use maps of study area using GIS / related tools, site visit for ground reality survey, finalization of land use maps and studying the ecologically sensitive details in the study area as per Topo map and Gazette notifications.	R.Venkateswarlu 5/02/24
5.	AP	Mr. Vamsee Krishna Navooru	**Period:May 2023- February 2024** **Task:**Selection of air quality monitoring location, discussion with client on various air pollution control aspects, collection of inputs and development of EMP.	2/02/24

S. No.	Functional Area	Name of the Expert	Period of Involvement	Signature
6.	AQ	Dr.J.R.Moses	**Period: April 2023- February 2024** **Task:** Collecting Micro metrological data from secondary sources and emission from the proposed DG with the modeling inputs data and development of EMP for the project	6/02/24
7.	NV	Mr. Vivek P Navare	**Period::March 2023- May 2023** **Task:** Selection of noise sampling location for baseline monitoring, interpretation of results and development of EMP	V.P Navare 02.01.2024
8.	SC	Dr. B.C. Nagaraja	**Period:March 2023- May 2023** **Task:**Identification of soil quality monitoring locations for the project, study of soil nutrients in the study area., proposing the soil management practices during construction and operation phase of project, nutrients for green belt development	02/02/24
9.	SHW	Mr. Vamsee Krishna Navooru	**Period**: **April 2023- February 2024** **Task:**Selection of water monitoring station, interpretation of analysis results, collection of inputs and development of EMP with respect to the wastewater treatment and produced water management.	2/02/24
10.	HG	PVRS.Surendra	**Period:March 2023- February 2024** **Task**: Identification of ground water potential of the study area, Collection of secondary data and preparation of report with respect to Hydrogeological condition in and around the study area.	PRSSurendra 18/02/2024
11.	RH	Dr. J R Moses	**Period: April 2023- May 2023** **Task:** Identification of hazards from raw materials, Fire accidents from Diesel storage. Riskcontours& preparation of Disaster management plan for the project.	6/02/24

AP - *Air pollution monitoring, prevention and control*

AQ - *Meteorology, air quality modeling and prediction*

WP - *Water pollution monitoring, prevention and control*

SHW - Solid and hazardous waste management

SE - Socio-economics

EB - Ecology and biodiversity

HG - Hydrology, ground water and water conservation

NV - Noise &Vibration

LU - Land use

RH - Risk assessment and hazards management

SC – Soil conservation

Declaration by the Head of the Accredited Consultant Organization

I, Dr.J.R.Moses, hereby confirm that, the above mentioned experts, prepared the EIA Report for the "Development of Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres)"

I also confirm that, the Consultant Organization, shall be fully accountable for any misleading information mentioned in the document.

Signature:

Date: 20/02/2024

Name: Dr. J.R Moses

Designation: Chief Executive Officer

Name of the Accredited EIA Consultant Organization: M/s. Hubert Enviro Care Systems (P) Ltd., Chennai

NABET Certificate No. issue date: NABET/ EIA/ 2224/ SA0190 Valid up to 27/07/2024

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LIST OF ACRONYMS

AAQM -Ambient Air Quality Monitoring

BDL- Below Detection Limit

CPCB-Central Pollution Control Board

CTE-Consent to Establish

CTO-Consent to Operate

CER-Corporate Environmental Responsibility

CSR-Corporate Social Responsibility

TWAD- TamilNadu Water Supply And Drainage Board,

DIC-District Industries Centre

DMP- Disaster Management plan

EAC-Expert Appraisal Committee

EEP- Emergency Evacuation Plan

EMC- Environmental Monitoring Cell

EMP-Environmental Management Plan

EPA -Environmental Protection Agency

ETP -Effluent Treatment Plant

EIA-Environmental Impact Assessment

EV- Electric Vehicle

GDP- Gross Domestic Product

GLC -Ground Level Concentration

G.O- Government Order

KLD -Kilo Liters per Day

MoEF& CC-Ministry of Environment, Forests and Climate Change

NAAQs- National Ambient Air Quality Standards

NABET-National Accreditation Board for Education & Training

OHSAS-Occupational Health and Safety Administration Series

PPE-Personal Protective Equipment

PH-Public Hearing

SEIAA-State Environment Impact Assessment Authority

SEZ- Special Economic Zones

SPCB -State Pollution Control Board

TANGEDCO-Tamil Nadu Generation and Distribution Corporation

ToR- Terms of References

TNPCB-Tamil Nadu Pollution Control Board

TTRO-Tertiary Treated Reverse Osmosis Plant

VOC-Volatile Organic Compounds

ZLD-Zero Liquid Discharge

CHAPTER-1

INTRODUCTION

1. INTRODUCTION

1.1 Project Background

SIPCOT propose to establish an Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres).

Initially, The Industrial Park is planned to accommodate 3(a), 5(e), 5(f) and other Non EC category industries such General Engineering, Automobiles, Electrical & Electronics, etc. (100% of the Industrial plot area). As per the direction of EAC in 330th EAC meeting held on 19.06.2023, EC category industries has been reduced from 100% to 27.49% of the Industrial area.

Now, The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc..Thus, as per the EIA Notification 2006 and its amendments the projectis termed under Schedule 7 (c), Category A (If at least one industry in theproposed industrial estate falls under the Category A, entire Industrial Park shallbe treated as Category A, irrespective of the area).

Accordingly, application for ToR was uploaded vides Proposal No**:** IA/TN/INFRA1/430053/2023dated 22.05.2023 and the project was taken in 330th& 337th EAC meeting held on 19.06.2023 and 06.09.2023.ToR was issued for the projects vide File no.:10/34/2023-IA.II dated:02.11.2023. Copy of the same is enclosed as **Annexure-1.**

1.2 Identification of the Project and Project Proponent

Tamil Nadu is at the forefront of India's economic development and its manufacturing sector is one of the principal engines that drive the national vision of becoming a USD 5 trillion economy by 2024. Gross State Domestic Product (GSDP) of Tamil Nadu grew at a CAGR of 11.27% between 2015-16 and 2022-23, reaching 24.85 trillion (US$ 320.27 billion) in 2022-23 and it is the second largest state economy in the country, which contributes 9.6% of India's GDP.

The State's economy has registered an impressive growth in recent years and is continuing to maintain its growth momentum despite national and global economic slowdown. The secondary sector driven by the utility and manufacturing sectors contributes 32.72% to the State's economy.

This rapid growth in industrialization of Tamil Nadu is due to its strength such as proactive government policies, skilled labour force, world class infrastructures, 3 major ports, 15 minor ports, 7 Airports, highest density of road network, establishment of industrial estates / parks / SEZ with all necessary infrastructures etc.

Further, Tamil Nadu is a premier investment destination for several global companies in diverse sectors ranging from agro engineering to aerospace technology. Both overseas and home-grown companies prefer industrial space developed by Government organisations to private lands in view of lower cost and litigation free lands.

State Industries Promotion Corporation of Tamil Nadu Limited (SIPCOT) is thenodal agency of Government of Tamil Nadu to ensure sustainable developmentof industries. The objective of SIPCOT is to establish, develop, maintain andmanage industrial complexes, parks and Growth Centres at various locationsacross the State of Tamil Nadu.

SIPCOT has so far developed 28 Industrial Parks/Complexes including 6Sector Specific Special Economic Zones (SEZs) in 16 districts across Tamil Nadu. SIPCOT is theNodal Agency for Government of Tamil Nadu to sanction and for thedisbursement of Structured Package of Financial Assistance to large industrialunits. The role of SIPCOT in the industrialization of the State is not onlyquantitative but also qualitative. Instead of just accelerating the pace ofindustrial growth, SIPCOT strives to ensure that disbursal of financial incentives,which resulted in the growth of industries in backward and hitherto underdeveloped areas.

SIPCOT is having its Registered office at 19-A, Rukmani Lakshmipathy Road, Egmore, Chennai - 600 008. The authorized signatory for the project is Thiru Dr. K. Senthil Raj, I.A.S.,Managing Director.

Now SIPCOT propose to establish an Industrial Park at atAdhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres).

The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc. as per the EIA Notification2006 and its subsequent amendments. Hence, the projectis termed under Schedule 7 (c), Category A (If at least one industry in theproposed industrial estate falls under the Category A, entire Industrial Park shallbe treated as Category A, irrespective of the area).

1.3 Brief Description of Nature, Size &Location of the project

As part of its endeavor to promote new industries and considering the demand for industrial land in the vicinity of Bangalore-Hosur Industrial Stretch, SIPCOT propose to develop an Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu State.

Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District vide G.O(Ms)No.284 dated 30.12.2015 (**Annexure-2**).List of Survey numbers of the land (Land Plan Schedule) proposed for the establishment of Industrial Park is enclosed as **Annexure-3.**

Initially, The Industrial Park is planned to accommodate 3(a), 5(e), 5(f) and other Non EC category industries such General Engineering, Automobiles, Electrical & Electronics, etc. (100% of the Industrial plot area). As per the direction of EAC in 330th EAC meeting held on 19.06.2023, EC category industries has been reduced from 100% to 27.49% of the Industrial area.

Now, The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc. as per the EIA Notification2006 and its subsequent amendments.Thus, the projectis termed under Schedule 7 (c), Category A (If at least one industry in theproposed industrial estate falls under the Category A, entire Industrial Park shallbe treated as Category A, irrespective of the area).

SIPCOT will develop the physical infrastructure such as road, water supply systems, and other amenities and allot the developed plots to the potential industries based on the comprehensive assessment of Investment, technology, employment, expert, compliance to environmental regulations etc., The industries will be allowed to establish and operate as per the mandatory regulations. SIPCOT will mandate the industries to adopt “Zero Liquid Discharge”system.

1.4 Importance of the project to the Country & region

Importance of the project to the Country

Industrial parks have a tremendous socio-economic impact on our country’s economy. They have contributed to the growth and development of the economy in terms of exports, employment and investments. Further, they have made the country globally competitive. Establishment of industrial park promises to change the existing scenario and cluster the scattered community in and around the region. The setting up of industrial park is expected to boost the state’s multiproduct sector by ensuring a fair share of export revenues and raise the living standard of workers.

Importance of the project to the Tamil Nadu

Tamil Nadu leads the country with the highest number of factories at 38,837 contributing 11.04% of the gross value addition to India’s manufacturing GDP. Tamil Nadu’s world-class ports infrastructure makes the State the third largest exporting State in India contributing 8.96% (April 2022-January 2023) of country’s total exports, registering a 7.57% growth over the previous year.

This rapid growth in industrialization of Tamil Nadu is due to its strength such as proactive government policies, skilled labour force, world class infrastructures, 3 major ports, 15 minor ports, 7 Airports, highest density of road network, establishment of industrial estates / parks / SEZ with all necessary infrastructures etc.

Both overseas and home-grown companies prefer industrial space developed by Government organisations over private land in view of lower cost and litigation free land.

State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) and Tamil Nadu Small Industries Development Corporation Limited (TANSIDCO) are the Government agencies mandated for the development of industrial plots. While SIPCOT is involved in the development of industrial plots for large scale sector, development of industrial space for MSME sector is taken up by TANSIDCO. At present, Tamil Nadu has 173 industrial parks/ complexes / estates /growth centres/SEZs promoted by SIPCOT, TANSIDCO and DIC.

Due to the proactive policy of the Government and the positive role played by SIPCOT several big industrial houses like M/s. Apollo Tyres, Ashok Leyland, Bosch, Britannia, Cognizant Technology, Tata

Consultancy Services, Daimler, DELL, Delta Electronics, Delphi TVS, Eicher Motors, Foxconn, Growth Link, Hyundai, India Yamaha, Kone Elevator, KPR Spinning Mills, Mahindra & Mahindra, Mando-Hella, Michelin Tyres, Nokia Seimens, Renault-Nissan, Saint Gobain, Samsung, Sanmina and Wheels India have set up their units in SIPCOT Industrial Complexes/SEZs which will create a huge employment potential.

As part of its endeavor to promote new industries and considering the demand for industrial land in the vicinity, SIPCOT propose to develop an Industrial Park at atAdhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu State. SIPCOT has got enquiries from many companies for developed industrial plots in this location.

1.5 Scope of Study

- To assess the significant effects of the project on the surrounding environment
- To ensure environmental considerations are explicitly addressed and incorporated into the development of decision-making process.
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of the above project proposal.
- To protect the productivity and capacity of natural systems and the ecological processes which maintain their respective functions.
- To promote development that is sustainable and optimizes resource use as well as management opportunities.
- To fully recognize the scope and requirements of the Terms ofReference (ToR) and comply with the same.

1.5.1 Methodology adopted for theEIA Study

- Data collection and study of project details.
- Project Screening identifiyting the schedule and category of the Project contents are maintained.
- Preparation of feasibility necessary documents/ reports for applying for Terms of reference for the project.
- Uploading the ToR application in PARIVESH Portal.
- Appraisal of the project in EAC and grant of Terms of Reference.

- Collection of baseline data for the project.
- Data collection for the project and identification of impacts based on the project details and baseline data.
- Suggestion of mitigation measures for the project
- Prepration of Environmental Monitoring & management plan
- Preparation of generic Risk assessment & Disaster management plan for the project.
- Compilation of the details for meprationofdraft EIA report for review and finalization.
- Conducting Public Hearing.
- Preparation of Final EIA Report by Encorporating Public Hearing queries.
- Uploadingof EIA report for appraisal by EAC for obtaining the Environmental Clearance.
- The flow chart for EIA methodology is given in **Figure 1-1**.

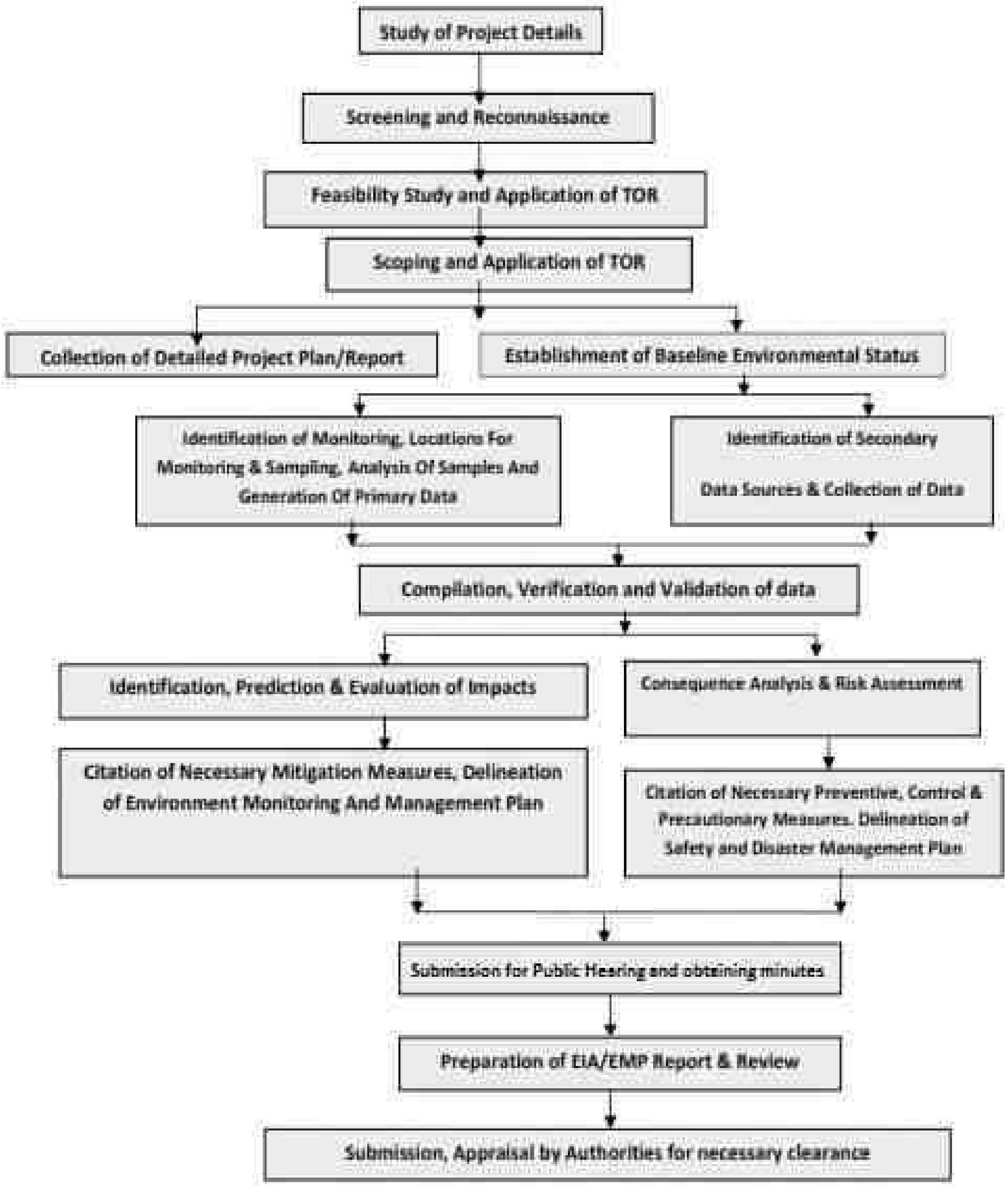


Figure 1-1 EIA methodlogy adopted for the project

1.5.2 Structure of the EIA Study

This EIA report is structured into twelve chapters as below.

Chapter 1– (Introduction) presents details of project background, overview of IP, justification and need for the project, screening and scoping studies etc.,

Chapter 2 – (Project Description) presents details of the proposed project, land requirement and details of various supporting facilities required for the project.

Chapter 3 - (Description of Environment) presents a comprehensive description of the baseline environmental conditions of the study area. This includes the data obtained from primary survey and also secondary published data from various authentic sources.

Chapter 4 – (Anticipated Environmental Impacts and Mitigation Measures) presents the environmental aspects associated with the proposed project, envisaged emissions and discharges from the facility, an overview of various pollution control systems proposed under project planning activities in the detailed project report and construction and operational phase environmental impacts.

Chapter 5 – (Analysis of Alternative Sites & Technology) presents alternative sites if any considered for the project and alternative Technologies considered for this project.

Chapter 6 – (Environmental Monitoring Programme) depicts the environmental monitoring plan for the project.

Chapter 7 – (Additional Studies) presents the findings of the risk assessment study, risk mitigation plan, a preliminary onsite emergency and disaster management plan.

Chapter 8– (Project Benefits) presents the benefits of the project.

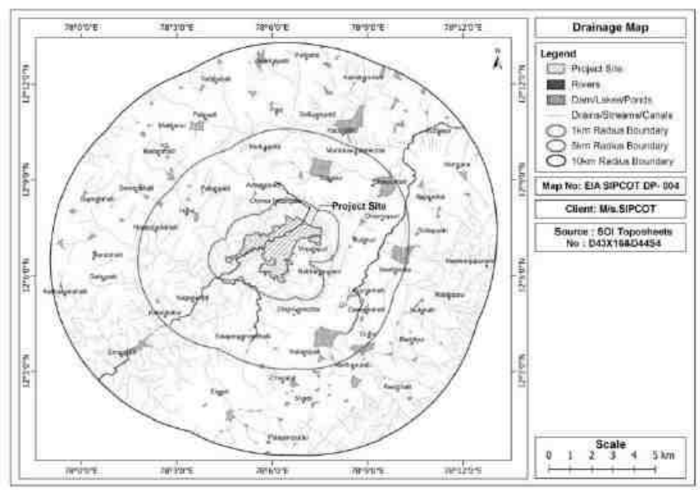
Chapter 9–(Environmental Cost Benefit Analysis) Not applicable during scoping stage

Chapter 10 - (Environmental Management Plan) depicts the summary of proposed environmental management plan.

Chapter 11 – Presents the (Summary and Conclusion) of EIA report.

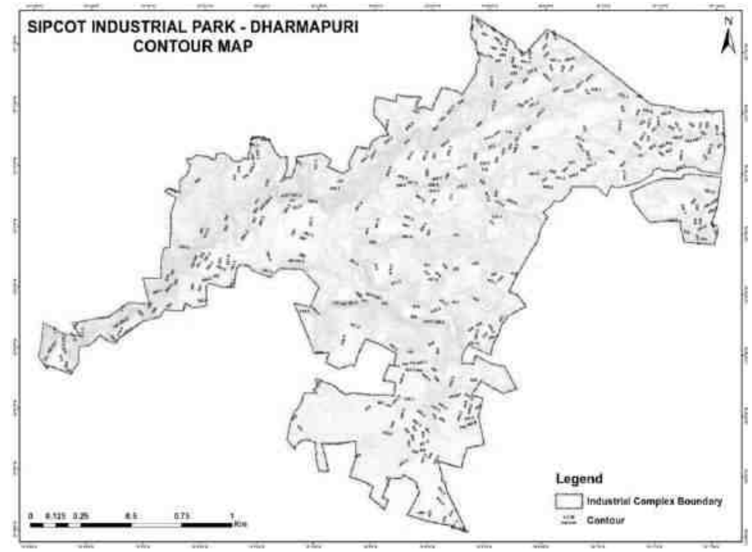
Chapter 12 – Disclosure of Consultant Engaged presents the declaration by the EIA consultant organisation as per the NABET requirements.

1.6 Complianceto the Terms of Reference Issued

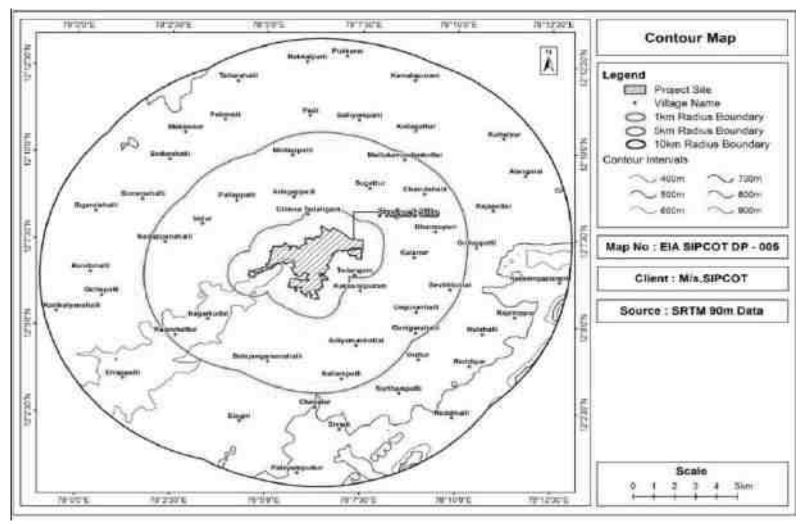
S.No	Terms of Reference	Compliance
Specific conditions		
1	The project area has undulating terrain and it is important to have detailed hydrological study and its impact need to be carried out on the catchment and drainage system in core and buffer zones. The drainage pattern shall be delineating considering the flow direction and flow accumulation using Geographical Information System.	**Summary of hydrological study conducted**: • The water level observed in the study area during **December 2023** based on the piezometric analysis varies from 5.20 m BGL (Nallampalli) to 13.6 m BGL (ChinnaTadangam) • Based on the geophysical investigation of the site, the results of the Vertical Electrical Sounding shows the ground water conditions of the locations which clearly indicates that the depth of water level varies from 5.20-13.6 m BGL in shallow aquifers, whereas 140-240 m depth BGL in deep aquifers.It is concluded that the neighboring core zone area is considered to have good groundwater potential. • The major drainage pattern in and around 10 km radius from the project site including core zone is shown below, wherein the PeriyaAr and elven seasonal streams passed through nearby areas of the site. In the seasonal streams water flow is observed during the rainy season only. 

		Detailed hydrogeology study was conducted and report is enclosed as an **Annexure-6.** **Impact and Mitigation Measures:** • There will not be any ground water extraction as the water source from Tamil Nadu Water Supply and Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2.0 MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23,which is enclosed as **Annexure-7**. • Also, ground water monitoring borewells based on the water flow direction will be implemented and their level and quality continuously monitored on Six monthly basis. • Since Zero liquid discharge will be mandated to individual industries there will be no impact on ground water. • Storm water drain will be designed in such way that the natural drainage pattern not altered. Contour map pattern of Project Site and buffer zone (10 km radius) is attached asan **Annexure-8**and**Annexure-9.** Map showing the direction of flow pattern within IP and Study area is attached as an **Annexure-10.**
2	The proposed land is near the river hence Drainage pattern/Flood flow and the distance between river and the land height / topography of the proposed land has to studied.	• As per the EAC instruction, 50m Buffer will be maintained on the both side of River as a greenbelt development to avoid the industrial intervention. After that only, Industrial plots will be allocated.So the minimum distance between the plot and River is 50 m. • Height between: A) River and plot No: 117 is~4 m. B) River and plot no: 119 is ~1 m. • Storm water drain will be designed in such way that the natural drainage pattern not altered.

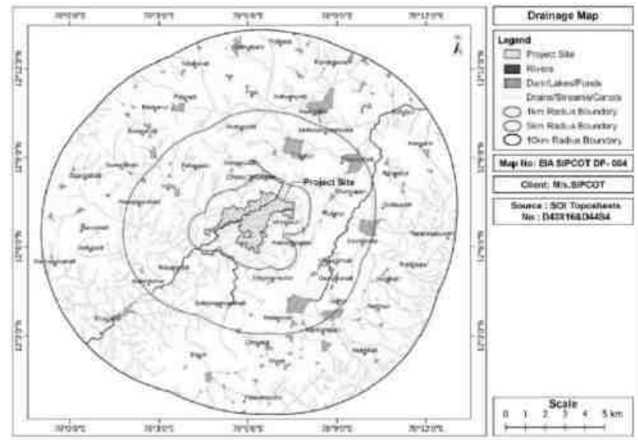
Contour Map of site is Enclosed: (**Annexure-8**)



Contour (Topographical) map pattern of buffer zone (10 km radius) (**Annexure- 9)**



Map showing the direction of flow pattern within IP and Study area (**Annexure-10).**



3

The revised layout shall be submitted by providing 50m buffer for rivers and 15m buffer for allwater bodies with the thick plantation within the site around the site. After keeping the bufferarea PP shall prepare a zonation map of the proposed industrial area with the categorization ofthe industries as per the EIA notification, 2006 and CPCB guidelines

a) Greenbelt:

As per ToR Condition, greenbelt is proposed to be developed in the following areas:

1. 15m along the peripheral of boundary
2. 50m along peripheral of rivers
3. 15m along other water bodies

Overall Green belt area of the park would be 250.929 Ha i.e.,41.30% of Developable Area (607.618 Ha). The details are given below:

Greenbelt details	Area in Acres	Area in Hectares
Greenbelt in IP	286.615	116.038
33% greenbelt in plot area	333.180	134.891
Total	**619.795**	**250.929**

b) Zonation :

After providing the buffer area, the Zonation map is prepared as per EIA notification, 2006 and CPCB guidelines and is enclosed as **Annexure-11.**

Zonation of Industrial Park

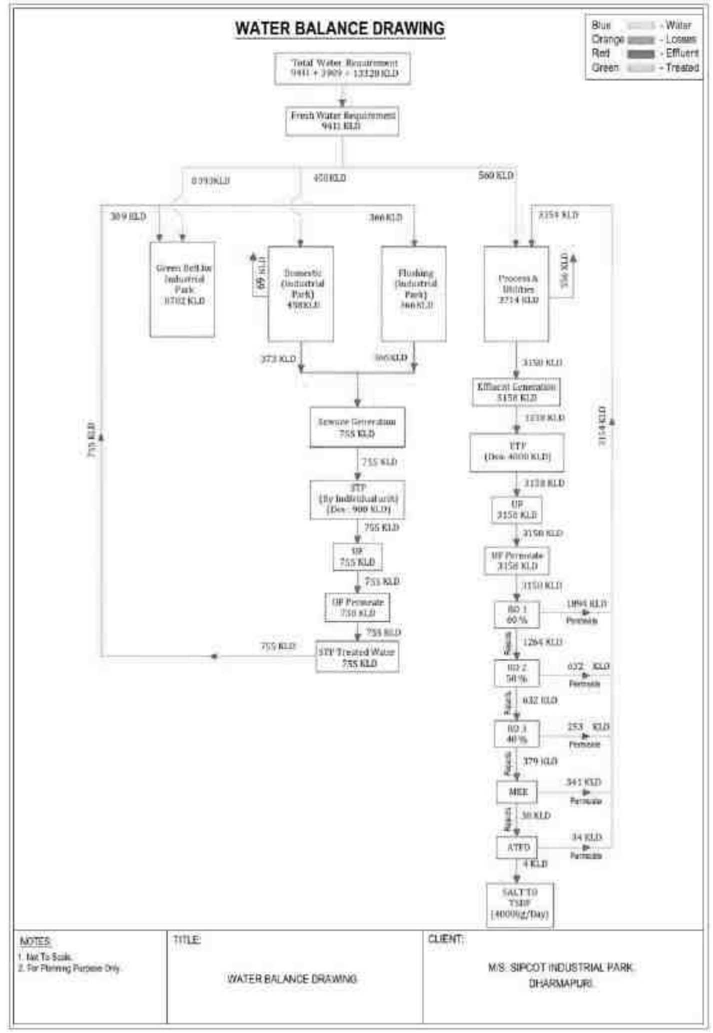
S. No.	Type of Industries	EV Products (Battery compound and others parts) under EC category	Approx. Percentage of Allocation
1.	3(a) - Metallurgical industries (ferrous & Non-Ferrous)	Metallurgical processing industrial units – EV/Automobile Manufacturing	27.49%
2.	5(e) - Petrochemical products and petrochemical based processing such as production of carbon black and electrode grade graphite	EV Battery Anode	
3.	5(f) - Synthetic Organic Chemical industries.	EV Battery Electrolyte	
4.	Other Non-EC Category Industries such as General Engineering, Automobile components, Electrical & Electronics, etc. as per the EIA Notification 2006 and its subsequent amendments	EV Battery Separator & Cathode, Other E-Vehicle parts and Automobile parts etc.,	72.51 %
Total			**100%**

4	PP shall obtain the no objection certificate (NOC) from the state irrigation department forestablishment of industrial area	No objection certificate (NOC) obtained from the state irrigation department for establishment of industrial area is attached as an **Annexure-12.**

<table>
<tr>
<td>5</td>
<td>Water balance chart be prepared and submitted along with EIA/EMP report.</td>
<td>
Construction Phase: During the construction phase, the water requirement for the project is calculated as 60 KLD and same will be sourced from Private water suppliers. Approximate people working will be around 250Nos.
Operation Phase: Total water requirement for the project during operation phase is 13320 KLD. Fresh water will be sourced from Tamil Nadu Water Supply and Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23 is attached as anAnnexure-7.
Water Requirement during operation phase
<table>
<tr><th>Usage</th><th>Total water (KLD)</th><th>Fresh water (KLD)</th><th>Recycled water (KLD)</th></tr>
<tr><td>Domestic</td><td>458</td><td>458</td><td>0</td></tr>
<tr><td>Flushing</td><td>366</td><td>0</td><td>366</td></tr>
<tr><td>Utilities & Process</td><td>3714</td><td>560</td><td>3154</td></tr>
<tr><td>Green belt</td><td>8782</td><td>8393</td><td>389</td></tr>
<tr><td>Total</td><td>13320</td><td>9411</td><td>3909</td></tr>
</table>
Note:

Water requirement for Industrial plots excluding GB area-676.459 acres@ 5 KL/Acre =3382.295 say 3383 KLD
Water requirement for Amenities and SWM-35.01 acres @ 3 KL/Acre =105.03 KLD say 106 KLD
Water requirement for commercial area-45.02acres @5 KL/Acre=225 KLD
Water requirement for employees- 18300 persons @45 LPCD =823.5 KLD say 824 (Domestic@25=457.5 say 458, Flushing @20=366)
Water requirement for green belt –35 KL/Ha =8782 KLD

In ToR, the Total water consumption is 12894 KLD in which fresh water consumption is 8793 KLD.
</td>
</tr>
</table>

		 **Water Balance Chart for Industrial park**
6	Proponent shall install the Zero Liquid System (ZLD). The Industrial complex shall achieve	SIPCOT will mandate individual industries to establish Zero liquid discharge (ZLD) based effluent treatment plants to reuse their treated effluent in their Process/utilities as per the prescribed standard.

<table>
<tr><td></td><td>Zero Liquid Discharge and to achieve the Zero Liquid Discharge, waste water generated from various industrial operations shall be properly collected, treated to the prescribed standards and then recycled or reused for the identified uses.</td><td></td></tr>
<tr><td>7</td><td>Detailed land use breakup of proposed Industrial area with green belt implementation details hasto be submitted to meet out the MoEF& CC requirement of 33%.</td><td>
Land use breakup of the IP:
Total area of Industrial Park is 698.205 Ha (1724.566 Acres). Land area breakup for the Industrial Park is given in below. Total number of industrial plots proposed is 349.
<table>
<tr><th rowspan="2">Description</th><th colspan="2">During 337th EAC meeting</th><th colspan="2">“Revised for EIA as per the ToR”</th></tr>
<tr><th>Extent(acres)</th><th>%</th><th>Extent acres)</th><th>%</th></tr>
<tr><td>Industrial Plot area (including 33% Greenbelt area)</td><td>1069.29</td><td>71.25%</td><td>1009.64</td><td>67.27%</td></tr>
<tr><td>Common Amenities (i.e Project office including First Aid Center, Water supply, EB, Fire station, etc)</td><td>30.010</td><td>2.00%</td><td>30.010</td><td>2.00%</td></tr>
<tr><td>Commercial Activities (i.e Bank, ATM, Shops, Canteen, etc)</td><td>45.020</td><td>3.00%</td><td>45.020</td><td>3.00%</td></tr>
<tr><td>Solid Waste Management Area</td><td>5.000</td><td>0.33%</td><td>5.000</td><td>0.33%</td></tr>
<tr><td>Roads along with Storm Water Drain</td><td>128.220</td><td>8.54%</td><td>121.280</td><td>8.08%</td></tr>
<tr><td>Green belt</td><td>219.915</td><td>14.65%</td><td>286.615</td><td>19.10%</td></tr>
<tr><td>1.3m Wide Garland Drain (Peripheral of EC category plot)</td><td>3.360</td><td>0.23%</td><td>3.250</td><td>0.22%</td></tr>
<tr><td>Developable area</td><td>1500.815</td><td>100.00%</td><td>1500.815</td><td>100.00%</td></tr>
<tr><td>Water body</td><td>197.785</td><td>-</td><td>197.785</td><td>-</td></tr>
</table>
</td></tr>
</table>

		110 KV HT line-22mRoW	25.966	-	25.966	-
		Total area	**1724.566**	**-**	**1724.566**	**-**

*Industries will be mandated to provide 33 % (134.891 Ha) of green belt within their premises. Total green belt proposed for Industrial Park is 41.30 % (250.929 Ha) of Developable area of 607.618 Ha..Layout of the Industrial Park is enclosed as **Annexure-4**

Greenbelt area details

Greenbelt details	Area in Acres	Area in Hectares
Greenbelt in IP	286.615	116.038
33% greenbelt in plot area	333.180	134.891
Total	**619.795**	**250.929**

Total greenbelt area is 250.929 Ha i.e., **41.30% of Developable Area (607.618 Ha)**

8	Protection measures to be taken for ensure the conservation and development of nearby waterbodies in the surrounding areas shall be submit along with the EIA/EMP report.	**Management Plan to protect and preserve the water bodies:** ❖ SIPCOT will provide 50m buffer for river and 15m buffer for all other water bodies within the site. ❖ SIPCOT is obligated to adopt an ecological approach to preserve the water bodies in their existing condition and ensure they remain undisturbed. All the existing water bodies within the site will be maintained as such with adequate buffer zone and preserved by SIPCOT.Further, the EC category industries are proposed to be located 160 m away from the river ❖ SIPCOT will instructindividual industries to implement Zero Liquid Discharge (ZLD) system to avoid the discharge of treated / untreated wastewater and to provide Rain Water Harvesting Tank/Harvesting Pit to maximize the use of rain water in their utilities, fire fighting, etc. after necessary treatment. ❖ SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.

<table>
<tr><td></td><td></td><td>❖ All Drains within the IP will be connected to nearby waterbodies and it will not affect the natural drainage pattern of the Surface runoff. So it will help to conserve the waterbodies near to IP and Improve the ground water table also.</td></tr>
<tr><td>9</td><td>Protection measures to ensure that Waste water will not be discharged in the river at any circumstances shall be submitted.</td><td>❖ SIPCOT will provide 50m buffer for river and 15m buffer for all other water bodies within the site.
❖ SIPCOT is obligated to adopt an ecological approach to preserve the water bodies in their existing condition and ensure they remain undisturbed. All the existing water bodies within the site will be maintained as such with adequate buffer zone and preserved by SIPCOT. Further, the EC category industries are proposed to be located 160 m away from the river
❖ SIPCOT will instruct individual industries to implement Zero Liquid Discharge (ZLD) system to avoid the discharge of treated / untreated wastewater and to provide Rain Water Harvesting Tank/Harvesting Pit to maximize the use of rain water in their utilities, fire fighting, etc. after necessary treatment.
❖ SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies.
❖ All Drains within the IP will be connected to nearby waterbodies and it will not affect the natural drainage pattern of the Surface runoff. So it will help to conserve the waterbodies near to IP and Improve the ground water table also.</td></tr>
<tr><td>10</td><td>While planning, industries creating Air/Noise pollution has to be avoided near villages.</td><td>Planning of the Industrial Park was done in such way that:
For AirPollution: Air emission from the EC& Non-EC category industries(controlled) and traffic was considered for the modeling. Following are the Highest Concentration of Pollutant for the nearest Habitation and its impact on them:
<table>
<tr><th rowspan="2">Pollutants</th><th colspan="2">Name of the Receptor</th><th colspan="2">UTM coordinates (m)</th><th rowspan="2">Conc. (µg/m^3)</th><th rowspan="2">Distance from Centr</th><th rowspan="2">Direction from project Centre</th><th rowspan="2">NAAQ standard (µg/m3)</th></tr>
<tr><th>Description (Max)</th><th>As per contour</th><th>E</th><th>N</th></tr>
</table>
</td></tr>
</table>

						e of the projec t (km)		
Habitation Area								
PM	Adagappadi	HAB 1	183847.12	1344321.76	0.72613	1.61	N	100
SO_2	Adagappadi	HAB 1	183847.12	1344321.76	0.38778	1.61	N	80
NO_x	Adagappadi	HAB 1	183847.12	1344321.76	1.83315	1.61	N	80
CO	Indur	HAB 4	179465.61	1342905.71	10.87859	3.25	WNW	4000

As per above predicated concentration of PM, SO2, NOx and CO due to proposed IP, which is coming within the limit of NAAQ standard and there will be minimial impact.

Mitigation Measures:

- To minimize the impact, individual industries will provide Air Polluion Control Measures as per CPCB /TNPCB Norms and also adequate stack height will be provided as per CPCB /TNPCB Norms.
- To minimize the impact, adequate stack height will be provided as per CPCB /TNPCB Norms. Further, 15m greenbelt will be provided along the site boundary & other water bodies and 50m greenbelt will be provided along the peripheral of river.

For Noise Pollution:

The Noise level ranges within the limit for the proposed Equipment and Loading&Unloading(Truck) activity. The noise range for within site and within 0.5km radius are given below

Summary

Activities	Adjacent to the Source dB (A)	Within Project Boundary dB (A)	Within 0.5Km radius from the project boundary dB (A)	Noise Standard (Industrial - Day) dB (A)

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>Equipment Activity</td><td>66.60</td><td>44.27</td><td>33.20</td><td>75</td></tr>
<tr><td>Loading & Unloading(Truck) activity</td><td>58.00</td><td>48.33</td><td>38.66</td><td>75</td></tr>
</table>
Based on the above impact from the proposed noise source to Nearest area within 0.5 km is 33.20 dB(A) – for equipments and 38.66 dB(A) for Truck which is within the noise standard of CPCB (75 dB(A)).

Mitigation Measures:

The major noise generating equipment like Compressors, DG sets, Boiler Feed water pumps etc. will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
Major noise generating equipment will be designed with 85 dB (A) ensuring cumulative noise at 1.0 m remains at 85 dB (A).
Acoustic silencers will be provided in equipment wherever necessary.
Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimise vibrations and secured properly.

</td></tr>
<tr><td>11</td><td>The PP has to clarify that is Open area lawn or Green Belt area? Since, lawns are not classified as green belt area.</td><td>Open area lawn is not proposed within the IP.
The greenbelt will be developed within the designated area.Total greenbelt area is 250.929 Ha, accounting for 41.30% of Developable Area (i.e., 607.618 Ha). Greenbelt layout plan of the IP is attached as Annexure-13.</td></tr>
<tr><td>12</td><td>An adequate drainage system shall be provided at the site with separate collection streams to segregate the storm runoff from roads, open areas, material storage areas, vehicle wash water and other wastewater streams.</td><td>❖ SIPCOT will instruct individual industries to implement Zero Liquid Discharge (ZLD) system to avoid the discharge of treated / untreated wastewater and to provide Rain Water Harvesting Tank/Harvesting Pit to maximize the use of rain water in their utilities, fire fighting, etc. after necessary treatment.
❖ SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would</td></tr>
</table>

<table>
<tr><td></td><td></td><td>outfall into nearby water bodies.
❖ All Drains within the IP will be connected to nearby waterbodies and it will not affect the natural drainage pattern of the Surface runoff. So it will help to conserve the waterbodies near to IP and Improve the ground water table also.
Layout plan showing the flow pattern and garland drain for EC category industries within IP is attached as an Annexure-14.</td></tr>
<tr><td>13</td><td>Prepare biodiversity conservation plan through a nationally reputed institutes like Jhunjhunwala College, University of Mumbai.</td><td>• Biodiversity Report prepared byRamniranjanJhunjhunwala College, University of Mumbai mentioning the Flora and Fauna within core and buffer zone of the project site is attached as an Annexure -15a.
• Conservation plan for the schedule species is attached as anAnnexure-15b</td></tr>
<tr><td>14</td><td>Submit the details of the storm water management and impacts due to contamination of storm water with affluent/chemicals and mitigation measures at industrial estate developer level and unit level.</td><td>➢ SIPCOT will mandate individual industries to implement Zero Liquid Discharge (ZLD) system to avoid the discharge of treated / untreated wastewater and to provide Rain Water Harvesting Tank/Harvesting Pit to maximize the use of rain water in their utilities, fire fighting, etc. after necessary treatment.
➢ SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.
➢ SIPCOT will instruct to all industries to provide adequate closed storage sheds of Raw material, intermediate material and final products.
➢ Excess rain water from Non EC plot area, will be let into regular storm water drain which would outfall into nearby water bodies.</td></tr>
<tr><td>15</td><td>Submit the details impacts of the impacts due to liquid waste discharge, air emissions, solvent</td><td>Proposed Impacts from IP and its mitigation measures:
<table><tr><th>S.no</th><th>Anticipated impacts</th><th>Mitigation measures</th></tr><tr><td>1</td><td>Water Environment :
Untreated wastewater if discharged</td><td>• Individual industries will have their own Sewage Treatment Plants. Treated sewage will</td></tr></table></td></tr>
</table>

	emissions, handling of hazardous waste and chemical odour.		into nearby surface water may affect the surface water and/or if disposed off on land without treatment may pollute the ground and surface water	be recycled for flushing and green belt development as per CPCB/TNPCB guidelines. • Individual industries will have their own Effluent Treatment Plants and will be mandated to ensure Zero Liquid Discharge concept as per CPCB/TNPCB guidelines. Treated effluent will be recycled for process and utilities purpose. • SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT
		2	**Air Environment:** Uncontrolled emission from the proposed project may lead to negative impact on the farm such as infertility of plant growth	• Individual industries will be instructed to provide proper stack height for DG sets, furnaces & boilers, etc., as per CPCB/ TNPCB guidelines. • Ambient air quality monitoring will be carried out regularly at selected locations in order to check and compare the predicted concentrations with the measured concentrations. Exceedance if any shall be reported to the statutory authority immediately. • Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary, 50 m along the peripheral of the river, 15m along other water bodiesand33% area by individual industries. Overall green belt area of the park will be 250.929 Ha i.e41.30% of developable area.

<table>
<tr><td rowspan="3"></td><td rowspan="3"></td><td></td><td></td><td>• Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.</td></tr>
<tr><td>3</td><td>Solvent emission:
Release of fugitive emission from the production process without proper APC measure will lead to health impact on the Human within the units and surrounding area.</td><td>• Individual industries will have their own solvent recovery system as per their requirement andambient air quality system will be connected to online monitoring system, if required by TNPCB
• SIPCOT will continuously monitor the Units activities.</td></tr>
<tr><td>4</td><td>hazardous wasteand chemical odour:
Poor waste management would lead to unsanitary conditions including fly infestation and odors as well as unsightly conditions. Spillage of waste oil from the D.G sets may also have an impact on soil quality.</td><td>• Hazardous wastes generated from the allotted industries will be managed by the industries and it will be stored in designated areas within their premises and disposed as per Hazardous waste (Management and Transboundary) Rules 2016.
• Separate Odour control system will be provided by individual units based on their requirement.</td></tr>
<tr><td>16</td><td>Submit the details of the common solvents recovery system planned at Industrial estate with anticipated efficiencies</td><td colspan="3">Common solvent recovery system is notplanned in theIndustrialPark.
Individual industries will have their own solvent recovery system as per their requirement and ambient air quality system will be connected to online monitoring system, if required by TNPCB</td></tr>
<tr><td colspan="5">Standard Terms of Reference for (Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones)</td></tr>
<tr><td>1</td><td colspan="4">Project Details</td></tr>
</table>

<table>
<tr>
<td>1.1</td>
<td>Reasons for selecting the site with details of alternate sites examined/ rejected/ selected on merit with comparative statement and reason/ basis for selection. The examination should justify site suitability in terms of environmental damage, resources sustainability associated with selected site as compared to rejected sites.</td>
<td rowspan="2">The proposed site over an extent of 698.205 Ha (1724.566 Acres) at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk has already been alienated and almost handed over to SIPCOT by Government of Tamil Nadu Administrative Sanction vide G.O. Ms. No. 284 dt: 30.12.2015 (Dharmapuri).
However, alternate sites were considered and the details are as below:-
Site-I: Nallamapalli Site was considered but due to the presence of limited land space (Approx. 436 hectare) more fertile/productive agricultural land (Landuse pattern as per Bhuvan: Agricultural Crop Land -75% ,Builtup Rural-15% and Waterbodies Tanks/Lakes/Ponds-10%) and habitations within the site, the site was not selected for the development of Industrial Park.
Site-II: Settihalli Site was considered but due to limited land space (approx. 431 hectare) and more fertile/productive agricultural (Landuse pattern as per Bhuvan: Agricultural Crop Land -65% , Agriculture fallow-25% and barren scrub land-10%) land within the site, the site was not selected for the development of Industrial Park.
Site-III: Lands at Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages were considered. Around 69% are poramboke lands and 31% are dry patta lands (Landuse pattern as per Bhuvan: Barren Scrub Land-72.6%, Agricultural Crop Land -15% , Agriculture fallow-12% and Builtup urban-0.4%). As the majority of the land is Government Porambokke, the project will have no impact on agricultural land
Based on the Siting Criteria for Industrial Estates / Parks specified in Technical Guidance Manual issued by MoEF&CC, Site –III was selected for the Development of IP.Details of alternative site analysis are given in Chapter 5.</td>
</tr>
<tr>
<td>1.2</td>
<td>The analysis should include parameters considered along with weightage criteria for short- listing selected site.</td>
</tr>
<tr>
<td>1.3</td>
<td>Zoning of the area in terms of ‘type of industries' coming-up in the industrial area based on the resource requirement along with likely pollutants with quantity from</td>
<td>1. Type of Industries proposed for the project are given below
<table>
<tr><th>S. No.</th><th>Type of Industries</th><th>EV Products (Battery compound and others parts) under EC category</th><th>Revised Approx. Percentage of Allocation</th></tr>
<tr><td>1.</td><td>3(a) - Metallurgical industries (ferrous & Non-</td><td>Metallurgical processing industrial units –</td><td>27.49%</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>the various industries.</td>
<td>
<table>
<tr><td></td><td>Ferrous)</td><td>EV/Automobile Manufacturing</td><td rowspan="3"></td></tr>
<tr><td>2.</td><td>5(e) - Petrochemical products and petrochemical based processing such as production of carbon black and electrode grade graphite</td><td>EV Battery Anode</td></tr>
<tr><td>3.</td><td>5(f) - Synthetic Organic Chemical industries.</td><td>EV Battery Electrolyte</td></tr>
<tr><td>4.</td><td>Other Non-EC Category Industries such as General Engineering, Automobile components, Electrical & Electronics, etc. as per the EIA Notification 2006 and its subsequent amendments</td><td>EV Battery Separator & Cathode, Other E-Vehicle parts and Automobile parts etc.,</td><td>72.51 %</td></tr>
<tr><td colspan="3">Total</td><td>100%</td></tr>
</table>
Project zoning Details are given in Chapter-2 Section 2.7.2 and Layout plan showing Zoning of industries is attached as Annexure -11.
2. Likely pollutants with quantity from the various industries
Air:
Individual industries will have their own power back up in case of power failure and there will be continuous vehicle movements. Due to that, there will be an incremental concentration of pollutants. Maximum pollutant concentrations of PM, SO2 and NOx observed due to proposed for an 24hr-average period have been studied and CO maximum concentration for 1 hr- average period have been studied. All the parameters are well within the NAAQ Standards.
Total Maximum GLCs from the Stack & Transportations EmissionsMeasures (controlled)
<table>
<tr><th>Pollutant</th><th>Max. Base line Conc. (µg/m³)</th><th>Estimated Incremental</th><th>Total Conc. (µg/m³)</th><th>NAAQ standard</th></tr>
</table>
</td>
</tr>
</table>

		Conc. ($\mu g/m^3$)		($\mu g/m^3$)
PM	58.13	0.98	59.11	100
SO_2	16.95	0.48	17.43	80
NO_x	33.89	2.95	36.84	80
CO	340	20.51	360.51	4000

- DG sets and boilers will be provided with acoustic enclosures and sufficient stack height for dispersion of gases.
- Adequate greenbelt (250.929 Ha) will be provided (50m along the river side and 15m along the waterbodies and Periphery of the site and 33% Greeen belt area within the plots).

Wastewater:

- Individual industries will have their own Sewage Treatment Plants. Treated sewage will be recycled for flushing and green belt developmentas per CPCB/TNPCB guidelines.
- Individual industries will have their own Effluent Treatment Plants and will be mandated to ensure Zero Liquid Discharge conceptas per CPCB/TNPCB guidelines. Treated effluent will be recycled for their process and utilities purpose. Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies.
- All Drains within the IP will be connected to nearby waterbodies and it will not affect the natural drainage pattern of the Surface runoff. So it will help to conserve the waterbodies near to IP and Improve the ground water table also.

Wastewater generation and treatment

S.No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			

1	Sewage	10	Will be treated in 15 KLD mobile STP and treated sewage will be used for green belt development during construction phase
Operation Phase			
2	Sewage from industries	755	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.
3	Effluent from individual industries	3158	Will be treated by individual industries and reused for process and utilities. ZLD will be maintained by individual industries.

Solid waste:

Municipal Solid Waste generation and Management

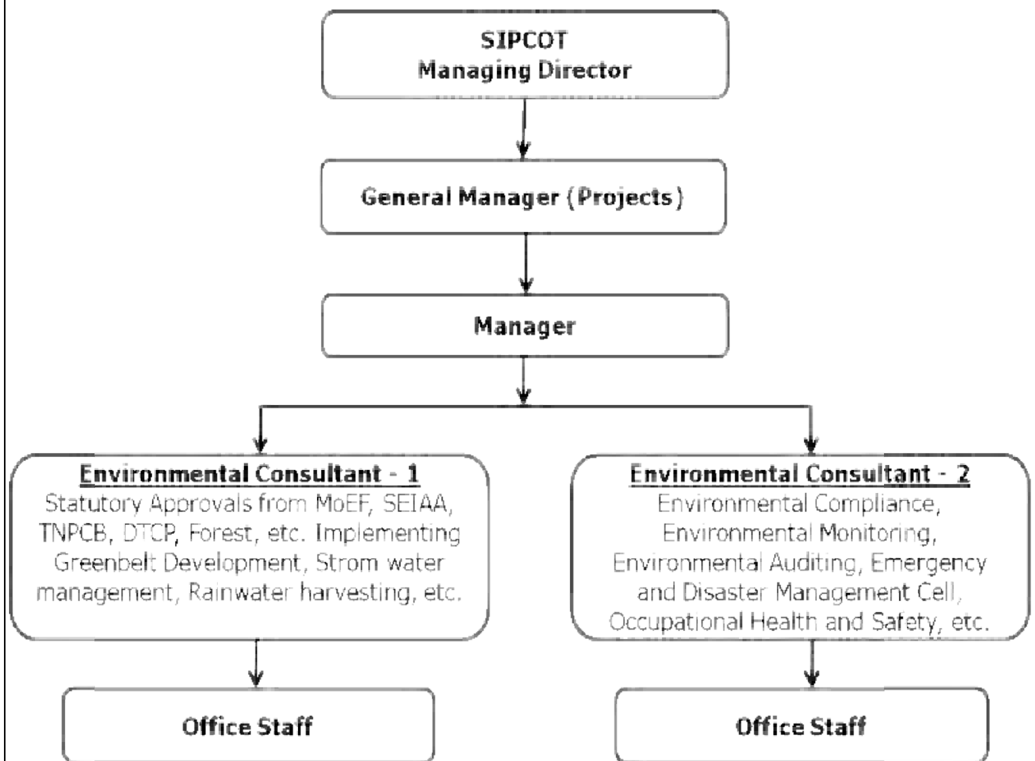
S. No	Municipal Solid waste	Construction phase (kg/day)- 250 Nos	Operation phase (kg/day)- 18300 Nos	Disposal Method
1	Organic waste	68	4941	Individual industries will segregate the waste and organic waste will be composted and used as manure.
2	Inorganic waste	45	3294	Sold to TNPCB authorized recyclers by individual industries

As per CPHEEO Norms 0.45 kg/capita/day is the MSW generation, of which 60% is organic & 40% is inorganic. Population for IP – 18300 nos.

MSW Management: As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facilityincluding a shed for E-Waste Management)has been earmarked for Solid Waste Management Facility.

Hazardous waste: Hazardous wastes generated from the allotted industries will be managed by the industries and it will be stored in designated areas within theirpremises and disposed as per Hazardous waste (Management and Transboundary) Rules 2016.

E-waste: Individual industries will have their own E-waste storage areas and the same will be disposed by

		individualindustries as per E-waste management rules 2022.
1.4	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.	The Organization of Environmental Management Cell (EMC) proposed given hereunder:  The details along with Roles and Responsiblities are given in **Chapter-10 Section 10.3.1**
1.5	Examine the details of National Highways/ State Highways/ expressways falling along the corridor and the impact of the development on them.	**Connectivity:** • Project site is well connected with Road and Rail • Nearest Highway (connectivity with approach road) is NH -44 (Srinagar-Dharmapuri-Kanyakumari) ~0.67 km (E) • Nearest Railway station is Dharmapuri RS ~2.98 km (E) **Detailed Traffic Study is conducted and the details given below**: **Existing and proposed vehicular movement in NH 44 (Srinagar –Kanyakumari)- Tadangam Junction**

S. No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	2 Wheeler	1278	959	380	285	1658	0.75	1244
2	3 Wheelers	417	834	60	120	477	2	954
3	4 Wheelers / Cars	4789	4789	150	150	4939	1	4939
4	Truck/Lorry	1879	6952	245	907	2124	3.7	7859
5	Agricultural Tractor	35	175	0	0	35	5	175
6	Light Emission Vehicle	1678	3356	0	0	1678	2.0	3356
	Total	**10076**	**17065**	**835**	**1462**	**10911**	**-**	**18526**

Traffic volume after implementation of the project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	10076	17065	35000	0.49	“B”	Stable Traffic flow
After implementation	10911	18526	35000	0.53	“B”	Stable Traffic flow

Categorisation of traffic

		<table><tr><th>V/C</th><th>LOS</th><th>Classification</th></tr><tr><td><0.35</td><td>A</td><td>Free flow Traffic</td></tr><tr><td>0.35-0.55</td><td>B</td><td>Stable flow Traffic</td></tr><tr><td>0.55-0.77</td><td>C</td><td>Restricted flow</td></tr><tr><td>0.77-0.92</td><td>D</td><td>High Density flow</td></tr><tr><td>0.92-1.0</td><td>E</td><td>Unstable Flow</td></tr><tr><td>>1.0</td><td>F</td><td>Forced Traffic flow</td></tr></table>Due to propose Project, there will be increment in the vehicle movement and the level of service (LOS) anticipated is Stable Traffic flow for NH-44(Srinagar -Kanyakumari) ~0.67km (E). Traffic circulation plan for the proposed IP is attached as an **Annexure-17**.Details given in **Chapter 4 section 4.5.2.**
1.6	Submit the details of the infrastructure to be developed	1) Road with storm water drains. 2) Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. 3) Common Amenities (i.e Project office including first aid centre, Water supply, EB, Fire station,etc) 4) Commercial Area (i.e Bank, ATM, Shops, Canteen,etc) 5) Solid waste Management: As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facility including a shed for E-waste management) has been earmarked for Solid Waste Management Facility
1.7	Justification of the parameters, frequency and locations shall be discussed in the EIA.	The project boundary and 10 Km radius study area for which the baseline data generated is clearly indicated in following Figures of Chapter**.** **1. Air monitoring Location: Figure-3-22.** **2. Noise monitoring Location: Figure-3-24.** **3. Surface Water monitoring Location: Figure-3-25.** **4. Ground water monitoring Location: Figure-3-27** **5. Soil Sample Location: Figure-3-28.** Baseline study details are given in **Chapter-3 under sections 3.5 to 3.11.** Justification of the parameters and frequencies in all locations in the study area discussed in **Chapter-3,**

		Section 3.6 to 3.10 in the EIA report.
2	**Environment Status/Baseline Data Methodology**	
2.1	Examine baseline environmental quality along with projected incremental load due to the project taking into account of the existing developments nearby. (ii) Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater, (c) surface water, (d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health	Fresh baseline was collected for the period of One season- **March 2023 to May 2023.** Summary of the baseline study is given below: **Soil Analysis** Summary of analytical results • The pH of the soil samples ranged from 7.36 to 8.92. The pH normal range is above 6 to 7.5. The pH level at the Nagarkudal (S5) sampling location falls within the normal range. However, at the project site (S1), Tadangam (S3), Adiyamankottai (S4), Errappatti (S6), Indur (S7), and Adagappadi (S8) sampling locations, the pH is slightly alkaline. The Chavulahalli (S2) sampling location exhibits a moderately alkaline pH. • Conductivity of the soil samples ranged from 48.3 to 766 µS/cm. The non saline range is 1680 µS/cm according to the soil and land use survey of India. • Nitrogen (N) content ranged from 90 to 142 mg/kg. The nitrogen levels at the project site (S1), Chavulahalli (S2), Nagarkudal (S5), Errappatti (S6), Indur (S7), and Adagappadi (S8) sampling locations fall within the low range(up to 125 mg/kg), as indicated by the Soil and Land Use Survey of India. In difference, Tadangam (S3) and Adiyamankottai (S4) sampling locations exhibit medium-range nitrogen levels (250 mg/kg) according to the soil and land use survey of India. • Phosphorous(P) ranges upto 8.49 mg/kg. The low range is 4.45 mg/kg as per the soil and land use survey of India. The sampling locations are Chavulahalli (S2), Adiyamankottai (S4), Nagarkudal (S5), Errappatti (S6) and Indur (S7) have nitrogen levels within the low range. However, sampling locations Project site (S1), Tadangam (S3), and Adagappadi (S8) fall within the medium range, ranging from 4.45 mg/kg to 11 mg/kg. Potassium(K) content ranges from 9.28 to 200.58 mg/kg. The soil and land use survey of India classifies potassium levels into low (up to 53 mg/kg), medium (54 mg/kg to 124 mg/kg), and high (above 124 mg/kg)

		ranges. The sample location S2 was found to have potassium levels in the high range, while all other samples are within the low range, as per the soil and land use survey of India **Ground Water Quality** A summary of analytical results are presented below: • The pH of the collected groundwater samples ranges from 7.01 to 7.59. According to IS 10500:2012, the acceptable pH limit is 6.5-8.5. All pH values in the samples fall within the acceptable limit as per IS 10500:2012. • The chloride concentrations in the collected groundwater samples range from 212.79 to 702.73 mg/l. According to IS 10500:2012, the acceptable limit is 250 mg/l. Samples from the Project site (GW1), Chavulahalli (GW2), Adiyamankottai (GW4), Nagarkudal (GW5), and Indur (GW7) fall within the permissible limit of 1000 mg/L as per IS 10500:2012. • The Total Dissolved Solids (TDS) values in the collected groundwater samples range from 823 mg/l to 2784 mg/l. According to IS 10500:2012, the acceptable limit is 500 mg/l, and the permissible limit is 2000 mg/l. Groundwater samples from the Project site (GW1), Chavulahalli (GW2), Tadangam (GW3), Adiyamankottai (GW4), Errappatti (GW6), and Adagappadi (GW8) are within the permissible limit of 2000 mg/L. However, samples from Nagarkudal (GW5) and Indur (GW7) exceed the permissible limit, recorded values above 2000 mg/L.TDS levels are higher maybe due to anthropogenic activities at the water courses. • Total hardness of the collected ground water sample ranges from 390 mg/l to 1960 mg/l. The sample locations of Chavulahalli (GW2),Tadangam(GW3), Errappatti (GW6) values are within Permissible limit of 600 mg/L as per IS 10500:2012. The sample Locations ofProject site (GW1), Adiyamankottai (GW4), Nagarkudal (GW5), Indur (GW7), Adagappadi (GW8) are above the Permissible limit of 600 mg/L as per IS 10500:2012. The concentrations of Sulphate in the collected groundwater samples range from 53.3 to 417.14 mg/l. According to IS 10500:2012, the acceptable limit is 200 mg/l, and the permissible limit is 400

		mg/L. Samples from Chavulahalli (GW2), Tadangam (GW3), Adiyamankottai (GW4), and Adagappadi (GW8) are within the acceptable limit. All other samples (GW1, GW5, GW7) fall within the permissible limit. However, the sample from Indur (GW7) exceeds the permissible limit. **Surface Water Quality** Surface water sample results are discussed below: • The pH values in the collected surface water samples vary between **7.26 to 9.14**. According to Surface Water Standards (IS 2296 Class-A), the acceptable pH limit is **6.5-8.5**. However, samples from Ramakkal Eri (SW4), Adiyamankottai lake (SW6), and Nagavathi dam (SW8) exhibit slightly alkaline pH values, exceeding 8.5. • The Total Dissolved Solids (TDS) values of the collected surface water samples range from **446 mg/l to 1507 mg/l**. According to Surface Water Standards (IS 2296 Class-A), the acceptable limit is 500 mg/L. However, samples from Ramakkal Eri (SW4), Virupakshipurampallam (SW5), Adiyamankottai lake (SW6), VettalAr (SW7), Nagavathi dam (SW8), and Indur lake (SW9) exceed the acceptable limit as per Surface Water Standards (IS 2296 Class-A). TDS levels are higher maybe due to anthropogenic activities at the water courses. • The Total Hardness values of the collected surface water samples range from **190 mg/l to 600 mg/l.** According to Surface Water Standards (IS 2296 Class-A), the acceptable limit is 300 mg/L. However, samples from Virupakshipurampallam (SW5), Adiyamankottai lake (SW6), Nagavathi dam (SW8), and Indur lake (SW9) exceed the acceptable limit as per Surface Water Standards (IS 2296 Class-A). • The BOD (Biochemical Oxygen Demand) values in the surface water samples range from 2 to 4 mg/l. BOD is an important parameter that indicates the amount of organic matter present in water and the level of oxygen required for microorganisms to break down that organic matter. These values suggest a relatively low to moderate level of organic pollution in the surface water. • The COD (Chemical Oxygen Demand) values in the surface water samples range from 16 to 36

mg/l. These values may indicate the potential intrusion of domestic activities, suggesting the introduction of pollutants into the water from domestic sources.

***SW1-Periya AR- No water was presence in the during monitoring period.**

Air Environment:

The ambient air quality has been monitored at 8 locations as per NAAQS, 2009 within the study area. The results obtained are summarised as below:

- The average baseline levels of PM10 vary from 32.5 to 48.92 $\mu g/m^3$.
- The average baseline levels of PM2.5 vary from 20.15 to 28.37 $\mu g/m^3$.
- The average baseline levels of SO2 vary from 8.32 to 14.26 $\mu g/m^3$.
- The average baseline levels of NO2 vary from 16.63 to 28.52 $\mu g/m^3$.

The monitored concentrations for SO2, NO2, PM2.5, and PM10 are within the prescribed NAAQS limits

Biological Environment

Detailed Bio Diversity study was conductedbyRamniranjanJhunjhunwala College. Bio Diversity Reportis enclosed as **Annexure-15a** and the conservation plan for Schedule I species is enclosed as **Annexure-15b.**

Noise Environment:

It is observed that the day equivalent and night equivalent noise levels at all locations are within prescribed CPCB standards:

- In Industrial area day time noise levels varied from 41.5 dB (A) and night time noise levels varied from 38.5 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels within the limit prescribed by CPCB for Industrial area (75 dB (A) Day time &70dB(A) Night time).
- In Residential area day time noise levels varied from 41.1 dB (A) to 49.6 dB (A) and night time noise levels varied from 39.5dB(A) to 42.8dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels in Residential area are within the limit prescribed by CPCB for Residential area (55 dB (A) Day time & 45 dB(A) Night

time).

Socioeconomic Profile

The Socioeconomic profile of the study area shows that majority of people in the study area work in other sector. They have good educational infrastructures and the people in the study area are well connected to the educational infrastructures. The average literacy rate of the study area is 65.66 %. They have sufficient educational infrastructures and the people in the study area are well connected to the educational infrastructures. The people in the study area are well connected to Government primary health centres and Primary health sub-centres.

Summary of Socioeconomic indicators within the study area

S.No	Particulars	Study area	Unit
0- 5 Km			
1.	Number of villages in the Study Area	25	Nos.
2.	Total Households	60947	Nos.
3.	Total Population	244456	Nos.
4.	Children Population (<6 Years Old)	26140	Nos.
5.	SC Population	20783	Nos.
6.	ST Population	904	Nos.
7.	Total Working Population	107150	Nos.
8.	Main Workers	91325	Nos.
9.	Marginal Workers	14622	Nos.
10.	Cultivators	16801	Nos.
11.	Agricultural labours	18751	Nos.
12.	Household Industries	3118	Nos.
13.	Other Workers	68480	Nos.
14.	Literates	167489	Nos.
15.	Illiterates	76967	Nos
5 – 10Km			
1.	Number of villages in the Study Area	37	Nos.
2.	Total Households	46233	Nos.
3.	Total Population	190162	Nos.
4.	Children Population (<6 Years Old)	21644	Nos.
5.	SC Population	17943	Nos.

6.	ST Population	3454	Nos.
7.	Total Working Population	94675	Nos.
8.	Main Workers	79651	Nos.
9.	Marginal Workers	15024	Nos.
10.	Cultivators	26506	Nos.
11.	Agricultural labours	31236	Nos.
12.	Household Industries	1983	Nos.
13.	Other Workers	34950	Nos.
14.	Literates	113686	Nos.
15.	Illiterates	76476	Nos

Complete details are given in **Chapter-3, section No: 3.5 to 3.11** of EIA Report.

Detailed Cumulative Impact Assessment by considering the industries situated within 10 km Radius:

Summary: Cumulative impact assessment study was carried out for existing industries using AERMOD model to predict maximum concentration due to existing industries in 10 km vicinity and proposed **SIPCOT DharmapuriIP**.

We considered the two scenarios-1) Without considering SIPCOT Dharmapuri IP and 2) With considering SIPCOT Dharmapuri IP. Estimated Incremental Concentration was generated as mentioned below:

Pollutant	Estimated Incremental Conc. (µg/m^3) (Without SIPCOT Dharmapuri)	Estimated Incremental Conc. (µg/m^3) (WithSIPCOT Dharmapuri)	NAAQ Standard (µg/m^3)
PM	0.49	0.76	100
SO_2	0.46	0.50	80
NO_x	7.02	7.021	80
CO	7.097	15.28	4000

Detailed report is given in **Annexure-16.**

2.2	Site justification of the identified industry sectors from environmental angle and the details of the studies conducted if any.	Three alternate sites were considered and the details are as below:- **Site-I**: Nallamapalli Site was considered but due to the presence of limited land space (Approx. 436 hectare) more fertile/productive agricultural land (Landuse pattern as per Bhuvan: Agricultural Crop Land -75% ,Builtup Rural-15% and Waterbodies Tanks/Lakes/Ponds-10%) and habitations within the site, the site was not selected for the development of Industrial Park.

		Site-II: Settihalli Site was considered but due to limited land space (approx. 431 hectare) and more fertile/productive agricultural (Landuse pattern as per Bhuvan: Agricultural Crop Land -65% , Agriculture fallow-25% and barren scrub land-10%) land within the site, the site was not selected for the development of Industrial Park. **Site-III:** Lands at Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages were considered. Around 69% are poramboke lands and 31% are dry patta lands (Landuse pattern as per Bhuvan: Barren Scrub Land-72.6%, Agricultural Crop Land -15% , Agriculture fallow-12% and Builtup urban-0.4%). As the majority of the land is Government Porambokke, the project will have no impact on agricultural land Based on the Siting Criteria for Industrial Estates / Parks specified in Technical Guidance Manual issued by MoEF&CC, Site –III was selected for the Development of IP. **Jusitification for Site suitability:** Proposed project site (Site III) has been selected as per the Siting Criteria for Industrial Estates / Parks specified in Technical Guidance Manual issued by MoEF&CC and the details are given below:

Siting Criteria For Sites	(Yes/ No)	Remarks
Ecologically and/or otherwise sensitive areas: Preferably 5 km; depending on the geoclimatic conditions the requisite distance may be decided appropriately by the agency.	No	Nil within 15km radius Note: Cauvery South Wildlife Sanctuary Core Boundary ~16.90 km (NW)
Coastal areas: Preferably ½ km away from high tide line (HTL).	No	Proposed project area is away from Coastal area and High Tide Line.
Flood plain of the riverine system: Preferably ½ km away from flood plain or modified flood plain affected by dam in the upstream or flood control	No	There is no dam/reservoir in the upstream. However, in downstream there is Nagavathi Reservoir (Inflow) located at a distance of

		systems.		~4.73 km (SW) and Nagavati Dam Reservoir (Outflow) is located at a distance of ~7.35 km (SW).
		Transport/Communication System: Preferably ½ km away from highway and railway line.	Yes	NH-844 (Hosur-Dharmapuri)/SH-17 (Malur Adhiyamankottai) ~0.25 km, E NH-44 (Srinagar-Dharmapuri-Kanyakumari) ~0.67km, E Dharmapuri RS ~2.98 km (E)
		Nearest Major settlements (3,00,000 population): Distance from major settlements is difficult to maintain because of urban sprawl. At the time of siting of the industry, if the notified limit of any major settlement is found to be within 50 km from the project boundary, the spatial direction of growth of the settlement for at least a decade must be assessed. Subsequently, the industry may be sited at least 25 km from the projected growth boundary of the settlement.	No	Nearest Town : Dharmapuri (Pop~ 68,619) ~ 2km (E)
		Critically polluted areas are identified by MoEF from time-to-time.	No	None within area

Other Points for site selection:

- ❖ Site is located near the following major Electronic and EV Hub:

Electronic & EV Hub	~Distance
Bargur	52 Km
Hosur	73 Km

<table>
<tr><td></td><td></td><td>
<table><tr><td>Bangalore</td><td>107 Km</td></tr></table>

The EV Car, Scooter, etc. manufacturing units are located at Bargur& Hosur in Krishnagiri District which is near to site.
Availability of land, water, power, manpower, transportation etc., are well established.

In the light of the above, there is good potential for industrial plots in Dharmapuri and viability of the project site is well established.Considering the water table and Site consition, it is proposed to accommodate industries sector viz. EC category -27.49% and Non EC category industries in 72.51%area.
</td></tr>
<tr><td>2.3</td><td>Identify, predict and assess the environmental and sociological impacts on account of the project.</td><td>
Environmental Impact:
1) Air Pollution:
The major air pollution sources from the industries will be DG set, Vehicular movements and other emissions. Individual industries will have air Pollution control measures as per CPCB/ TNPCB norms to disperse the pollutants. Adequate green belt will be developed to mitigate the pollution arising due to movement of vehicles
2) Noise Environment:
The major Noise pollution sorces are noise generated from DG sets ,Vehicular movement and from Process which will be Mitigated by providing adequate green belt,Wherever feasible, acoustic enclosures will be provided for compressors, DG sets.
3) Water Environment:
The major source of water pollution is Discharge of untreated wastewater into the land and nearby water bodies,which will be mitigated by providing STP and ETP and treated sewage will be used for green belt and treated effluent will be used for Process.
4. Land Environment:
Discharge of untreated sewage, effluent and solid waste will have adverse impact on the land. Poor garbage management would lead to unsanitary conditions including fly infestation and odors as well as unsightly conditions.It will be mitigated by providing STP and ETP (by
</td></tr>
</table>

		Individual industries) and treated sewage will be used for green belt and treated effluent will be used for Process. 5. **Biological Environment:** The impact on terrestrial ecology will be due to emission of gaseous pollutants like PM, NO_X, SO_2. The gaseous pollutants at higher doses, are injurious to vegetation.The release of effluent and sewage, dumping of solid and hazardous waste will also affect the ecology of the region. It will be mitigated by Adequate greenbelt area and Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms. **Sociological impacts:** The proposed project by SIPCOT will improve the quality of life of nearby villages. Thus, it can be said that the proposed project will have significant beneficial impact on the socio economic scenario in the study area. **Impacts of the proposed Project:** • The proposed project will provide direct employment to 18300 people during operation phase and indirect employment opportunities to local people in contractual works like housing construction, transportation,for supply of goods and services to the project and other community services • There will be positive impact on social conditions in and around the site due to the proposed project. • There will be increase in market and business establishment facilities. • Proposed project will also attract generation of additional revenue to the Government by means of Taxes and duties. • Growth in exports. • Investment Catalysation. • Proposed project may cause mild impact to Human health due to air pollution,Water

pollution and Noise pollution which will be significantly reduced with proper mitigation measures.

- Proposed project will cause land pollution if there is any disposal of untreated effluent and sewage nearby land.

Mitigation Measures

- Adequate air pollution control devices and adequate stack height will be proposed by individual industries as per CPCB/TNPCB Norms.
- Total Green belt area of 41.30% will be proposed(250.929 Ha) including 50m Greenbelt towards river, 15 m along the periphery & other water bodies. Apart from this Individual industries will provide acoustic enclosures for their D.G.sets& Boilers.
- Individual industries will be mandated to treat the effluent in their ETP. Treated effluent will be utilized for process and utility. Zero liquid discharge (ZLD) will be mandated by SIPCOT to individual industries.

3. Budgetfor Environmental Management Plan (EMP)

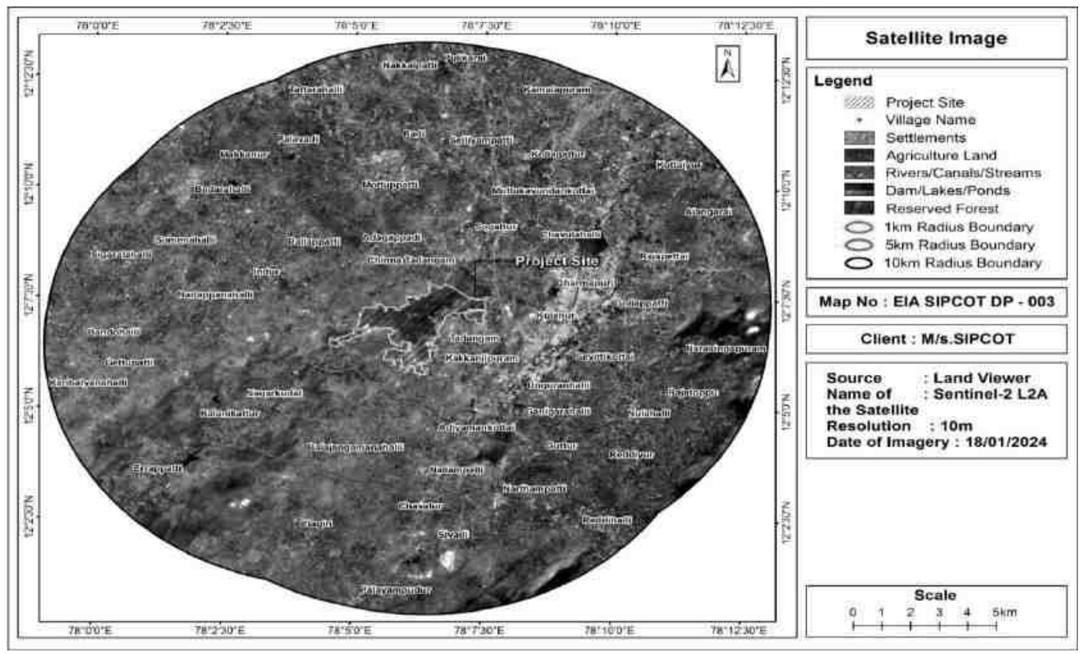
S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
1	Solid Waste Management Facility	800	64
2	Greenbelt development	776.48	32.5
3	Rain water harvesting	100	8
4	Garland drain along the periphery of the EC category plots	900.00	9
5	Environmental Monitoring during Construction Phase and Operation Phase	0	5
	Total EMP Cost	**2576.48**	**118.50**

3	**Remote Sensing/GIS**	
3.1	Analysis should be made based on latest satellite imagery for land use	**<u>Analysis of the study area using Satelite imagery for land use is given below:</u>** **Land use within 10 km Radius of the project site**

with raw images.

S. No	Description	%	Sq.Km	Acres	Hec.
1	Crop land	72.56	341.65	84423.42	34165
2	Scrub land	9.70	45.67	11285.29	4567
3	Fallow	6.30	29.68	7334.08	2968
4	Rural	4.26	20.05	4954.46	2005
5	Reservoir/Lakes/Ponds	3.02	14.23	3516.30	1423
6	Urban	1.92	9.05	2236.30	905
7	Deciduous	1.25	5.89	1455.45	589
8	Barren rocky	0.66	3.11	768.50	311
9	Mining	0.30	1.41	348.42	141
10	Plantation	0.03	0.14	34.59	14
Total		**100.00**	**470.88**	**116356.80**	**47088**

Satellite Map shows Land use within 10 km Radius from Study Area



Source: Bhuvan (2015-2016)

3.2 | Check on flood plain of any river. | Nearest River is PeriyaAr which is passing through the Project Site. As per the information received from

		WRD about the 25 years flood data for the Periyar AR, there is no data offlood on the particular river.Letter from WRD, Dharmapuri regarding the flood data for PeriyarAr within the site dated: 04.09.2023 is attached as an **Annexure-20.**
4	**Land Use, Land Acquistion, R&R**	
4.1	Submit the details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site.	**1. Land use for proposed project:**

Description	During 377th EAC meeting		"Revised for EIA as per the ToR"	
	Extent(acres)	%	Extent acres)	%
Industrial Plot area (including 33% Greenbelt area)	1069.29	71.25%	1009.64	67.27%
Common Amenities (i.e Project office including First Aid Center, Water supply, EB, Fire station, etc)	30.010	2.00%	30.010	2.00%
Commercial Activities (i.e Bank, ATM, Shops, Canteen, etc)	45.020	3.00%	45.020	3.00%
Solid Waste Management Area	5.000	0.33%	5.000	0.33%
Roads along with Storm Water Drain	128.220	8.54%	121.280	8.08%
Green belt	219.915	14.65%	286.615	19.10%
1.3m Wide Garland Drain (Peripheral of EC category plot)	3.360	0.23%	3.250	0.22%
Developable area	**1500.815**	**100.00%**	**1500.815**	**100.00%**
Water body	197.785	-	197.785	-
110 KV HT line-22mRoW	25.966	-	25.966	-
Total area	**1724.566**	**-**	**1724.566**	**-**

*Industries will be mandated to provide 33 % (134.891 Ha) of green belt within their premises. Total green belt proposed for Industrial Park is 41.30 % (250.929 Ha) of Developable area of 607.618 Ha

Land use within 10 km Radius of the project site

S.	Description	%	Sq.Km	Acres	Hec.

No					
1	Crop land	72.56	341.65	84423.42	34165
2	Scrub land	9.70	45.67	11285.29	4567
3	Fallow	6.30	29.68	7334.08	2968
4	Rural	4.26	20.05	4954.46	2005
5	Reservoir/Lakes/Ponds	3.02	14.23	3516.30	1423
6	Urban	1.92	9.05	2236.30	905
7	Deciduous	1.25	5.89	1455.45	589
8	Barren rocky	0.66	3.11	768.50	311
9	Mining	0.30	1.41	348.42	141
10	Plantation	0.03	0.14	34.59	14
Total		**100.00**	**470.88**	**116356.80**	**47088**

Source: Bhuvan (2015-2016)

4.2	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/ villages and present status of such activities.	See below

1) Details of Environmental sensitive places:

List of water bodies &Reserve forest within the 15km radius:

Waterbodies	Dist(km)	Direc
PeriyaAr	Passing within the site	
Pond near Tokkampatti	0.8	E
VettalAr	0.85	S
Nagavati R/Palar R	1.91	SW
Pidamaneri Lake	2.19	E
Sogattur Lake	2.57	N
Indur Lake	2.61	W
VirupakshipuramPallam	2.95	E
Adiyamankottai Lake	3.22	SE
RamakkalEri	3.77	ENE
Nagavathi Dam	4.73	SW
SemmandakuppamAr	5.08	NNE
KadagatturEri	5.11	NNE
PanangalliEri	8.44	N
VarattuPallam	10.55	NW
SiddampattiPallam	10.79	NW
PeriyaPallam	11.46	SW

<table>
<tr>
<td></td>
<td></td>
<td>
<table>
<tr><td>Baisuhalli Lake</td><td>11.67</td><td>NE</td></tr>
<tr><td>KutturevaPallam</td><td>12.54</td><td>SW</td></tr>
<tr><td>MurugankinattuPallam</td><td>13.18</td><td>SW</td></tr>
<tr><td>ToppaiAr/VeppadiAr</td><td>14.69</td><td>SSE</td></tr>
<tr><td>Thoppaiyaru Reservoir</td><td>14.63</td><td>S</td></tr>
</table>
<table>
<tr><th>Reserved Forest</th><th>Dist(km)</th><th>Direc</th></tr>
<tr><td>ElagiriRF</td><td>6.06km</td><td>SSW</td></tr>
<tr><td>ToppurRF</td><td>9.10km</td><td>SSE</td></tr>
<tr><td>ParigamRF</td><td>11.95km</td><td>SSW</td></tr>
<tr><td>PikkilimalaiRF</td><td>12.39km</td><td>NW</td></tr>
<tr><td>MukkanurRF</td><td>12.48km</td><td>E</td></tr>
<tr><td>MukkanurRF</td><td>14.14km</td><td>ESE</td></tr>
</table>
2) Land acquisition status and R&R:
There is no R & R for the proposed project since Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District, Tamil Nadu vide G.O. (Ms) No.284 dated 30.12.2015 (Annexure-2).
</td>
</tr>
<tr>
<td>4.3</td>
<td>Examine the impact of proposed project on the nearest settlements.</td>
<td>
1) Settlements near project area given below
<table>
<tr><th>Villages</th><th>~Dist.</th><th>Dire.</th><th>Popu</th></tr>
<tr><td>Siva Subramanya Nagar</td><td>0.11km</td><td>N</td><td>250</td></tr>
<tr><td>Veganampatti</td><td>0.31km</td><td>E</td><td>1,000</td></tr>
<tr><td>Vimalapuri</td><td>0.40km</td><td>E</td><td>50</td></tr>
<tr><td>ChinnaTadangam</td><td>0.70km</td><td>N</td><td>350</td></tr>
<tr><td>Tadangam</td><td>0.80km</td><td>E</td><td>8,601</td></tr>
</table>
2) Result of Cumulative Impact Assessment (Point and Line source)-Controlled- shown below
</td>
</tr>
</table>

Pollutant	Max. Base line Conc. ($\mu g/m^3$)	Estimated Incremental Conc. ($\mu g/m^3$)	Total Conc. ($\mu g/m^3$)	NAAQ standard ($\mu g/m^3$)
PM	58.13	0.98	59.11	100
SO_2	16.95	0.48	17.43	80
NO_x	33.89	2.95	36.84	80
CO	340	20.51	360.51	4000

All parameters are well within NAAQ standards.

Following are the Highest Concentration of Pollutant for the nearest Habitation and its impact on them:

Pollutants	Name of the Receptor		UTM coordinates (m)		Conc. ($\mu g/m^3$)	Distance from Centre of the project (km)	Direction from project Centre	NAAQ standard ($\mu g/m3$)
	Description (Max)	As per contour	E	N				
Habitation Area								
PM	Adagappadi	HAB 1	183847.12	1344321.76	0.72613	1.61	N	100
SO2	Adagappadi	HAB 1	183847.12	1344321.76	0.38778	1.61	N	80
NOx	Adagappadi	HAB 1	183847.12	1344321.76	1.83315	1.61	N	80
CO	Indur	HAB 4	179465.61	1342905.71	10.87859	3.25	WNW	4000

- As per the above predicted concentrations of PM, SO2, NOx and CO due to proposed IP, the values are wellwithin the limit of NAAQ standard. So there will be no impact on Nearby area.
- Further, the individual industries will provide Air Pollution Control Measures as per CPCB /TNPCB Norms and alsoadequate stack height will be provided as per CPCB /TNPCB Norms.
- Further, 15m greenbelt will be provided along the site boundary & other water bodies and 50m greenbelt will be provided along the peripheral of river. Site Layout Plan is attached as **Annexure-4.**

		• Due to the above proposed mitigation measures impact on the nearest settlements are not envisaged.
4.4	Submit details regarding R&R involved in the project	There is no R & R for the proposed project since Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District, Tamil Nadu vide G.O. (Ms) No.284 dated 30.12.2015 (**Annexure-2**).
4.5	The project boundary area and study area for which the base line data is generated should be indicated through a suitable map	Topo map of the sampling location (Demaracted with project site and Study area -10 km radius) for following attributes are given below: 1. Ambient Air quality Sampling map- F**igure 3-22.** 2. Noise Sampling map- F**igure 3-24.** 3. Surface water sampling map- F**igure 3-25.** 4. Ground water sampling map- F**igure 3-27.** 5. Soil sampling map- F**igure 3-28.**
5	**ESZ, CRZ details**	
5.1	Details regarding project boundary passing through any eco- sensitive area and within 10 km from eco-sensitive area.	Nil, there is No notified eco-sensitive area located within 10km radius from the project site Boundary.
6	**Forest and Wildlife related details**	
6.1	An overall green area of at-least 33% of the Industrial Area should be developed with native species. The green area shall be 40% in case of critically polluted area. Green buffer in the form of green	a) Proposed project Site is not located within critically Polluted Area. b) Width of 15m greenbelt will be provided along the site boundary & other water bodies and 50m greenbelt will be provided along the peripheral of river. c) Total green belt area of 41.30 % (for developable area) will be proposed in the Industrial Park. Green belt area breakup is given in below:

belt to a width of 15 meters should be provided all along the periphery of the industrial area.

Green belt	Area (Acres)	Area (Ha)	Percentage of developable area
Green belt in plot area (33% by industries)	333.180	134.891	22.20
Green belt by SIPCOT	286.615	116.038	19.10
Total	**619.795**	**250.929**	**41.30**

d) List of native species (tentative) selected for Greenbelt development in the IP are:

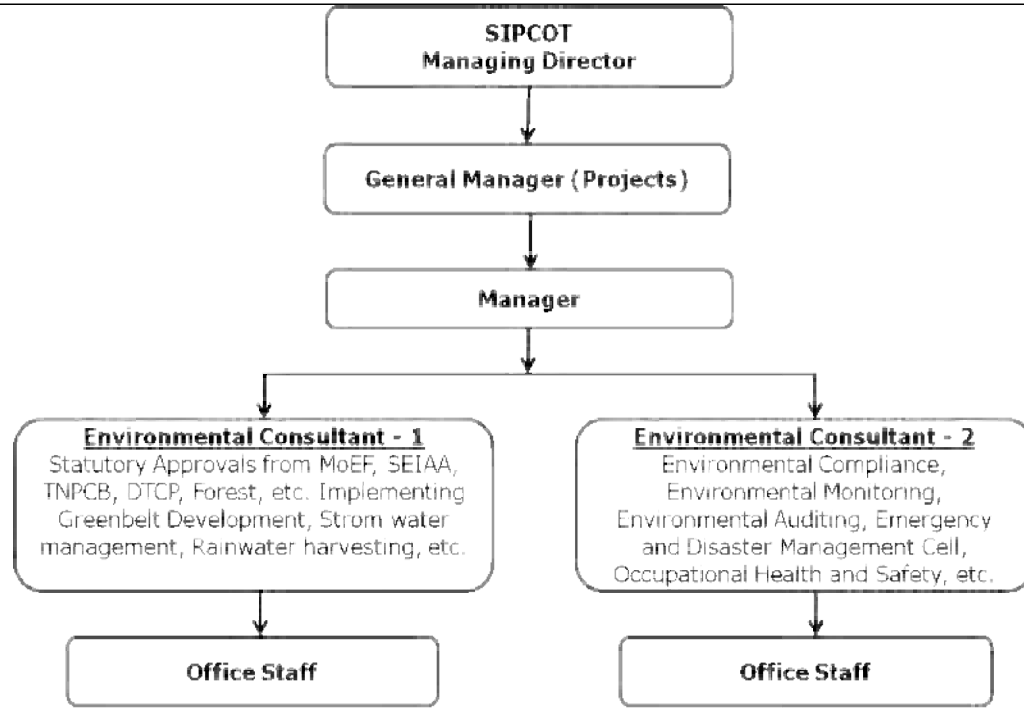
Sl.no	Species Name	Common Name
1	Aegle marmelos (L.) Correa	Bael
2	Albizia lebbeck (L.) Benth.	Lebbek tree
3	Azadirachta indica A. Juss.	Neem Tree
4	Cassia fistula L.	Indian laburnum
5	Cordia dichotomaG.Forst.	Clammy cherry
6	Cordia sebestena L.	Scarlet Cordia
7	Dalbergia sissoo DC.	Indian rosewood
8	Delonix regia (Boj. Ex Hook) Rafin.	Royal poinciana
9	Ficus benghalensis L.	Indian banyan
10	Ficus religiosa L.	Sacred fig
11	Millingtonia hortensis L.f.	Tree jasmine
12	Mimusopselengi L.	Spanish cherry
13	Pongamia pinnata (L.) Pierre	Indian beech
14	SpathodeacampanulataP.Beauv.	Squirt tree
15	Syzygiumcumini (L.) Skeels	Jamun
16	Tamarindus indica L.	Indian date
17	Tectona grandis L.f.	Teak
18	Terminalia arjuna (Roxb.) Wight & Arn.	Arjun tree
19	Thespesia populnea (L.) Soland ex Correa	Portia tree
Total Nos		**7,84,153**

		Greenbelt layout of the project site is given in **Annexure-13.**
6.2	Submit the details of the trees to be felled for the project	Total number of trees within the site is 128911 out of which 16114trees will felled down due to proposed project.To Compensate that 161140trees will be planted in green belt area. **Details is Given below:**

Sr. No	Botanical Name	Total Tree	Cutting tree
1.	*Acacia catechu*	87922	10990
2.	*Acacia leucophloea*	610	76
3.	*Acacia nilotica*	9447	1181
4.	*Ailanthus excelsa*	305	38
5.	*Azadiracta indica*	8990	1124
6.	*Butea monosperma*	152	19
7.	*Cassia fistula*	610	76
8.	*Cassia siamea*	305	38
9.	*Chloroxylon swietenia*	152	19
10.	*Gmelina arborea*	152	19
11.	*Holoptelia integrifolia*	7314	914
12.	*Morinda tinctoria*	152	19
13.	*Phoenix pusilla*	914	114
14.	*Pongamia pinnata*	1067	133
15.	*Prosopis juliflora*	1067	133
16.	*Strychnos nux vomica*	152	19
17.	*Tecoma stans*	2438	305
18.	*Tectona grandis*	762	95
19.	*Terminalia arjuna*	610	76
20.	*Wrightia tinctoria*	5790	724
	Total	**128911**	**16114**

Tree numbers were generated using the Expert Committee Report as a basis.

<table>
<tr><td>6.3</td><td>Submit the present land use and permission required for any conversion such as forest, agriculture etc.</td><td>
1. As per Bhuvan 2015-2016, the proposed site is predominantly classified Barren Scrub Land-72.6%, Agricultural Crop Land -15%, Agriculture fallow-12% and Builtup urban-0.4%.
2. Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District, Tamil Nadu vide G.O. (Ms) No.284 dated 30.12.2015 (Annexure-2). Villagewise survey number and their classification is given in Annexure-3.
3. As per the revenue records, the entire land (698.205 Ha) is government Poromboke land and patta land classified as under:
<table>
<tr><th>Land use</th><th>Area in Ha</th></tr>
<tr><td>Dry Land</td><td>219.635</td></tr>
<tr><td>MeichelTharai</td><td>374.270</td></tr>
<tr><td>Pathai</td><td>8.585</td></tr>
<tr><td>Aaru</td><td>26.175</td></tr>
<tr><td>Podugal (Kasivu Neer Odai)</td><td>0.650</td></tr>
<tr><td>Vaari</td><td>44.175</td></tr>
<tr><td>Podugal</td><td>14.770</td></tr>
<tr><td>Ubarinilam</td><td>0.230</td></tr>
<tr><td>Kasivu Neer Kuttai</td><td>5.240</td></tr>
<tr><td>Ooni</td><td>3.795</td></tr>
<tr><td>Koil</td><td>0.155</td></tr>
<tr><td>Theervaierpadathatharisu</td><td>0.485</td></tr>
<tr><td>Samudhayakinaru</td><td>0.040</td></tr>
<tr><td>Total</td><td>698.205</td></tr>
</table>
</td></tr>
<tr><td>7</td><td colspan="2">Court/Litigation Related</td></tr>
<tr><td>7.1</td><td>Submit Legal frame work for the implementation of Environmental Clearance conditions – to be</td><td>The Organization of Environmental Management Cell (EMC) proposed given hereunder:</td></tr>
</table>

<table>
<tr>
<td></td>
<td>clearly spelt out in the EIA report</td>
<td>


Roles and Responsiblitiesof EMC :
<table>
<tr><th>S.No</th><th>Designation</th><th>Responsibilities</th></tr>
<tr><td>1</td><td>Managing Director</td><td>➢ Responsible for overall environmental management.
➢ Regularly conduct meeting with EMC and take feedback regarding all the activities performed under Environmental Management and give directions to succeeding component.
➢ Approval of funds for carrying out environmental management activities.</td></tr>
<tr><td>2</td><td>GM – Projects</td><td>➢ Keep aware about all the activities performed under EMC in the industrial parks.
➢ Issuing direction to Project officers for implementing Greenbelt development, Storm water management, rainwater harvesting, etc.</td></tr>
</table>
</td>
</tr>
</table>

				➢ To deal with legal entity pertaining to environmental issues.
		3	Manager	➢ To prepare and allocate budget for Environment Management Plan. ➢ Ensuring compliance to the conditions prescribed by statutory authority. ➢ Mandating member industries to comply with the conditions stipulated in the statutory approvals and non-compliance if any shall be reported to GM and immediately required action will be taken.
		4	Environmental Consultant 1 & 2	➢ Obtaining Statutory Approvals from MoEF&CC / SEIAA /TNPCB, etc. ➢ Addressing the various queries received from statutory authorities on environmental front. ➢ Submitting Environmental compliance report and coordinating with project officers for Environmental monitoring, audit, etc. ➢ Compliance with the environmental laws and implications which dynamically changes from time to time due to the emerging challenges.

		S. No	Name of the Court Supreme / Madras Highcourt	Case Type	Case No & Year	Present Status	Judgement Delivered Date and Details	Action taken Report	Remarks
7.2	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the Project should be given.	1	Madras High Court	WP	10069/2021	Judgment ordered	25.11.2021. The 8th Resondent is directed to fix the compensation for the petitioner in respect of the subject property as the provisions of the Right to Fair Compensation and	The 8th Respondent The District Registrar, Dharmapuri have been filed in W.M.P.No. 17027 of 2022 on 05.07.2022.	Pending for revised judgement.

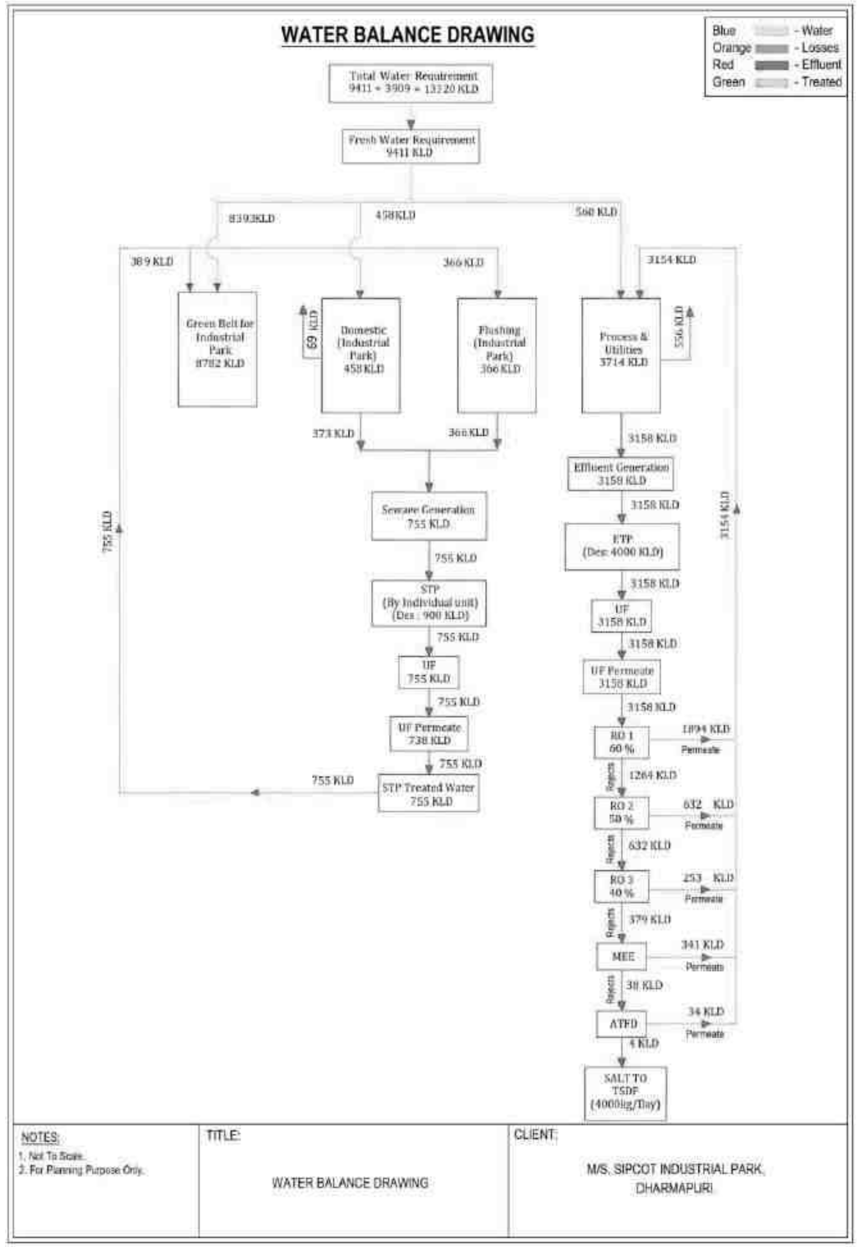
					Transperency in Land Acquisition, Rehabilitation and Resettlement Act (Central Act 30/2013) and complete the said process within a period of twelve weeks from the date of receipt of a copy of the order		
2	**Madras High Court**	WP	20340/2021	Pending	-	-	-

Complete details ofcourtcaseis attached as an **Annexure-19.**

8	**Water Environment/Quality/Hydrology**	
8.1	Ground water classification as per the Central Ground Water Authority	As per CGWA Report 2007 Project site fall under over-exploited Area.
8.2	Submit the source of water, requirement vis-à-vis waste water to be generated along with treatment facilities, use of treated waste water along with water balance chart taking into account all forms of water use and management.	**Source of water and their requirement:** Total water requirement for the project during operation phase is 13320 KLD. Fresh water (9411KLD) will be sourced from Tamil Nadu Water Supply and Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23 is attached as an **Annexure-7**. Remaining 3909 KLD will be sourced from Treated sewage/effluent within the IP. **Wastewater generation and it treatment methods**

S. No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			
1	Sewage	10	Will be treated in 15 KLD mobile STP and treated sewage will be used for green belt development during construction phase
Operation Phase			
2	Sewage from industries	755	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.
3	Effluent from individual industries	3158	Will be treated by individual industries and reused for process and utilities. ZLD will be maintained by individual industries.

Water balance Chart:


WATER BALANCE DRAWING
Blue - Water
Orange - Losses
Red - Effluent
Green - Treated
Total Water Requirement 9411 + 3909 = 13320 KLD
Fresh Water Requirement 9411 KLD
8393KLD
458KLD
560 KLD
389 KLD
366 KLD
3154 KLD
Green Belt for Industrial Park 8782 KLD
69 KLD
Domestic (Industrial Park) 458 KLD
Flushing (Industrial Park) 366 KLD
Process & Utilities 3714 KLD
556 KLD
373 KLD
366 KLD
3158 KLD
Effluent Generation 3158 KLD
Sewage Generation 755 KLD
755 KLD
ETP (Des: 4000 KLD)
STP (By Individual unit) (Des : 900 KLD)
UF 3158 KLD
UF 755 KLD
UF Permeate 3158 KLD
UF Permeate 738 KLD
RO 1 60 %
1894 KLD
Permeate
Rejects
1264 KLD
STP Treated Water 755 KLD
RO 2 50 %
632 KLD
RO 3 40 %
253 KLD
379 KLD
MEE
341 KLD
38 KLD
ATFD
34 KLD
4 KLD
SALT TO TSDF (4000kg/Day)
NOTES:
1. Not To Scale.
2. For Planning Purpose Only.
TITLE:
WATER BALANCE DRAWING
CLIENT:
M/S. SIPCOT INDUSTRIAL PARK, DHARMAPURI

<table>
<tr><td>9</td><td colspan="2">Rain Water Harvesting</td></tr>
<tr><td>9.1</td><td>Rain water harvesting proposals should be made with due safeguards for ground water quality.</td><td>

Rainwater harvesting calculation

<table>
<tr><th>Land Allocation Breakup</th><th>Area in Hectares</th><th>Area (A) in (Sq.m)</th><th>Run off Coefficient I</th><th>Intensity of rainfall-I (m/day)</th><th>Total Discharge-Q (m3/day)</th></tr>
<tr><td>Roads and Pavement Area</td><td>49.101</td><td>491010</td><td>0.7</td><td>0.117</td><td>40213.719</td></tr>
<tr><td>Common amenities</td><td>12.15</td><td>121500</td><td>0.7</td><td>0.117</td><td>9950.85</td></tr>
<tr><td>Commericial activities</td><td>18.227</td><td>182270</td><td>0.7</td><td>0.117</td><td>14927.913</td></tr>
<tr><td>Green belt</td><td>116.038</td><td>1160380</td><td>0.15</td><td>0.117</td><td>20364.669</td></tr>
<tr><td>Total</td><td>195.516</td><td>1955160</td><td>-</td><td>-</td><td>85457.15</td></tr>
</table>

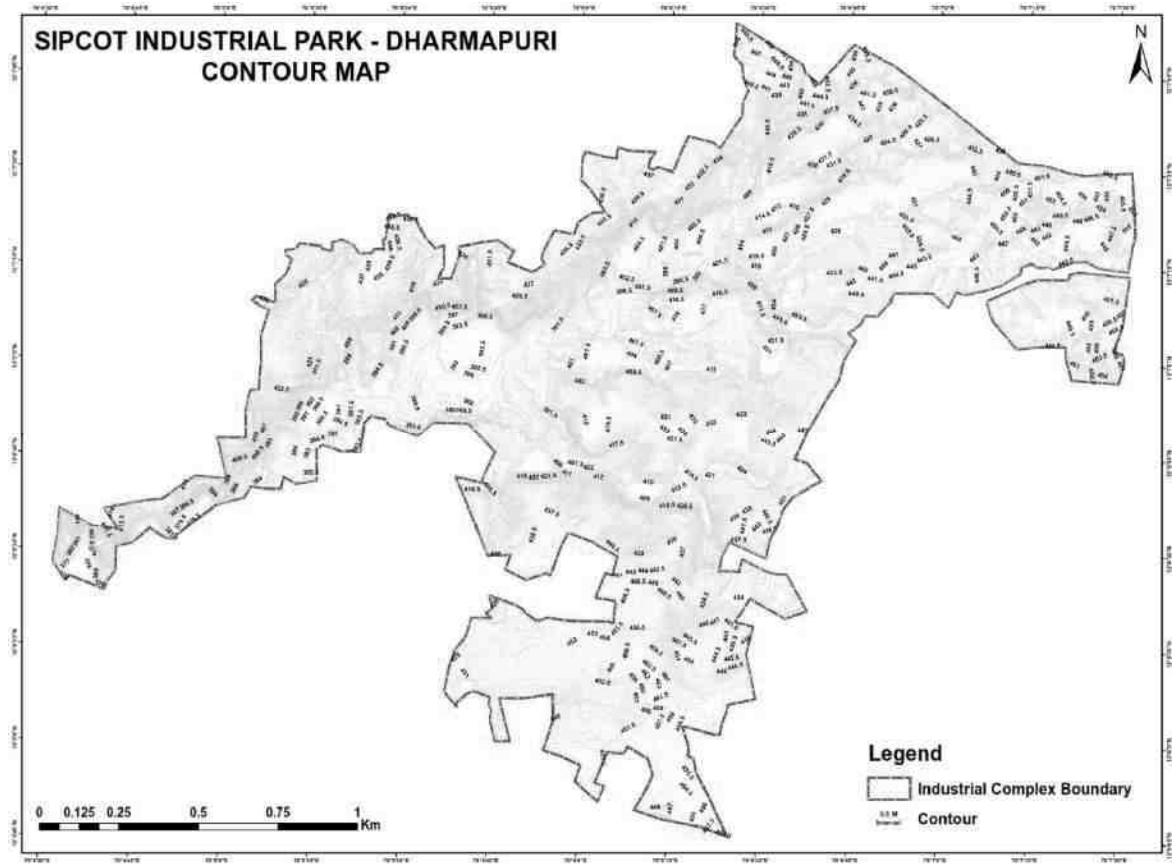
Design parameters:
Intensity of Rain fall Considered =117 mm/day (IMD Dharmapuri for the Period of 09.07.2010)
Formula:
Discharge, Q= CIA (m3/day)
Where,
Q= Discharge (in m3/day)
C=Coefficient of Runoff
I= Intensity of rainfall (in mm/day)
A= Area (in Sq.m)
Runoff calculation:
➢ Total runoff Load = 85457.15m3/day.
➢ Rainwater harvesting will be done for 50% of total Runoff. So it will be 85457.15/2 = 42728.58 m3/day.
➢ Total runoff load per hour = 42728.58/24 = 1780.36 m3/Hr.
➢ RWH pits of 1 m Dia and 3.5 m depth (Volume of 2.75 m3/hr) (Assuming 50% percolation rate). Considering the percolation rate as 50%, total harvesting capacity of each pit per hour = 2.75 *0.5
</td></tr>
</table>

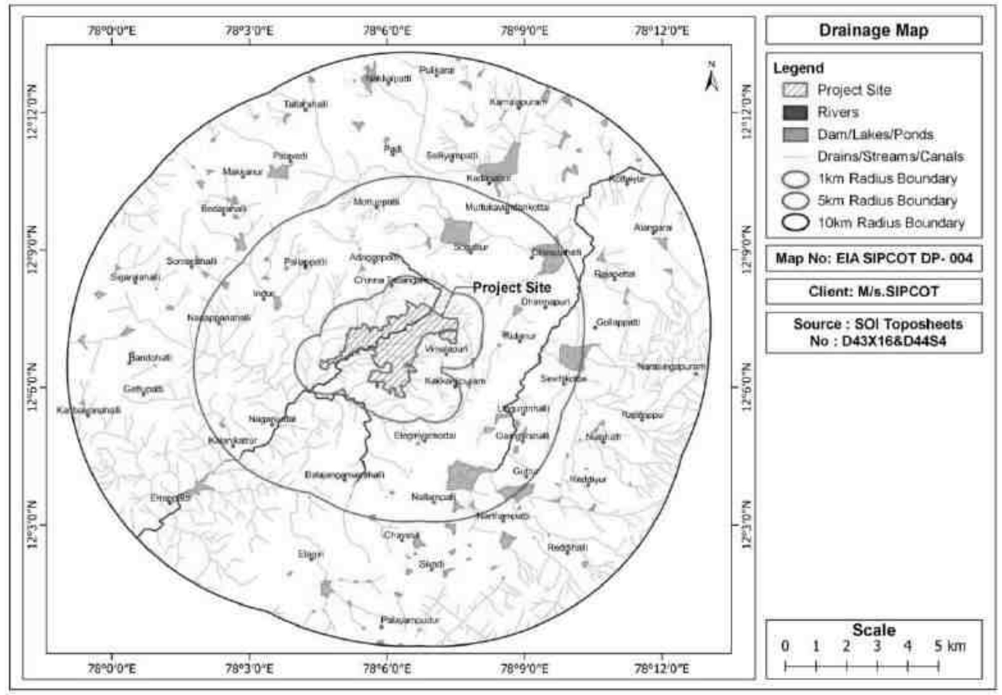
<table>
<tr><td></td><td></td><td>=1.375 m3.
➢ Total runoff load per hour = 42728.58/24 = 1780.36 m3/Hr.
No of Rainwater harvesting pits proposed =1780.36 /1.375 = 1294.80 ~1295nos and Remaining 50% runoff will be diverted into nearby water bodies through storm water drain after filteration.Layout with storm water drain is attached as an Annexure 11.</td></tr>
<tr><td>9.2</td><td>Maximize recycling of water and utilization of rain water. Examine details.</td><td>1. Out of Total water requirement 13320 KLD, 3909 KLD will be recycledfrom Treated sewage/effluent within the IP. Recovery rate is 99.8%.
2. Rainwater collected within the IP will be stored within the water bodies available within the IP. Apart from this individual industries will have their own rain water harvesting system.</td></tr>
<tr><td>9.3</td><td>Examine soil characteristics and depth of ground water table for rainwater harvesting.</td><td>1) Soil Characteristics:
<table>
<tr><th rowspan="2">Test Parameters</th><th rowspan="2">Units</th><th>Project site</th><th>Chavul ahalli</th><th>Tadan gam</th><th>Adiya mankot tai</th><th>Nagar kudal</th><th>Errap patti</th><th>Indur</th><th>Adaga ppadi</th></tr>
<tr><th>S1</th><th>S2</th><th>S3</th><th>S4</th><th>S5</th><th>S6</th><th>S7</th><th>S8</th></tr>
<tr><td>Cadmium</td><td>mg/kg</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td></tr>
<tr><td>Chromium</td><td>mg/kg</td><td>10.127</td><td>7.33</td><td>8.667</td><td>7.618</td><td>7.637</td><td>8.979</td><td>9.027</td><td>9.865</td></tr>
<tr><td>Copper</td><td>mg/kg</td><td>59.183</td><td>63.711</td><td>30.958</td><td>26.484</td><td>66.893</td><td>20.12</td><td>33.604</td><td>32.944</td></tr>
<tr><td>Nickel</td><td>mg/kg</td><td>7.132</td><td>4.897</td><td>5.552</td><td>4.295</td><td>4.673</td><td>5.654</td><td>5.453</td><td>5.981</td></tr>
<tr><td>Selenium</td><td>mg/kg</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td><td>BLQ (LOQ: 0.1)</td></tr>
<tr><td>Zinc</td><td>mg/kg</td><td>6.082</td><td>4.871</td><td>5.834</td><td>4.418</td><td>4.987</td><td>5.425</td><td>6.02</td><td>5.386</td></tr>
<tr><td>Soil Texture</td><td></td><td>Loam</td><td>Clay</td><td>Loam</td><td>Loam</td><td>Clay loam</td><td>Sandy clay loam</td><td>Loam</td><td>Loam</td></tr>
<tr><td>Soil Texture i)Sand</td><td>%</td><td>30.9</td><td>26.6</td><td>32.7</td><td>29.7</td><td>35.3</td><td>47.1</td><td>38.6</td><td>48.3</td></tr>
<tr><td>Soil Texture ii)Silt</td><td>%</td><td>48.7</td><td>30.6</td><td>41.5</td><td>45.2</td><td>39.5</td><td>22.3</td><td>42.9</td><td>36.3</td></tr>
<tr><td>Soil Texture iii)Clay</td><td>%</td><td>20.4</td><td>42.8</td><td>25.8</td><td>25.1</td><td>30.7</td><td>30.6</td><td>18.5</td><td>15.4</td></tr>
<tr><td>pH Value @ 25 ° C</td><td>-</td><td>8.18</td><td>8.92</td><td>7.36</td><td>7.88</td><td>7.40</td><td>7.62</td><td>8.26</td><td>7.52</td></tr>
</table>
</td></tr>
</table>

(1 : 2.5)									
Electrical conductivity @ 25 ° C (1 : 2)	µS/cm	220.1	766	128	84.5	63.1	95	69.8	48.3
Bulk Density	gm/cm 3	1.04	0.96	1.08	1.02	1.11	1.06	1.1	1.18
Organic Carbon	%	0.33	0.21	0.37	0.24	0.38	0.27	0.41	0.26
Organic Matter	%	0.58	0.37	0.65	0.43	0.67	0.48	0.71	0.45
Available Phosphorous as P	µ g/g or mg/kg	5.91	BLQ(LOQ 5.0)	8.49	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	6.67
Available Potassium	mg/kg	15.91	200.58	34.24	17.32	9.28	20.79	37.56	16.07
Total Nitrogen as N	mg/kg	90	112	142	139	119	120	132	117
Exchangable Calcium as Ca	mEq/L	15.95	21.03	17.75	13.86	14.7	16.48	14.1	18.28
Exchangable Magnesium as Mg	mEq/L	63.83	59.17	59.2	27.72	54.78	57.17	61.39	49.65
Available Sodium as Na	mg/kg	119.68	889.53	145.07	34.65	18.63	136.12	28.17	24.15
Cation Exchange Capacity	mEq/100g	2.2	8.5	7.8	4.2	7	7.4	7.6	6.3
Water Holding capacity	%	30.2	20.6	28.2	32.6	18.6	16.8	29.4	31.5
Manganese	mg/kg	120.021	99.113	114.79	71.322	66.018	97.564	114.023	112.073
Boron as B	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
Iron	mg/kg	7.32	6.29	3.97	7.17	8.76	9.46	10.39	12.74
Infiltration Rate	-	0.92	0.8	0.63	0.72	0.35	1.2	0.55	0.75
Moisture	%	3.04	7.98	2.61	3.86	1.92	2.78	3.94	4.12

2) The water level observed in the study area during December 2023 based on the piezometric analysis varies from 5.20 m BGL (Nallampalli) to 13.6 m BGL (ChinnaTadangam)

3) Based on the geophysical investigation of the site, the results of the Vertical Electrical Sounding shows the ground water conditions of the locations which clearly indicates that the depth of water level varies from 5.20-13.6 m BGL in shallow aquifers, whereas 140-240 m depth BGL in deep

		aquifers.It is concluded that the neighboring core zone area is considered to have good groundwater potential. 4) SIPCOT will provide around 1295 nos of Rain water Harvestingpitswithin the site and Storm water layout is Enclosed as **Annexure-11.**
10	**Waste Management, Drainage and STPs Details**	
10.1	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area, and any obstruction of the same by the project.	1) Contour Map of site is Enclosed: (**Annexure-8**)  2) Draninage map of 10 km Radius is Enclosed



All storm water Drains within the IP (Non –EC plot area) will be connected nearby waterbodies and it will not affect the natural drainage pattern of the Surface runoff. So it will help to conserve the waterbodies near to Industrial Park and Improve the ground water table also.

SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. So there will be no obstruction of the same by the project.

10.2	Examine details of solid waste generation treatment and its disposal.	**Municipal Solid Waste generation and Management**

S.No	Municipal Solid waste	Construction phase (kg/day)-250 Nos	Operation phase (kg/day)- 18300 Nos	Disposal Method

<table>
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<table>
<tr><td>1</td><td>Organic waste</td><td>68</td><td>4941</td><td>Individual industries will segregate the waste and organic waste will be composted and used as manure.</td></tr>
<tr><td>2</td><td>Inorganic waste</td><td>45</td><td>3294</td><td>Sold to TNPCB authorized recyclers by individual industries</td></tr>
</table>
As per CPHEEO Norms 0.45 kg/capita/day is the MSW generation, of which 60% is organic & 40% is inorganic. Population for IP – 18300 nos.
MSW Management: As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facility (including a shed for E-Waste Management) has been earmarked for Solid Waste Management Facility.
Hazardous waste:
Hazardous wastes generated from the allotted industries will be managed by the industries and it will be stored in designated areas within theirpremises and disposed as per Hazardous waste (Management and Transboundary) Rules 2016.
E-waste: Individual industries will have their own E-waste storage areas and the same will be disposed by individualindustries as per E-waste management rules 2022.
</td>
</tr>
<tr><td>11</td><td colspan="2">Energy and Resources</td></tr>
<tr>
<td>11.1</td>
<td>Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption.</td>
<td>1) SIPCOT will provide solar Panels on Roof top of Project office and Solar street lights will be provided along the proposed SIPCOT internal Roads.
2) Apart from this, SIPCOT willinstructIndividualIndutries to provide Solar Panels on Roof Top area.</td>
</tr>
<tr><td>12</td><td colspan="2">Air Environment</td></tr>
<tr>
<td>12.1</td>
<td>In case DG sets are likely to be used during construction and operational phase of the project, emissions from DG sets must be taken into consideration</td>
<td>Based on the plot size of individual industries & type of industry, the capacity of DGs and utilities has been arrived at and Air Quality modeling has been done for the project. Details are given in Chapter 4.Theincremental load due to proposed project (DG and Utilities) and baseline values are given below</td>
</tr>
</table>

while estimating the impacts on air environment. Examine and submit details.

Pollutant	Max. Base line Conc. (µg/m^3)	Estimated Incremental Conc. (µg/m^3)	Total Conc. (µg/m^3)	NAAQ standard (µg/m^3)
PM	58.13	0.76	58.89	100
SO2	16.95	0.48	17.43	80
NO_x	33.89	1.85	35.74	80
CO	340	15.27	355.27	4000

As per the table, the total concentration of PM, Sox, NOX & CO after establishment of the project is coming within the NAAQ standards.

13 **Road/Transport Safety and Traffic Aspects**

13.1 Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project.

13.2 Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.

13.3 A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.

Connectivity:

- Project site is well connected with Road and Rail
- Nearest Highway (connectivity) is NH -44 (Srinagar-Dharmapuri-Kanyakumari) ~0.67 km I
- Nearest Railway station is Dharmapuri RS ~2.98 km (E)

Detailed Traffic Study is conducted and the details given below:

Existing and proposed vehicular movement in NH 44 (Srinagar –Kanyakumari)-Tadangam Junction

S. No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	2 Wheeler	1278	959	380	285	1658	0.75	1244
2	3 Wheelers	417	834	60	120	477	2	954
3	4 Wheelers / Cars	4789	4789	150	150	4939	1	4939
4	Truck/Lorry	1879	6952	245	907	2124	3.7	7859

5	Agricultural Tractor	35	175	0	0	35	5	175
6	Light Emission Vehicle	1678	3356	0	0	1678	2.0	3356
	Total	**10076**	**17065**	**835**	**1462**	**10911**	**-**	**18526**

Traffic volume after implementation of the project

For the Road	Volume of Traffic	Volume (V)	Road Capacity I	V/C Ratio	LOS Category*	Traffic Classification
Existing	10076	17065	35000	0.49	"B"	Stable Traffic flow
After implementation	10911	18526	35000	0.53	"B"	Stable Traffic flow

Categorisation of traffic

V/C	LOS	Classification
<0.35	A	Free flow Traffic
0.35-0.55	B	Stable flow Traffic
0.55-0.77	C	Restricted flow
0.77-0.92	D	High Density flow
0.92-1.0	E	Unstable Flow
>1.0	F	Forced Traffic flow

Due to propose Project, there will be increment in the vehicle movement and the level of service (LOS) anticipated is Stable Traffic flow for NH-44(Srinagar –Kanyakumari) ~0.67km I. Traffic circulation plan for the proposed IP is attached as an **Annexure-17**.Details given in **Chapter 4 section 4.5.2.**

13.4	Examine the details of transport of materials for construction which should include source and	The construction materials will be sourced from nearby places for the proposed project. Nearest Town-Dharmapuri ~2.0 km,E

	availability.	
14	**Noise Environment**	
14.1	Examine noise levels – present and future with noise abatement measures.	**Present** : Noise monitoring was carriedout in 8 location and the details given below

Location	Location Code	Distance (~km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
				Day	Night	Lday (Ld)	Lnight (Ln)	
Project site	N1	Within Site		41.5	38.5	75	70	Industrial
Chavulahalli	N2	3.77	NE	48.1	42.7	55	45	Residential
Tadangam	N3	0.99	E	42.8	40.5	55	45	Residential
Adiyamankottai	N4	3.11	SE	46.2	42.8	55	45	Residential
Nagarkudal	N5	2.96	SW	44.8	40.8	55	45	Residential
Errappatti	N6	8.02	SW	45.9	40.1	55	45	Residential
Indur	N7	3.23	W	41.1	39.5	55	45	Residential
Adagappadi	N8	2.08	N	49.6	41.8	55	45	Residential

Noise abatement measures

- All the noise generating equipments will be designed / operated to ensure that noise level does not exceed 75-70 dB (A) at plant boundary as per the requirement of Central / State Pollution Control Board.
- Noise generating sources will be maintained properly to minimize noise generated by them.
- Wherever feasible, acoustic enclosures will be provided for compressors, DG sets.
- Individual Industries will comply with noise control norms.

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- Green belt will act as a noise barrier.
- Training will be imparted to personnel to generate awareness about effects of noise and importance of using PPEs.

Future:

Noise modeling:The noise range for adjacent to the source, within site and within 0.5km radius by considering Equipments& Vehicles of the IP is given below

Summary of Noise modeling

Activities	Adjacent to the Source dB (A)	Within Project Boundary dB (A)	Within 0.5Km radius from the project boundary dB (A)	Noise Standard (Industrial - Day) dB (A)
Equipment Activity	66.60	44.27	33.20	75
Loading &Unloading(Truck) activity	58.00	48.33	38.66	75

The Noise level ranges within the limit for the proposed Equipment & Loading & Unloading (Truck) activity. Details of Noise Modelling are given in**chapter-4**.
</td></tr>
<tr><td>15</td><td colspan="2">Environmental Management Plans and Mitigative Measures</td></tr>
<tr><td>15.1</td><td>Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.</td><td>

EMP During Construction Phase

Environmental impacts during the construction phase can be attributed to the site preparation activity and the mobilization of workforce. The impacts of the construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the project is completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

In order to mitigate such impacts and restrict them within tolerable levels, the following measures shall be adopted:

- Proper and prior planning of approach and access roads, and appropriate sequencing and scheduling of all major construction activities.
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		• Adoption of appropriate soil conservation programme and its timely implementation in the proposed project site. • Initiation of an appropriate landscape programme including plantation of trees and flowering plants in and around the project site particularly, at all available spaces which would serve the dual purpose of controlling fugitive dust and abatement of noise levels in addition to improving the aesthetics of the area. • Water sprinkling in the vulnerable areas to suppress the dust generated during excavation, 59odeling and other operations. • Use of properly tuned construction machinery & vehicles in good working condition with low noise & emission and engines turned off when not in use. • Control of quality of construction wastewater within the construction site through suitable drainage system with traps for arresting the sediment load for its proposed disposal into the main natural drainage system around the site. • Implementation of suitable disposal methods of sediment/ construction debris at designated places to avoid water logging at construction site. • Provision of protective gears such as ear mufflers etc. for construction personnel exposed to high noise levels and locating the temporary labour sheds for housing the construction labourers away from the construction site **EMP During Operation Phase** Monitoring during the operation phase will reflect those environmental and socio-economic issues that may persist upon completion of construction activities. Monitoring will focus on evaluating the effectiveness of project mitigation measures and continue baseline monitoring and sampling. The mitigation measures to prevent adverse impact during the operation phase of the project shall focus on the following: 1. Air quality 2. Noise environment

3. Water quality and water resources
4. Solid and hazardous waste
5. Land environment

Details are given in **Chapter 10.5.**

Budget for Environmental monitoring – construction phase

Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Rate per sample (INR)	Total cost / year (INR)
Ambient Air Quality	Three stations (one at site, one in upwind direction and one in down wind direction)	Half yearly	3,500	21,000
Noise	Three locations at site in different places	Half yearly	500	3,000
Water	Two number of surface and ground water samples near the site.	Half yearly	3,000	24,000
Solid waste / Hazardous waste	Storage areas of solid and hazardous waste	Half yearly	1,000	2,000
Soil	Three locations within the site	Half yearly	3,500	21,000
Total			**11,500**	**71,000**

Budget for Environmental monitoring – operation phase

Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Rate per sample (INR)	Total cost / year (INR)
Ambient Air	Three stations (one at site,	Half yearly	3,500	21,000

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<table>
<tr><td>Quality</td><td>one in upwind direction and one in down wind direction)</td><td></td><td></td><td></td></tr>
<tr><td>Noise</td><td>Three locations at site in different places</td><td>Half yearly</td><td>500</td><td>3,000</td></tr>
<tr><td>Water</td><td>Two number of surface and ground water samples near the site.</td><td>Half yearly</td><td>3,000</td><td>24,000</td></tr>
<tr><td>Solidwaste/ Hazardous waste</td><td>Storage areas of solid and hazardous waste</td><td>Half yearly</td><td>1,000</td><td>2,000</td></tr>
<tr><td>Soil</td><td>Three locations within the site</td><td>Half yearly</td><td>3,500</td><td>21,000</td></tr>
<tr><td colspan="3">Total</td><td>11,500</td><td>71,000</td></tr>
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<td>15.2</td>
<td>Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.</td>
<td>The Disaster Management Plan (DMP) (including Emergency Evacuation Plan) is aimed to ensuresafety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of DMP, it should be widely circulated and a personnel training is to be provided through rehearsals/drills. To tackle the consequences of a major emergency at the project location or its immediate vicinity, a DMP has to be formulated.
The objective of the DMP is to make use of the combined resources of the Industrial Area and the outside services to achieve the following:

Effective rescue and medical treatment of casualties
Safeguard other people
Minimize damage to property and the environment
Initially contain and ultimately bring the incident under control
Identify any dead
Provide for the needs of relatives
Provide authoritative information to the news media

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		• Secure the safe rehabilitation of affected area • Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency **Causes of Disaster** Causes for Disaster as follows: • Natural: Flood, Earth Quakes, Lightning, Cyclonic winds • System failure, design deficiency, bad operating practice and sabotage resulting in Fire. • Explosion • Release of toxic/ inflammable gases A broad framework of EEP and DMP is given in **Annexure-18a.** The specific industrial team where the emergency has arisen would be in charge of the situation while the other teams would assist them as and when required. Specific Risk assessment is attached as an **Annexure-18b**.
15.3	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry.	Noted and Complied

CHAPTER-2

PROJECT DESCRIPTION

2. PROJECT DESCRIPTION

2.1 Type of the project

The proposed project is “Development of Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres).

Initially, The Industrial Park is planned to accommodate 3(a), 5(e), 5(f) and other Non EC category industries such General Engineering, Automobiles, Electrical & Electronics, etc. (100% of the Industrial plot area). As per the direction of EAC in 330th EAC meeting held on 19.06.2023, EC category industries has been reduced from 100% to 27.49% of the Industrial area.

Now, The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc..Thus, as per the EIA Notification 2006 and its amendments the projectis termed under Schedule 7 (c), Category A (If at least one industry in theproposed industrial estate falls under the Category A, entire Industrial Park shallbe treated as Category A, irrespective of the area).

2.2 Need for the Project

For Industrial Estate:

Tamil Nadu is at the forefront of India’s economic development and its manufacturing sector is one of the principal engines that drive the national vision of becoming a US$ 5 trillion economy by 2024. Gross State Domestic Product (GSDP) of Tamil Nadu grew at a CAGR of 12.20% between 2015-16 and 2020-21, reaching about 20.92 trillion (US$ 269.32 billion) in 2020-21 and it is the second largest state economy in the country, which contributes 8.43% of India’s GDP.

The State economy has registered an impressive growth in recent years and is continuing to maintain its growth momentum despite national and global economic slowdown. The secondary sector contributes 32.4% and the manufacturing contributes 21% to the State’s economy.

Tamil Nadu has a wide availability of industrial space with requisite infrastructure, which is one of the most important factors for attracting large investments. Both overseas and home-grown companies prefer industrial space developed by Government 65odeling65able to private lands in view of lower cost and litigation free lands.

Considering the vicinity of site from Bangalore and Hosur, SIPCOT propose to establish an Industrial Park at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu State over an extent of 698.205 Ha (1724.566 Acres). Now, The Industrial Park is planned with 72.51% of Industrial plot area for Non-EC Category industries and remaining 27.49% of industrial plot area for EC category industries (5(f), 5(e) and 3(a) category).

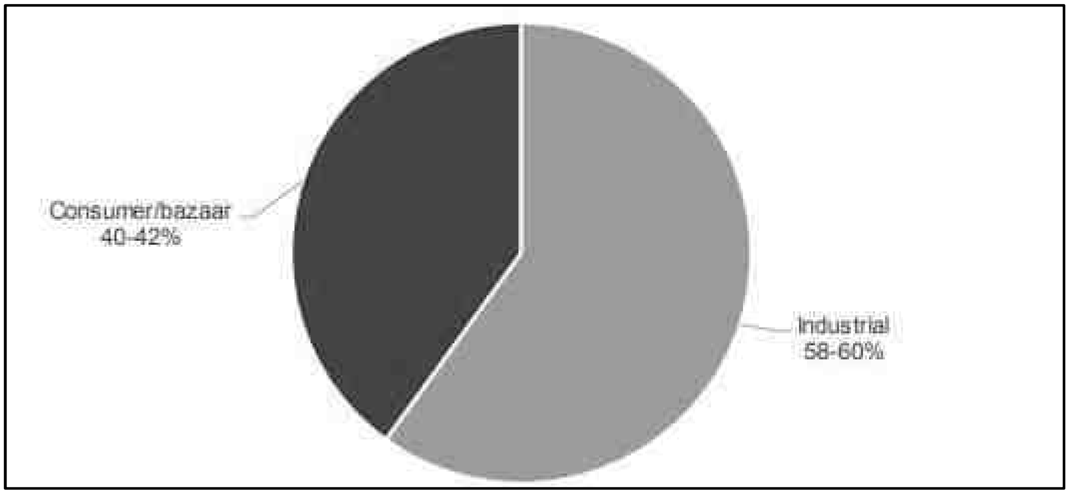
a. Synthetic organic chemicalssuchas Synthetic acrylic polymers and resins, water proofing compounds and Synthetic adhesives etc.”

India has one of the largest global chemical markets and is ranked sixth in the world and fourth in Asia in terms of global sale of chemicals. India accounts for 2.5% of the world’s global chemical sales. The industry is expected to reach US$ 304 billion by 2025 at a CAGR of 9.3%, driven by rising demand in the end-user segments for specialty chemicals and petrochemicals segment.

Acrylic resins are transparent thermoplastics produced from acrylic acid, methacrylic acid, cyanoacrylic acid, acrylonitrile, acrylamide, or low level of monomers. They have excellent ultraviolet (UV) and oxidative stability and consequently are used in products like lawn and garden equipment, sporting goods, automotive exterior parts, safety helmets, and building materials. They can also be compounded with other polymers to make weather-resistant alloys and compounds. At present, they are available either in the form of solvent-based systems or as aqueous emulsions that can be customized in a broad range of natural colours. As per the report Imarc, the global acrylic resin market reached a value of US$ 19.3 Billion in 2021 and expected to reach US$ 26.2 Billion by 2027, exhibiting a CAGR of 5.31% during 2022-2027.

The Indian Adhesives and sealants market is expected to grow significantly at the highest CAGR of 8.07%, during the forecast period (2021-2026) The Indian Adhesive & Sealant market combined was valued at ~INR 10,100 crore in 2020 and is expected to reach ~INR 15,000 crore in 2025.

Based on the consumption pattern, the market of the adhesive is split into two categories. The same is depicted below:



The waterproofing market in India is widely under penetrated and consumers lack awareness about product. Around 4 out 10 houses in India are currently using waterproofing products. There are growingdemand for the water proofing products in the future with no mere competition among the industries.

The major growth drivers of the Indian chemical industry are given hereunder:

- Rise in GDP and purchasing power
- World class engineering and strong R&D capabilities
- Government policy support and increase in investment initiatives
- Low cost manufacturing
- Big infrastructural investments

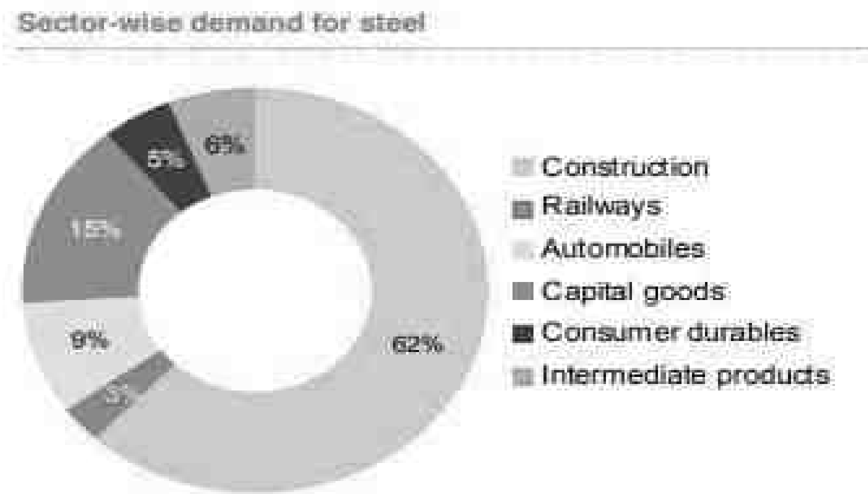
b. Metallurgical Industry (Ferrous and Non-Ferrous)

The metal industry consists of two major groups: ferrous metals and non-ferrous metals. Ferrous metals primarily consist of iron and different varieties of steel and Non-ferrous metals, which include aluminium, copper, zinc, lead, nickel and tin. The major share in metallurgical industry comes from Iron and Steel sector followed by Aluminium and other metals. There are also many allied industries in Metallurgical sector which centre on these ferrous and non-ferrous industries.

The steel sector contributes nearly 2% to country's GDP and employs over 6 lakh people. Steel is thus a crucial factor for country's growth and is very important for building nation and creating jobs.India was the second largest producer of crude steel as of FY 2022. The production of crude steel and finished steel stood at 133.596 MT and 120.01 MT. The country is also the largest producer of Sponge Iron or DRI in the world and the 3rd largest finished steel consumer in the world after China & USA.

Currently Aluminium (Non ferrous) is the second most used metal after steel and its major applications include electrical and electronics sector followed by the automotive and transportation, building, construction, packaging, consumer durables, industrial and other applications including defence. It was hence expected that there will be a huge growth in both the ferrous and non-ferrous sectors, allied industries, R & D and others owing to the increasing consumption of metals and capacity expansion.

Based on the consumption pattern discussed earlier, the sector-wise breakup of the steel demand is depicted below:



c. Petrochemical Products and Petrochemical based processing such as production of carbon black and Electrode grade graphite

The petrochemical industry in India has been one of the fastest-growing industries in the country. It contributes largely to the country's economy, the growth and development of the manufacturing industry. In terms of oil and gas consumption, India ranks 3rd, of the 30 percent of the energy consumed in India, 25% is consumed for Oil & 5% is consumed for Gas. According to world energy data book, the consumption of Oil and gas for producing energy in India is growing at a rate of 2.7 percent.

It provides the foundation for manufacturing industries like construction, packaging, pharmaceuticals, agriculture, textiles etc. The major players in this sector viz. Reliance Industries Ltd (RIL), Indian Petrochemicals Corporation Ltd. (IPCL), Gas Authority of India Ltd. (GAIL) and Haldia Petrochemicals Ltd. (HPL) dominate the industry to a large extent.

The amalgamation of IPCL with RIL has made the industry more concentrated further, as they jointly account for over 70% of the country's total petrochemical capacity. In contrast, the downstream petrochemical sector is highly fragmented covering over 80,000 commercial products. It is broadly classified into bulk chemicals, agrochemicals, specialty chemicals, polymers, petrochemicals and fertilizers.

India is the fourth largest producer of agrochemicals and manufacturing more than 50% technical grade pesticides. The industry is the third largest consumer of polymers in the world and known as a key global dye supplier with exports to over 90 countries, accounting for approximately 16% of the global production of dyestuff and dye intermediates.

While considering the volume, the petrochemical market in India ranked at 42.50 Mn Tons and is projected to reach 49.62 Mn Tons by 2025. It is proposed to increase compound annual growth rate (CAGR) of ~6.14% between FY 2021 and FY 2025.

Carbon Black:

Carbon black is a specialty product, made up of solid carbon in a fine powder form. This derived from petro chemical. The demand for carbon black in India stood at 984.63 thousand 68odel in 2018 and is projected to grow at a CAGR of 5.82% during 2019-2030 to reach 1853.84 thousand 68odel by 2030.

The maximum consumption of Carbon Black takes place in the tyre industry. Almost 73% of the Carbon Black is consumed in the tyre industry followed by 20% in non-tyre and 7% in non-rubber industry. In a tyre, about 47% is rubber, 22% is Carbon Black, 17% metals, 6% textiles and the rest other additives like Zinc Oxide, sulfur, clays and other compounds.

Growth in the Indian packaging industry has increased the demand for carbon black in food packaging, industrial film, lamination and carrier bags and high-quality protective packaging applications. The major drivers for this market are increasing tyre production and growth in plastic and coating market. With the increase, the demand for carbon black stood at 1100KT in 2021 and likely to increase to 1180 KT in 2023E.

Electrode Grade Graphite

Graphite electrodes are made up of petroleum coke, Coal tar pitch and needle coke. Graphite electrodes are a crucial component in producing electric arc steel and the ladle refinement of steel. They also have a significant impact on the automobile sector. One of the main factors propelling the expansion of the global market is the rising use of graphite in lithium-ion batteries. Global Graphite Electrode Market size & share revenue was valued at approximately USD 7.6 billion in 2022 and is expected to reach around USD 12.5 Billion by 2030, at a CAGR of 11% between 2022 and 2030. In India, of the total steel production, around 57% of the steel production is carried out by Electric Arc Furnace. One of the major raw materials in this method is Graphite Electrode.

The India passenger car market was valued at US$ 32.70 billion in 2021, and it is expected to reach a value of US$ 54.84 billion by 2027, while registering a CAGR of over 9% between 2022-27.

d. General Engineering

The engineering sector is the largest of the industrial sectors in India. It accounts for 27% of the total factories in the industrial sectors and represents 63% of the overall foreign collaborations. Turnover of the capital goods industry was estimated at US$ 92.00 billion in 2019 and is forecast to reach US$ 115.17 billion by 2025. India's engineering sector is divided into two major segments – heavy engineering and light engineering.

Heavy Engineering Industry

The Heavy Engineering Industry is the largest among all industrial sectors in India. It incorporates diverse segments of industry which can be broadly divided into segments, namely, machining tools, Textile machinery, Cement machinery, Material handling equipment, Plastic processing machinery, Process plant equipment and Earth moving construction equipment.

Machining tools

The global machine tools market size was US$ 111.36 billion in 2021. The global machine tools market is projected to grow from $113.26 billion in 2021 to $164.92 billion in 2028 at a CAGR of 5.5% during 2021-2028.

The production of machine tools has been influenced by their demand across the automotive, industrial and transportation machinery. Moreover, suppliers are 69odeling on the digital transformation of the machinery, owing to the shift of the era from conventional to CNC machines.

Machine tools industry in India is scattered all over the country. The hubs of manufacturing activities, are concentrated in Maharashtra, Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu, Haryana and Punjab.

Light Engineering Industry

The light engineering industry includes items like castings, industrial fasteners and sophisticated microprocessor-based process control equipment and diagnostic medical instruments.

Casting & Forging

Castings & Forgings are one of the key engineering segments supplying various components to end-user industries such as Railways, Automobile, Defence, Aerospace, Material handling, Construction equipment, and Mines. In this regard, the Indian casting and forging sector is in a good position to generate higher revenues from the auto sector.

Major expansion of manufacturing units, by way of organic and inorganic growth, has been playing an important role in this industry. The size of the casting and forging industry is currently estimated at 136 lakh70odel per annum (TPA), of which casting capacity is around 98 lakh 70odel. There are around 4,500 units in the castings segment of which 450 are large, 450 medium, and 3,600 are small and micro enterprises. Thus, the industry is dominated by MSMEs organized in clusters.

As per the Association of Indian Forging Industry (AIFI), with an installed capacity of around 38 lakh TPA, the forging industry has a capability to forge variety of raw materials like carbon steel, alloy steel, stainless steel, super alloy, titanium, aluminium, etc.

Based on their installed capacity, the forging units are classified as very large (capacity above 75,000 TPA), large (capacity above 30,000 to 75,000 TPA), medium (capacity above 12,500 to 30,000 TPA), small (capacity above 5,000 to 12,500 TPA), and very small (capacity up to 5,000 TPA). Based on this classification, it is seen that about 95 percent of the total number of units fall under MSME category, while only about 5 percent can be classified as very large and large units.

Industrial fasteners

Industrial fasteners cover a wide range of products such as nuts, screws, bolts, studs, rivets, nails, and washers to name a few. High tensile fasteners account for 82-85 percent of the market share and mild steel makes up the balance. The fastener sector is predominantly comprised of SMEs (60 percent) and large units (40 percent). There are a large number of Industrial fasteners clusters in Delhi, Haryana, Ludhiana, Uttar Pradesh, Maharashtra, Gujarat, Karnataka, and Tamil Nadu. South India accounts for 33 percent of the total capacity.

MSMEs primarily manufacture low value-added products, while large companies' sub-contract non-critical jobs to smaller players. This helps the larger players focus on their core activities that are mission-critical. In the overall manufacturing process, at an average, around 8 percent of the deliverables are sub-contracted. Domestic firms are also keen on entering into partnerships with international players to rapidly increase technical know-how and 70odeling70a on the growing market.

The fasteners market in India is closely linked to the performance of the auto industry, as it is the largest consumer of fasteners. Currently, the auto industry is witnessing a steady growth resulting in upswing in the fasteners segment.

Medical and surgical equipments

The medical and surgical equipment industry manufactures a wide range of medical equipment, such as ECG and X-ray scanners. The indigenous industry caters to 40% of demand, while remaining is met through imports. Export of medical and scientific instruments reached US$ 36 billion in FY20.

e. Automobiles

Indian Scenario

India was the fifth-largest auto market and world's fifth largest manufacturer of cars and seventh largest manufacturer of commercial vehicles in 2019. Indian automotive industry (including component manufacturing) is expected to reach US$ 251.4-282.8 billion by 2026. The industry attracted Foreign Direct Investment (FDI) worth US$ 25.85 billion between April 2000 and March 2021 accounting for ~5% of the total FDI.

India is also a prominent auto exporter and has strong export growth expectations for the near future. Domestic automobile production increased at 2.36% CAGR between FY16-FY20 with 26.36 million vehicles being manufactured in the country in FY20. Overall, domestic automobiles sales increased at 1.29% CAGR between FY16-FY20 with 21.55 million vehicles being sold in FY20.

Two wheelers and passenger vehicles dominate the domestic Indian auto market. Passenger car sales are dominated by small and mid-sized cars. Two wheelers and passenger cars accounted for 80.8% and 12.9% market share, respectively, accounting for a combined sale of over 20.1 million vehicles in FY20. Two--wheeler sales stood at 1,195,445 units in March 2021, compared with 1,846,613 units in March 2020, recording a decline of 35.26 %.

Passenger vehicle (PV) sales stood at 279,745 units in March 2021, compared with 2,17,879 units in March 2020, registering a growth of 28.39%.

Tamil Nadu Scenario

Tamil Nadu is among the top 10 automobile hubs of the world. Its well-developed ecosystem accounts for 35 percent of the auto component production in India. The industry produces two wheelers, three-wheeler passenger vehicles, commercial vehicles, and electric vehicle (EV) components.

The state has more than 1,300 factories involved in the production of motor vehicles, trailers, and semi-trailers. Automotive manufacturers have been very successful across segments in the local market as the population becomes more and more upwardly mobile.

f. Electrical & Electronic Industry

Electronics Industry, valued at USD 1.75 trillion, is the largest and fastest growing industry in the world. At present, the electronic industry in India accounts for a miniscule share of the global electronic industry which represents huge opportunity for growth in the sector.

In India, electronic industry is classified into six major categories. The categories are as follows:

- Consumer Electronics – 31.0%
- Industrial Electronics – 20.5%
- Computer – 9.0%
- Electric Components – 22.0%
- Strategic Electronics – 7.5%
- Communication and Broadcasting Equipments– 10.0%

Consumer electronics is the fastest growing sub-sector which is characterized with a huge manufacturing base, large consumer set and intense competition owing to the presence of global players. There has been a steep rise in demand due to a growing and aspirational market in India.

Along with consumer electronics, another segment which has been one of the fastest growing is computers & peripherals. The performance of industrial electronics sub-sector is closely linked with investments and demand patterns in other industries as these electronic products are consumed by other industries. India has been showing progressive reforms in the field of strategic electronics wherein, some of the latest technologies being promoted includes electro-magnetic wave application, intelligent sensor, RFID, microrobotic, intelligent material, micro-electronic systems, intelligent secure data communication, millimeter wave and microwave devices. In the electronic component segment, India has been an exporter of components such as cables, speakers, and cathode ray tubes among others.

2.3 Project Location

The Industrial Park is proposed to be located at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu State. The site is located at **Adhagapadi Village:** SF.No: 389/2, 673, 674/1, 674/2, 675/1, 675/2, 676/1, 676/2, 680, 681, 683/1, 683/2, 685/1A, 685/1B, 685/2, 685/3, 686, 688, 689, 690/1, 690/2, 691/1, 691/2, 694/1, 694/2, 695, 696/1B, 696/2, 696/3, 696/4, 697/1, 697/3, 697/4, 697/5, 697/6, 697/7, 698, 699, 700, 701/1, 701/2, 704/1, 704/2, 705/2, 706, 707, 708/1, 708/2, 709/2, 709/3, 711/2, 712/1, 712/2, 713/1, 713/2, 714/1, 714/3, 714/4, 716/2, 716/3, 717, 718, 719, 720, 721/1, 721/2A, 721/2B, 721/2C, 722, 1036, 1037, 1038, 1039, 1040, 1093, 1095, 1096/1, 1096/3, 1097, 1098/1, 1099/1, 1099/4, 1100/1, 1100/3, 1101/1, 1102/1, 1103/1, 1103/3, 1104, 1105/1, 1105/2, 1105/4, 1106/1, 1106/3, 1107/1, 1107/3, 1108, 1109, 1110/2, 1111/1, 1111/3, 1113/2, 1121/1, 1121/2, 1125/1, 1128/1, 1128/2, 1128/3, 1129/1, 1129/2, 1132/1, 1135, 1136, 1137, 1139, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150/1, 1150/2, 1150/3, 1151/1, 1151/2, 1152, 1153/1, 1153/2, 1153/3, 1153/4, 1154/1, 1154/2, 1154/3, 1155/2, 1156/1, 1156/2, 1158, 1159, 1160, 1161/1, 1162, 1163/1, 1163/2, 1164, 1165, 1166, 1167/1, 1167/2, 1168, 1169, 1170/1, 1171/1, 1172/2, 1171/3, 1171/4, 1172/1, 1173/1, 1173/3, 1174, 1175/1, 1175/3, 1179/1, 1179/2, 1179/3, 1179/5, 1181/1, 1181/2, 1181/3, 1185, 1186, 1187/1, 1187/2, 1187/3, 1187/4, 1190/1, 1190/2, 1190/3, 1191/1, 1191/3, 1192/1, 1192/2, 1193, 1197, 1198, 1201/1, 1201/2, 1201/3, 1202, 1204, 1205/1, 1205/2, 1206, 1208/1, 1208/2, 1209, 1210, 1211, 1213/1, 1213/2, 1213/3, 1213/4, 1214, 1215/1, 1215/2, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1227, 1096/2, 1099/3, 1105/3, 1106/2, 1107/2, 1111/2, 1113/1, 1120, 1170/2, 1171/2, 1173/2, 1175/2, 1126, 1122, 1125/2, 1155/1, 1157, 1177, 1180, 1182, 1183, 1184, 1194, 1195, 1196, 1199, 1200, 1203, 1207, 1212, 1224, 1225, 1226, 713/3, 702, 703, 1098/2, 1099/2, 1100/2, 1101/2, 1102/2, 1103/2, 1110/1, 1112, 1127, 1131, 1132/2, 1141, 1161/2, 1179/4, 1191/2, 1205/3, 709/1, 388, 389/1, 390, 687, 692, 693, 696/1A, 697/2, 701/3, 705/1, 711/1, 714/2, 716/1, **AdhiyamankottaiVillage:** SF.No: 509/1, 509/2, 509/3, 510/1, 510/10, 510/2, 510/3, 510/4, 510/5, 510/6, 510/7, 510/8, 510/9, 511/1, 511/2, 511/3, 511/4, 511/5, 511/6, 511/7, 867/13A1, 867/19B, 508/1, 508/2, 867/13C, 867/19A, **ThadangamVillage:** SF.No: 186/1, 186/2,239/1, 239/2, 239/3,254/-, 255/1, 255/2, 256/1, 256/2, 258/-, 260/1, 260/2, 267/-, 297/-, 304/-, 331/1, 331/2, 331/3, 331/4, 332/1, 332/2, 333/1, 333/2A, 333/2B, 333/3, 333/4, 340/1, 340/2, 344/-, 345/1, 345/2, 346/-, 347/1, 347/2, 348/1, 348/2, 349/-, 351/1, 351/2, 359/-, 360/1, 360/2, 368/-, 371/-, 372/1, 372/2, 373/-, 375/1, 379/-, 187, 188, 189, 190, 191, 257, 262, 296, 298, 299, 300, 303, 305, 306, 307, 308, 310, 311, 312, 313, 314, 315, 318, 319, 320, 339, 341, 342, 343, 350, 352, 353, 354, 355, 356, 357, 358, 361, 362, 363, 366, 367, 369, 370, 374, 375/2, 376, 377, 378 & 380, **BalajangamanahalliVillage:** SF.No: 299/1, 300/2A, 302/1, 302/2, 302/3, 311, 312, 313/2, 313/3, 314/1, 314/2, 315, 316/1, 316/2, 318/1, 318/2, 319, 331/1, 332/2A, 367, 750/1, 750/2, 750/3, 751/1, 751/2, 752/1, 752/2, 298, 299/2, 313/1, 331/2, 317, 324, 325, 332/1 & 332/2B, Dharmapuri Taluk Nallampalli Taluk, Dharmapuri District and Tamil Nadu State.

The proposed site is located approximately 0.25 km (E) from NH-844 (Hosur-Dharmapuri)/SH-17(Malur-Adhiyamankottai) and~0.67 km (E) from NH-44 (Srinagar-Dharmapuri-Kanyakumari). The Project location map is given in **Figure 2-1**. Satellite image of project siteis given in **Figure 2-2** and the coordinates of project site are given in **Table 2-1**.Google image of project site showing 1 km, 5km & 10 km are given in **Figure 2-3**, **Figure 2-4** and **Figure 2-5** respectively.

Site photographs are given in **Figure 2-6.** Salient features of the site and surrounding features are given in **Table 2-2.**Village wise survey no extent for the project is enclosed in Land Plan schedule as **Annexure-3.** Layout of the Industrial Park is given in **Figure 2-7** and **Annexure-4.**Combined FMB for the proposed site is enclosed as **Annexure-5**.

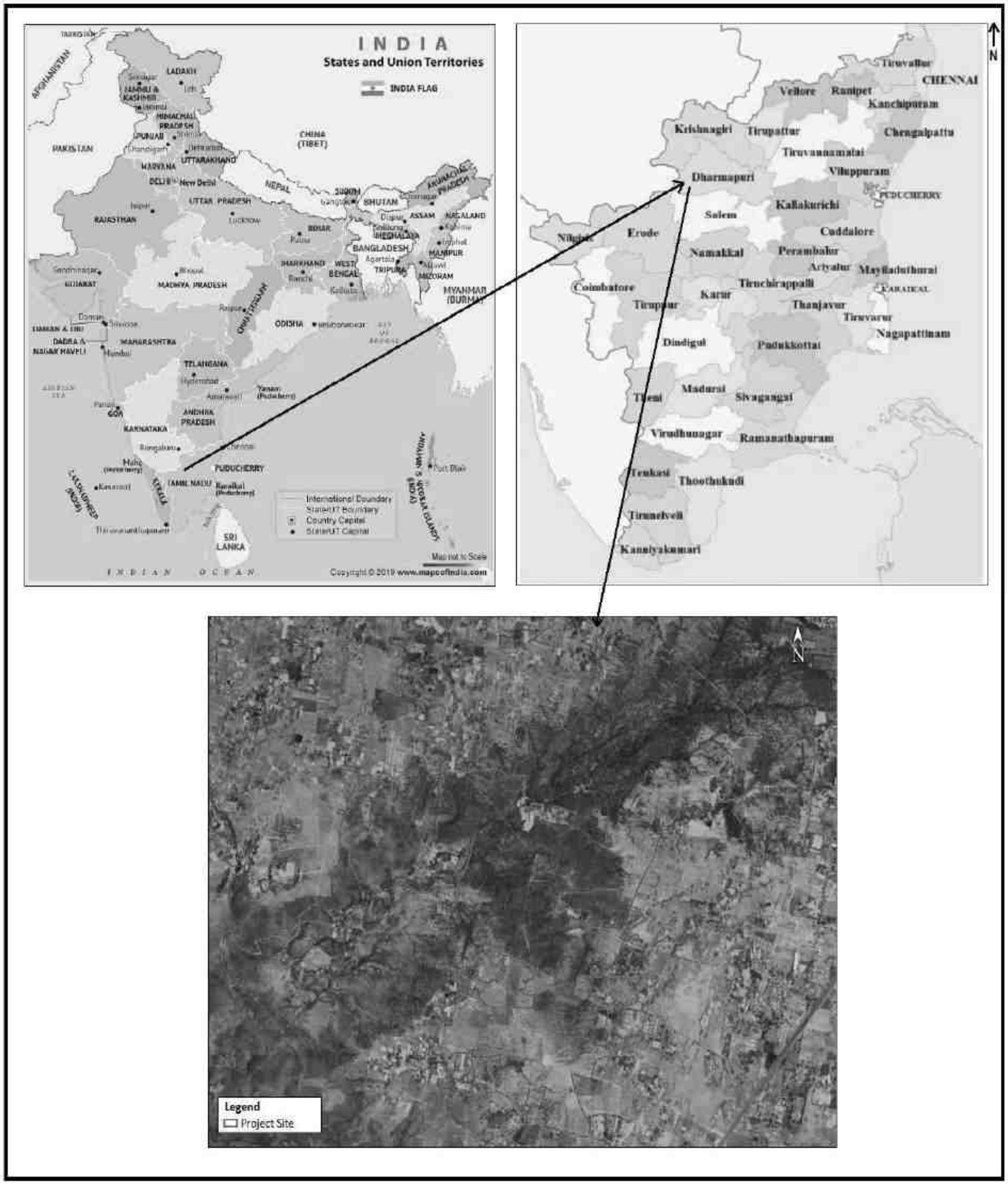


Figure 2-1Location Map of the project

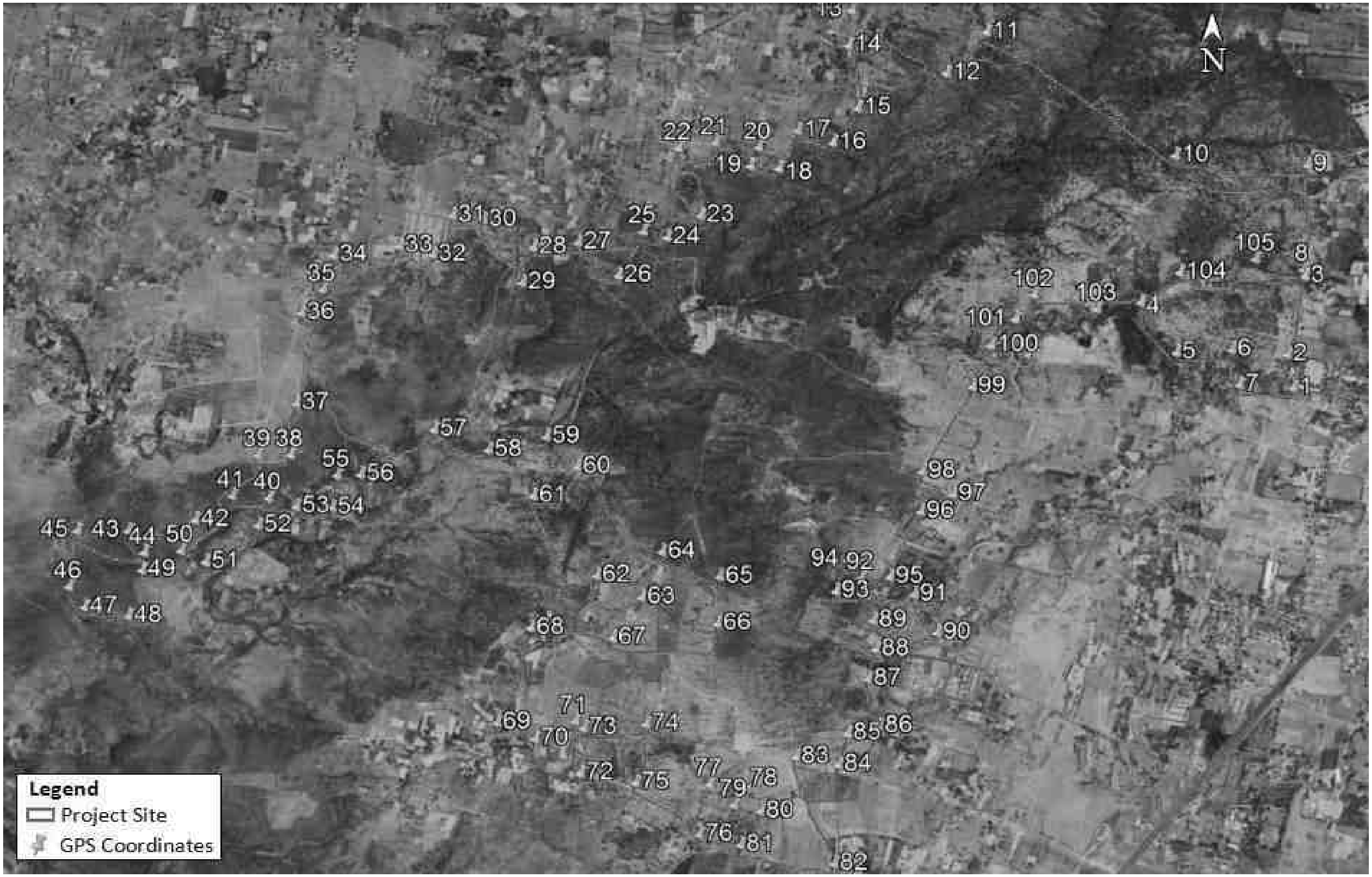


Figure 2-2 Google map of project Site

Table 2-1 Coordinates of the project site

S.No	Latitude(N)	Longitude(E)	S.No	Latitude(N)	Longitude(E)
1	12° 6’ 57.425”	78° 7’ 30.254”	54	12° 6’ 39.595”	78° 5’ 10.532”
2	12° 7’ 2.38”	78° 7’ 29.445”	55	12° 6’ 44.409”	78° 5’ 11.316”
3	12° 7’ 13.971”	78° 7’ 31.994”	56	12° 6’ 44.529”	78° 5’ 14.737”
4	12° 7’ 10.112”	78° 7’ 8.119”	57	12° 6’ 51.134”	78° 5’ 25.39”
5	12° 7’ 2.681”	78° 7’ 13.265”	58	12° 6’ 48.141”	78° 5’ 33.322”
6	12° 7’ 3.111”	78° 7’ 21.354”	59	12° 6’ 50.126”	78° 5’ 41.703”
7	12° 6’ 57.88”	78° 7’ 22.442”	60	12° 6’ 45.646”	78° 5’ 46.224”
8	12° 7’ 14.967”	78° 7’ 31.702”	61	12° 6’ 41.371”	78° 5’ 39.851”
9	12° 7’ 30.442”	78° 7’ 32.346”	62	12° 6’ 29.564”	78° 5’ 49.038”
10	12° 7’ 31.829”	78° 7’ 13.17”	63	12° 6’ 26.377”	78° 5’ 55.61”
11	12° 7’ 50.096”	78° 6’ 45.633”	64	12° 6’ 33.1”	78° 5’ 58.59”
12	12° 7’ 44.008”	78° 6’ 39.883”	65	12° 6’ 29.423”	78° 6’ 6.95”
13	12° 7’ 53.336”	78° 6’ 25.971”	66	12° 6’ 22.472”	78° 6’ 6.621”
14	12° 7’ 48.125”	78° 6’ 25.581”	67	12° 6’ 20.326”	78° 5’ 51.389”
15	12° 7’ 38.862”	78° 6’ 26.951”	68	12° 6’ 21.8”	78° 5’ 39.496”
16	12° 7’ 33.696”	78° 6’ 23.335”	69	12° 6’ 7.802”	78° 5’ 34.601”
17	12° 7’ 35.502”	78° 6’ 18.226”	70	12° 6’ 5.443”	78° 5’ 40.133”
18	12° 7’ 29.887”	78° 6’ 15.503”	71	12° 6’ 8.025”	78° 5’ 45.913”
19	12° 7’ 30.251”	78° 6’ 11.331”	72	12° 6’ 0.293”	78° 5’ 46.685”
20	12° 7’ 32.998”	78° 6’ 12.551”	73	12° 6’ 7.03”	78° 5’ 47.144”
21	12° 7’ 33.659”	78° 6’ 6.271”	74	12° 6’ 7.586”	78° 5’ 56.248”
22	12° 7’ 32.884”	78° 6’ 0.892”	75	12° 5’ 58.907”	78° 5’ 54.726”
23	12° 7’ 22.896”	78° 6’ 4.165”	76	12° 5’ 51.253”	78° 6’ 4.012”
24	12° 7’ 19.663”	78° 5’ 59.248”	77	12° 5’ 58.708”	78° 6’ 5.494”
25	12° 7’ 20.555”	78° 5’ 55.786”	78	12° 5’ 59.455”	78° 6’ 10.494”
26	12° 7’ 13.984”	78° 5’ 52.157”	79	12° 5’ 55.674”	78° 6’ 9.076”
27	12° 7’ 18.906”	78° 5’ 46.289”	80	12° 5’ 54.702”	78° 6’ 12.851”
28	12° 7’ 18.193”	78° 5’ 39.787”	81	12° 5’ 49.74”	78° 6’ 9.99”

S.No	Latitude(N)	Longitude(E)	S.No	Latitude(N)	Longitude(E)
29	12° 7’ 12.911”	78° 5’ 38.201”	82	12° 5’ 46.972”	78° 6’ 23.58”
30	12° 7’ 22.228”	78° 5’ 32.494”	83	12° 6’ 2.764”	78° 6’ 18.008”
31	12° 7’ 22.857”	78° 5’ 28.03”	84	12° 6’ 1.602”	78° 6’ 24.215”
32	12° 7’ 17.072”	78° 5’ 25.173”	85	12° 6’ 6.253”	78° 6’ 25.536”
33	12° 7’ 18.377”	78° 5’ 20.32”	86	12° 6’ 7.327”	78° 6’ 30.111”
34	12° 7’ 16.989”	78° 5’ 10.823”	87	12° 6’ 14.305”	78° 6’ 28.483”
35	12° 7’ 11.885”	78° 5’ 9.195”	88	12° 6’ 18.664”	78° 6’ 29.62”
36	12° 7’ 8.433”	78° 5’ 6.066”	89	12° 6’ 22.966”	78° 6’ 29.248”
37	12° 6’ 55.03”	78° 5’ 5.327”	90	12° 6’ 21.128”	78° 6’ 38.567”
38	12° 6’ 47.403”	78° 5’ 4.558”	91	12° 6’ 26.809”	78° 6’ 35.205”
39	12° 6’ 47.396”	78° 4’ 59.819”	92	12° 6’ 29.302”	78° 6’ 27.496”
40	12° 6’ 41.013”	78° 5’ 1.407”	93	12° 6’ 27.29”	78° 6’ 23.803”
41	12° 6’ 41.374”	78° 4’ 56.099”	94	12° 6’ 31.953”	78° 6’ 25.507”
42	12° 6’ 37.78”	78° 4’ 50.743”	95	12° 6’ 29.412”	78° 6’ 31.654”
43	12° 6’ 36.147”	78° 4’ 40.974”	96	12° 6’ 39.063”	78° 6’ 36.136”
44	12° 6’ 32.944”	78° 4’ 43.285”	97	12° 6’ 41.65”	78° 6’ 40.812”
45	12° 6’ 36.155”	78° 4’ 33.531”	98	12° 6’ 45.029”	78° 6’ 36.383”
46	12° 6’ 27.871”	78° 4’ 32.398”	99	12° 6’ 57.561”	78° 6’ 43.618”
47	12° 6’ 24.871”	78° 4’ 34.61”	100	12° 7’ 3.731”	78° 6’ 46.354”
48	12° 6’ 23.531”	78° 4’ 41.022”	101	12° 7’ 7.569”	78° 6’ 49.844”
49	12° 6’ 30.338”	78° 4’ 43.01”	102	12° 7’ 11.229”	78° 6’ 52.589”
50	12° 6’ 33.227”	78° 4’ 48.656”	103	12° 7’ 9.106”	78° 7’ 1.748”
51	12° 6’ 31.533”	78° 4’ 52.243”	104	12° 7’ 14.514”	78° 7’ 13.771”
52	12° 6’ 36.941”	78° 4’ 59.85”	105	12° 7’ 16.522”	78° 7’ 24.777”
53	12° 6’ 39.755”	78° 5’ 5.397”			

Figure 2-3 Google map of project site and 1 Km radius

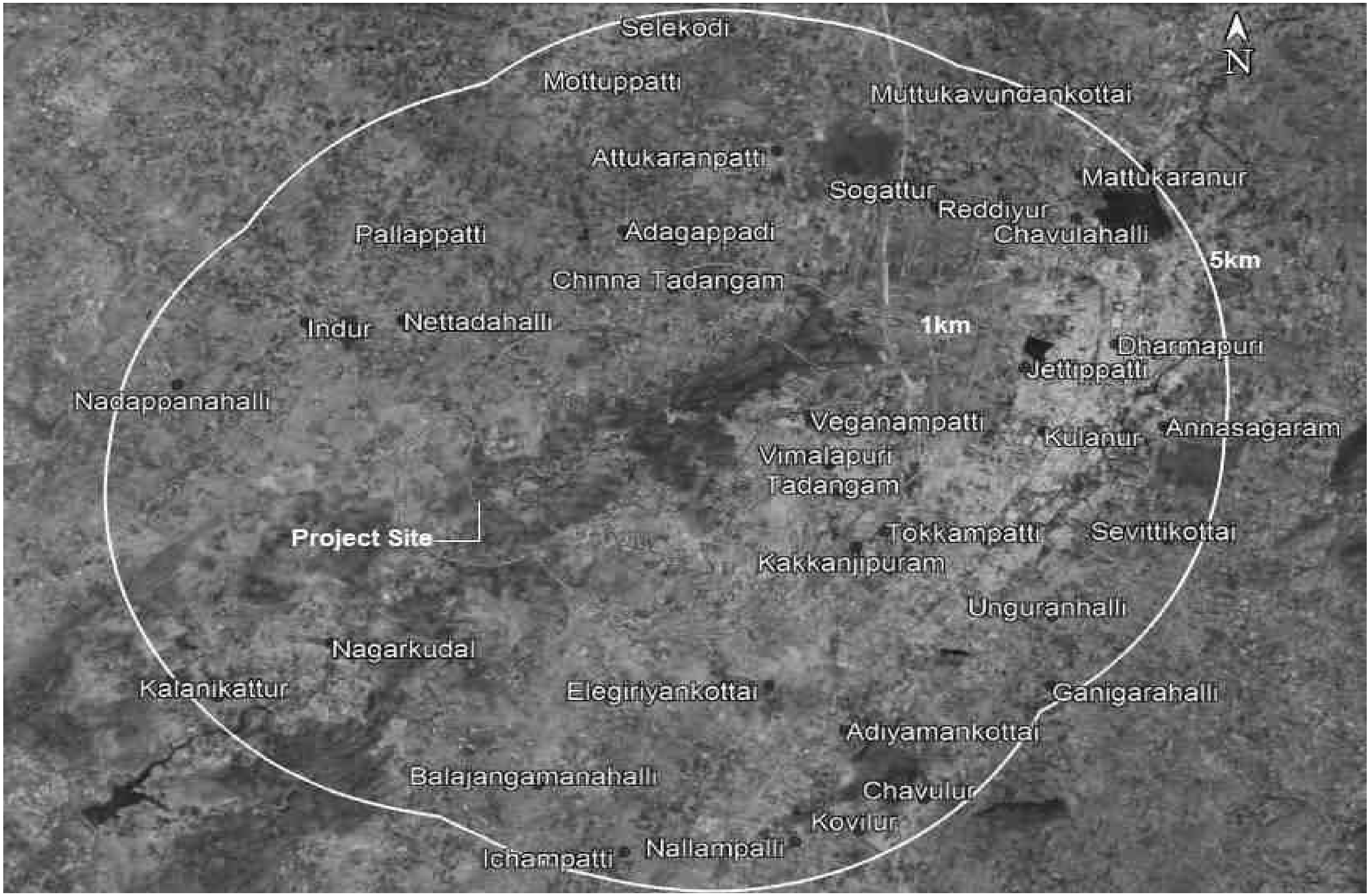


Figure 2-4 Google mapof project site in 5 Km radius

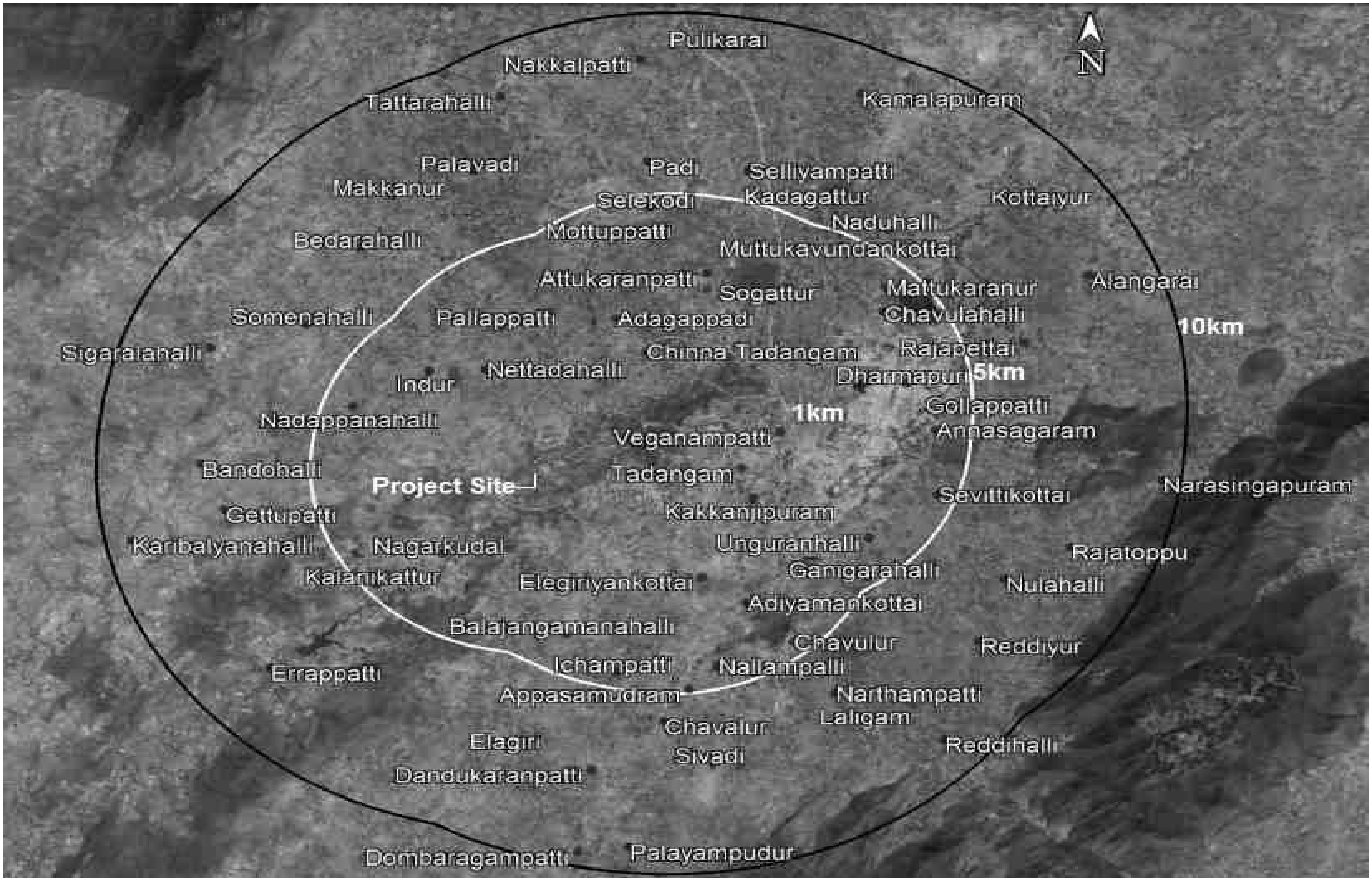


Figure2-5Google mapof project site in10 Km radius

Figure 2-6Latest Photographs of the Project Site

Table 2-2 Salient features of project and surroundings

<table>
<tr><th>S. No</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Site Co-ordinates of the project site</td><td>Longitute: 12° 6’27.871”N -12°7’30.4423”N,
Latitute: 78° 4’32.398”E- 78° 7’32.346”E</td></tr>
<tr><td>2.</td><td>Elevation</td><td>~ 375m – 455m MSL</td></tr>
<tr><td>3.</td><td>Present land use</td><td>1. As per Bhuvan 2015-2016, the proposed site is predominantly classified Barren Scrub Land-72.6%, Agricultural Crop Land -15%, Agriculture fallow-12% and Builtup urban-0.4%.
2. Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District, Tamil Nadu vide G.O. (Ms) No.284 dated 30.12.2015 (Annexure-2). Villagewise survey number and their classification is given in Annexure-3.
3. As per the revenue records, the entire land (698.205 Ha) is government Poromboke land and patta land classified as under:
<table>
<tr><th>Land use</th><th>Area in Ha</th></tr>
<tr><td>Dry Land</td><td>219.635</td></tr>
<tr><td>MeichelTharai</td><td>374.270</td></tr>
<tr><td>Pathai</td><td>8.585</td></tr>
<tr><td>Aaru</td><td>26.175</td></tr>
<tr><td>Podugal (Kasivu Neer Odai)</td><td>0.650</td></tr>
<tr><td>Vaari</td><td>44.175</td></tr>
<tr><td>Podugal</td><td>14.770</td></tr>
<tr><td>Ubarinilam</td><td>0.230</td></tr>
<tr><td>Kasivu Neer Kuttai</td><td>5.240</td></tr>
<tr><td>Ooni</td><td>3.795</td></tr>
<tr><td>Koil</td><td>0.155</td></tr>
<tr><td>Theervaierpadathatharisu</td><td>0.485</td></tr>
<tr><td>Samudhayakinaru</td><td>0.040</td></tr>
<tr><td>Total</td><td>698.205</td></tr>
</table></td></tr>
<tr><td>4.</td><td>Nearest Highway</td><td><table>
<tr><td>NH-844 (Hosur-Dharmapuri)/SH-17(Malur-Adhiyamankottai)</td><td>~0.25km</td><td>E</td></tr>
<tr><td>NH-44(Srinagar-Dharmapuri-Kanyakumari)</td><td>~0.67km</td><td>E</td></tr>
</table></td></tr>
<tr><td>5.</td><td>Nearest railway Station</td><td>Dharmapuri Railway station, ~ 2.98km (E)</td></tr>
<tr><td>6.</td><td>Nearest Airport</td><td>Salem Airport, ~ 33.98 km (S)</td></tr>
</table>

<table>
<tr><th>S. No</th><th>Particulars</th><th>Details</th></tr>
<tr><td>7.</td><td>Nearest Port</td><td>Cuddalore Port, ~ 185 km (ESE)</td></tr>
<tr><td>8.</td><td>Defence Installation</td><td>Nil</td></tr>
<tr><td>9.</td><td>Nearest Town</td><td>Dharmapuri (pop-68619) ~2.0 km, E</td></tr>
<tr><td>10.</td><td>Nearest Village/ Habitation</td><td>
<table>
<tr><th>Villages</th><th>~Dist.</th><th>Dire.</th><th>Population</th></tr>
<tr><td>Siva Subramanya Nagar</td><td>0.11km</td><td>N</td><td>250</td></tr>
<tr><td>Veganampatti</td><td>0.31km</td><td>E</td><td>1,000</td></tr>
<tr><td>Vimalapuri</td><td>0.40km</td><td>E</td><td>50</td></tr>
<tr><td>ChinnaTadangam</td><td>0.70km</td><td>N</td><td>350</td></tr>
<tr><td>Tadangam</td><td>0.80km</td><td>E</td><td>8,601</td></tr>
</table>
</td></tr>
</table>

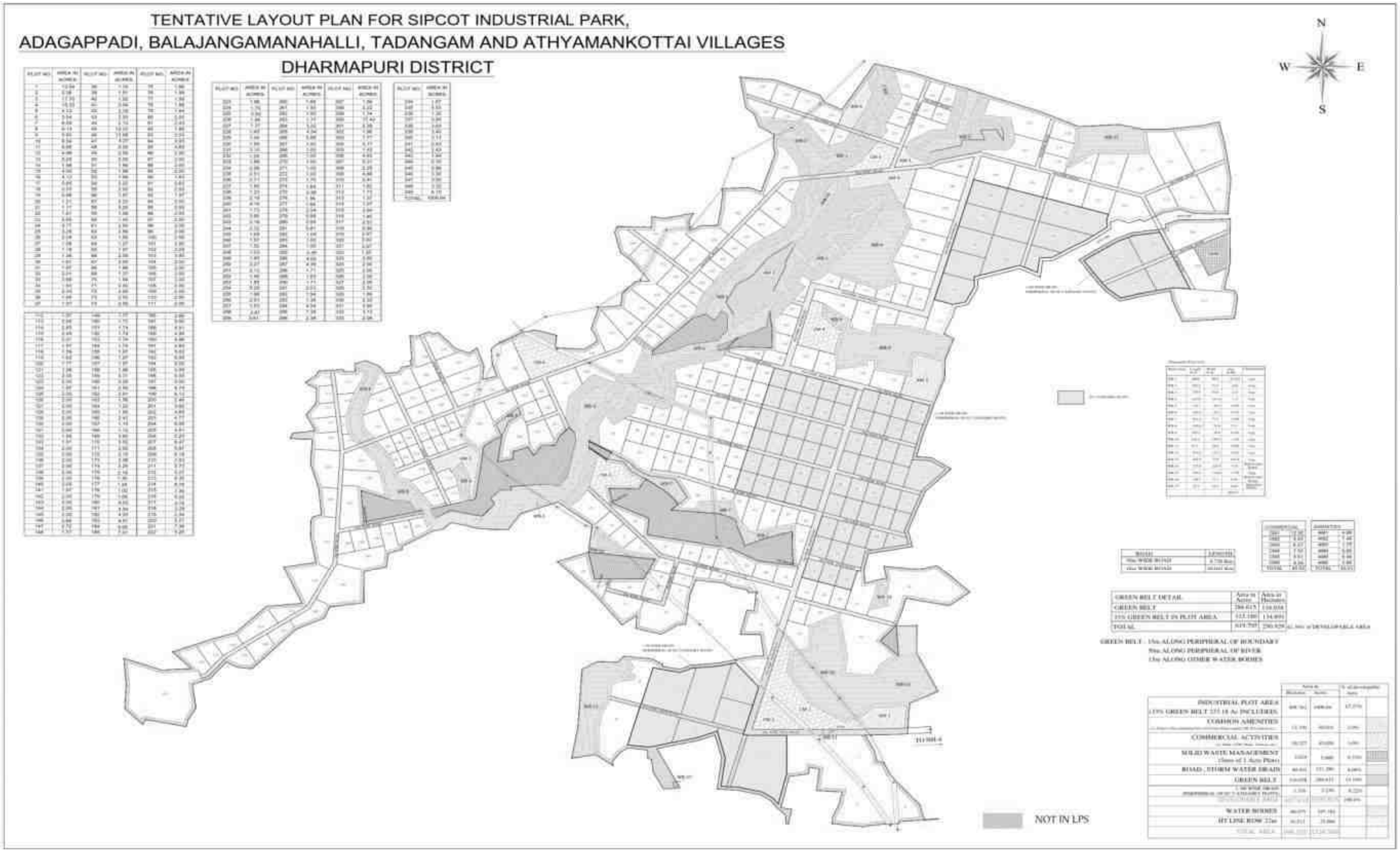


Figure 2-7 Tentative Layout of Industrial Park

2.4 Size or Magnitude of operation

Total area of Industrial Park is 698.205 Ha (1724.566 Acres). Total number of industrial plots proposed is 349.Land area breakup for the Industrial Park is given **below**.

Table 2-3 Area break up for the Proposed Industrial Park

Description	During 377th EAC meeting		Revised for EIA as per the ToR	
	Extent(acres)	%	Extent (acres)	%
Industrial Plot area (including 33% Greenbelt area)	1069.29	71.25%	1009.64	67.27%
Common Amenities (i.e Project office including First Aid Center, Water supply, EB, Fire station, etc)	30.010	2.00%	30.010	2.00%
Commercial Activities (i.e Bank, ATM, Shops, Canteen, etc)	45.020	3.00%	45.020	3.00%
Solid Waste Management Area	5.000	0.33%	5.000	0.33%
Roads along with Storm Water Drain	128.220	8.54%	121.280	8.08%
Green belt	219.915	14.65%	286.615	19.10%
1.3m Wide Garland Drain (Peripheral of EC category plot)	3.360	0.23%	3.250	0.22%
Developable area	**1500.815**	**100.00%**	**1500.815**	**100.00%**
Water body	197.785	-	197.785	-
110 KV HT line-22mRoW	25.966	-	25.966	-
Total area	**1724.566**	**-**	**1724.566**	**-**

*Industries will be mandated to provide 33 % (134.891 Ha) of green belt within their premises. Total green belt proposed for Industrial Park is 41.30 % (250.929 Ha) of Developable area. Layout of the Industrial Park is enclosed as **Annexure-4** and **Figure 2-7.**

2.5 Proposed schedule for approval & implementation

Proposed project schedule is given in **Table 2-4** below.

Table 2-4Project Schedule

S. No	Description	Time Frame
1	Environmental Clearance	May2024
2	CTE	June 2024
3	Construction activities	June 2024to May 2026

2.6 Technology and Process Description

The project proposal is development of Industrial Park. Different types of industries are proposed for the project. Manufacturing technology and process description will be provided by Individual industries upon establishment while obtaining CTE / CTO.

2.7 Project Description

The proposed project involves development of Industrial Parkis planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc.as per the EIA Notification 2006 and its amendments.

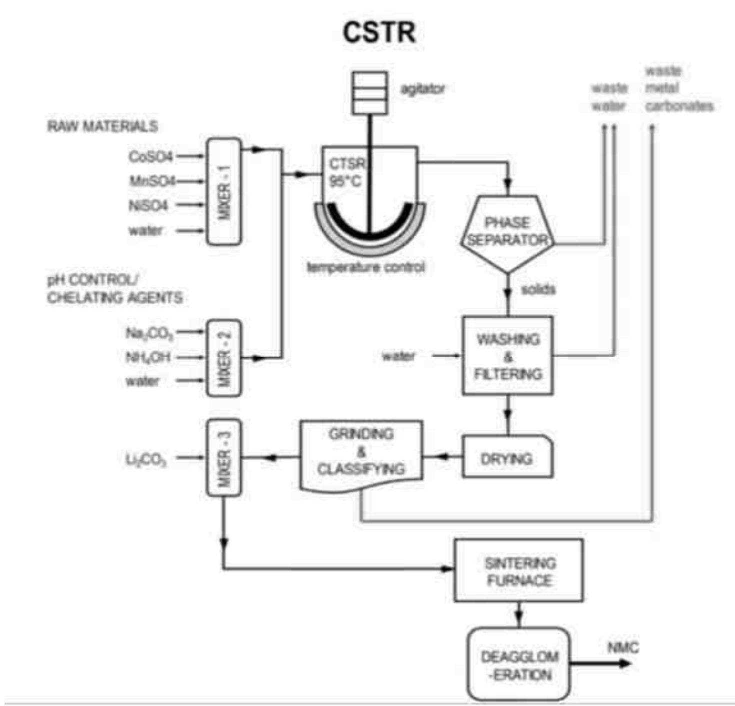
The project will be established with infrastructure development like provision of storm water drain, laying of internal roads, water supply line, providing substation, green belt in common area and other common facilities.

2.7.1 Types of some industrial units, processes /products in the proposed industrial area-

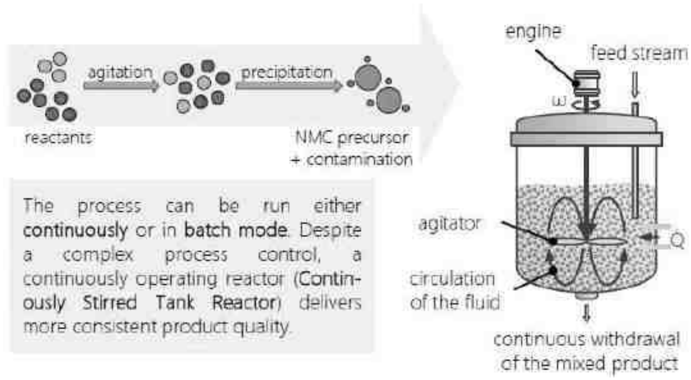
For Battery manufacturing:

4. **Cathode Active Material (CAM) Processing:**

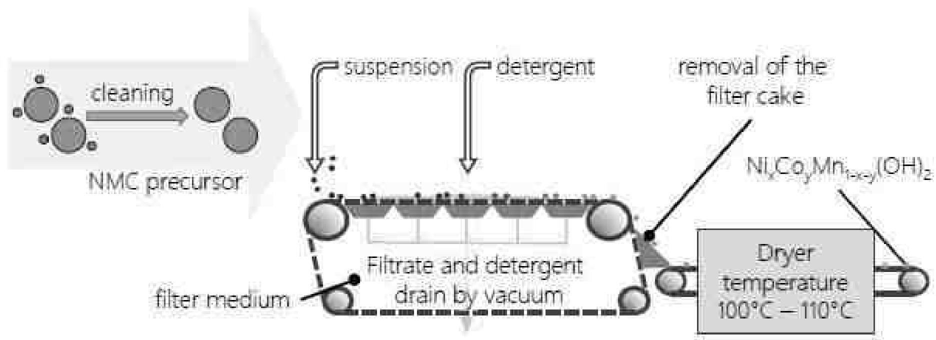
Conventionally CAM is processed in CSTR. Like a two-step production process first precursor production then adding lithium in the 87odeling87abl step. If we need coated NMC powder, that would be another additional step.



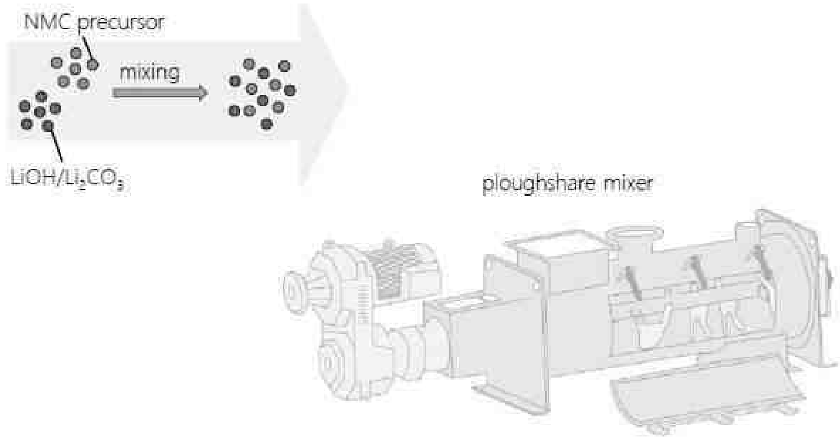
- Precursor [pCAM]
  - Co-precipitation: According to the desired proportions, Ni, Mn, Co sulphates are mixed at 1000 rpm and at temperatures between 35-80 ℃ for coprecipitation. The stirring is done at high speeds to avoid precipitation of hydroxides independently



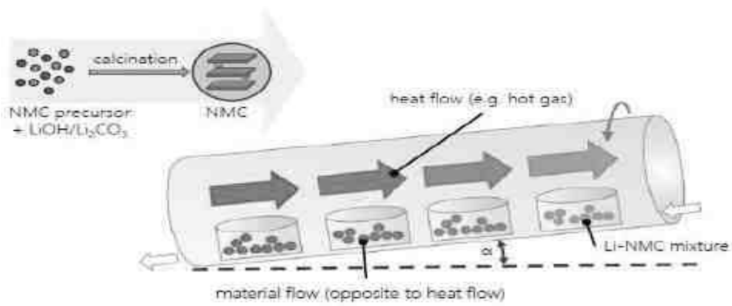
- Filtration & washing: The NMC precursor is first passed through a belt feeder to separate from the suspension. The NMC precursor (filter cake) remaining on the belt filter is contaminated with lye from coprecipitation. To clean the filter cake and remove the remaining lye, a detergent is applied to the filter cake from above and sucked off again with the suspension liquid under the belt filter
- Drying: The filter cake is continuously dried at a temperature of approx. 110°C to remove impurities and volatile substances



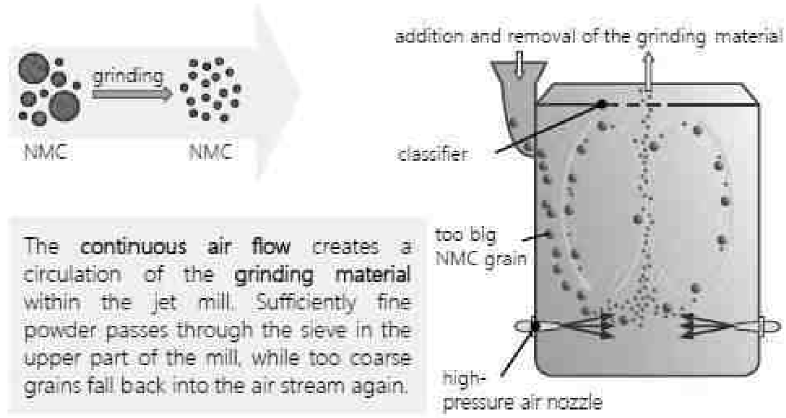
- Calcination step:
  - Mixing: Ploughshare mixers with knife heads are used to ensure complete deagglomeration of the raw materials. A defined fineness or large specific surface of the starting materials must be guaranteed to achieve a high reactivity of the later battery cell



- Calcination: Li NMC compound is transported through a continuous furnace at high temperatures in ceramic batch containers to remove volatile substances. Also, Lithium oxidizes and reacts with NMC composite to form layered LiNMC crystals. The temperature gradient should be around 800-1000 ℃ and homogeneous across the material movement. The temperature significantly determines the particle size and influences the mobility of free electrons, crystal growth and the proportion of undesired side reactions, such as the evaporation of lithium. Typically, 5-10% of lithium is lost in evaporation



- Grinding: The layered LiNMC crystals from the 89odeling89abl step will be of various sizes. Hence the grinding of the material is required to synthesize homogeneously sized crystals. An Air jet mill is typically used to size the materials. The NMC grains are accelerated to high speeds ~ 100m/s and shred through collisions. The mixer will also have a sieve at the top which acts as the classifier. During classification, the ground NMC is sorted according to grain size. Grains that are too large fall back into the grinding process again, while grains of a defined size can pass through the classifier.



Future Technologies:

Some technologies that are developed but not yet industrialized.

- One pot process:

  Conventional process uses sulphates of powder and usually three steps (precursor, 90odeling90abl, coating) are involved in CAM production. But Nano One's patented One-Pot process forms durable single-crystal cathode powders and protective coatings simultaneously and M2CAM enables CAM materials to be made directly from metal powders. Metal powders are one-fifth of the weight of metal sulfates, avoiding the added costs, energy and environmental impact of converting to sulfate and shipping and handling of waste. The One-Pot process is an aqueous process, using carbon neutral chemistry, that operates at room temperature and atmospheric pressures, and it combines feedstock conversion, precursor formation, lithiation and coating steps into one reaction. This creates added value for metals.

5. **Anode Processing**

List of proposed Products

S.No.	Products
	1. Main Product
1	**AnodeMaterialsforLithiumBattery**
	ByProducts for Main Product
1	BulkMesocoke/NaturalGraphiteFines
2	PitchOil
3	Crucibles(Used)/GraphitizedCoke
4	CalcinedpetroleumCoke(Used)/GraphitizedCalcinedpetroleumCoke
5	CarbonBlack(Used)
6	QuartzSand/RiverSand/ IndustrialSand(Used)
7	Gypsum cake up / Sodium sulfate cake to 20% water (Qty – 100%drybasis)

8	WashOilformScrubber(Used)
2. Raw material for Main Products	
1	Crucibles
ByProducts	
2	PitchOil

Natural Graphite Based Anode Material –ProcessDescription

Graphite deposits are mined using conventional mining methods. Flake graphite deposits are typically found near the surface and, depending on the degree of weathering, can be mined using conventional hard or soft-rock mining techniques.

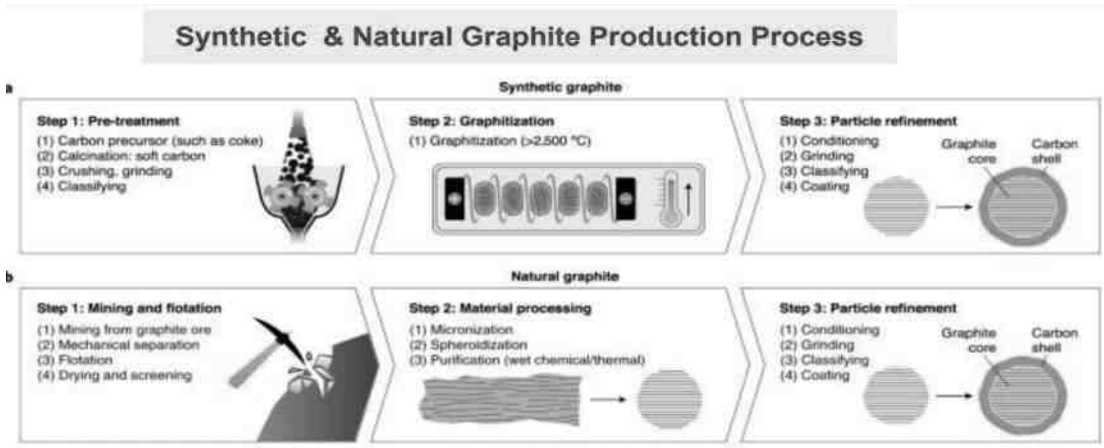
Beneficiation techniques depend on the type of deposit, flake size distribution, and the required specifications of the final concentrate such as crystallinity, texture of the flakes, ash content and level of impurities. They can be divided into comminution (reducing material size), beneficiation (removing impurity and improving value of graphite) and, for flake graphite, refining stages.

Comminution processes focus on the liberation of graphite flakes from the host rock to increase recovery during the following beneficiation stages. The liberation of the graphite flakes is critical for the ultimate grade of the final product. However, as flake size and carbon content are important commercial considerations, with large and jumbo graphite flakes commanding the highest prices, any processing that reduces flake size should be kept to a minimum.

Spherical Graphite is manufactured from flake graphites concentrates produced from Graphite Mines and used in making battery anode. The manufacturing process for producing spherical graphite consists of micronizing, rounding and purifying in series. The raw flake concentrates with 95% carbon purity are first crushed into small pieces and classified to separate the target size range (10 -15 microns). The micronized graphite is then rounded and purified from approximately 95% carbon to 99.95% carbon, as impurities affect battery performance and safety. The uncoated spherical graphite is then subjected to a carbon coating (thermal coating) process to cover the spherical graphite. This protects the sphere from exfoliation and degradation during the expansion and contraction that occurs with charging and discharging.

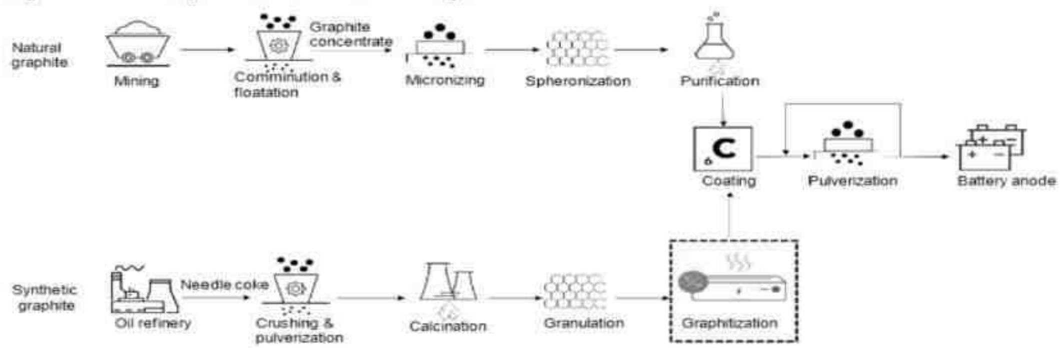
Typically, three tons of flake graphite concentrate is required to produce one ton of spherical graphite. This is due to losses during micronizing and rounding stages. These losses impact the environmental footprint of the process and increase costs. In 2020, the Chinese government announced a notice requiring a minimum spherical graphite yield of 35%.

ProcessFlowDiagram



Note: Both process will get final yield 50%. Further this production cost will increase additionally 15-20% due to the carbon coating & carbonization temperature (800-900 deg C).

Figure 2: Battery anode manufacturing



Source: BloombergNEF

Synthetic Graphite Based Anode MaterialProcess:

Milling: The Bulk Meso coke granules/ Needle Coke Ganules / Petroleum based coke Granules are processed through a series of milling machines to refine it to desired properties. In this process two outputs are obtained: Coke powder and Coke fines.

Volatile Matter Removal/ Calcination: After milling the powder contains some volatile matter which is removed by subjecting it to high temperature in calcined or muffle furnace.

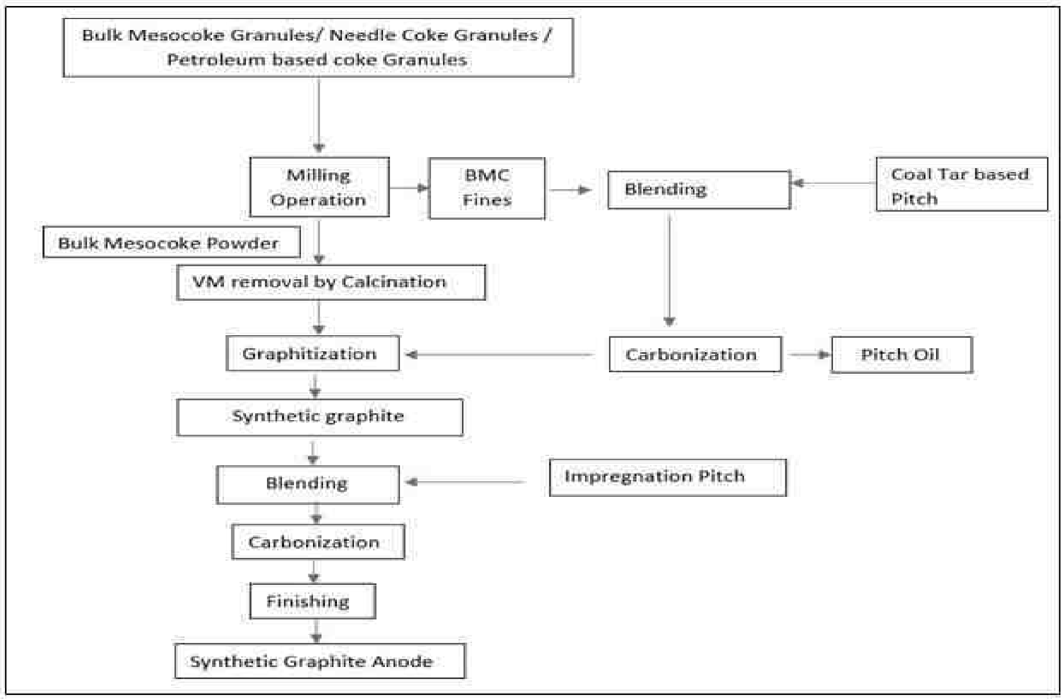
Blending: The fines are blended in calculated proportions with impregnation pitch in a blender.

Carbonization: The blended mixture is processed at high temperature to ensure the blended impregnation pitch is coked. Some pitch oil is generated during this process.

Graphitization: The coke powder and carbonized material is graphitized at very high temperature in Acheson furnace. The material is filled in crucibles and placed in cuboid shaped Acheson furnace. The void space is filled with calcined petroleum coke to conduct the electricity. Conductive electrodes are arranged on the two upper end walls of the furnace head, which relate to the power source to form an energized loop (see figure). When the circuit is connected, the furnace core heats up due to the resistance and material is graphitized. During this process the moisture content, impurities and volatiles escapes producing Synthetic graphite. The Synthetic graphite as per the grade requirement if required is blended with impregnation pitch followed by carbonization.

Finishing and packing: Material is screened to remove any foreign particle present. It is then passed through an electromagnetic separator to remove iron content if any. For uniform distribution the material processed and then packed in jumbo bag or smaller bags of desired sizes.

ProcessFlowDiagram:



Crucible Manufacturing Process:

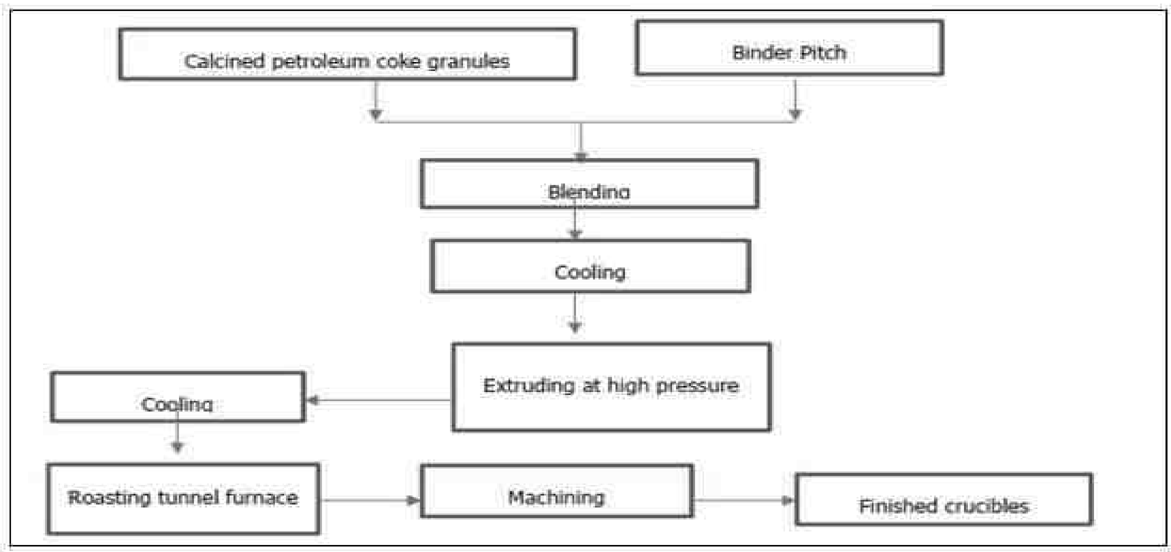
Preparation of Raw Material Blend: Graphitized calcined petroleum coke is the main input which can be sourced from graphitization plant, it is crushed in crushing and screening unit to obtain powder and different sizes of CPC. Apart from CPC recycled crucibles chips and binder pitch is mixed in desired proportion in blender. The temperature here is maintained at 150 Deg C to maintain flow ability and consistency.

Extrusion: The blend with uniform consistency is cooled in cooler. Cooling water is used for cooling, the material is further extruded in an extruder at high pressure by hydraulic machine.

Roasting: The extruded crucibles are roasted in tunnel type continuous furnace at 800 to 1000 Deg C. The furnace is gas fired with 2 rows and has 4 sections – Loading, heating cooling and unloading respectively.

Machining: For uniform geometry and to eliminate undulation machining is to be carried out.

Process Flow Diagram:



Graphitization Unit Process:

Electrical System: This process is electricity intensive process for 50,000 MTPA processing capacity 150 MWH connection is required. The system consists of substation, switch yard, rectifying transformer system, PCC and metering center, copper and aluminum bus bar network and switch.

Utilities: Apart from electricity, cooling water is required for cooling of recto former, cooling scrubbing system solution and electrode head of the furnace.

Crucibles and Bulk mesocoke, handling and storage system: The anode precursor powder can either be stored in Jumbo bag or in silo. The containers are cylindrical graphite vessels with Lid. The crucibles placed inside the Acheson furnace and are charged with anode precursor. Usually in Acheson furnace the crucibles are mounted one above the other in two layers, the number of rows depend on the dimensions / capacity of Acheson furnace. The new/ spare crucibles used crucibles and scrap crucibles are stored separately. The charging and discharging of crucible and anode precursor is done by crane and crane mounted vacuum system respectively.

Furnace: Acheson graphitization furnace is classified as a direct resistance heating furnace according to the heating method. The so-called direct heating means that the product itself is a conductor, and the product is heated by resistance to complete graphitization.

The Acheson furnace consists of the furnace body, the transformer of the power supply system, and a short network connecting the two parts Conductive electrodes are arranged on the two upper end walls of the furnace head, which relate to the power source to form an energized loop (see figure). When the circuit is connected, the furnace core heats up due to the resistance, so that the carbon blank is converted into artificial graphite by high-temperature heat treatment.

As indicated in figure the figure the crucibles containing the anode precursor are placed inside the furnace over coke granules bed. The void space in between crucibles and in between crucibles and furnace wall is filled with resistive coke granules. Also, a layer of resistive coke is made above the crucibles.

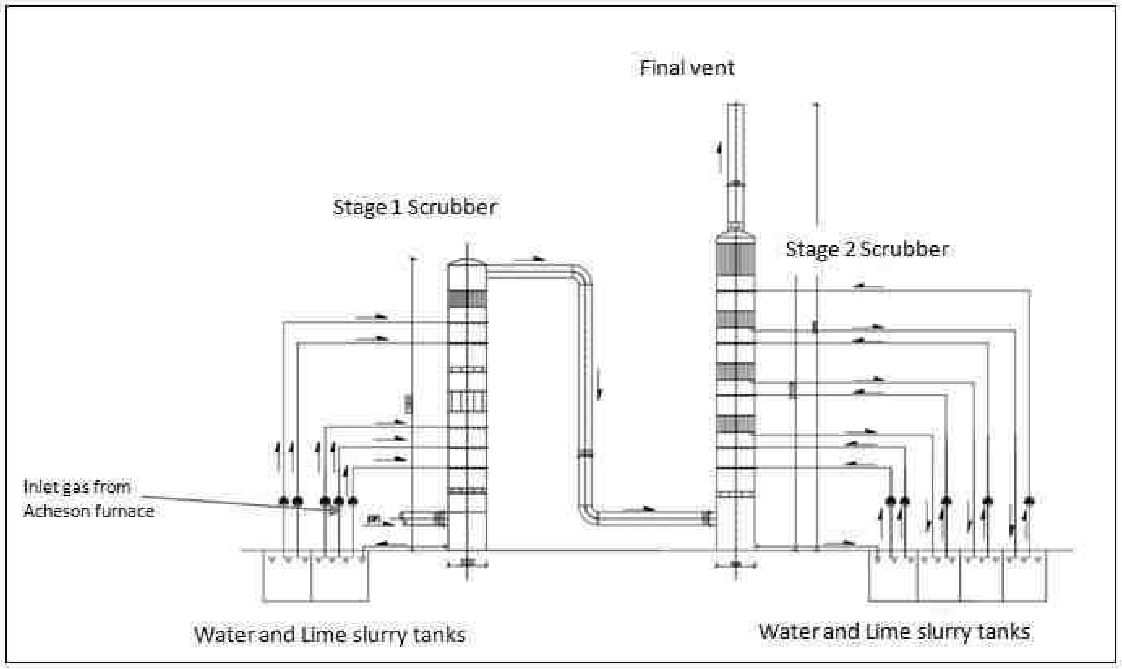
The power supply is connected to the furnace head/electrode by transformer and a switch. The current flows across the furnace through resistive coke granules, crucibles, and the anode precursor inside the crucibles. Due to resistive properties of the said material a very high temperature up to 3500 Deg C is produced at such high temperature the bulk meso coke is converted to graphite.

During the heating process the furnace is covered with hood and the fumes generated are channel ed to desulfurization / scrubbing unit.

Resistive coke, handling, storage and screening system: The resistive coke is categorized in 3 to 4 types based on their size. Different sized resistive coke is filled space of furnace. For example, the coke bed below crucible has different diameter than between void space and above crucibles. When the batch is complete the crucibles are taken out for discharge and the resistive coke is mixed irrespective of size. These are to be screened based on their size and stored separately and used for new batch. The charging and discharging are done by crane mounted vacuum system. After few batches the resistive coke gets exhausted and is to be replaced by new coke.

Scrubbing: As explained earlier the furnace is covered with hood during heating cycle of the process. The vapors and fumes during the heating cycle are scrubbed in scrubber.

Desulphurization Unit: The system adopts wet method of desulfurization system by using lime or sodium hydroxide Gas treatment is divided into two stages, that is, equipped with two efficient desulfurization towers, arranged in series.



The Flue gas produced by Acheson furnace is transported to the first-level high efficiency desulphurization tower by induced draft fan. The tower is designed with five level desulphurization and dust removal spray and two-level turbulence efficiency enhancing device, and the tower is equipped with high efficiency gas-liquid separation device. SO2 and particulate matter in flue gas are completed removed in the first level tower. After the first level washing, the flue gas enters the second level high efficiency desulphurization tower. The first level turbulence booster device and the second level desulphurization and dust spraying device are designed in the tower. After clean liquid water washing, the clean flue gas is cooled by two-stage cooling spray, and the final defogging procedure is completed by the chimney on the top of the tower for discharge

There are different spray systems in this process the by-product is gypsum or sodium sulphate cake. It is filtered by cyclone and vacuum filter, and the moisture content of gypsum/ sodium sulphate cake is about 15%. The PH value of each cycle is controlled separately, and the PH value of each cycle pool and the number of spraying layer are adjusted according to the concentration of SO2 in gas.

6. **Electrolyte Processing:**

Materials:

Electrolyte is composed of lithium salt, solvents & additives, such as LiPF6 in an organic solution with LiF, HF, PCL5 that allows for the easy diffusion of lithium. Ethylene Oxide & Propylene Oxide are used as solvents, Liquid Chlorine with Ethylene Carbonate are the additives.

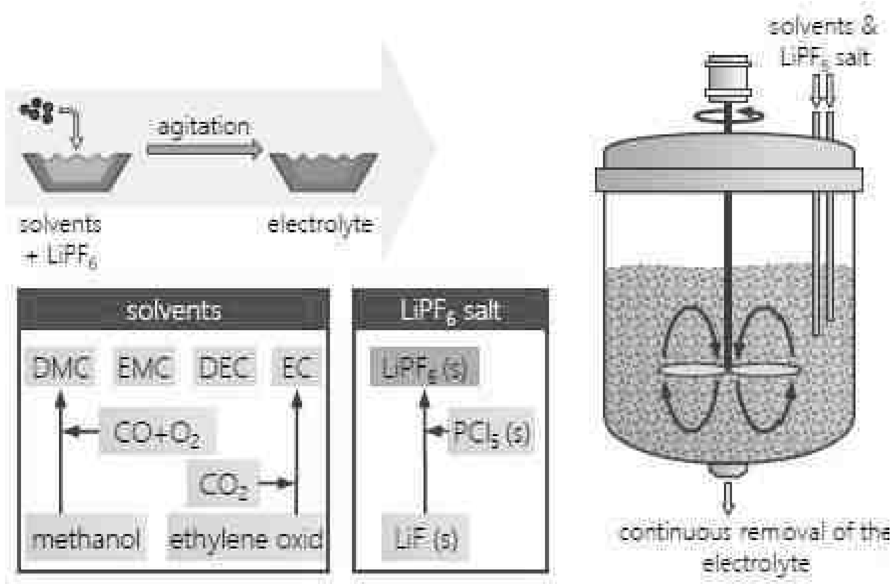
- LiPF6 – Lithium hexafluorophosphate
- EC – Ethylene carbonate
- DEC – Diethyl carbonate

- DMC – Dimethyl carbonate
- EMC – Ethyl methyl carbonate
- FEC – Fluoroethylene carbonate
- VC – Vinylene carbonate
- PS – Propane 1,3 sultone
- LiBF4 – Lithium tetrafluoroborate
- MMDS –Methylene methane disulfonate
- LiFSI– Lithium bis(trifluoromethane sulfonyl)imide

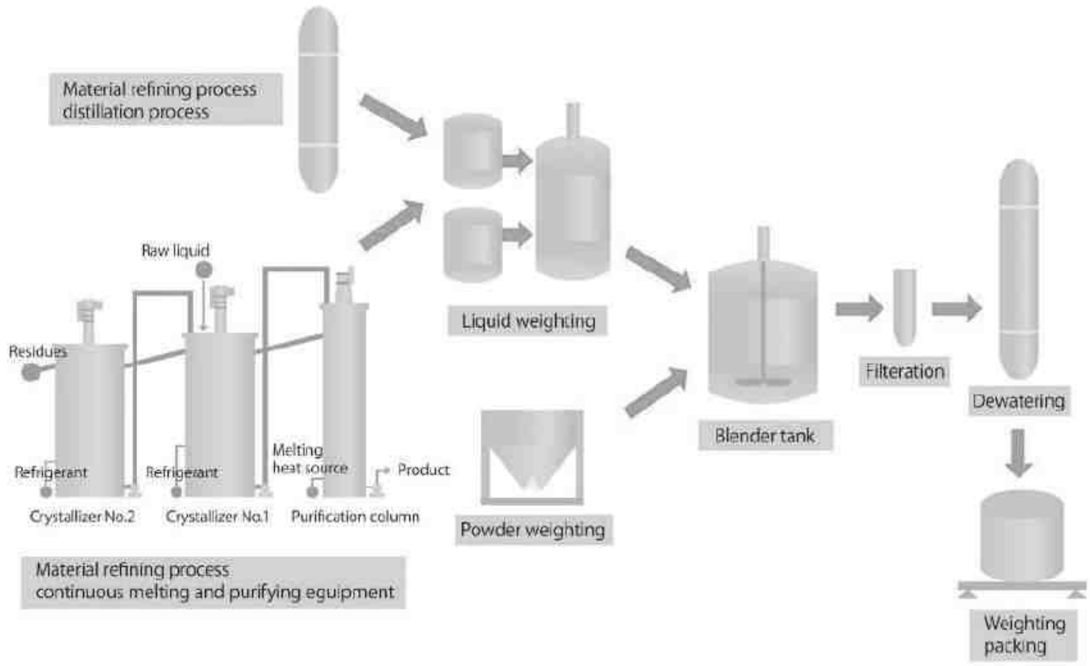
Processing:

All salt (LiPF6, LiClO4, LiBF4), Solvent- (Dimethyl Carbonate , Diethyl Carbonate, Ethyl Methyl Carbonate) with additives (Vinylene Carbonate , Fluoroethylene carbonate (FEC)) will be mixed to have formulation in a reactor to form electrolyte.

- The electrolyte consists of a conductive salt (e.g., lithium hexafluorophosphate (LiPF6)) and a solvent (e.g., dimethyl carbonate (DMC), ethylene carbonate (EC), diethyl carbonate (DEC) or ethyl methyl carbonate (EMC)). These are brought together in the reactor.
- LiPF6 is the most important component of the electrolyte as a conductive salt and accounts for the main share of the costs
- Additives (e.g Vinylene carbonate (VC) are added to improve the long-term stability of the battery.
- Residues and the formation of water must be avoided as water impurities result in the decomposition of LiPF6.



Detailed Processing of Electrolyte



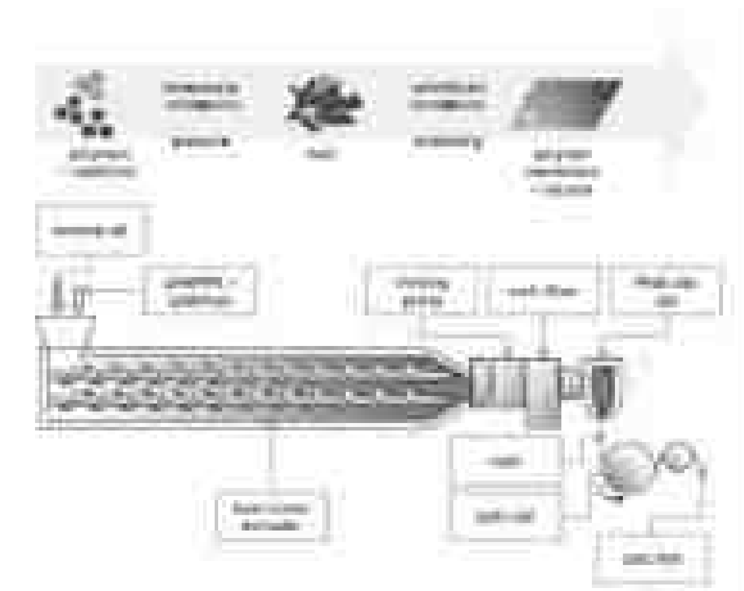
7. **<u>Separator Processing:</u>**

- Pre-cursor processing: Polymers are converted into battery-grade PP/PE
- Final product conversion: There are two options for production process of Separators :
    - For the dry process, mechanical force is used to stretch film materials and make pores. The semi-crystalline thermoplastics PP or PE are converted.
    - For the wet process, additives create the required pores chemically. The wet process based on PE is the most common manufacturing process with lines up to 110 m long.
- All wet or dry PP/PE separators can further be coated to improve thermal stability or laminability
- Wet separators can go up to 5 micron thickness versus dry separators are limited to 9 microns. A typical requirement for a battery application is around 10-12 microns.

Wet Process Description:

- **<u>Extrusion</u>**: The mixtures of HDPE (high-density polyethylene), low molecular weight waxes or mineral oils as plasticizer as well as some additives are used as starting material for the wet process. The mixture is dosed in a co-rotating twin-screw extruder, where it is homogenized and melted by heat and shear. A melt pump generates a constant, higher pressure with which the melt is conveyed to the wide slot nozzle.
- **<u>Cast Film</u>**: The melt emerging from the slot die solidifies through contact with the chill roll to form the cast film. An even cooling over the working width and circumference is crucial.

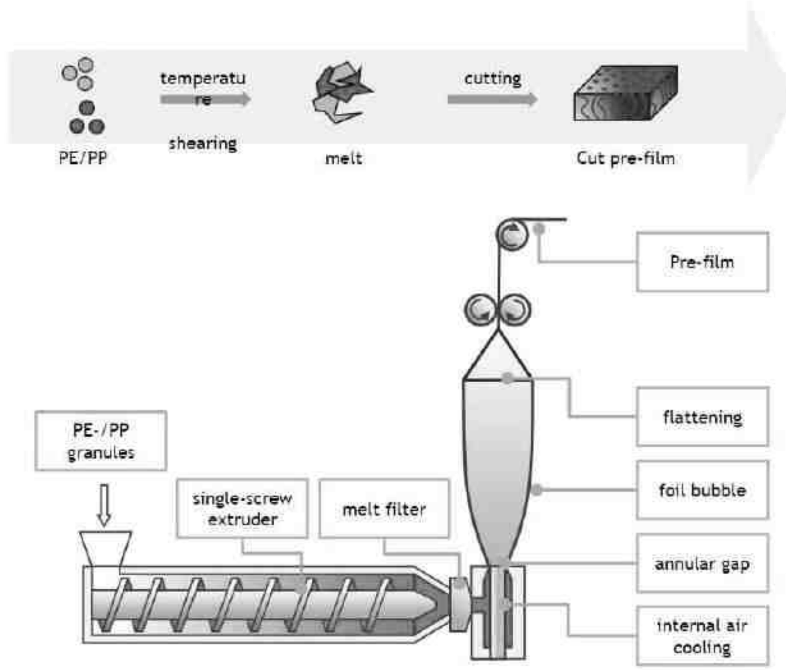
- <u>Biaxial Stretching:</u> In Biaxial simultaneously stretching, the film edges are held by clips whose spacing increases both in the running direction and at right angles to it. Biaxial sequential stretching involves stretching first in the longitudinal direction by rollers and then in transverse direction by clips.
- <u>Extraction:</u> Plasticizers [mineral oils] are extracted and recycled back into the process through solvents like chlorinated / fluorinated hydrocarbons.
- <u>Drying:</u> Directly after the extraction the DCM is dried and removed from the pores by evaporation
- <u>Thermo Fixation:</u> The film is fixed at the edges by retaining clips and passed through a further stretching furnace in order to carry out cross-stretching and cross-relaxing in different temperature zones
- <u>Rewind:</u> The final working step consists of a controlled winding, which usually takes place on a winder with a full working width of max. 5.5 m



Dry Process Description:

- <u>Extrusion:</u> In a single screw extruder, PE/PP granules are melted and homogenized by heat input and shearing.
- <u>Blown film process:</u> The melt is pressed through an annular gap to form a tube. Air flows through it from inside, which results in cooling from inside as well as outside. Knives are placed
- Slitting: After rewinding, the prefilm is transferred batchwise to narrower rolls on a cutting machine.
- <u>Lamination:</u> The roll goods are laminated together in a subsequent step with several layers under pressure and high temperature. Thus a “tri-layer” structure PP/PE/PP can be created.

- Longitudinal Stretching: In order to create a pore structure, it is necessary to arrange lamellae in rows perpendicular to the machine direction. This structure is created by a 2-step stretching process. In longitudinal stretching, the stretching process is realized by different roll speeds at different temperatures.
  - Cold stretching: Initiation of pore growth
  - Hot stretching: production and enlargement of pores
  - After stretching, the separator is then thermo fixed using heated rollers in order to reduce the shrinkage values.



For EV Parts manufacturing:

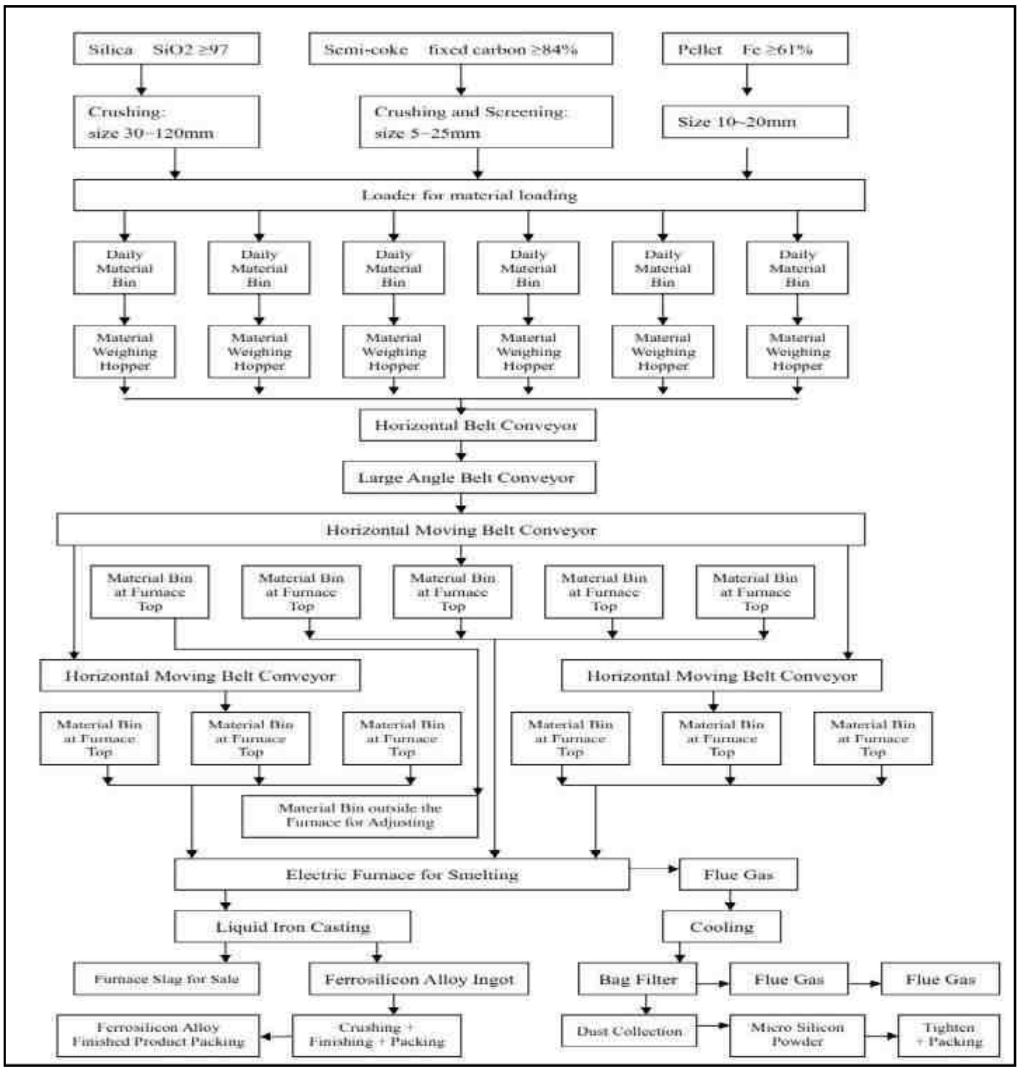
8. **Metallurgical industries (ferrous & Non-Ferrous):**

Ferro silicon Manufacturing

- Stack the purchased qualified raw materials (Silica, Semi coke, Iron pellets) in the stockyard (shed), set a material batching bin in the stockyard, and the raw materials are sent to the material batching bin through loader or other feeding equipment.
- Automatic batching equipment is equipped under the batching bin. The prepared mixture is sent to the bin at the top of the furnace by belt conveyor, and then intermittently added into the furnace through the material pipe for smelting reduction.
- A movable furnace door is installed on the platform of the furnace cover. After the furnace door is opened, a walking rammer can be used to assist in charging and maintain the material surface.

- When tapping, open the furnace mouth with taphole machine, and the molten iron flows into the ladle. After tapping, the ladle will cross to the casting workshop, and the iron will be poured into the ingot mould by crane. After cooling, it will be sent to the finished product warehouse for crushing and transportation.
- The flue gas contained dust is cooled by pipes and coolers, and then enters the dust collection system. The qualified flue gas is emitted, and the micro silicon powder is collected and densified before being transported out for sale.

Process flow diagram for manufacturing Ferro silicon is given in **below**



Magnesium Ingots Manufacturing

The production process of magnesium by vacuum silicon thermal reduction method mainly includes: crushing and screening of dolomite, 101odeling101abl of dolomite, raw material preparation, vacuum thermal reduction, refining and ingot casting of coarse magnesium, surface treatment and packaging.

9. **Crushing and screening of dolomite**

After crushing and screening, the qualified dolomite raw material from the mine is sent to the 102odeling102abl system with the particle size of 20-40mm; the qualified dolomite stone material with the particle size of 20-40mm can also be directly purchased and sent to the 102odeling102abl system after inspection and screening.

10. **Calcination of dolomite**

The dolomite with particle size of 20-40mm is send to the top bin of the vertical preheater by the conveying equipment, and then the dolomite is distributed into the vertical preheater by the chute. After entering the preheater, dolomite is preheated and decomposed by 800ºC ~ 900ºC high temperature hot gas from the rotary kiln tail, and then sent to the rotary kiln for 102odeling102abl by the hydraulic push rod feeding device, and calcined at 1150ºC ~ 1200ºC.

After 102odeling102abl in rotary kiln, the hot calcined dolomite enters the cylinder cooler from the kiln head. The hot calcined dolomite exchanges heat with the air in the cooler and cools. The calcined dolomite cooled to 150ºC ~ 200ºC is sent to the calcined dolomite silo of raw material preparation workshop through the discharger and conveying equipment.

After preheating the dolomite, the flue gas at the end of rotary kiln is cooled to ＜180ºC and then goes into bag filter for dust removal and purification, which is sent to the chimney by induced draft fan and discharged into the atmosphere.

Coal is used as fuel in rotary kiln, and the prepared coal powder is sent to the coal burner by pneumatic conveying device through closed pipeline from coal bunker to provide heat source for rotary kiln 102odeling102abl.

11. **Raw material preparation**

Calcined dolomite, crushed ferrosilicon and fluorite powder are added into the ball mill for grinding according to the proportioning ratio. After grinding to <0.15mm (100 mesh), the mixture is sent to the double-roller ball press by the conveying device, and the mixed powdery raw materials are pressed into dense massive pellets and sent to the reduction workshop.

iv. Vacuum thermal reduction

The pellets sent by the raw material preparation workshop are put into the heat-resistant steel reduction tank and reduced under vacuum and high temperature. The MgO in the pellet material is reduced by Si in the reduction tank, and escaped from the pellet in gaseous state, cooled and crystallized in the crystallizer at the front end of the reduction tank to form crystalline magnesium. After the reduction process, the crystalline magnesium is taken out from the reduction tank and sent to the refining workshop for refining. At the same time, the reduced slag is removed and transported to the storage yard for cooling and then sold to the cement plant. Then the pelletizing material is added to start the next reduction cycle.

At high temperature, Magnesium oxide reacts with silicon to produce magnesium and silicon oxide. At high temperature, Magnesium is in magnesium vapor state. If magnesium vapor combines with oxygen in the air, it will react to produce magnesium oxide. Therefore, in the reduction tank, it needs to be in vacuum state and isolated from the air. After cooling, magnesium vapor crystallizes into magnesium metal.

The reduction furnace uses the gas produced by coal as the fuel. The gas is sent from the gas station to the front of the reduction furnace by pipeline, and the combustion of the reduction furnace provides the heat source for the reduction furnace. The reduction furnace is the regenerator technology, which is the latest technology. Compared with the traditional reduction furnace, it can save 40-50% energy, and the flue gas at the end of the furnace will be discharged after being reduced to less than 100ºC.

Fluorite will be added before heating in reduction furnace. The maximum temperature in Reduction furnace is 1200 ºC only.The melting point of CaF_2 (fluorite powder) is 1402 ºC and boiling point is 2500ºC.

HF gas will be removed by a two stage wet scrubber by adding NaOH or $Ca(OH)_2$ soaked filters. One mole of NaOH is required to neutralize one mole of HF as follows:

$$NaOH + HF = NaF + H_2O$$

In addition, one mole of $Ca(OH)_2$ will neutralize two moles of HF to produce insoluble CaF_2 salt. CaF_2 can be removed and added back to reduction chamber:

$$Ca(OH)_2 + 2HF = CaF_2 + 2H_2O$$

For every ton of Mg produced 68.6 kg of NaOH or 63.5 kg of Ca $(OH)_2$ will be used to neutralize HF emissions.

v. Refining and ingot casting

Crystalline magnesium (coarse magnesium) sent from reduction workshop is added into refining pot, heated to 610 C by gas fuel to remelt and dilute, impurity slag contained in coarse magnesium is separated and precipitated, then heated to 650 C, solvent is added, standing for 5-10 minutes, then the temperature is reduced to 610 C, and magnesium liquid is pumped out by electromagnetic pump and poured into mold to cast refined magnesium ingot. In order to avoid oxidation and combustion of molten magnesium during casting, nitrogen injection protection was used to prevent oxidation and combustion.

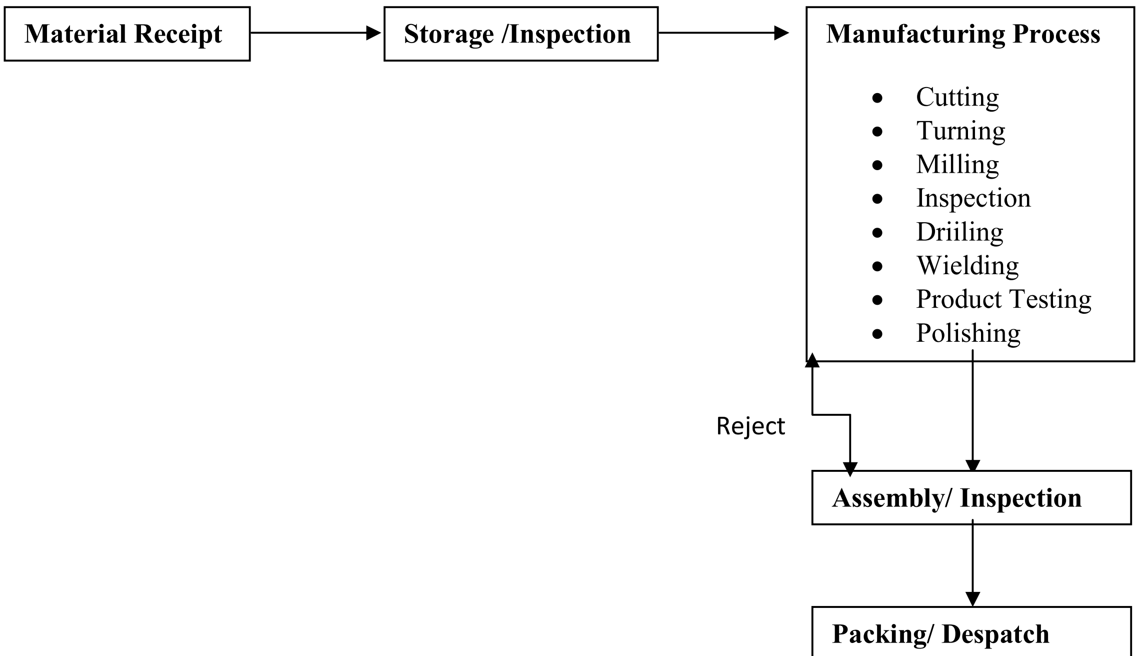
12. General engineering Units:

India's engineering sector is divided into two major segments:

- **Heavy Engineering Industry**: The Heavy Engineering Industry is the largest among all industrial sectors in India. It incorporates diverse segments of industry which can be broadly divided into segments, namely, Machining tools, Textile machinery, Cement machinery, Material handling equipment, Plastic processing machinery, Process plant equipment and Earth moving construction equipment.

- **Light Engineering Industry**: The light engineering industry includes items like castings, industrial fasteners and sophisticated microprocessor-based process control equipment and diagnostic medical instruments.

General Manufacturing Process: (Process Flow)

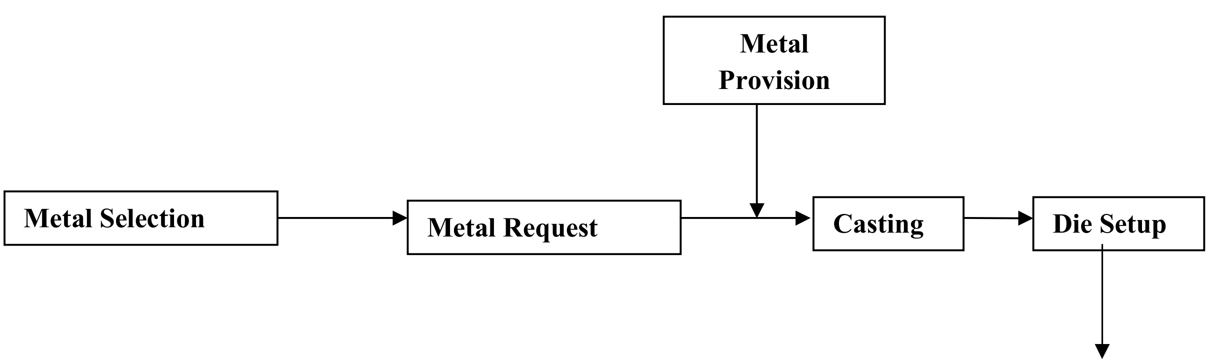


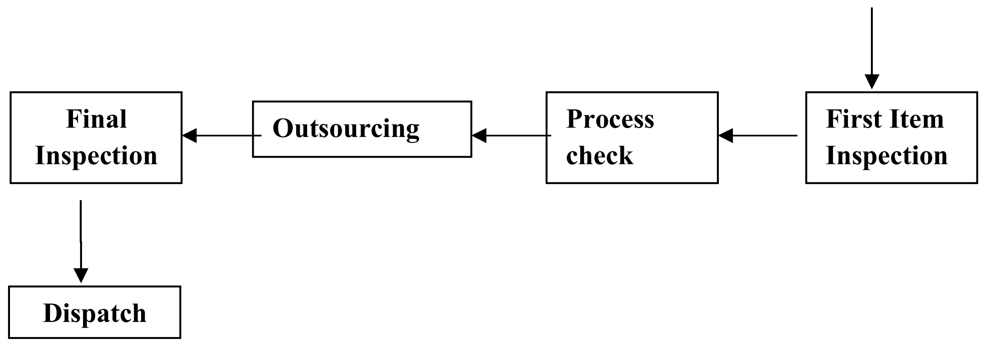
6.1. 7. Automobile Components:

India was the fifth-largest auto market and world's fifth largest manufacturer of cars and seventh largest manufacturer of commercial vehicles in 2019. Indian automotive industry (including component manufacturing) is expected to reach US$ 251.4-282.8 billion by 2026. The industry attracted Foreign Direct Investment (FDI) worth US$ 25.85 billion between April 2000 and March 2021 accounting for ~5% of the total FDI.

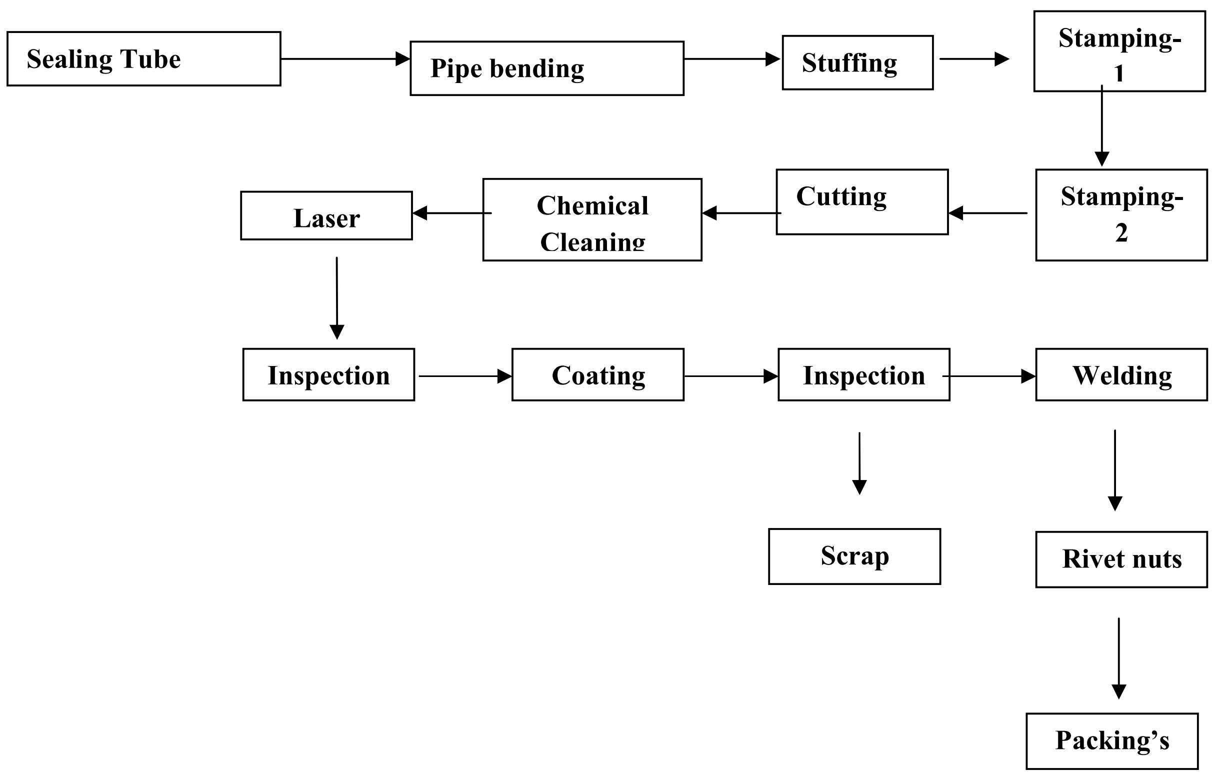
General Manufacturing Process: (Process Flow)

1. Metal Casting (Gear, Wheel rim, Chain/Shaft etc):





2. Metal Casting (Nuts, fasteners):



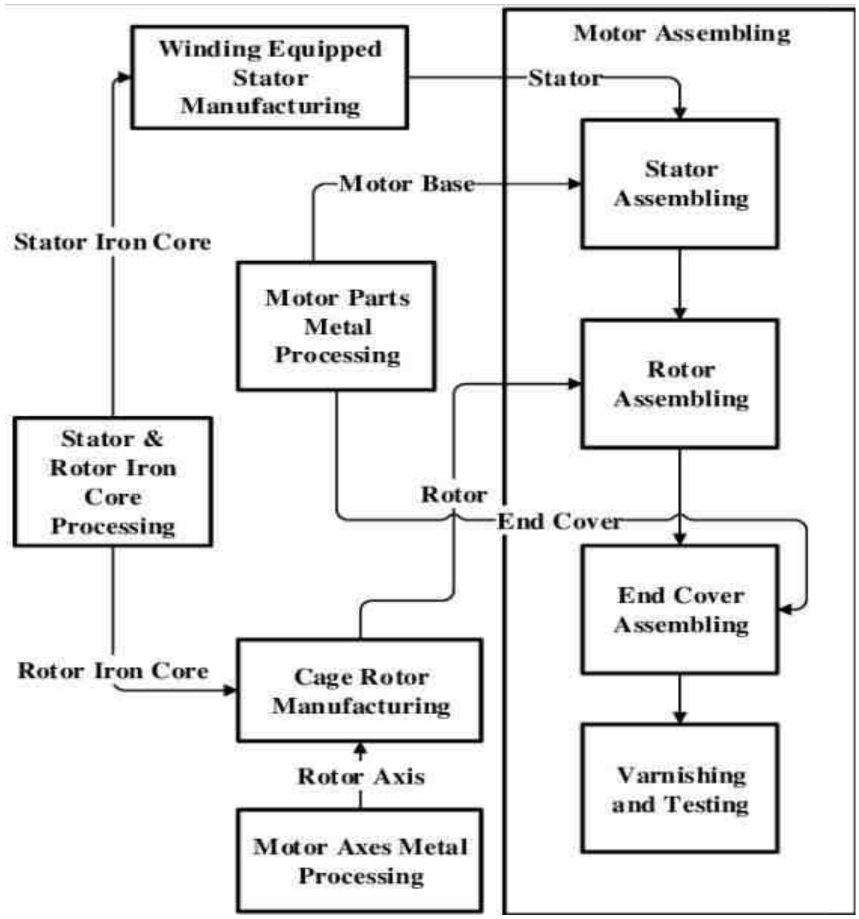
Source:https://www.researchgate.net/figure/Production-flow-of-automobile-parts_fig3_327936137

8. Electrical & Electronics:

The performance of industrial electronics sub-sector is closely linked with investments and demand patterns in other industries as these electronic products are consumed by other industries. India has been showing progressive reforms in the field of strategic electronics wherein, some of the latest technologies being promoted includes electro-magnetic wave application, intelligent sensor, RFID, microrobotic, intelligent material, micro-electronic systems, intelligent secure data communication, millimeter wave and microwave devices. In the electronic component segment, India has been an exporter of components such as cables, speakers, and cathode ray tubes among others.

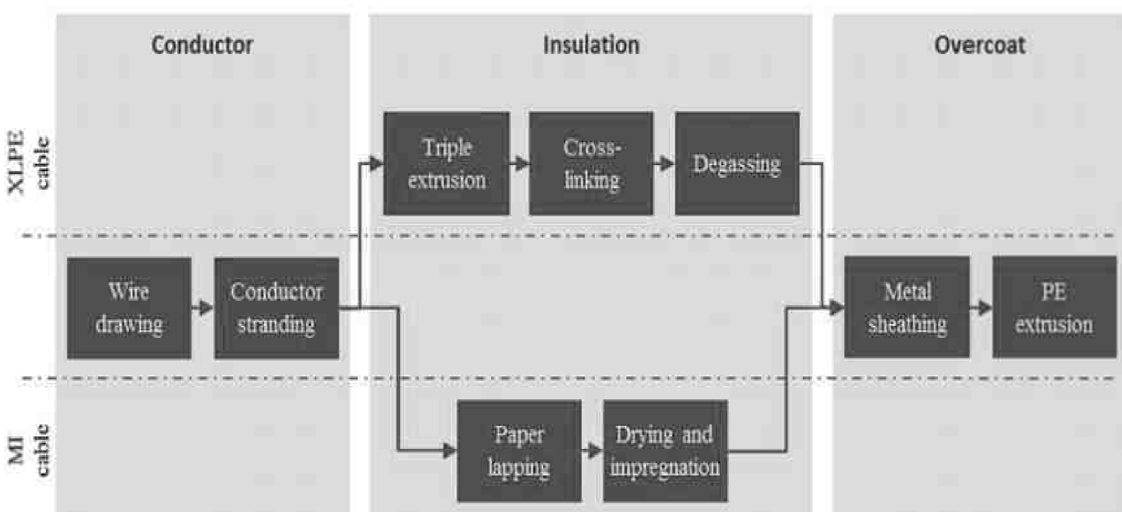
General Manufacturing Process: (Process Flow)

1. EV Motor manufacturing processes.



Source:https://www.researchgate.net/figure/Motor-manufacturing-processes_fig1_335499297

2. Brake Cable manufacturing process:



Apart from the above, some other industries (non-EC & EC) as stated in undertaking may come based on their requirement.

2.7.2 Project zoning

The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc.as per the EIA Notification 2006 and its subsequent amendments. Zonation details of the Industrial Park are given in **Table 2-5**. Zonation Map of the Industrial Park is given in **Figure 2-8** and enclosed as **Annexure-11.**

Table 2-5Zonation of Industrial Park

<table>
<tr><th>S. No.</th><th>Type of Industries</th><th>EV Products (Battery compound and others parts) under EC category</th><th>Revised Approx. Percentage of Allocation after EAC meeting</th></tr>
<tr><td>1.</td><td>3(a) – Metallurgical industries (ferrous & Non-Ferrous)</td><td>Metallurgical processing industrial units – EV/Automobile Manufacturing</td><td rowspan="3">27.49%</td></tr>
<tr><td>2.</td><td>5I– Petrochemical products and petrochemical based processing such as production of carbon black and electrode grade graphite</td><td>EV Battery Anode</td></tr>
<tr><td>3.</td><td>5(f) – Synthetic Organic Chemical industries.</td><td>EV Battery Electrolyte</td></tr>
<tr><td>4.</td><td>Other Non-EC Category Industries such as General Engineering, Automobile components, Electrical & Electronics, etc. as per the EIA Notification 2006 and its subsequent amendments</td><td>EV Battery Separator & Cathode, Other E-Vehicle parts and Automobile parts etc.,</td><td>72.51 %</td></tr>
<tr><td colspan="3">Total</td><td>100%</td></tr>
</table>

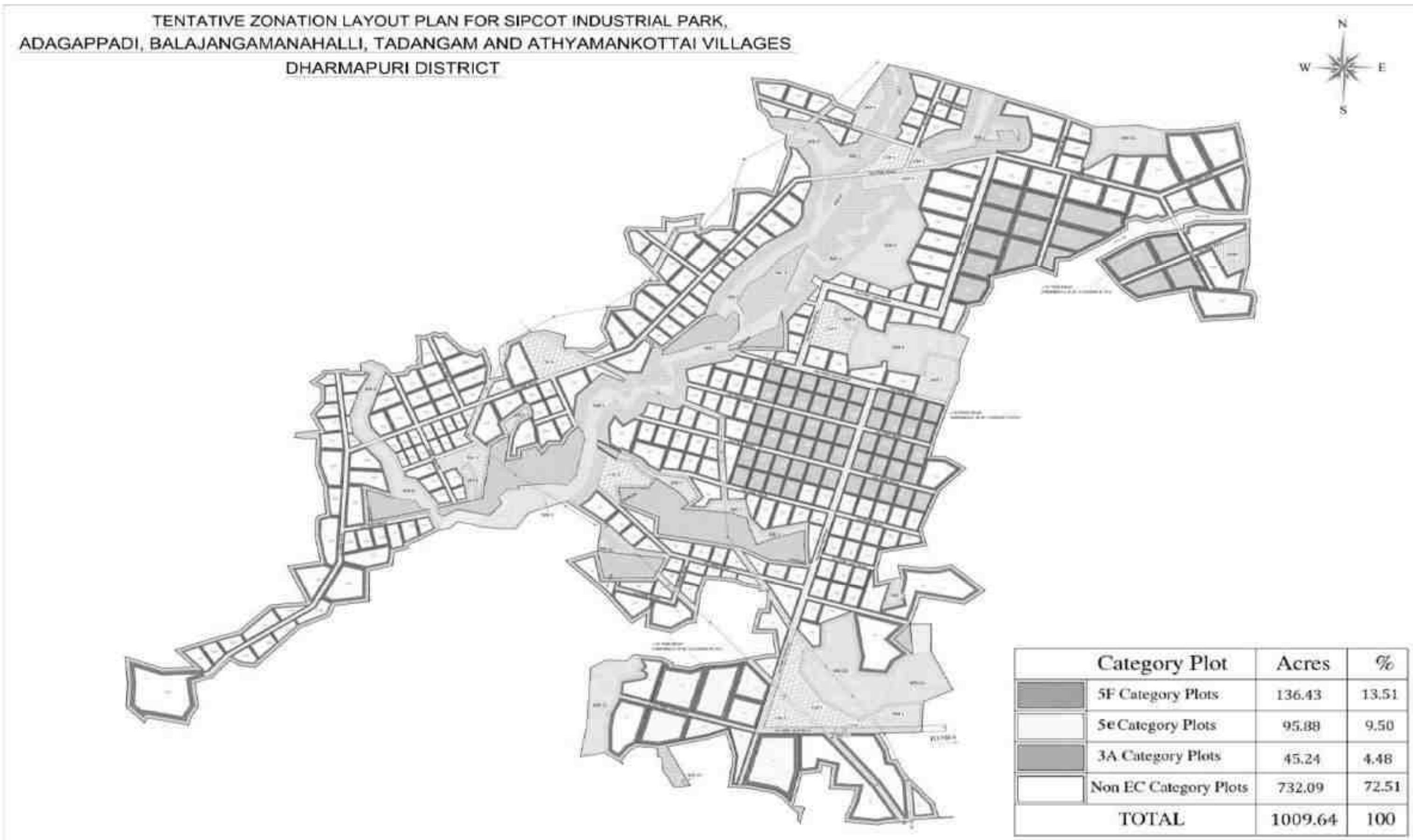


Figure 2-8Zonation map for the Industrial Park

2.7.3 Project components

2.7.3.1 Industrial plot area

Total industrial plot area is 1009.64 acres.Totalnumbers of plots proposed for theIndustrial Park is 349 nos. Industrial plot area break up for the Industrial Park is given in **Table 2-6**.

Table 2-6Industrial plot area breakup

Plot No	Acres	Plot No	Acres	Plot No	Acres
1	13.04	118	1.59	235	2.51
2	2.38	119	1.63	236	2.71
3	17.70	120	1.77	237	1.85
4	15.33	121	1.96	238	1.23
5	4.12	122	2.00	239	2.19
6	3.54	123	2.00	240	4.16
7	8.09	124	1.97	241	1.73
8	9.14	125	2.00	242	3.90
9	5.90	126	2.00	243	3.18
10	9.54	127	2.00	244	2.32
11	9.95	128	2.00	245	1.68
12	4.96	129	2.00	246	1.57
13	5.28	130	2.00	247	1.52
14	1.88	131	2.00	248	1.63
15	4.00	132	1.99	249	1.85
16	4.12	133	1.91	250	2.27
17	0.95	134	2.00	251	2.13
18	0.70	135	2.00	252	1.95
19	0.88	136	2.00	253	1.55
20	1.21	137	2.00	254	5.29
21	1.17	138	2.00	255	1.98
22	1.61	139	2.00	256	2.91
23	5.66	140	2.00	257	1.53
24	3.77	141	1.97	258	2.87
25	3.28	142	2.00	259	3.61
26	2.08	143	2.00	260	1.69
27	1.58	144	2.00	261	1.50
28	1.18	145	2.00	262	1.50
29	1.36	146	2.69	263	1.77
30	1.61	147	2.72	264	3.22
31	1.97	148	1.77	265	4.94
32	2.01	149	1.77	266	0.88
33	3.68	150	1.72	267	1.00
34	1.83	151	1.74	268	1.00
35	2.33	152	1.74	269	1.00
36	1.89	153	1.74	270	1.00

Plot No	Acres	Plot No	Acres	Plot No	Acres
37	1.57	154	1.74	271	1.00
38	1.74	155	1.97	272	1.00
39	1.51	156	1.97	273	1.70
40	1.92	157	1.97	274	1.64
41	2.04	158	1.96	275	0.96
42	2.76	159	3.31	276	1.36
43	2.00	160	3.26	277	1.84
44	2.13	161	2.50	278	2.04
45	12.23	162	2.91	279	0.99
46	13.08	163	1.56	280	0.99
47	4.27	164	1.22	281	0.81
48	2.00	165	1.59	282	1.09
49	2.00	166	2.42	283	1.00
50	2.00	167	1.10	284	1.00
51	1.94	168	1.12	285	3.39
52	1.98	169	3.82	286	4.02
53	1.94	170	3.52	287	4.39
54	2.22	171	2.02	288	1.71
55	2.00	172	2.18	289	1.83
56	1.97	173	3.36	290	1.71
57	2.23	174	2.20	291	2.03
58	3.20	175	2.16	292	1.94
59	1.06	176	1.30	293	1.36
60	1.45	177	1.24	294	4.54
61	2.93	178	1.02	295	7.35
62	2.56	179	1.58	296	2.38
63	1.85	180	4.02	297	1.56
64	1.27	181	4.54	298	2.22
65	1.97	182	4.20	299	1.74
66	2.00	183	4.51	300	17.42
67	2.00	184	5.95	301	2.39
68	1.88	185	7.01	302	1.96
69	1.37	186	2.66	303	1.77
70	1.84	187	5.00	304	3.17
71	2.00	188	4.91	305	1.63
72	2.00	189	4.96	306	4.83
73	2.00	190	4.96	307	5.21
74	2.00	191	4.83	308	2.25
75	1.98	192	5.00	309	4.86
76	1.98	193	6.59	310	2.41
77	1.98	194	5.00	311	1.82
78	1.98	195	4.95	312	1.73
79	1.94	196	5.00	313	1.37

Plot No	Acres	Plot No	Acres	Plot No	Acres
80	2.00	197	5.00	314	1.07
81	2.43	198	8.74	315	2.64
82	1.85	199	6.12	316	1.40
83	2.03	200	2.46	317	0.57
84	3.95	201	3.92	318	0.80
85	4.68	202	4.69	319	2.67
86	2.00	203	4.77	320	3.02
87	2.00	204	8.09	321	2.67
88	2.00	205	4.91	322	1.25
89	2.00	206	5.20	323	2.60
90	1.63	207	8.47	324	2.00
91	2.62	208	5.97	325	2.00
92	2.00	209	6.19	326	2.00
93	1.97	210	2.93	327	2.00
94	2.00	211	5.73	328	2.52
95	2.00	212	5.27	329	1.86
96	2.00	213	8.35	330	2.33
97	2.00	214	8.78	331	3.90
98	2.00	215	7.36	332	3.13
99	2.00	216	5.02	333	2.09
100	2.00	217	2.72	334	1.67
101	2.00	218	2.28	335	5.53
102	2.05	219	2.34	336	1.35
103	3.90	220	2.27	337	3.93
104	2.00	221	7.36	338	3.63
105	2.00	222	5.25	339	3.40
106	2.00	223	1.86	340	3.13
107	2.00	224	1.76	341	2.63
108	2.00	225	2.92	342	2.43
109	2.00	226	1.39	343	1.84
110	2.00	227	1.31	344	2.10
111	2.00	228	1.45	345	2.86
112	1.97	229	1.46	346	3.30
113	2.00	230	1.59	347	3.52
114	2.65	231	3.10	348	3.33
115	2.49	232	1.26	349	6.15
116	2.01	233	1.88	**Total**	**1009.64**
117	1.57	234	2.06		

2.7.3.2 Common facilities

12.15Ha (30.010 Acres) of land is proposed for common amenities. The amenities/ facilities proposed within project site are Administrative Office, First Aid Center,watersupply, Fire station,EB,etc.

2.7.3.3 Commercial area

18.227 Ha (45.020 Acres) is proposed for commercial facilities like Bank, ATM, Shops,Canteen,etcwill be proposed in commercial area.

2.7.3.4 Green belt

Total green belt area proposed in the Industrial Park works out to be 250.929 Ha (619.796 Acres) which accounts to 41.30 % of Developable area of 607.618 Ha (1500.815 Acres). Green belt area break up is given in **Table 2-7**.

Table 2-7 Green belt area break up

Details	Ha	Acres	%
33% GB in plot area	134.891	333.181	22.20%
Green belt	116.038	286.615	19.10%
Total	**250.929**	**619.796**	**41.30%**

Individual industries will be mandated to maintain green belt area of 33% in their allotted premises.

2.7.3.5 Roads

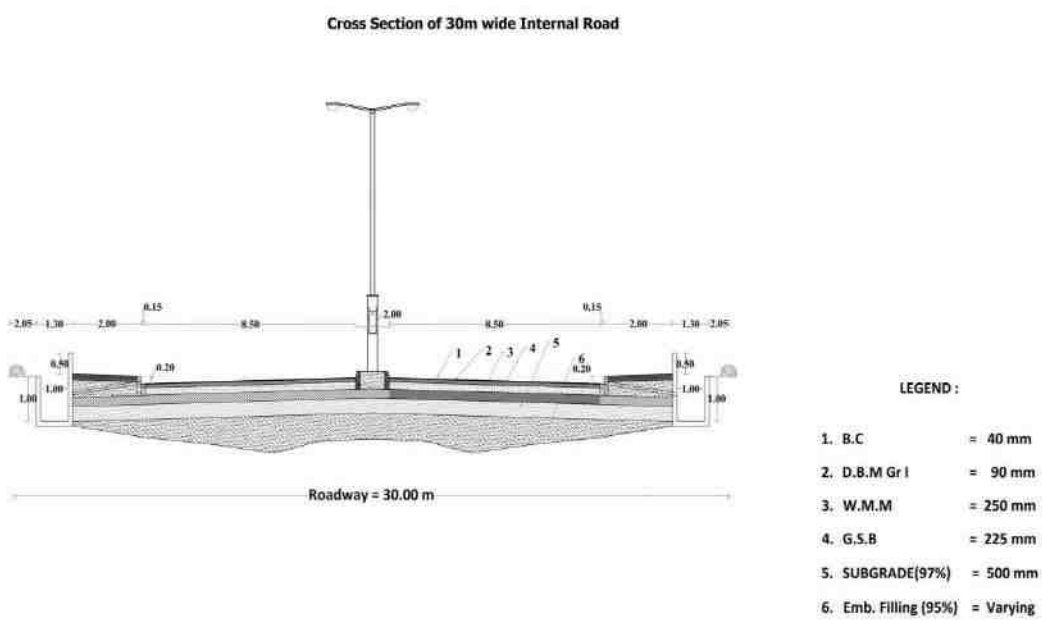
49.101 Ha (121.280Acres) is proposed for roads and storm water drains.30m and 18m RoWInternal roads will be provided by SIPCOT. The length of roads is given in **Table 2-8**.

Table 2-8 Length of internal roads

Width of the road	Road Length(km)
30	4.730
18	20.042

It is proposed to provide integrated storm water drainage system(on side of roads) along with rain water harvesting pits.The typical cross-section of the proposed roads is given in **Figure 2-9**.

<u>TYPICAL CROSS SECTION OF 30.00M WIDE ROAD</u>



TYPICAL CROSS SECTION OF 18.00M WIDE ROAD

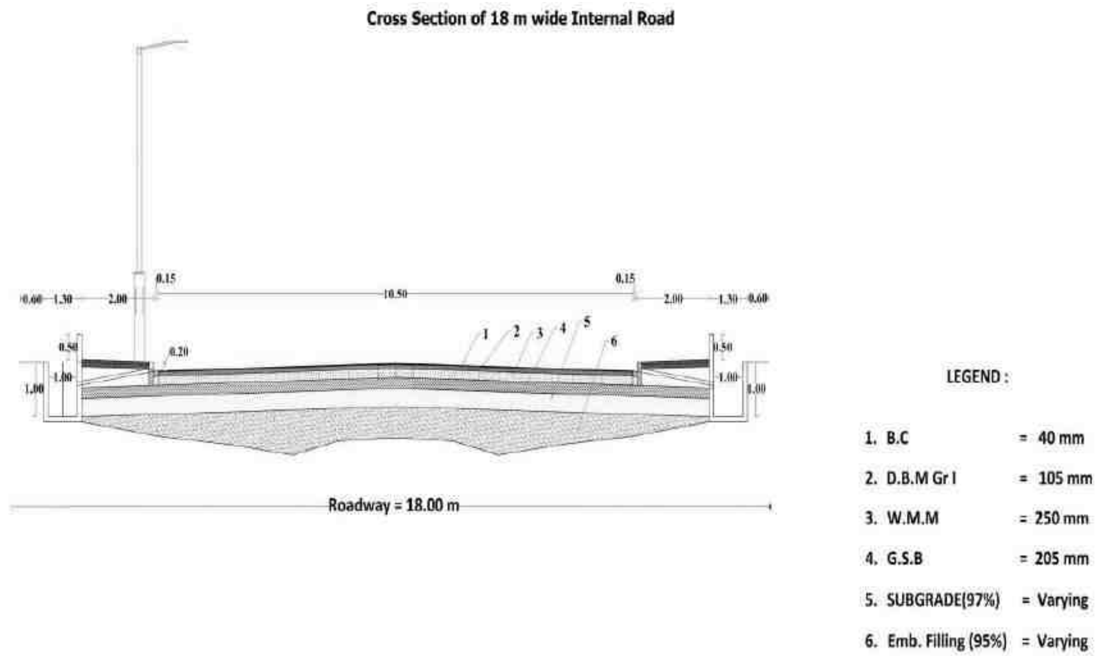


Figure 2-9 Typical Road Cross-section of 30 m & 18 m ROW

2.7.4 Infrastructure requirements for the project

2.7.4.1 Water Requirement

Construction Phase: During the construction phase, the water requirement for the project is calculated as 60 KLD and same will be sourced from Private water suppliers. Approximate people working will be around 250 Nos. Only infrastructure development like provision of storm water drain,laying of roads, water supply line, providing substation, green belt in common area, commonfacilities are under the scope of SIPCOT. The construction period for infrastructure facilities is estimated to be 24months.

Operation Phase:

Total water requirement for the project during operation phase is 13320 KLD. Fresh water will be sourced from Tamil Nadu Water Supply and Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23 (**Annexure-7)**.Water requirement calculations are given in **Table 2-9** and Water balance chart for Industrial Park with is given in **Figure 2-10**.

Table 2-9Water Requirement during operation phase

Usage	Total water (KLD)	Fresh water (KLD)	Recycled water (KLD)

Domestic	458	458	0
Flushing	366	0	366
Utilities & Process	3714	560	3154
Green belt	8782	8393	389
Total	**13320**	**9411**	**3909**

Note:

- Water requirement for Industrial plots excluding GB area-676.459 acres@ 5 KL/Acre =3382.295 say 3383 KLD
- Water requirement for Amenities and SWM-35.01 acres @ 3 KL/Acre =105.03 KLD say 106 KLD
- Water requirement for commercial area-45.02acres @5 KL/Acre=225 KLD
- Water requirement for employees- 18300 persons @45 LPCD =823.5 KLD say 824 (Domestic@25=457.5 say 458, Flushing @20=366)
- Water requirement for green belt –35 KL/Ha =8782 KLD

In ToR, the Total water consumption is 12894 KLD in which fresh water consumption is 8793 KLD.

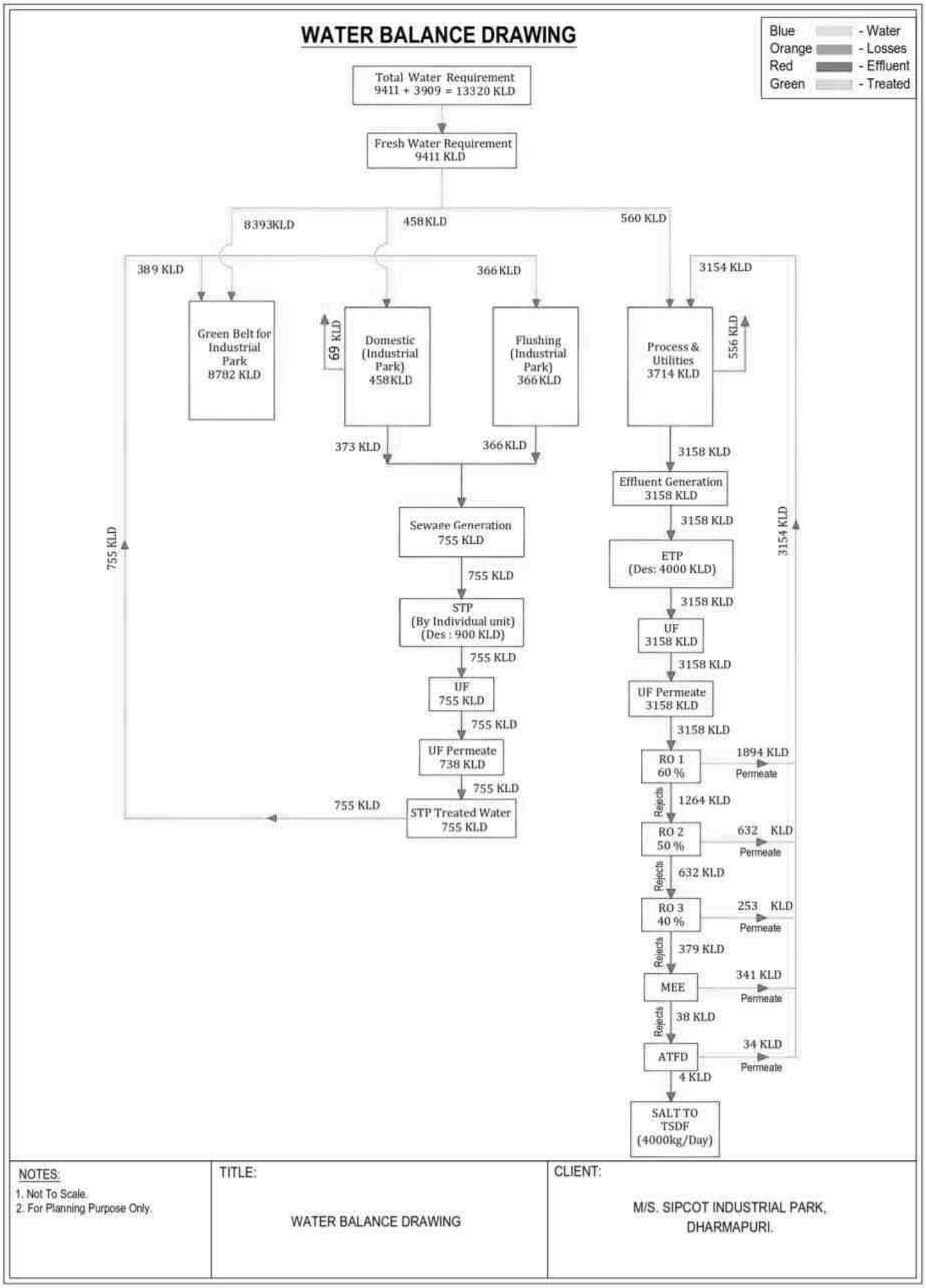


Figure 2-10Water Balance Chart for Industrial park

2.7.4.2 Power Requirements

Power requirement for the Industrial Park is estimated to be 60 MVA (In ToR: 61 MVA). SIPCOT will earmark requisite land for TANGEDCO for the establishment of exclusive substation for the industrial park. Supply and distribution systems will be installed by TANGEDCO. Individual industries will have their own power back up.SIPCOT will not propose any power back up for other common facilities.

2.7.4.3 Man Power

Approximately 250 employees will be required for the construction Period inclusive of Workmen, Supervisors, Engineers, Architects and Managers. During operation phase, the estimated population will be 18300 people (Direct- 16470 & Indirect: 1830).

In ToR, manpower is 19210 No (Direct- 17290 & Indirect-1920).

2.8 Mitigation Measures Proposed for the project to meet the Environmental Standards

2.8.1 Air Pollution Control Measures

Individual industries will have their own power back up in case of power failure. DG sets, Kiln/furnace andboilers,etcwill be provided with acoustic enclosures and sufficient stack height for dipersion of gases.Fumes are envisaged from the Engineering, Fabrication and Automobile/ auto components units. Individual industries will be instructed to provide appropriate Air Pollution Control Equipments at different locations, which will be connected to their common stack of appropriate height. Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.

2.8.2 Wastewater generation and Management

Individual industries will have their own Sewage Treatment Plants. Treated sewage will be recycled for flushing and green belt developmentas per CPCB/TNPCB guidelines.Individual industries will have their own Effluent Treatment Plants and will be mandated to ensure Zero Liquid Discharge conceptas per CPCB/TNPCB guidelines. Treated effluent will be recycled for their process and utilities purpose. Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.Details of waste water generation& treatment are given in **Table 2-10.**

Table 2-10Wastewater generation and treatment

S.No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			
1	Sewage	10	Will be treated in15 KLD mobile STP and treated sewage will be used for green belt development during construction phase
Operation Phase			
2	Sewage from industries	755	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.

3	Effluent from individual industries	3158	Will be treated by individual industries and reused for process and utilities. ZLD will be maintained by individual industries.

2.8.3 Municipal Solid Waste generation and Management

Municipal Solid waste generation and management for proposed project are detailed in **Table 2-11.**

Table 2-11Municipal Solid Waste generation and Management

S.No	Municipal Solid waste	Construction phase (kg/day)- 250 Nos	Operation phase (kg/day)- 18300 Nos	Disposal Method
1	Organic waste	68	4941	Individual industries will segregate the waste and organic waste will be composted and used as manure.
2	Inorganic waste	45	3294	Sold to TNPCB authorized recyclers by individual industries

Note: As per CPHEEO Norms 0.45 kg/capita/day is the MSW generation, of which 60% is organic & 40% is inorganic.

MSW Management: As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facility including a shed for E-Waste Management) has been earmarked for Solid Waste Management Facility.

2.8.4 Hazardous waste generation and management

Hazardous wastes generated from the allotted industries will be managed by the industries and it will be stored in designated areas within theirpremises and disposed as per Hazardous waste (Management and Transboundary) Rules 2016.

E-waste Management: E-wastes from the allotted industries will be managed them and it will be stored in designated areas within their premises and disposed as per E-waste Management Rules 2022.

2.9 Assessment of New & untested technology for the riskof technological failure

The Industrial Park is planned with 27.49% industrial plot area for EC category industries(3a,5e and 5f) and balance 72.51% Industrial plot area for non EC-category Industries as per the EIA Notification 2006 and its amendments. The industries to be proposed will be using only tested technology and there will be no risk for technological failure. Details of general manufacturing process and technology of the individual industries is given in **Section 2.7.1.**

2.10 Project Cost

Tentative Project cost for the proposed project is estimated at INR. 461.36 crores. The details are given below in **Table 2-12.**

Table 2-12Project cost for Industrial Park

S.No	Components	Total cost (Rs in lakhs)
1	Land alienation cost	18661.97
2	Site Development	698.83
3	Development of Roads (including storm water drains, rainwater harvesting, Solid Waste Management)	10094.27
4	Water Supply scheme	11290.05
5	Common facilities	931.78
6	Street light	543.54
7	Green belt development	776.48
8	Contingency	2221.85
9	Preliminary and Preoperative expenses	917.43
Total cost of project		**46136.20**
say Rs. In crores		**461.36**

CHAPTER-3

DESCRIPTION OF ENVIRONMENT

3. DESCRIPTION OF ENVIRONMENT

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the proposed project located at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, Tamil Nadu by The primary baseline data monitored covered three (3) months i.e., from **March 2023 to May 2023**and secondary data was collected from government and semi-government organizations published data. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) ltd, Chennai, NABL accredited MoEF&CC approved environmental testing laboratory for the following terrestrial environmental components.

3.1 Study Area and Period

A 10 Km radial distance with the proposed project site has been identified as the General study area for assessing the baseline environmental status. The core study area is the project area and its immediate surroundings to the tune of 1.0 Km radius from the boundary. Further the Project Impact/Influence Area (PIA) is 10Km from the boundary of the project site which covers parts of Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri district of Tamil Nadu State. The primary baseline data monitored covered three (3) months i.e., from **March 2023 to May 2023**.

3.2 Description of the Study Area, components & Methodologies

As described in Chapter-1, proposed project is "Development of Industrial Park at Adhagapadi Village of DharmapuriTaluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District, and Tamil Nadu over an extent of 698.205 Ha (1724.566 Acres)".As part of its endeavor to promote new industries and considering the demand for industrial land in the vicinity of Bangalore-Hosur Industrial Stretch. An overall idea of the study area with reference to the physical conditions are presented for better understanding in the following sections before proceeding into the section on the prevailing environmental conditions of the study area. The map showing the satellite image of the study area is given in **Figure 3-1**and Topo Map of the study area is given in **Figure 3-2**.

- **Meteorology:** Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section- 3.5.4.**
- **Ambient Air Quality:** Particulate matter <10-micron size (PM_{10}), Particulate matter <2.5-micron size ($PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Lead (Pb), Ozone (O_3), Benzene (C_6H_6), Benzo (a) pyrene ($C_{20}H_{12}$), Arsenic (As), Nickel (Ni), Ammonia (NH_3),TVOC,**Refer Section- 3.6.**
- **Ambient Noise Levels:** Day equivalent noise levels, Night equivalent noise levels –**Refer Section- 3.7**
- **Water Quality:** Ground Water Quality, Surface Water Quality- **Refer Section- 3.8**

- **Soil Quality- Refer Section- 3.90**
- **Biological Environment – Refer Section- 3.10**
- **Socio Economic Status- Refer Section- 3.11**

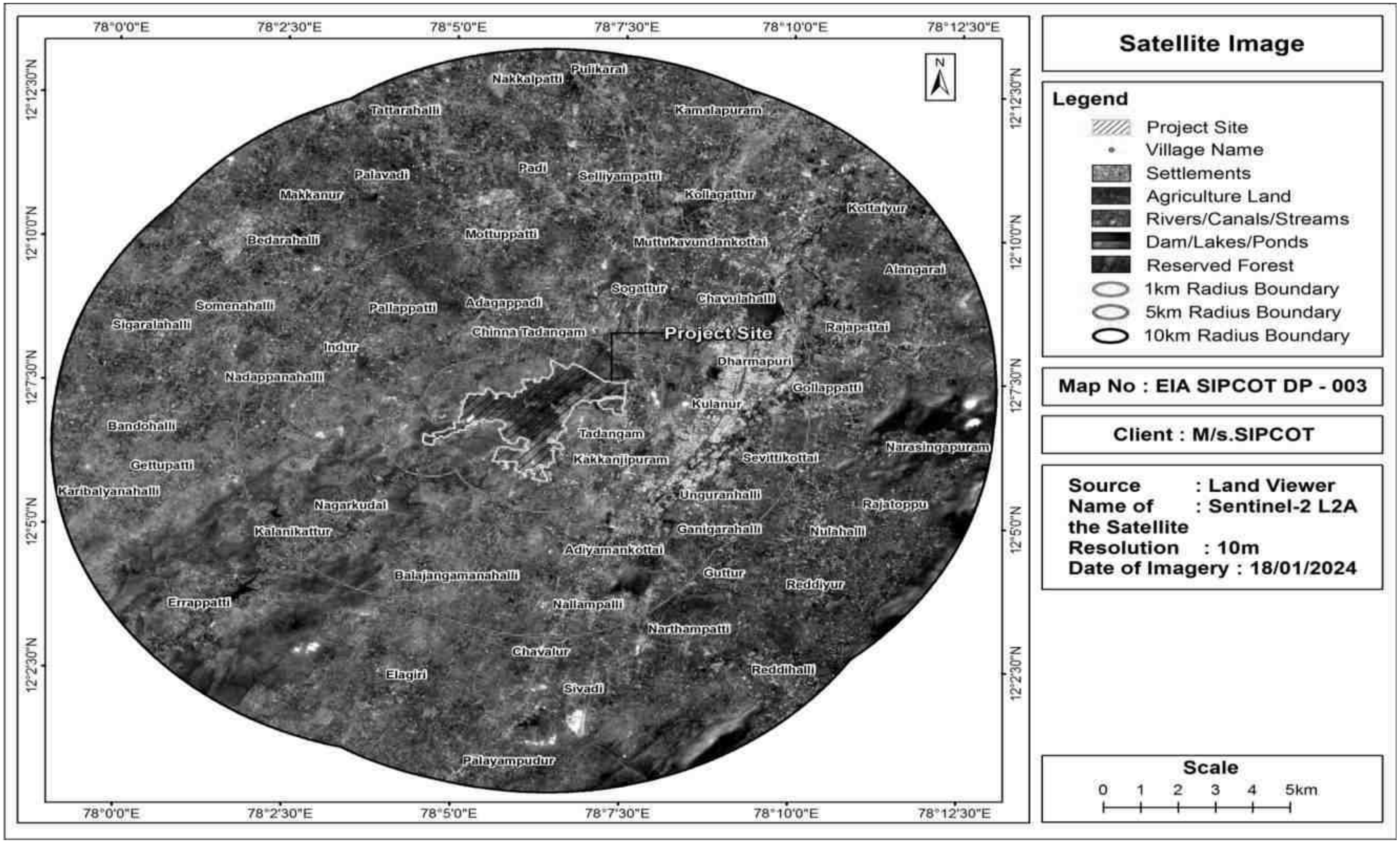


Figure 3-1Map showing the Satellite Image of the study area of Project

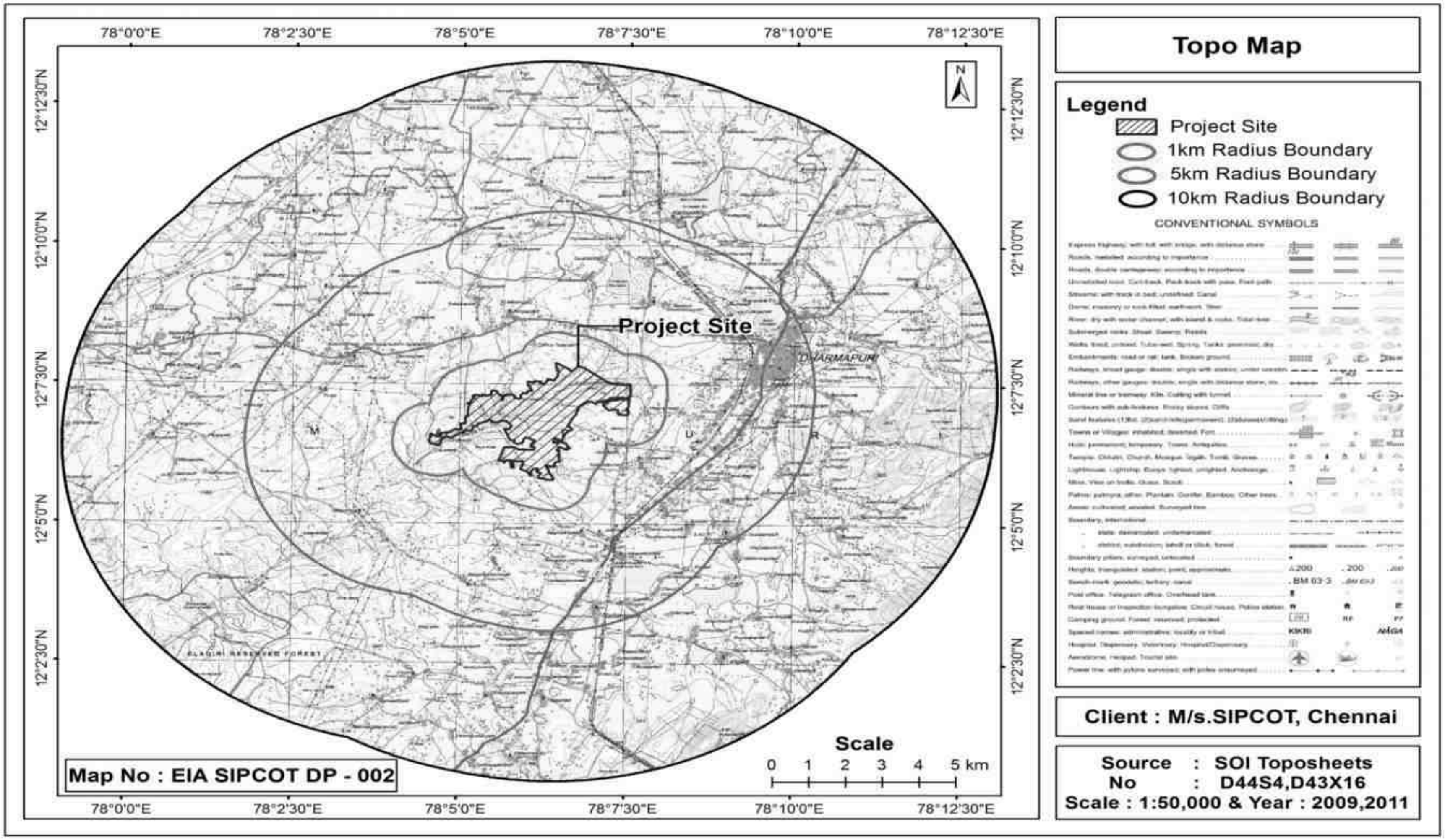


Figure 3-2Topo Map of Study area

3.3 Environmental/ Ecological Sensitive Areas

This section details with the environmentally sensitive areas present within the project site and surrounding environs. It included national parks, state forest, essential habitats etc. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in **Table 3-1**.

Table 3-1Environmentally Sensitive Areas within 15km from Project Boundary

S. No	Particulars	Details		
1.	Monuments	**Monuments**	**~Dist**	**Direc**
		Chennaraya Perumal Temple	2.71km	SSE
2.	Water bodies/Reserve forest	**Waterbodies**	**Dist(km)**	**Direc**
		PeriyaAr	Passing within the site	
		Pond near Tokkampatti	0.8	E
		VettalAr	0.85	S
		Nagavati R/Palar R	1.91	SW
		Pidamaneri Lake	2.19	E
		Sogattur Lake	2.57	N
		Indur Lake	2.61	W
		VirupakshipuramPallam	2.95	E
		Adiyamankottai Lake	3.22	SE
		RamakkalEri	3.77	ENE
		Nagavathi Dam	4.73	SW
		SemmandakuppamAr	5.08	NNE
		KadagatturEri	5.11	NNE
		PanangalliEri	8.44	N
		VarattuPallam	10.55	NW
		SiddampattiPallam	10.79	NW
		PeriyaPallam	11.46	SW
		Baisuhalli Lake	11.67	NE
		KutturevaPallam	12.54	SW
		MurugankinattuPallam	13.18	SW
		ToppaiAr/VeppadiAr	14.69	SSE
		Thoppaiyaru Reservoir	14.63	S
		Reserve Forest		
		ElagiriRF	6.06	SSW
		ToppurRF	9.1	SSE
		ParigamRF	11.95	SSW
		PikkilimalaiRF	12.39	NW
		MukkanurRF	12.48	E
		MukkanurRF	14.14	ESE
3.	Notified Wildlife Sanctuary/ National Parks	Nil within 15km radius (**Note**: Cauvery South Wildlife Sanctuary is located at ~16.90		

<table>
<tr><th>S. No</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td></td><td>km (NW) from project site boundary)</td></tr>
<tr><td>4.</td><td>Inter State Boundary</td><td>Nil within 15km radius</td></tr>
<tr><td>5.</td><td>Nearest Highway</td><td>
<table>
<tr><td>NH-844(Hosur-Dharmapuri)/SH-17(Malur-Adhiyamankottai)</td><td>~0.25km</td><td>E</td></tr>
<tr><td>NH-44(Srinagar-Dharmapuri-Kanyakumari)</td><td>~0.67km</td><td>E</td></tr>
</table>
</td></tr>
<tr><td>6.</td><td>Nearest Village/ Habitation</td><td>
<table>
<tr><th>Villages</th><th>~Dist.</th><th>Dire.</th><th>Population</th></tr>
<tr><td>Siva Subramanya Nagar</td><td>0.11km</td><td>N</td><td>250</td></tr>
<tr><td>Veganampatti</td><td>0.31km</td><td>E</td><td>1,000</td></tr>
<tr><td>Vimalapuri</td><td>0.40km</td><td>E</td><td>50</td></tr>
<tr><td>ChinnaTadangam</td><td>0.70km</td><td>N</td><td>350</td></tr>
<tr><td>Tadangam</td><td>0.80km</td><td>E</td><td>8,601</td></tr>
</table>
</td></tr>
<tr><td>7.</td><td>Manmade Sensitive</td><td>
<table>
<tr><th>Schools</th><th>~Dist (km)</th><th>Direc</th></tr>
<tr><td>Unity Matric Hr Sec School</td><td>0.57</td><td>ESE</td></tr>
<tr><td>Thokkampatti A.D.W. Govt Primary School</td><td>1.54</td><td>E</td></tr>
<tr><td>Lakkiampatty Govt High School</td><td>2.76</td><td>E</td></tr>
<tr><td>Nagarkudal Govt High School</td><td>3.31</td><td>SW</td></tr>
<tr><td>Indur Govt Hr Sec School</td><td>3.84</td><td>WNW</td></tr>
<tr><td>Nallampalli Govt High School</td><td>4.10</td><td>SSE</td></tr>
<tr><td>Hale Dharmapuri Govt High School</td><td>6.28</td><td>NE</td></tr>
<tr><td>KendriyaVidhalaya</td><td>7.81</td><td>E</td></tr>
<tr><td>Samichettipatti Govt High School</td><td>8.58</td><td>S</td></tr>
<tr><td>Papparapatti Govt Girls Hr Sec School</td><td>9.84</td><td>NNW</td></tr>
<tr><th>Colleges</th><th>~Dist (km)</th><th>Direc</th></tr>
<tr><td>Christ College of Education for Womens</td><td>Adjacent to the Site</td><td>S</td></tr>
<tr><td>SrriPaspo College of Nursing</td><td>Adjacent to the Site</td><td>E</td></tr>
<tr><td>Kamadhenu College Of Arts & Science</td><td>Adjacent to the Site</td><td>E</td></tr>
<tr><td>Don Bosco College</td><td>0.01</td><td>NE</td></tr>
<tr><td>PMP Arts and Science College</td><td>0.77</td><td>E</td></tr>
<tr><td>Sri Lakshminarayan College of Education</td><td>1.67</td><td>N</td></tr>
<tr><td>Dharmapuri Govt Arts College</td><td>2.28</td><td>E</td></tr>
<tr><td>Dharmapuri Medical College and Hospital</td><td>3.14</td><td>E</td></tr>
<tr><td>Dharmapuri Govt College of Engineering</td><td>7.70</td><td>E</td></tr>
<tr><td>Dharmapuri Govt Law College</td><td>12.35</td><td>NNE</td></tr>
<tr><th>Hospitals</th><th>~Dist (km)</th><th>Direc</th></tr>
</table>
</td></tr>
</table>

S. No	Particulars	Details		
		Thadangam Govt Sub Health Centre	0.90	E
		Dharmapuri Govt Veterinary Hospital	3	E
		Indur Govt PHC	3.14	W
		Nallampalli Govt PHC	4.32	S
		Dharmapuri Govt Urban PHC	4.60	ENE
		Bedarahalli Govt Sub Health Centre	6.61	WNW
		Bandahalli Govt PHC	7.84	W
		Rajathopu Govt PHC	8.33	E
		Palayampudur Govt PHC	8.40	S
		Konanginaickanahalli Govt PHC	10.9	NE
		Government Buildings	**~Dist (km)**	**Direc**
		Dharmapuri Combined Court	Adjacent to the Site	E
		Dharmapuri Tamil Nadu Pollution Control Board	0.39	E
		Dharmapuri District Central Jail	0.84	N
		Dharmapuri District Collector Office	2.58	E
		Dharmapuri Superintendent of Police Office	2.59	E
		Religious Places	**~Dist (km)**	**Direc**
		Madeshwaran Temple	Within the Site	
		Jakkalamman Temple	Within the Site	
		KundalaMuniyappan Temple	Within the Site	
		Kalabairavar Temple	2.68	SE
		Dharmapuri AG Church	2.51	E
		Sengunthar Siva SubramaniaSwamy Temple	3.80	ENE
		Madina Masjid	4.25	ENE
		ShriKottaiPerumal Temple	4.75	ENE
		Pachaiamman Temple	6.73	NNE
		Varahi Amman Temple	7.27	E
		Veera Hanuman Temple	11.83	SSE
		Industries	**Dist (km)**	**Direc**
		Vintage Agro Foods Pvt Ltd	Adjacent to the Site	S
		Bhadra granite factory	0.46	S
		Riffa food industries	0.18	E
		Indigra Exports Private Limited	0.20	W
		Saravana Spinning Mills	0.74	E
		Molikule Technologies Pvt Ltd	4.97	N
		TNWC Nallampalli	5.77	SSE
		Goodwill Fabrics Private Limited DP Unit	6.65	S

S. No	Particulars	Details		
		Hindustan Petroleum Corporation Ltd	7.18	S
		P.M.P. Textiles Ltd	7.79	S
		SKM Fly Ash Bricks	8.31	S
		Shri PKP Spintex Private Limited	8.89	NE
		Sree Infratech Ltd	9.63	N

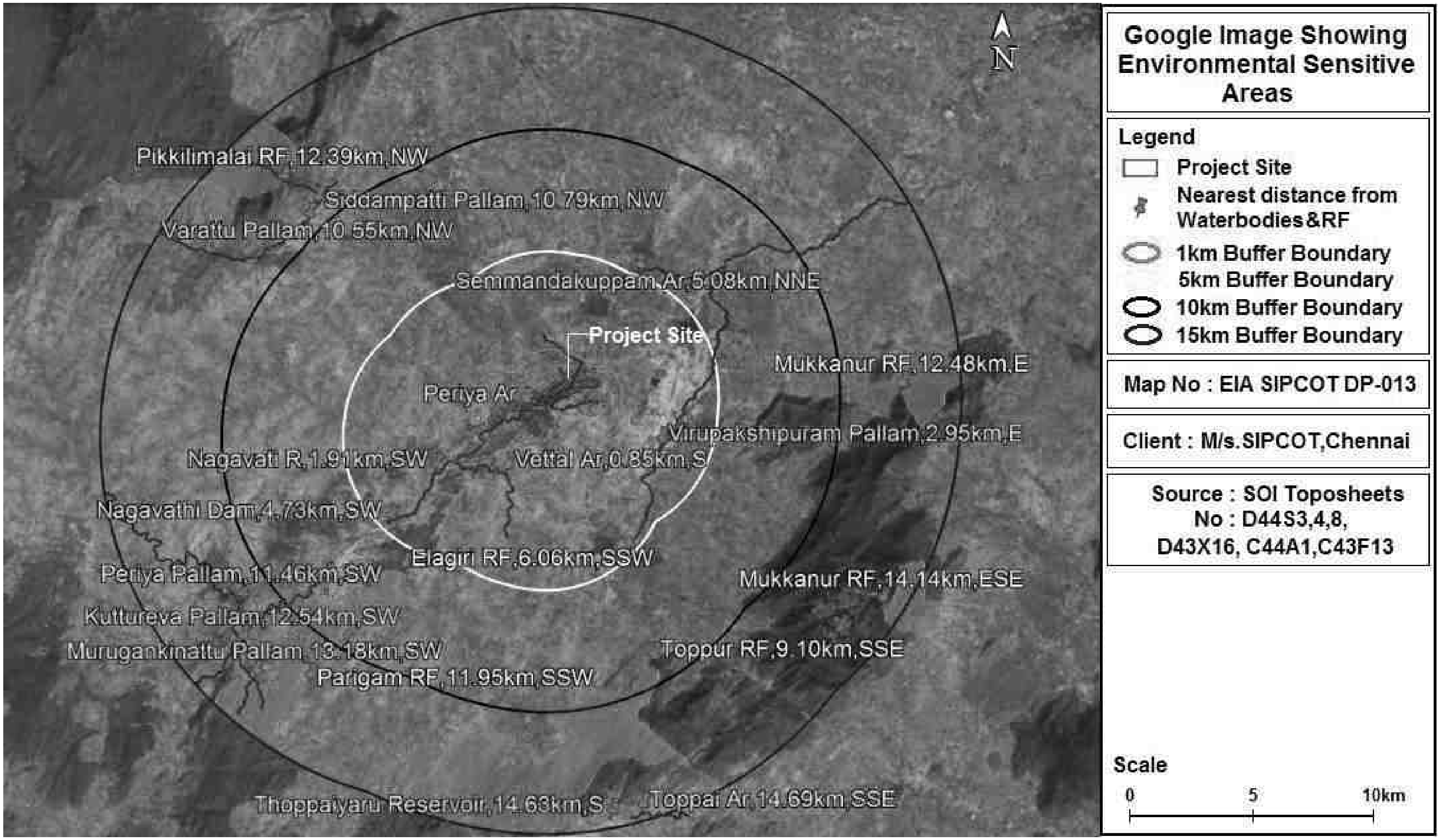


Figure 3-3Environmental sensitive areas covering within 15 km from project boundary

3.4 Physical Conditions of PIA district

In this section, the physical conditions of PIA district(Dharmapuri)are discussed in general and wherever possible references to the conditions prevailing in the study area in particular are also provided. The physical conditions are discussed as under:

- District profile
- Drainage, land use, geology, Physiographic profile
- Natural resources
- Climatic conditions, seismic zone characteristics and natural hazard

3.4.1 PIA District Profile

Dharmapuri district lies between 11^{o} 47’ and 12^{o} 33’ of Northern latitude and 77^{o} 02’ and 78^{o} 40’30’’ of Eastern longitude. This district is bounded on the north by Krishnagiri district, on the east by Tiruvannamalai and Villupuram districts, on the southby Salem district, and on the west by Karnataka’s Chamarajanagar district. The total geographical area of the district is 4497 sq kms, i.e. 3.46% of Tamil Nadu. This district is placed at 14th rank in comparision to other districts in terms of area in Tamil Nadu. It is located 297 kms away from 129odelin and 126 kms away from Bangalore. Neighbouring cities like Bangalore, Mysore, Tumkur, Chittoor, Tirupathi, Thrissur, Palakkad, Puducherry also lie within a 300 kms radius.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.4.2 Climatic Conditions

Dharmapuri district is situated in the Western Agro climatic zone. The climate of the Dharmapuri district is generally normal and warm. The district has 37°C and the mean daily minimum temperature of about 25°C in the plains. The district temperature is a gradual decrease of both day and night from June to December, when the mean daily maximum is about 30°C and the mean daily minimum about 19°C in the plains.

April and May are the hottest months in the year with a highest temperature being 38°C in April. The climate becomes cool in December and continue up to February, touching a minimum of 17°C in January. The climate of the district on the whole is slightly humid.

In summer, the wind is hot and uncomfortable. From December to February, the wind is very cold. The district gets rainfall from both south-west and north-west monsoons. During the monsoon season, the climate is pleasant.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.4.3 Natural Resources OfPIA District

3.4.3.1 Flora & Fauna

Dharmapuri district has various flora and fauna spices which includes short shrubs and throne plants. The whole district is predominantly covered with forests. Spider valley located near Hogenakkal is home for many wild animals. The district falls in the migratory path of elephants. Man and elephant conflicts are most common in these parts. Many tribal communities depend on these forests. Vathalmalai, a mountain hamlet on top of Servarayan hill chain has suitable conditions to cultivate coffee and jack fruit. Wild boars and spotted deers are commonly seen in Morappur and Harur forest region. Gaurs sometimes stroll near villages around Bommidi region.

Source:*https://censusindia.gov.in/2011census/dchb/DCHB_A/34/3301_PART_A_DCHB_DHARMAPURI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.4.3.2 Forest Resources

Dharmapuri district has tropical forests.Thoppur ghat section has one of the scenic highways surrounded by mountains and forests. For a massive tree planting program to increase tree cover in the district, the Environmental and Forest Department has planted 60,000 seedlings in public places, Government institutions, Industries, Schools, Colleges and roads in Harur taluks. Dharmapuri and Harur are the two forest divisions in this district.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.4.3.3 Irrigation

The chief rivers that flow through the districtare Cauvery, Chinnar, Markandanathi and Vaniyar.Though river Cauvery flows in the border of the State,as well as in the district, due to topographical condition,possibility of construction of dam is far away in theplanning of the State. Krishnagiri dam, which isconstructed across Thenpennar, irrigates part of thearea. Chinnar, Palar, Thoppiar, Kallar, VarathiarandPambar are minor rivers, which are almost dry duringmost part of the year.

Major sources of water supply for irrigation in this district during 2010-11 are given in the following table.

Irrigation source	Number	Length (in Kms)
Canals	85	187
Tube Wells & Other Wells	1405	-
Open Wells	83970	-
Reservoir	7	-
Tanks	1015	-

Source: Statistical HandBook of TamilNadu, 2011

Chinnar Reservoir, NagavathiReservoir,Thoppaiyar Reservoir, KesargulihallaReservoir,Thumbalahalli Reservoir and Vaniyar Reservoir arethe source of irrigation of this district. By all thesewater reservoirs, large area of land is irrigated. LakeslikeAlapuram and Annasagaram also contributes I irrigation in the district. The following table givessource wise net area irrigated in this district during -2009-10.

Irrigation source	Area (in Hec.)	Percentage
Canals	1016. 59	1.69
Wells/Tube-wells	56198. 31	93.17
Tanks/Lakes	30009. 75	49.75
Others	94. 94	0.16
Total irrigated area	**60319. 59**	**100**

Source: Village Records

The different sources of irrigation are canals,wells, tanks, lakes and reservoirs. Tube wells or wellscovered 56198.1 hectares which accounted to 93% I irrigation in the district. Lakes and reservoirscontributed 5% of the irrigation in Dharmapuri district.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.4.3.4 Agricultural Resources

The district economy is mainly agrarian innature. Nearly 70% of the work force is dependent onagriculture and allied activities. The district is oneamong the most backward and drought prone area I State. To achieve the food production target, variousschemes are being implemented for the benefit of thefarmers and those are System of Rice Intensification,Pulses production and development, Initiative fornutritional security through intensive millets promotionand Rainfed area development programmeinDharmapuri district. The Agricultural EngineeringDepartment is implementing a number of developmentprogrammes throughout the district. These can beclassified as follows:

1. Land Development Scheme
2. Minor Irrigation Scheme

3. Soil Conservation works in Tribal Area (IntegratedTribal Development Programme)
4. Agricultural Mechanization (Farm Mechanization)
5. National Agricultural DevelopmentProgramme(NADP)
6. Run off Management Programme
7. Artificial recharge ground water scheme
8. IAMWARM (Irrigated Agriculture Modernizationand Water bodies Restoration Management)

The important food grains in the district are paddy, cholam, cumbu, ragi and samai. The major pulses cultivated are redgram, greengram, blackgram, horsegram,bengalgram and cowpea. The other commercial crops like cotton, chilly, sugarcane, turmeric, tamarind and 132odeling132 are also cultivatedin Dharmapuri district.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.4.3.5 Mineral Resources

Dharmapuri district is endowed with sizeablereserves of granite. The following table shows thevarious mining and quarrying units in each taluksofthe district during 2010-11.

Name of the taluk		**No.of Mining Quarrying Units**			
	Quartz	**Sand**	**Rough stone**	**Black Granite**	**Grey Granite**
Dharmapuri	-	-	20	1	0
Pennagaram	3	-	3	5	0
Harur	-	3	23	4	-
Pappireddipatti	-	1	11	3	0
Palakkodu	-	1	17	6	1
Total	**3**	**5**	**74**	**19**	**1**

Source: District Statistical Handbook, 2010-11

High quality black granite is present in thisdistrict. Quartz is available at KendiganapalliVillageofPennagaram Taluk, A.Velampatti of Harur taluk andPethathampatti of Pappireddipatti Taluk. Another highvalue mineral available in this district is Molybdenum,it was discovered near Harur by the Ministry of Minesin 2001. It is the only source of the minerals in India. The ability of molybdenum to withstand extremetemperatures without significantly expanding orsoftening makes it useful in applications involvingintense heat, including the manufacture of aircraft parts,electrical contacts, industrial motors and filaments. The following table shows the minerals available in thedistrict and its quantity during 2010-11.

Name of the Minerals	**Quantity**	**Value (Rs in '000')**
Rough Stone Jelly	10069 units	3514725
Black Granite	16518.502 cubic meter	4672580

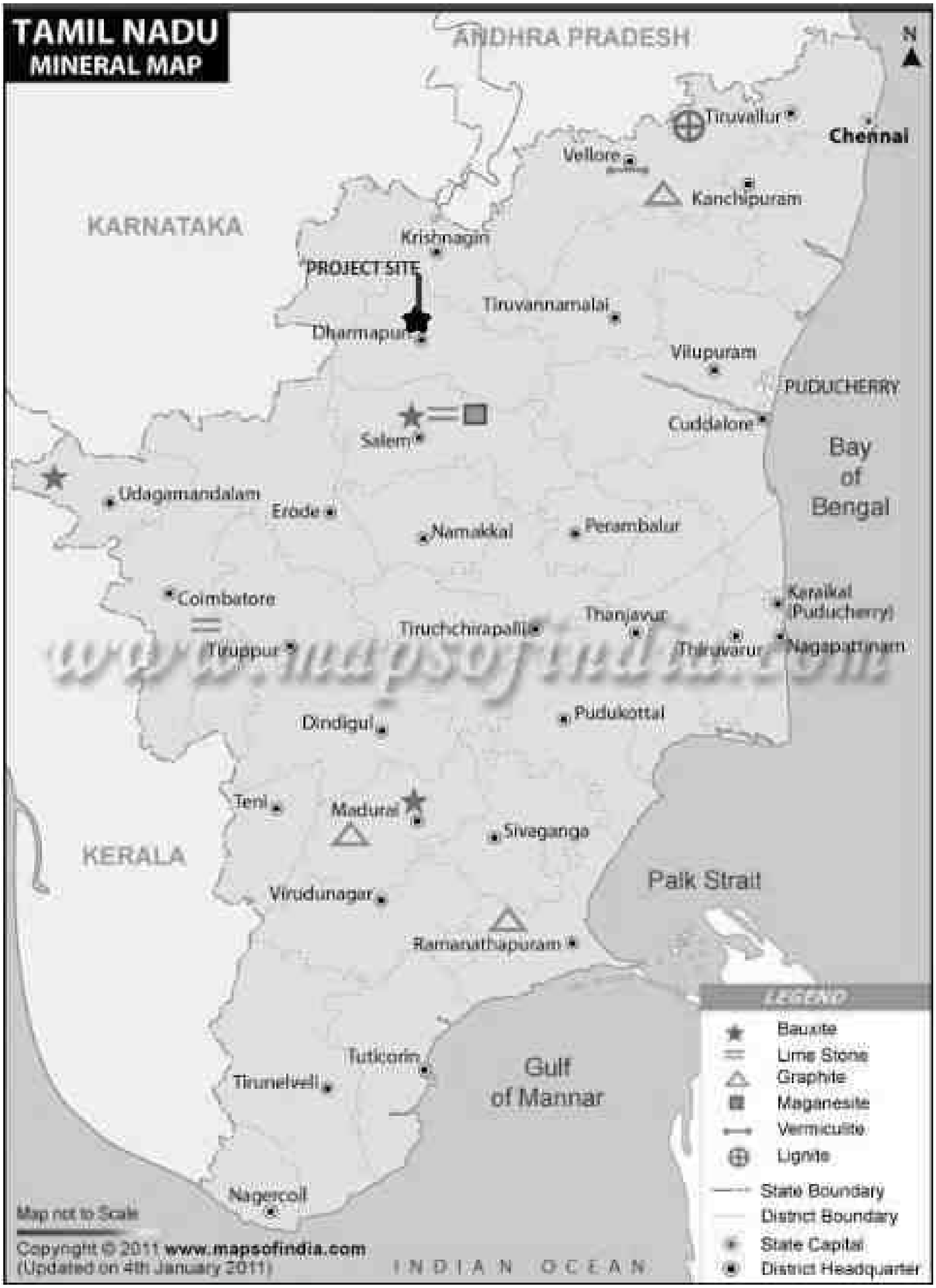
Quartz	4652 tones	93040

Source: District Statistical Handbook, 2010-11

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

Mineral map of India is given in **Figure 3-4.**



***(Source:** Maps of India)*

Figure 3-4Mineral Map of Tamil Nadu

3.4.4 Land Use & Land Cover

Total geographic area of Dharmapuri district is 4616.01Sq.Km. Urban Builtup area is 16.3Sq.Km and Rural Builtup area is 73.1Sq.Km. Details of land use/land cover statistics for Dharmapuridistrict were given in **Table 3-2** and Land Use map of Dharmapuri district is given in **Figure 3-6.** Land Use pattern of Dharmapuriis given in **Figure 3-5**. From the LULC map given it is observed that the project site consists of agricultural crop lands, barren and unculturable lands.

Table 3-2 Details of District land use/land cover statistics (2015-16) for Dharmapuri district

Division of Land Use/Land Cover	Area in Sq.Km	Area in Acres	Area in Ha	Total Area %
Built-up, Urban	16.3	4027.81	1630	0.353
Built-up ,Rural	73.1	18063.38	7310	1.584
Built-up, Mining	4.36	1077.38	436	0.094
Agriculture, Crop land	2287.52	565257.63	228752	49.559
Agriculture, Plantation	56.48	13956.49	5648	1.224
Agriculture, Fallow	352.81	87181.12	35281	7.644
Forest, Evergreen/ Semi evergreen	63.54	15701.05	6354	1.377
Forest, Deciduous	1286.14	317811.62	128614	27.864
Forest, Forest Plantation	0.88	217.45	88	0.019
Forest , Scrub Forest	0	0	0	0.000
Forest,Swamp/ Mangroves	0	0	0	0.000
Barren/ unculturable/ Wastelands, Salt Affected land	1.48	365.72	148	0.03
Barren/ unculturable/ Wastelands, Gullied/Ravinous Land	0	0.00	0	0.00
Barren/ unculturable/ Wastelands, Scrub land	287.89	71139.06	28789	6.24
Barren/unculturable/ Wastelands, Sandy Area	0	0.00	0	0.00
Barren/unculturable/ Wastelands, Barren rocky	23.72	5861.33	2372	0.51
Wetlands/Water Bodies, Inland Wetland	0	0.00	0	0.00
Wetlands/Water Bodies, River/Stream/canals	28.91	7143.81	2891	0.63
Wetlands/Water Bodies, Resorvoir/Lakes/Ponds	132.61	32768.59	13261	2.87
Wetlands/Water Bodies, CoastalWetland	0	0	0	0.000
Total	**4616**	**1140572.4**	**461574**	**100.0**

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

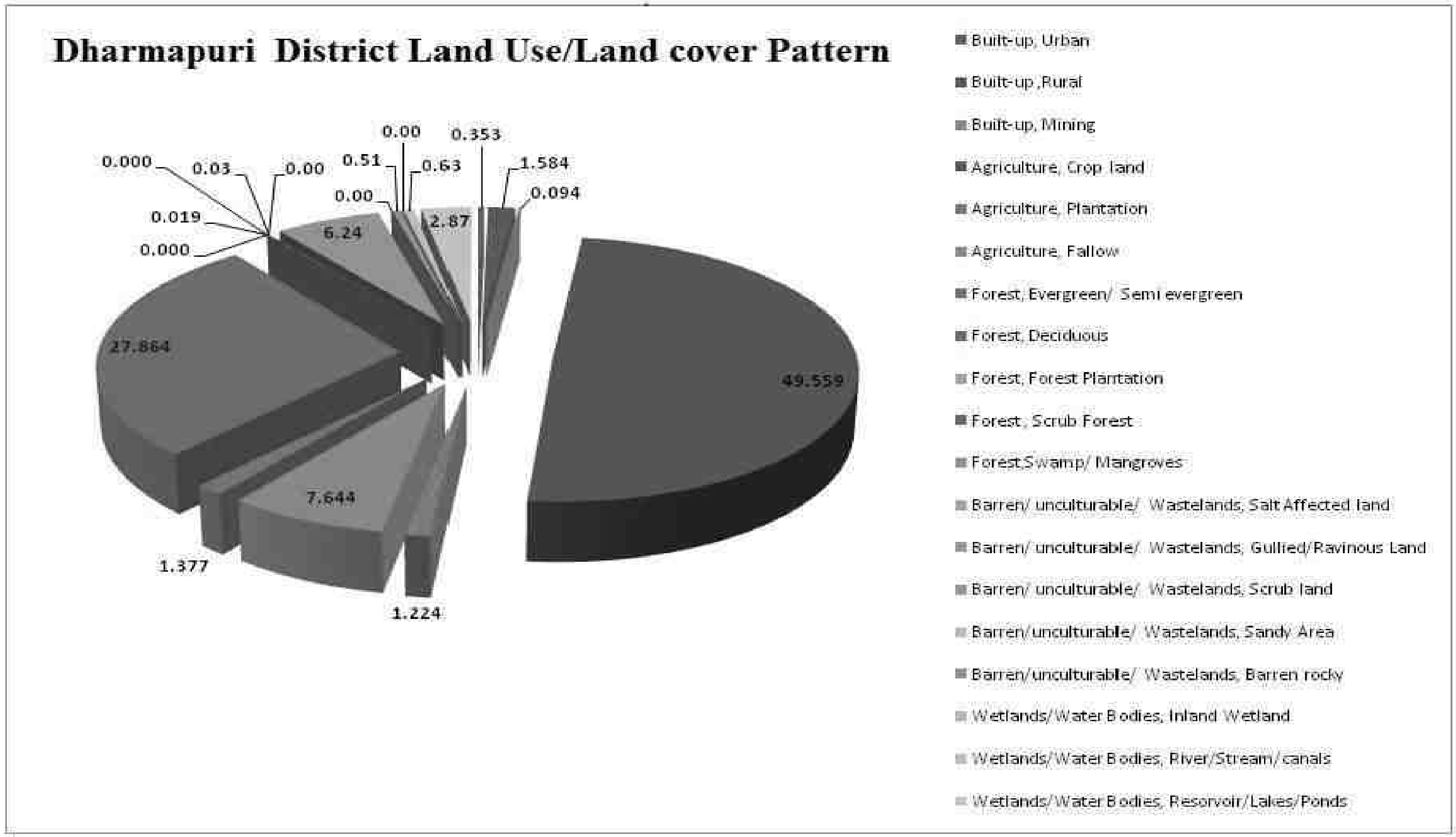
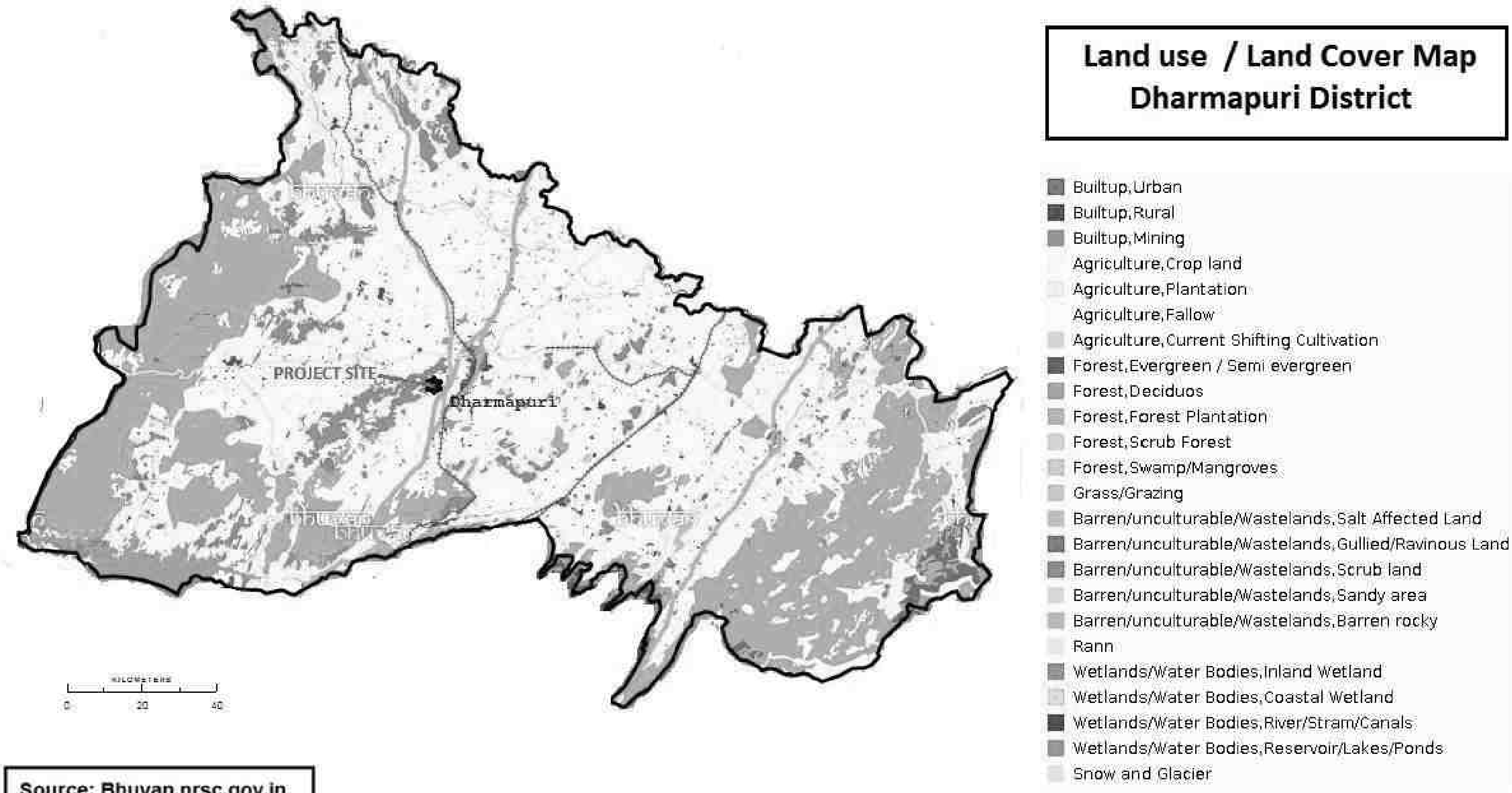


Figure 3-5Land use pattern of the Dharmapuri District (for 2015-16)



Source: Bhuvan.nrsc.gov.in

Figure 3-6Landuse/Landcover Map of Dharmapuri district

3.4.4.1 Land Use and Land Cover of the Study Area

Total Project Study area is **470.88**Sq.km. The Land Use Pattern is given in **Table 3-3.** The Land Use Pattern and Land Use Map of the Study area are given in **Figure 3-7** and **Figure 3-8** respectively. It can be observed that majority of the study area consists of Crop lands almost 72.56% followed by scrub and fallow and plantation.

Table 3-3Land Use Pattern of the Study Area

Description	%	sq.Km	Acr	Hec
Crop land	72.56	341.65	84423.42	34165
Scrub land	9.70	45.67	11285.29	4567
Fallow	6.30	29.68	7334.08	2968
Rural	4.26	20.05	4954.46	2005
Reservoir/Lakes/Ponds	3.02	14.23	3516.30	1423
Urban	1.92	9.05	2236.30	905
Deciduous	1.25	5.89	1455.45	589
Barren rocky	0.66	3.11	768.50	311
Mining	0.30	1.41	348.42	141
Plantation	0.03	0.14	34.59	14
Total	**100.00**	**470.88**	**116356.80**	**47088**

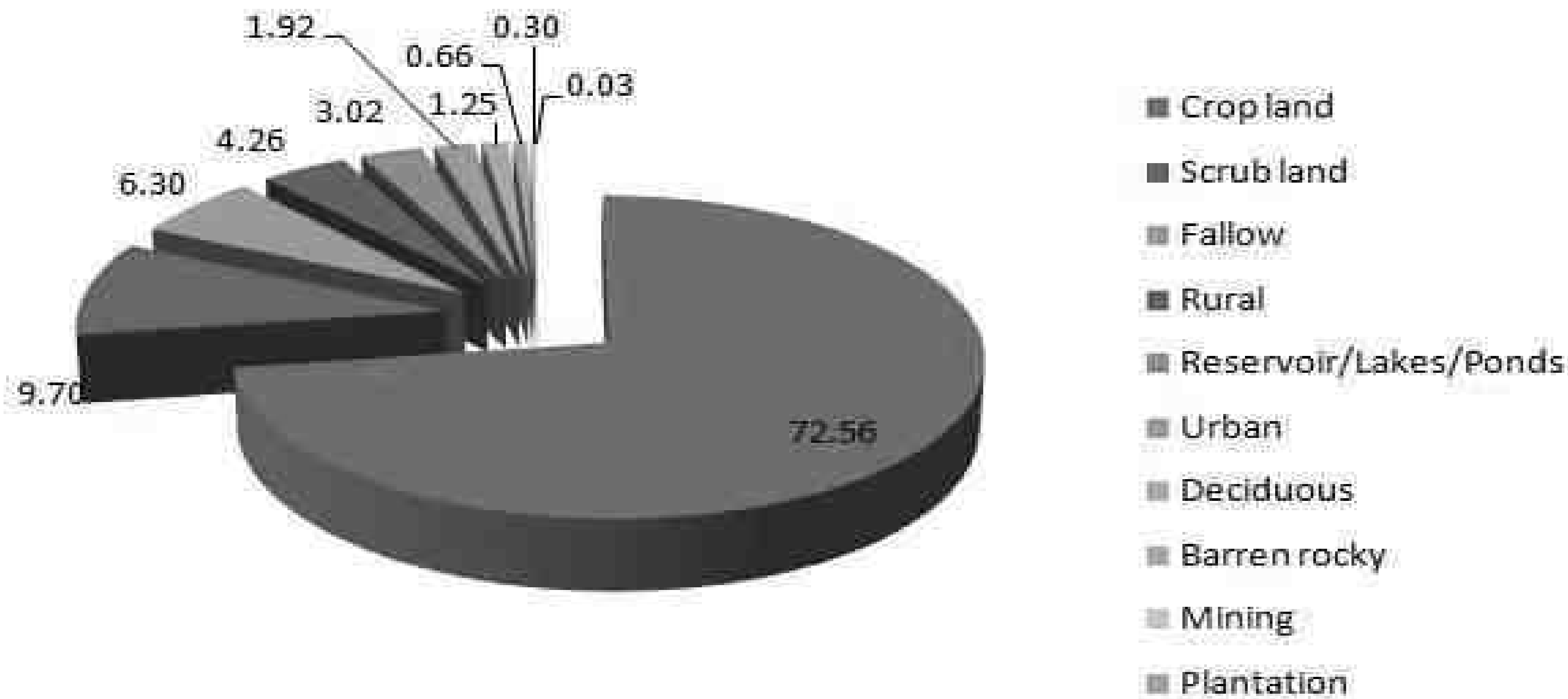


Figure 3-7Land Use Pattern of the Study Area

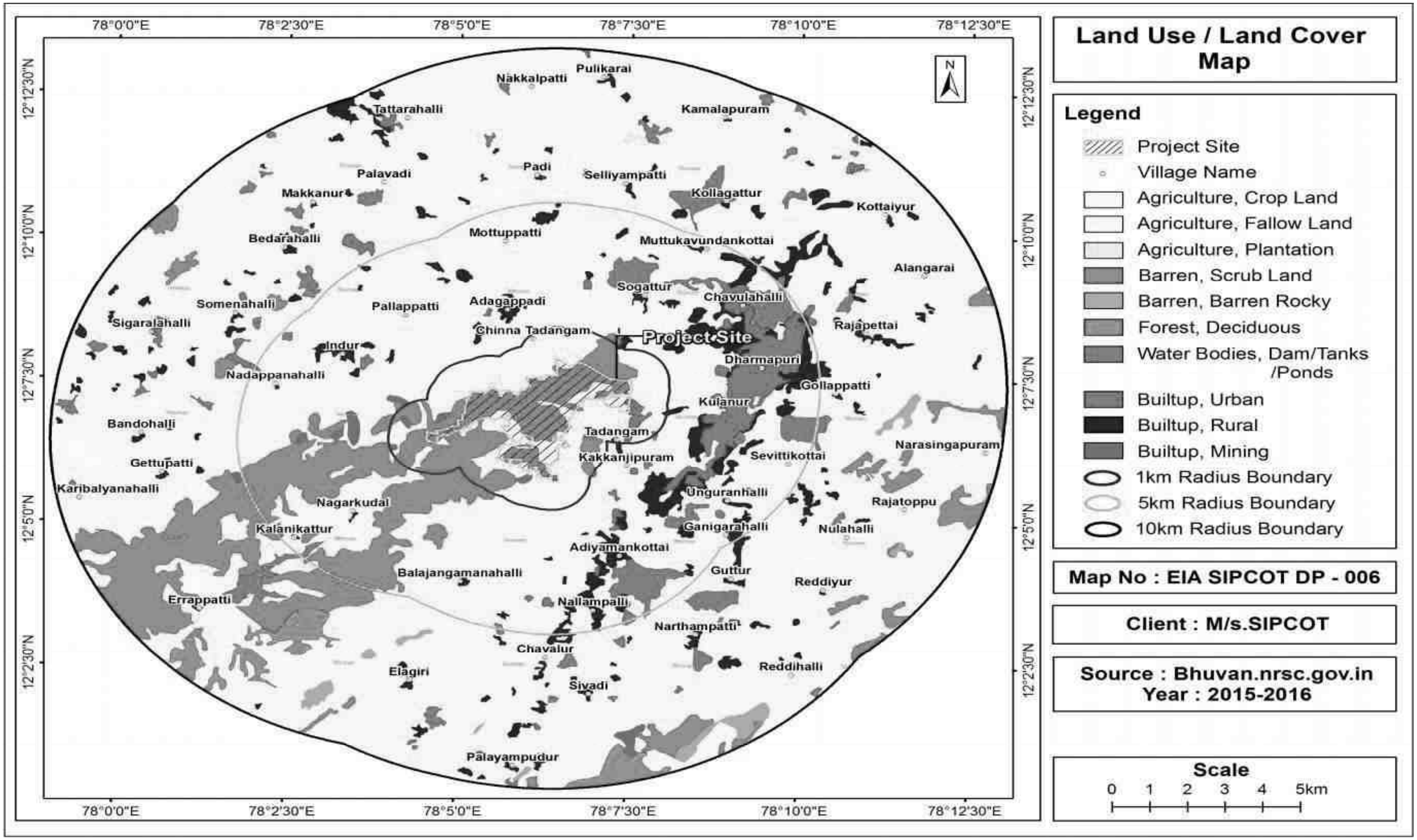


Figure 3-8 Land Use Map of the Study Area

3.4.5 Topography

- Dharmapuri district forms part of the upland plateau region of Tamil Nadu with many hill ranges and undulating plains.
- The western part of the district between Pennagaram and Denkanikottai has hill ranges of Mysore Plateau with a chain of undulating hills.
- The southern boundary of the district is occupied by the Shevaroy hill ranges.
- The plains occupying the central, eastern and southern parts of the district have an average elevation of 488 m. above Mean Sea Level.
- The Plateau region along the western boundary and the northwestern part of the district has an average elevation of 914 m. above Mean Sea Level.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

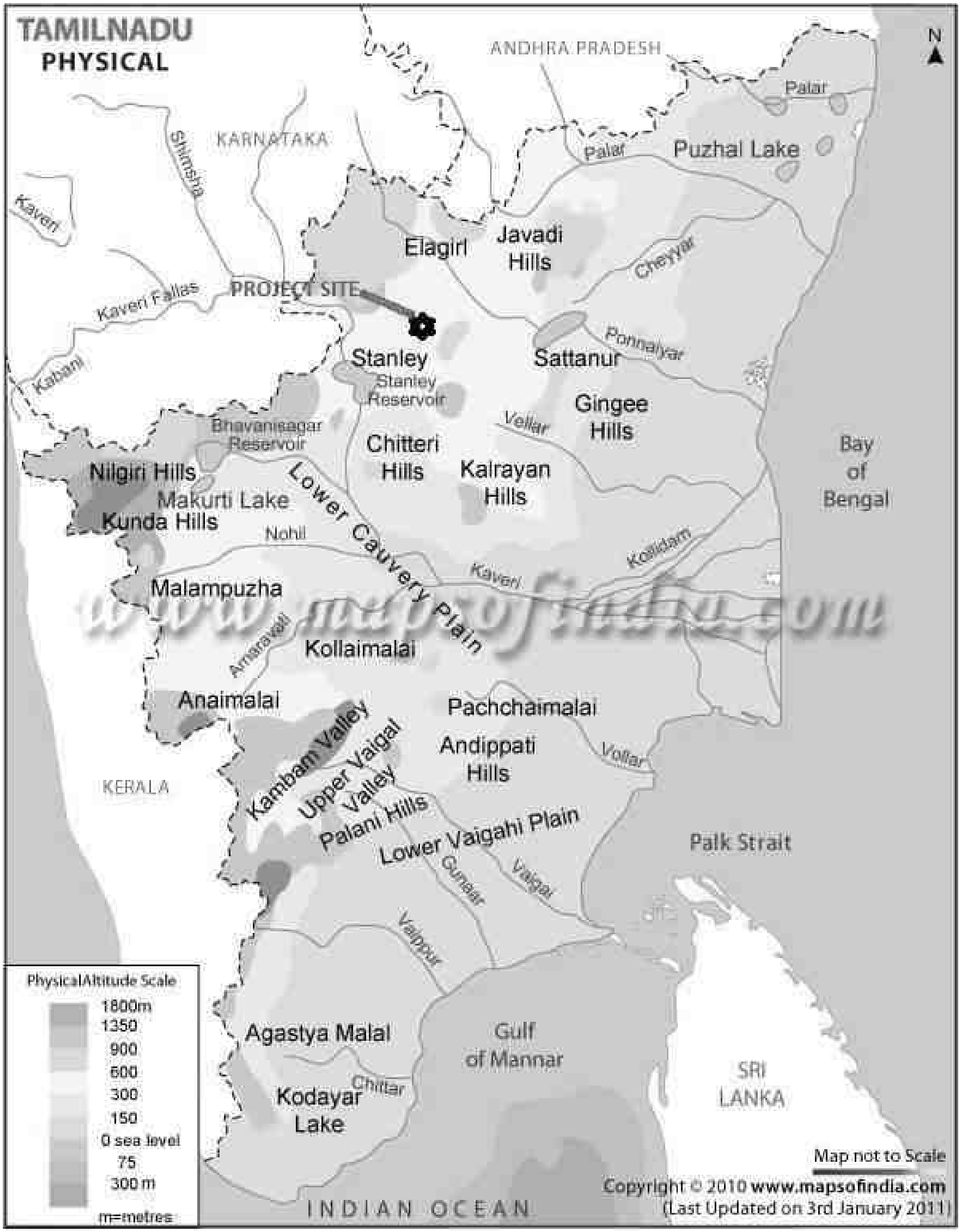


Figure 3-9Physical Map of Tamilnadu

(Source: *Maps of India)*

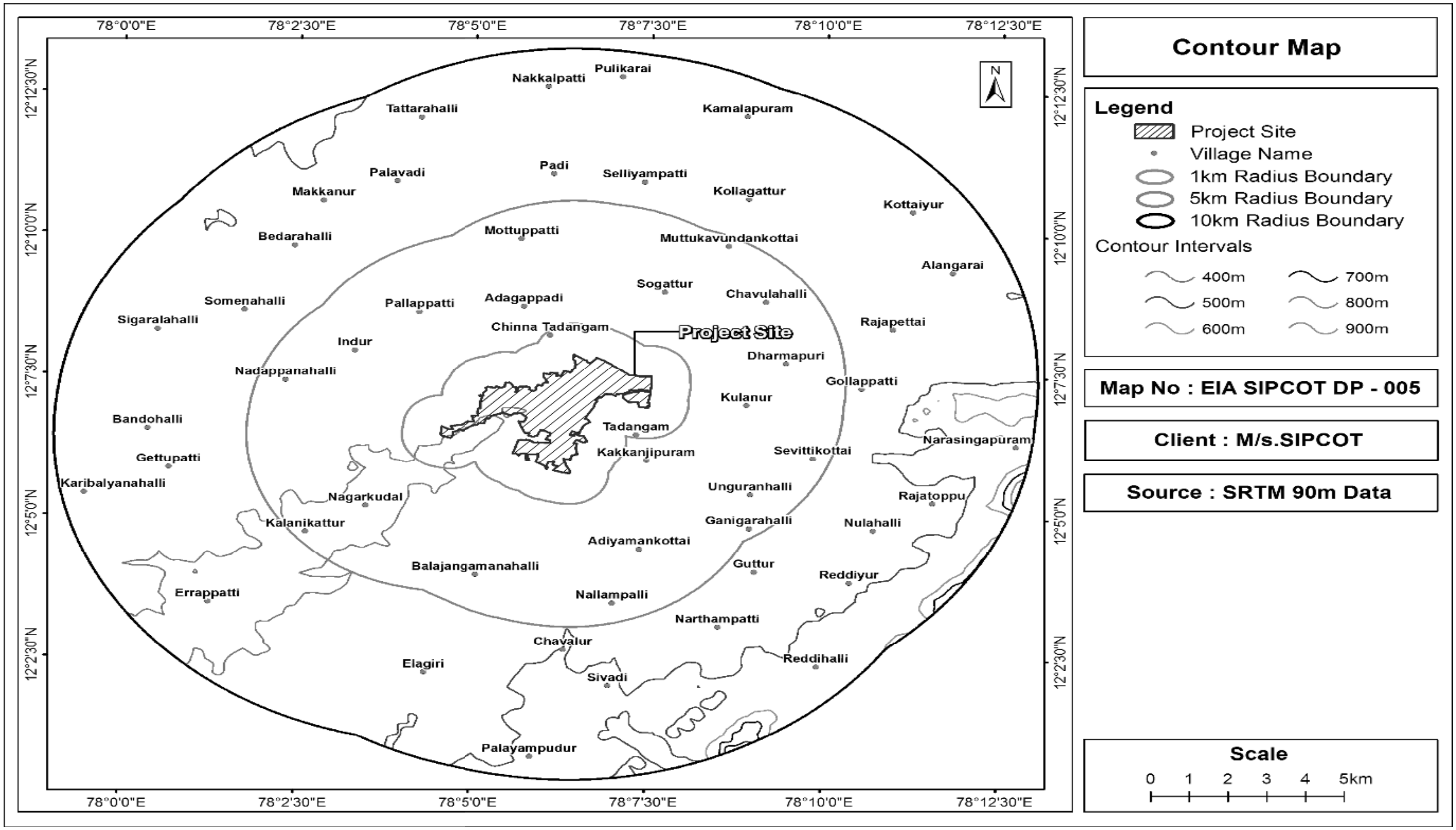


Figure 3-10Contour Map of Study Area

3.4.6 Geomorphology of PIA district

Dharmapuri district forms part of the upland plateau region of Tamil Nadu with many hill ranges and undulating plains. The western part of the district between Pennagaram and Denkanikottai has hill ranges of Mysore Plateau with a chain of undulating hills. The southern boundary of the district is occupied by the Shevaroy hill ranges. The plains occupying the central, eastern and southern parts of the district have an average elevation of 488 m. above Mean Sea Level. The Plateau region along the western boundary and the northwestern part of the district has an average elevation of 914 m. above Mean Sea Level.

The prominent geomorphic units identified in the district through interpretation of Satellite imagery are 1) Structural Hills 2) Inselberg 3) pediments, 4) Buried pediments 5) Shallow Buried Pediments 6) Plateau,7) Flood plain, and 8) Bazada Zone.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.4.6.1 Geomorphology of the study area

Total geographical area of the study area is **47088**Sq.Km. The Geomorphology pattern of the study area is given in **Table 3-4.**Geomorphology pattern of the study area is given in **Figure 3-11.** Geomorphology map of the study area is given in **Figure 3-12.**Geomorphology map of the study area is given in **Figure 3-13.**

Table 3-4Geomorphology pattern of the study area

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Denudational Origin-Pediment PediPlain Complex	418.90	103512.28	41890	88.96
2	Structural Origin-ModeratelyDissected Hills and Valleys	42.36	10467.37	4236	9.00
3	Waterbodies	6.79	1677.84	679	1.44
4	Structural Origin-Low Dissected Hills and Valleys	1.62	400.31	162	0.34
5	Anthropogenic Origin Anthropogenic Terrain	1.21	299.00	121	0.26
Total		**47088**	**47088**	**47088**	**47088**

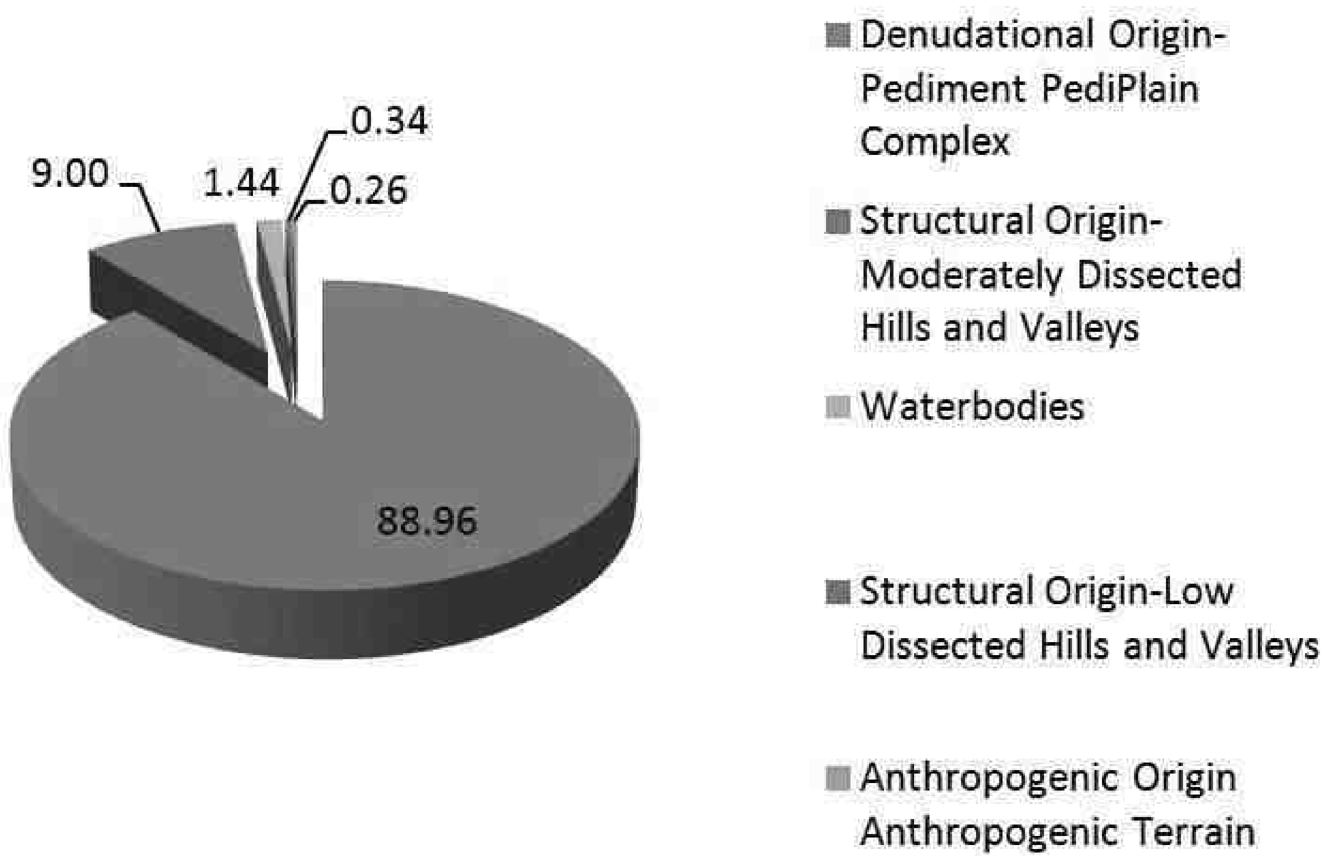
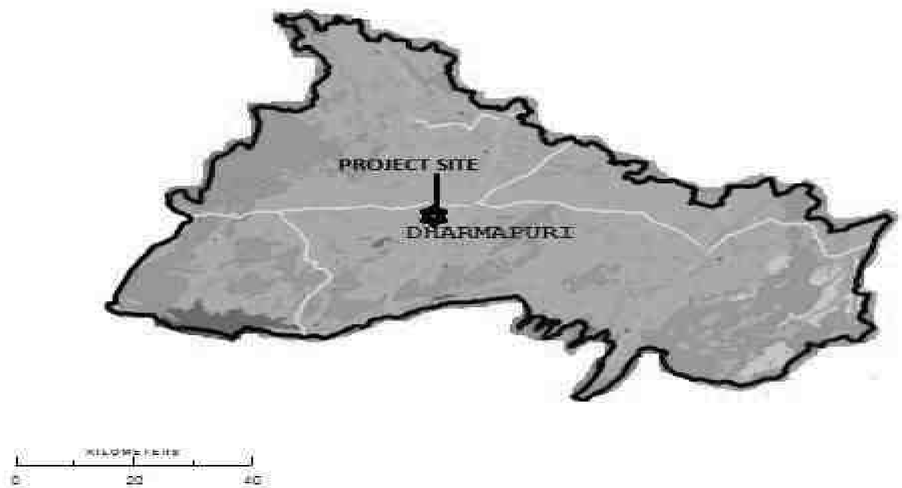


Figure 3-11Geomorphology pattern of the study area

Geomorphology Map of Dharmapuri District



Source: Bhuvan.nrsc.gov.in

Level-2

Geomorphology	
	Structural Origin
	Denudational Origin
	Fluvial Origin
	Anthropogenic Origin
	Waterbodies

Figure 3-12Geomorphology Map of Dharmapuri District

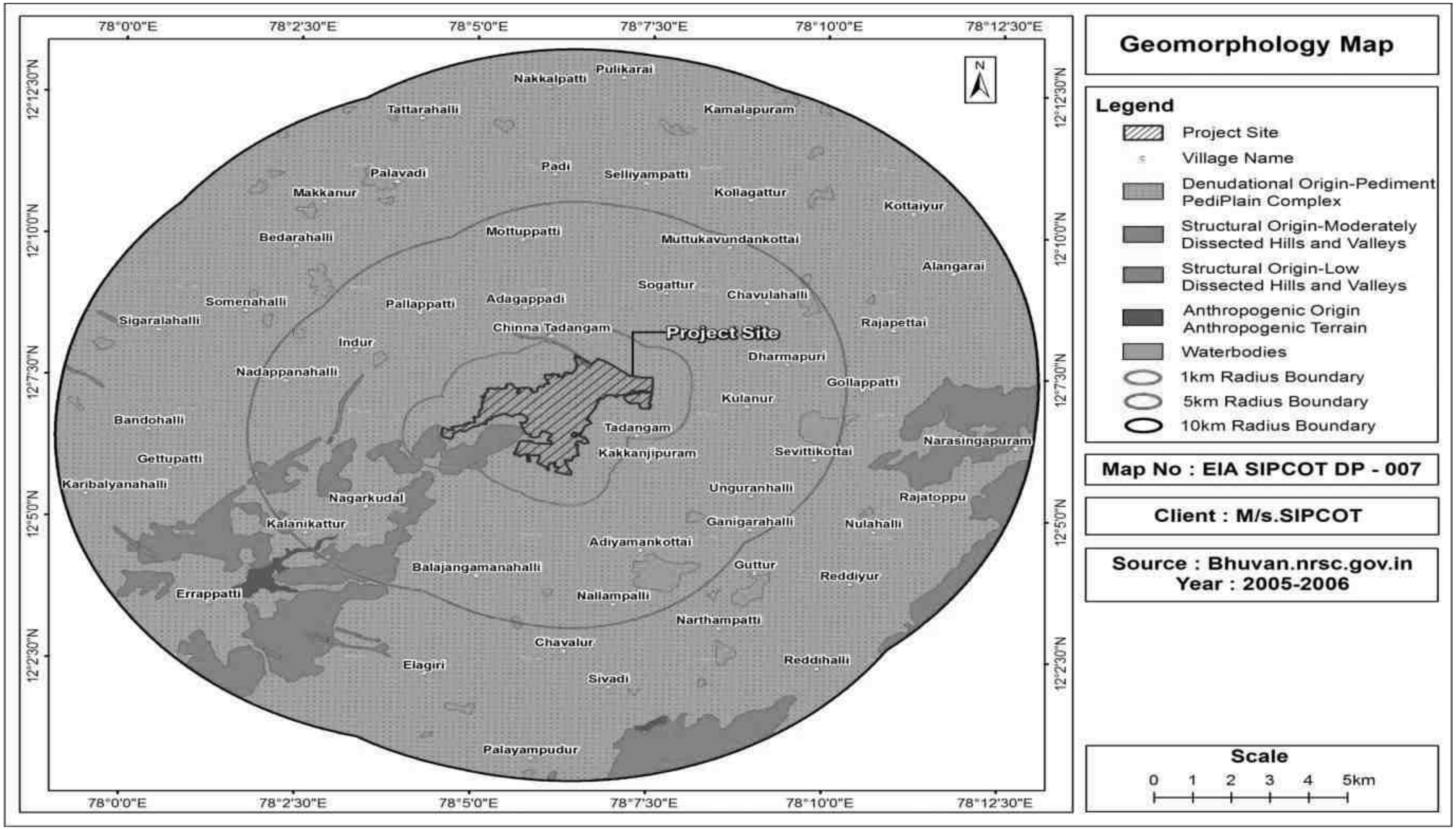


Figure 3-13Geomorphology Map of Study Area

3.4.7 Hydrogeology of PIA district

The district is underlain by Archaean Crystalline formations with recent alluvialdeposits of limited areal and vertical extents along major rivers. (Plate-II). Theimportant aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and (ii) weathered and fractured crystalline rocks.

In the areas underlain by crystalline rocks, occurrence of ground water is essentiallylimited to zone of weathering and fracturing. Generally the hard rock aquifers areheterogeneous in nature, which is indicated by the variations in lithology, structureand texture. Ground water occurs under phreatic condition in the weathered mantleand semi confined to confined condition in the fracture and fissured zones of theserocks. Thickness of weathered material varied widely from less than 1m bgl to morethan 20m bgl.

The Alluvium with intervening crystalline outcrops are noticed as patches west of Dharmapuri, and Papireddipatti areas. The ground water occurs under water table tosemi-confined conditions. The discharge ranges from 10 to 20 m/day.

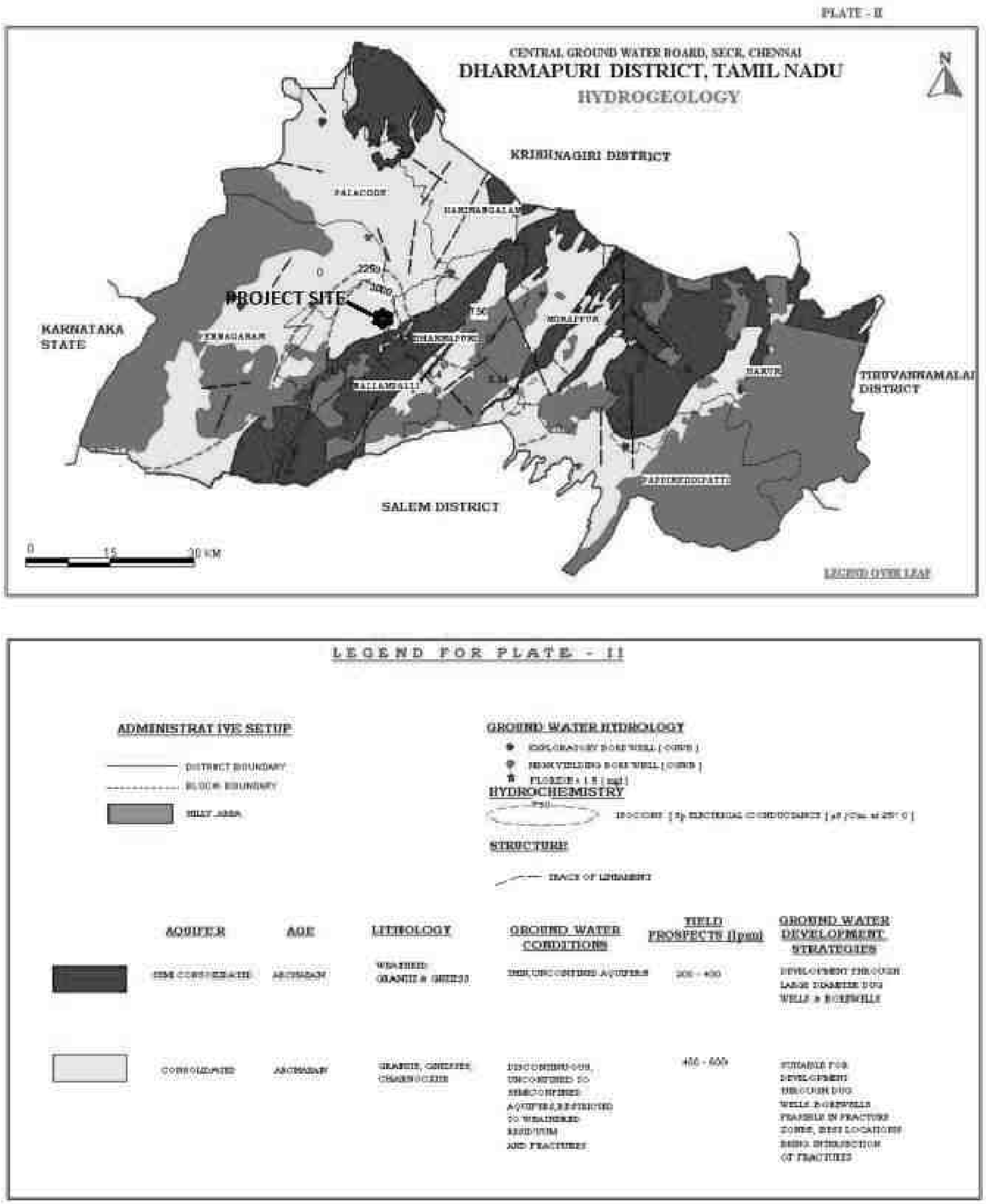
The yield of large diameter wells in the district, tapping the weathered mantle ofcrystalline rocks ranges from 150-200 m^3/day and are able to sustain pumping for 2 to4 hours per day. The yield of large diameter wells tested in crystalline rocks rangesfrom 150 to 200 m3/day for drawdown of 1 to 3 m. The yield characteristics of wellsvary considerably depending on the topographic set-up, litho logy and nature ofweathering. The transmissivity of weathered formations computed from pumping testdata using empirical methods range from 12 to 22 m^2/day. The specific capacity in thefissured formation ranges from 2.89 to 153.74 lpm/m/dd. In the porous formation thespecific capacity values vary from 6.31 to 28.7 lpm/m/dd.

The yield of bore wells drilled down to a depth of 36 to 200 m bgl, by various stateagencies mainly for domestic purposes. The discharge ranged from 2 to 33 lps. Theyield of successful bore wells drilled down to a depth of 200 m bgl during the groundwater exploration programme of Central Ground Water Board ranged from 1 to 12lps. The aquifer and well parameters of the wells show wide variation, both incrystalline and sedimentary formations.

The depth to water level in the district varied between 5.27 and 16.70 m bglduringpre-monsoon (Plate-III) and varied between 2.47 and 11.32 m bgl during postmonsoon (Plate-IV). The seasonal fluctuation shows a rise in water level, whichranges from 3.71 to 7.06 m bgl. The piezometric head varied between 2.66 to 20.06m bgl (May 2006) during pre monsoon and 1.19 to 14.57 m bgl during post monsoon.

Source:http://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Dharmapuri District")



Source:**[*https://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf*](https://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf)**

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Dharmapuri District")

Figure 3-14Hydrogeology Map of Dharmapuri District

3.4.8 Drainage Pattern in PIA district

Dharmapuri district is drained by Cauvery and Ponnaiyar rivers and their tributaries. Cauvery river flows along the south western boundary of the district. It flows in aneasterly direction up to Bellgundla and then takes a more or less southerly course tillit reaches the Stanley Reservoir. The Doddahalla and the Chinnar R. are importanttributaries of Cauvery river in the district.

Ponnaiyar is the major river draining the district and is ephemeral in nature. It originates from Nandhi hills in Karnataka, enters Tamil Nadu west of Bagalurandflows almost in a south easterly direction till it reaches Daddampatti from where ittakes an easterly course. Pambar, Vaniyar and Kallar are the important tributaries ofPonnaiyar draining the eastern part of the district whereas the ChinnarandMarkandeyaNadhi drain the northern part of the district.

Source:http://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, “District Ground Water Brochure Dharmapuri District”)

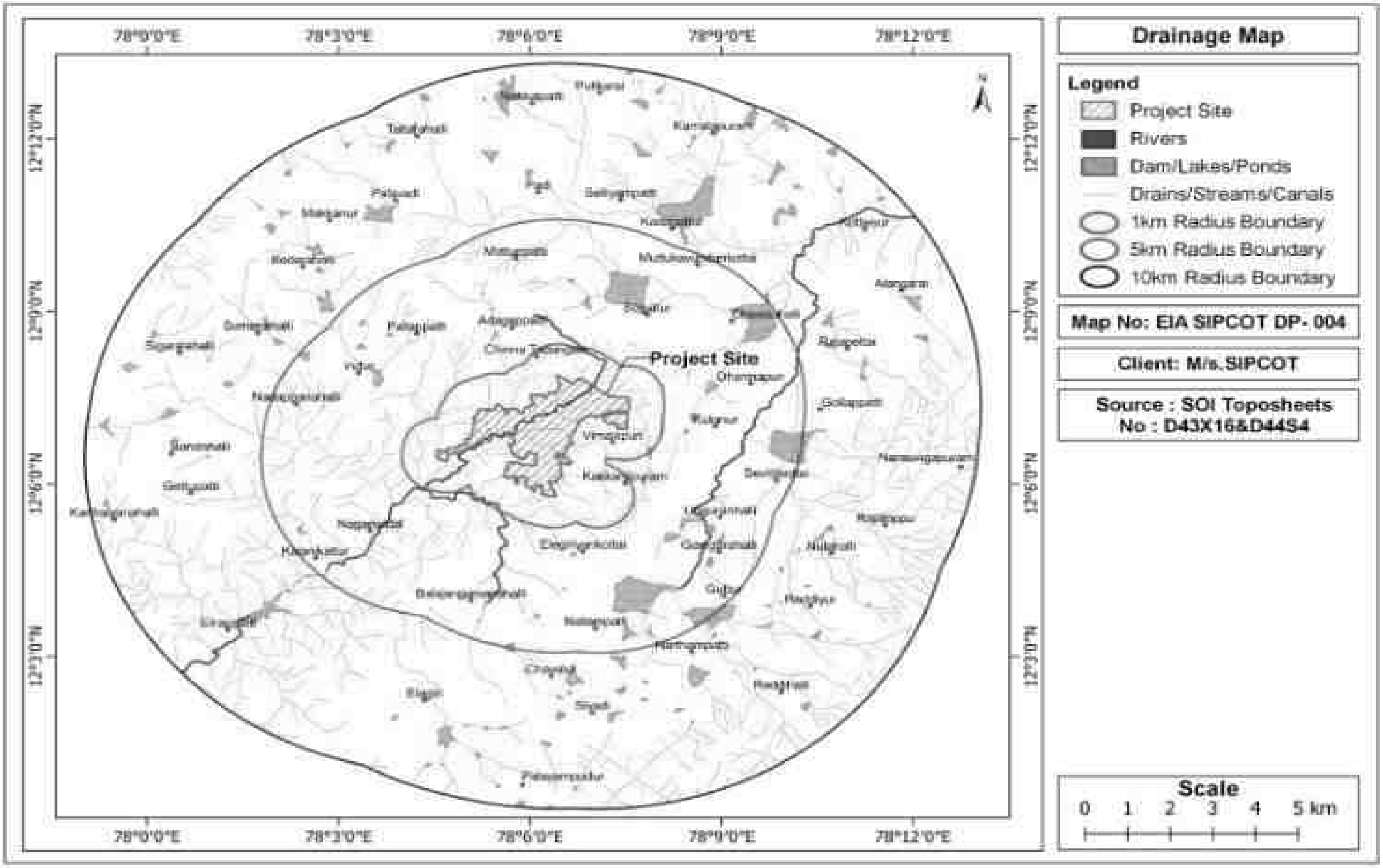


Figure 3-15Drainage map of the study area

3.4.9 Geology

Geologically Dharmapuri District is covered by crystalline rocks of Archaean age.

Crystalline rocks:

The entire district is underlain by hard crystalline rocks of Archaean age comprising of various rock types such as Gneiss, Charnockite, etc., The Gneissic type of crystalline formation is found in the north and north eastern part of the district. Shoolagiri, Hosur, Denganikottai and Kelamangalam areas are covered by Granitic 4 Gneiss. Veppanapalli, Krishnagiri and parts of Kaveripaattinam areas are covered by peninsular Gneiss. Bargur, part of Kariamangalam, Palacode, Pochampalli and Uthangarai are covered by Biotite Gneiss. Part of Harur, Uthangarai and Morappurareas are covered by foliated gneiss.

Charnockite occurs in the southern part of the district, covering part of Palacode, part of Morappur, Pappireddipatti, part of Dharmapuri, Pennagaram and Nallampalli. Quartzites are found in patches in Denganikottai block. Dolerite dykes varying from few feet to few miles in length cut across the country rock in this district.

Alluvial deposits such as sand, silt, clay and gravels which are transported sediments by the river Ponnaiyar and Chinnar are found on either side of the river courses. These formations are overlying the hard rock's as a thin layer.

In Dharmapuri district, weathered thickness ranges from 8 m to 15 m bgl. And jointed formation ranges from 15 m to 60 m in general. The strike direction is generally North East – South west, dipping towards south east. Geological map of Tamilnadu is given as**Figure 3-16.**

Source:https://nwm.gov.in/sites/default/files/Notes%20on%20Dharmapuri%20District.pdf

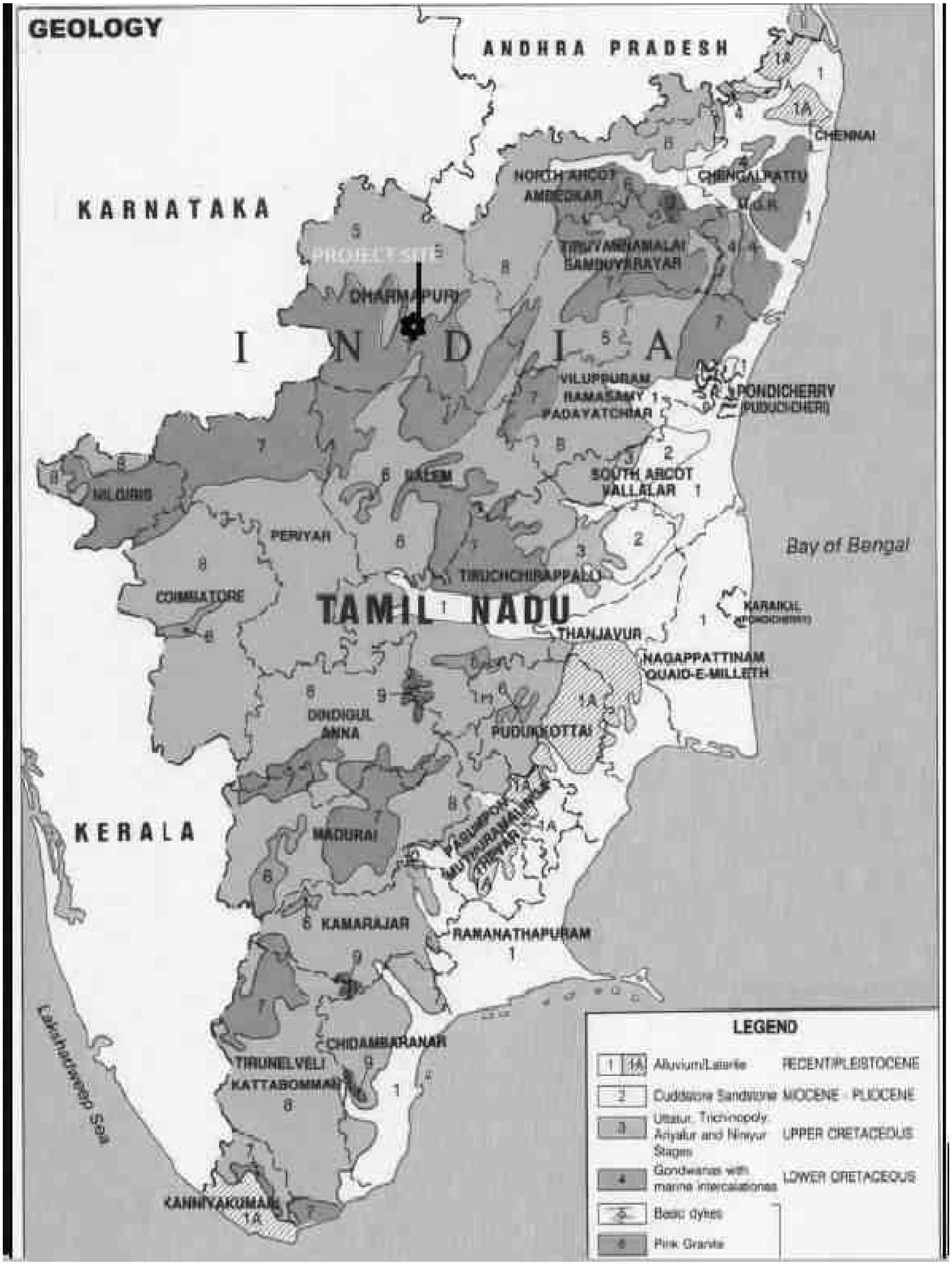


Figure 3-16Geology Map of Tamilnadu

***(Source:** Maps of India)*

3.4.10 Seismicity

As per Earthquake hazard map of India, The project location/study area falls in Zone III, which is categorized as a Moderate Damage Risk Zone. The Earthquake hazard map of India is shown in **Figure 3-17**.

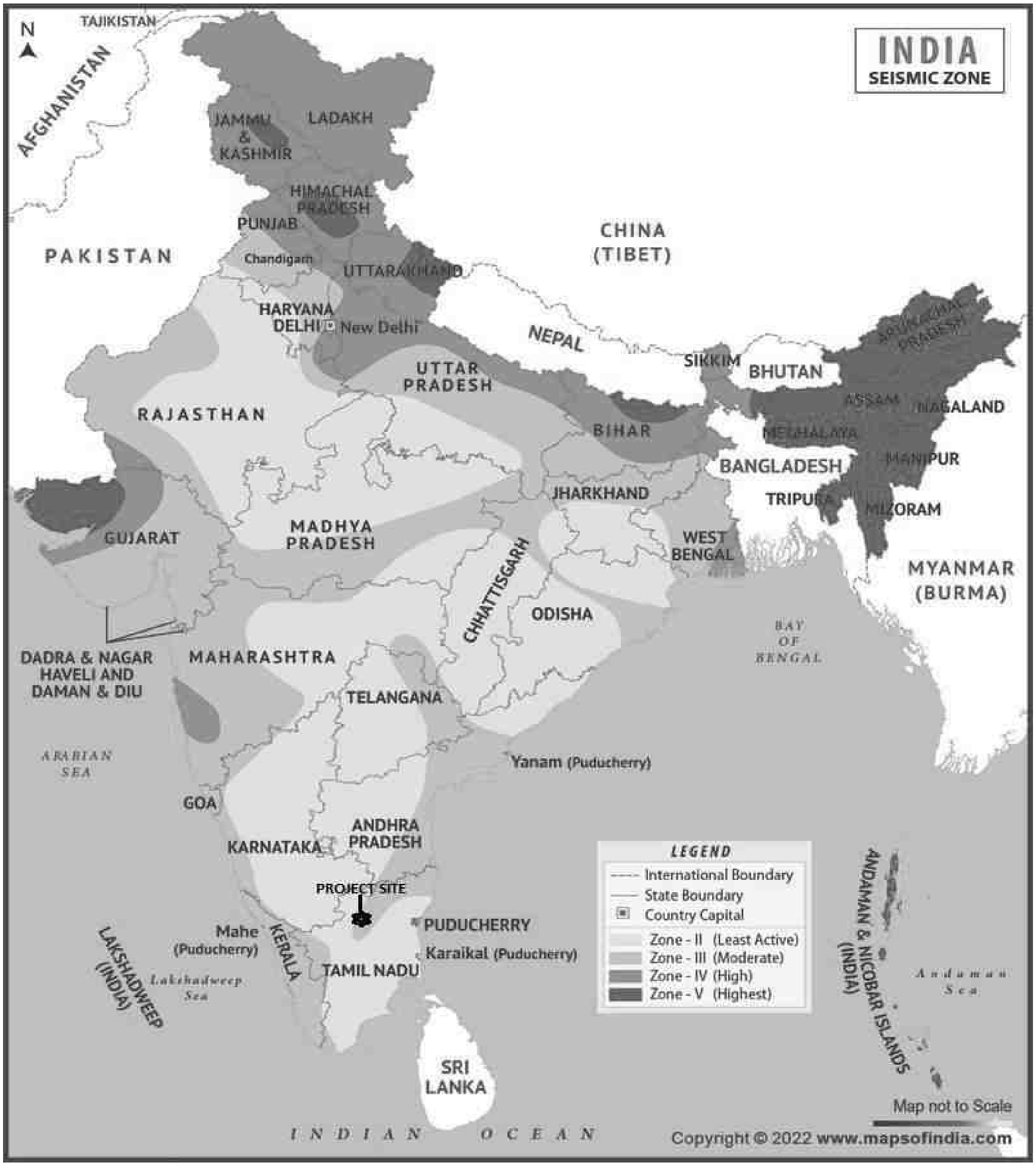


Figure 3-17Seismicity Map of India

***(Source:** Maps of India)*

3.4.11 Soils in PIA District

The district has a wide range of soil types. In general, the soil in the district is quite loose and fresh with its colour varying from red to dark brown. The soils are mostly in-situ in nature, lateritic, earthy and pale reddish in colour. The soil has low nitrogen and phosphate content with marked variations between different taluks.

Different types of the soils such as black or mixed loams, red ferruginous and gravel are found in the district. The black or red loam is very fertile due to its moisture absorbing character, which is found in Dharmapuri taluk. Red and sandy soils are seen in Harur taluk. Lateritic and sandy coastal alluvium soils are found in almost all blocks. Considerable stretches of good loam and black soil are found in Dharmapuri district.

Type of Soil	Places in the District
Lateritic Soil	Harur
Black Soil	Dharmapuri, Palacode, Pappireddipatti
Sandy Coastal Alluvium	Dharmapuri, Harur, Palacode
Red Sandy Soil	Pennagaram, Palacode, Harur

Source: District Statistical Handbook, 2010-11

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

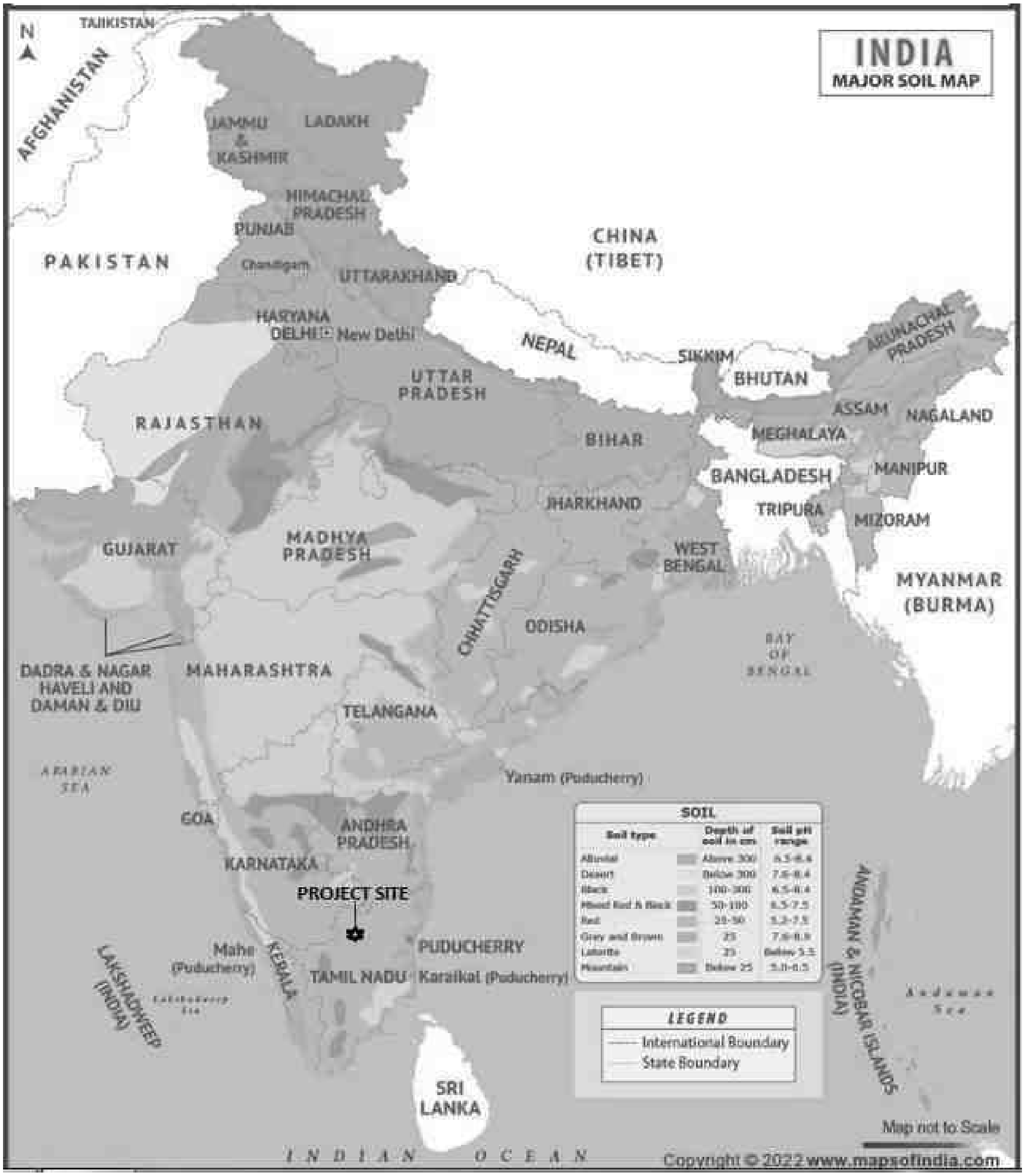


Figure 3-18Soil map of India

***(Source:** Maps of India)*

3.4.12 Natural Hazards in PIA District

Dharmapuri District situated in TamilNadu is prone to multi hazards like earthquake, drought, flood, landslide and Road accidents. District Disaster management plan has been 24 developed which aims to improve district's response to disasters while improving its ability to mitigate the disaster risks and increasing community's resilience by implementing the preparedness plan.

According to GSHAP data, the state of Tamil Nadu falls mostly in a region of low seismic hazard with the exception of western border areas that lie in a low to moderate hazard zone. Puducherry lies in a low hazard region. As per the 2002 Bureau of Indian Standards (BIS) map, Tamil Nadu and Puducherry fall in Zones II and III. Historically, parts of this region have experienced seismic activity in the M5.0 range.NaturalHazard Map of India is given in **Figure 3-19.**

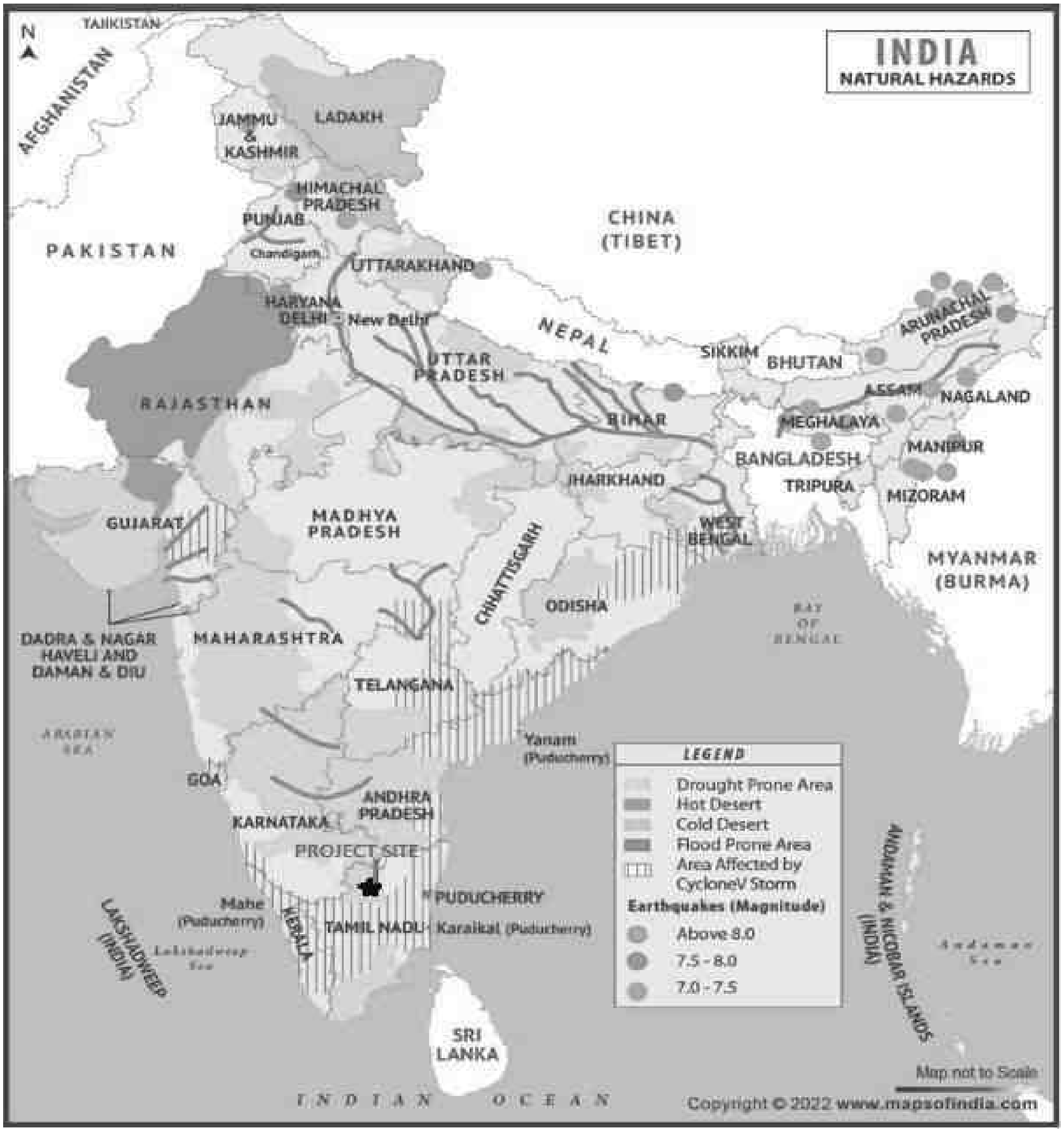


Figure 3-19Natural Hazard Map of India

***(Source:** Maps of India)*

3.5 Air Environment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. Significant changes, in predominant winds and weather conditions are observed in winter, summer and post-monsoon seasons apart from the local topographic influences. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance programme

3.5.1 Meteorological Conditions

The regional air quality is influenced by the meteorology of that region. The principal weather parameters that influence the concentration of the air pollutants in the surroundings are wind speed, wind direction and temperature. The meteorological data is useful for proper interpretation of the baseline data.

3.5.2 Meteorological Data Collection

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data was generated during the study period Mar 2023 to May 2023.The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) i.e. IS:8829 and India Meteorological Department (IMD).

3.5.3 General Meteorological Scenario based on IMD Data

The nearest India Meteorological Department (IMD) station located to project site is Dharmapuri. The Climatological data of Dharmapuri (12° 08' N and 78^{o} 02' E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30 year period (1991-2020), is presented in the following sections on the meteorological conditions of the region. The monthly variations of the relevant meteorological parameters are reproduced in**Table 3-5..**

Table 3-5Climatological Summary– Dharmapuri (1991-2020)

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
Jan	29.7	17.7	49	0.3	81	50	20.1	18.1	5.1	NE	E
Feb	32.7	18.9	64	0.2	75	41	20.9	17.9	5.0	NE	E
Mar	35.8	20.8	123	0.9	68	33	22.3	17.3	4.6	NE	E
Apr	36.8	23.8	177.5	2.8	68	38	25.5	20.0	4.3	SW	E
May	36.5	24.5	297.0	6.6	66	48	25.9	23.5	5.3	SW	SW
Jun	34.2	23.9	233.6	3.9	67	52	24.7	23.3	6.7	SW	SW
Jul	33.2	23.4	246.4	4.1	69	56	24.2	23.5	6.8	SW	SW
Aug	32.5	23.1	291.8	6.2	73	58	24.5	24.0	6.2	SW	W
Sep	32.3	22.6	359.4	7.0	76	61	25.6	24.9	4.7	SW	SW
Oct	30.7	21.9	462.6	9.7	82	71	25.6	25.6	3.7	NE	E

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
Nov	29.0	20.4	436.5	6.5	83	69	23.7	23.4	4.3	NE	E
Dec	27.9	18.3	184.5	2.7	82	62	20.8	20.0	4.8	NE	E
Max.	**36.8**	**24.5**	**462.6**	**0.2**	**83**	**71**	**25.9**	**25.6**	**6.8**	**Annual Predominant wind direction is NorthEast**	
Min.	**27.9**	**17.7**	**49**	**9.7**	**66**	**33**	**20.1**	**17.3**	**3.7**		
Annual Avg/Total	**32.7**	**21.6**	**1446**	**50.8**	**74**	**53**	**23.6**	**21.8**	**5.1**		

As per the above IMD climatological Data given in **Table 3-5,** the observations drawn are as follows

- Highest Daily maximum temperature is 36.8°C and the Lowest daily minimum temperature is 17.7°C were recorded in the months of April and January respectively
- Maximum and minimum relative humidity of 83% and 33% were recorded in the months of November and Marchrespectively.
- Maximum and minimum rainfall of 462.6mm and 49mm was recorded in the months of October and January respectively.
- Maximum and minimum Mean wind speed is 6.8 Km/hr and 3.7 Km/hr was recorded in the months of July and October respectively. Annual Wind predominant direction is North East.

3.5.4 Meteorological Scenario during Study Period

The meteorological scenario in and around the project site is an essential requirement during study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period **(March 2023 to May 2023)** and is presented in **Table 3-6**. The wind rose for the study period is given as **Figure 3-20.**

Table 3-6 Meteorological Data for the Study Period (March 2023 to May 2023)

S. No	Parameter	Observation
1	Temperature	Max. Temperature: 37°C Min. Temperature: 22°C Avg. Temperature: 33.17°C
2	Average Relative Humidity	42.14%
3	Average Wind Speed	2.26m/s
4	Predominant Wind Direction	South and South East

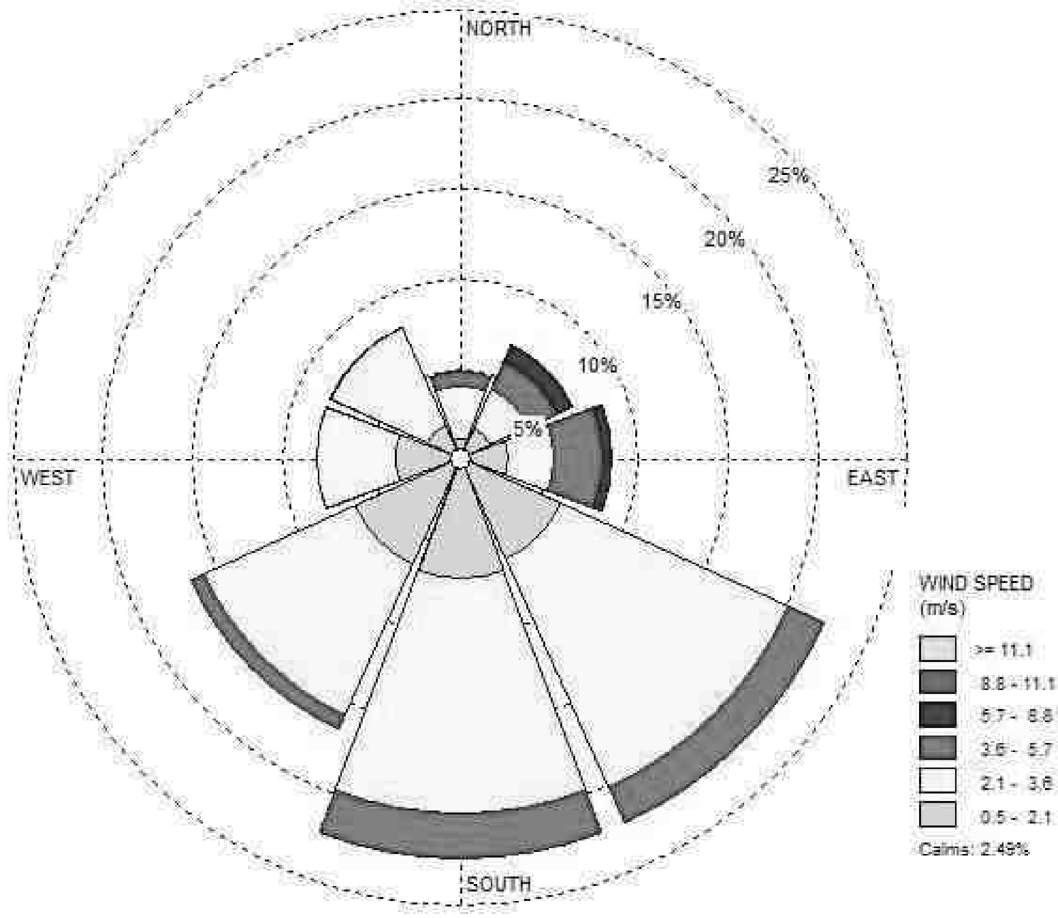


Figure 3-20Wind rose during study period (March 2023 to May 2023)

3.5.5 Atmospheric Inversion

Atmospheric inversion level at the project site was monitored; the results observed at the site during the study period are as follows

- Average atmospheric temperature: 33.17°C
- Average Relative humidity:42.14%
- Average Wind speed: 2.26m/s

The daily inversion level calculated based on the average temperature and average wind speed at the project site and the maximum inversion height is derived by the graph plotted based on the average temperature and average wind speed. The daily inversion level at the project site varies from 50 to 3939 m during 6 AM to 5 PM, the maximum recorded at 3939 m during May 2023. This is shown in **Figure 3-21.**

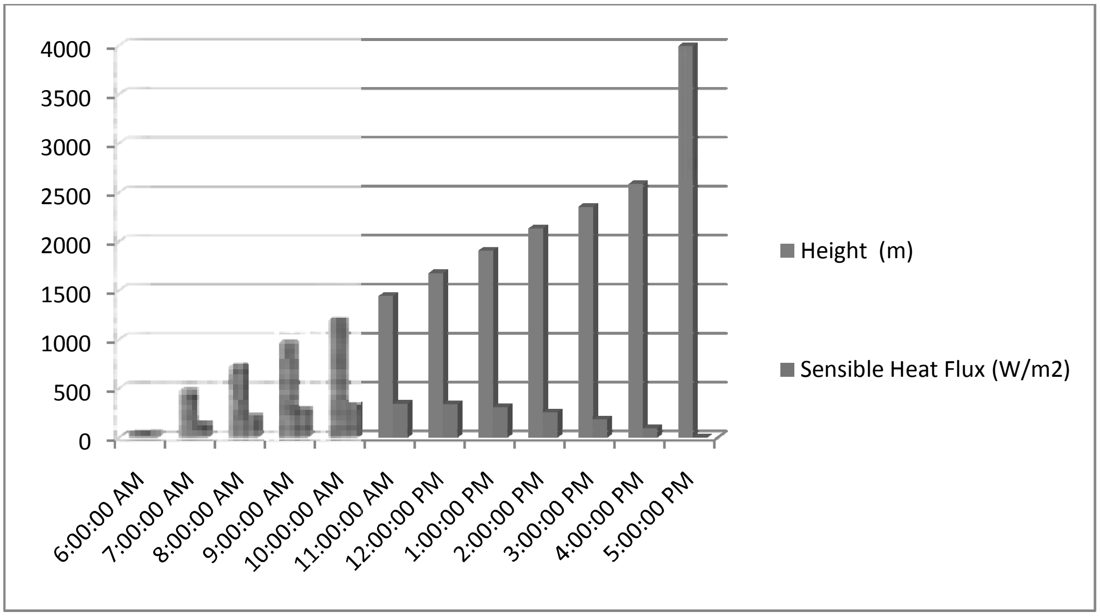


Figure 3-21Atmospheric inversion level at the project site

3.6 Ambient Air Quality

The selection criteria for monitoring locations are based on the following:

- Topography/Terrain
- Meteorological conditions – Upwind and Downwind locations
- Residential and sensitive areas within the study area
- Representatives of regional background air quality/pollution levels and
- Representation of likely impacted areas.

3.6.1 Ambient Air Quality Monitoring Stations

To evaluate the baseline air quality of the study area, Eight (08) monitoring locations have been identified as per annual wind predominance of Dharmapuri from IMD data (1991-2020). The wind predominance during study period (March 2023 to May 2023) is from South and SouthEast. AAQ monitoring locations are selected based on Annual wind predominance (NE) as per **Table 3-5**, map showing the AAQ monitoring locations is given in **Figure 3-22**and the details of the locations are given in **Table 3-7.**

Table 3-7 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind*	Distance (~km) from Project boundary	Azimuth Directions
A1	**Project site**	-	Within the site	
A2	Chavulahalli	u/w	3.77	NE
A3	Tadangam	c/w	0.99	E
A4	Adiyamankottai	c/w	3.11	SE

Station Code	Location	Type of Wind*	Distance (~km) from Project boundary	Azimuth Directions
A5	Nagarkudal	d/w	2.96	SW
A6	Errappatti	d/w	8.02	SW
A7	Indur	c/w	3.23	W
A8	Adagappadi	c/w	2.08	N

***u/w-upward wind, d/w-downward wind, c/w-cross wind.**

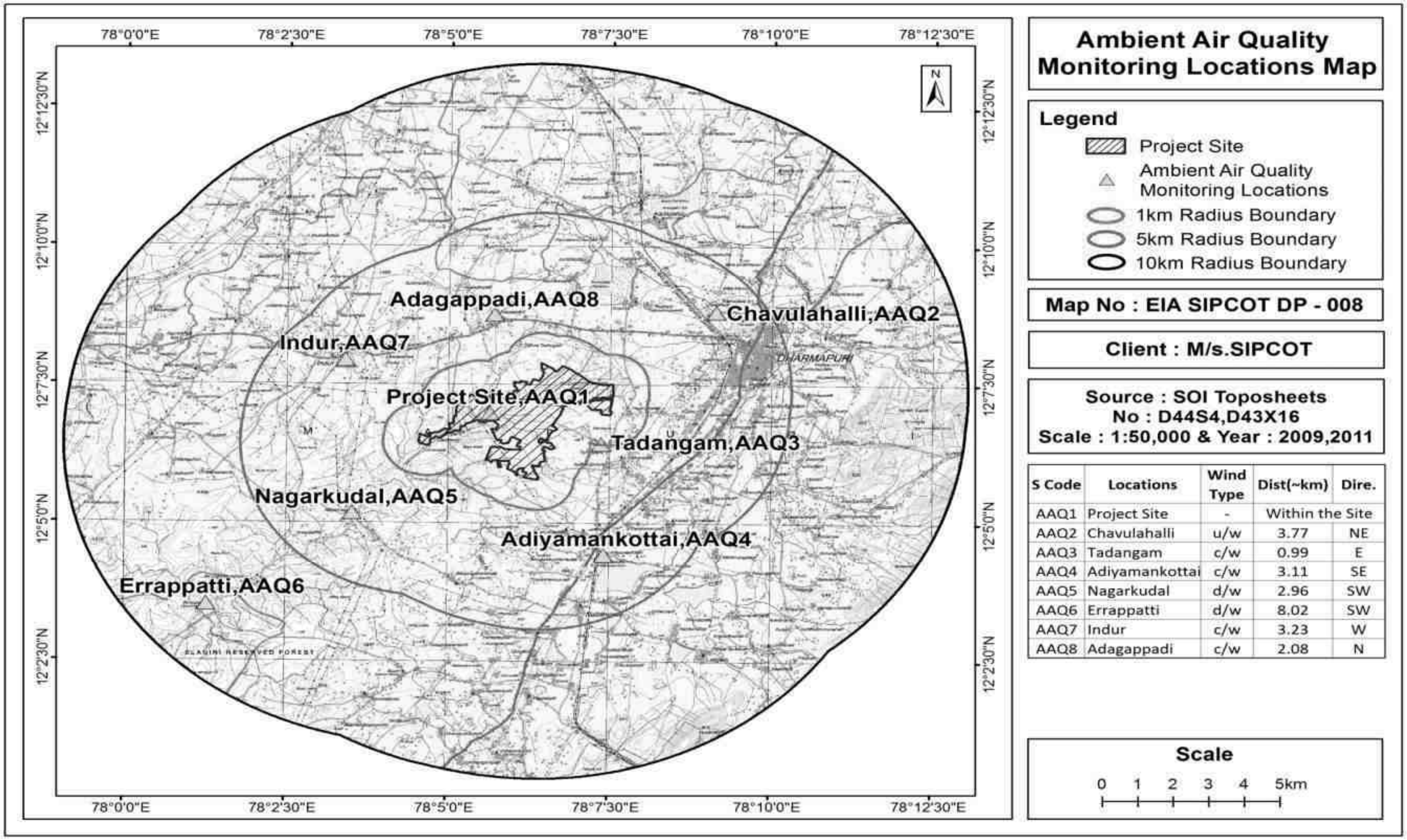


Figure 3-22Map showing the Air monitoring locations

3.6.2 Ambient Air Quality Monitoring Techniques and Frequency

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. during **(March 2023 to May 2023**). PM10, PM2.5, SO2, Nox, CO, Pb, O3, NH3, C6H6, C20H12, As, Ni, TVOC were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in**Table 3-8**.

Table 3-8Analytical Methods for Analysis of Ambient Air Quality Parameters (NAAQ)

S. No	Parameters	Analytical method	NAAQ standards: 2009		Sampling Time
1	Sulphur Dioxide (SO_2), µg/m^3	IS:5182(Part-2):2001	50 (Annual)	80(24 Hours)	24 Hours
2	Nitrogen Dioxide (NO_2), µg/m^3	IS: 5182 (Part – 6): 2006	40 (Annual)	80 (24 Hours)	24 Hours
3	Particulate Matter ($PM_{2.5}$), µg/m^3	IS: 5182 (Part – 23): 2006	40 (Annual)	60 (24 hours)	24 Hours
4	Particulate Matter (PM_{10}), µg/m^3	IS:5182 (Part– 23): 2006	60 (Annual)	100 (24 hours)	24 Hours
5	CO, mg/m^3	IS:5182(Part–10):1999	2 (8 hours)	4 (1hour)	8 Hours
6	Pb, µg/m^3	IS:5182(Part–22):2004	0.5(Annual)	1(24 hours)	24 Hours
7	O_3, µg/m^3	IS 5182 Part 9: 1974	100(8hours)	180 (1hour)	8 Hours
8	NH_3, µg/m^3	IS 5182 Part 25: 2018	100(Annual)	400(24 hours)	8 Hours
9	Benzene, µg/m^3	IS 5182 Part 11: 2006	5 (Annual)	5 (Annual)	24 Hours
10	Benzo (a) pyrene, ng/m^3	IS 5182 Part 12 : 2004	1 (Annual)	1 (Annual)	24 Hours
11	Arsenic, ng/ m^3	HECS/AA/SOP/019,Issue No:01,Issue Date :16.12.:2016: 2016	6 (Annual)	6 (Annual)	24 Hours
12	Nickel, ng/ m^3	HECS/AA/SOP/009,issue No.01,Issue Date :16.12:2016: 2016	20(Annual)	20 (Annual)	24 Hours
13	TVOC	HECS-G/ENV/AAQ/SOP/005	-	-	-

3.6.3 Results and Discussions

The variations of the pollutants Particulate matter <10 micron size (PM_{10}),Particulate matter <2.5 micron size ($PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2),Carbon Monoxide (CO), Lead (Pb),Ozone (O_3),Benzene (C_6H_6), Benzo (a) pyrene ($C_{20}H_{12}$), Arsenic (As), Nickel (Ni),Ammonia (NH_3) are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November 2009. Ambient Air Quality Monitoring Data (**March 2023 to may 2023)** for the study area is given in **Table 3-9** and trends of measured ambient concentration in the study area were graphically represented in **Figure 3-23**.

Table 3-9Summary of the average baseline concentrations of pollutants

SL.NO.	Parameters	Units	Conc.	NAAQ Standards	Locations							
					Project site	Chavulahalli	Tadangam	Adiyaman kottai	Nagarkudal	Errappatti	Indur	Adagappadi
					A1	A2	A3	A4	A5	A6	A7	A8
1	PM_{10} Conc.	µg/m³	Min.	100(24 Hours)	27.10	40.79	34.44	32.11	39.71	34.89	33.38	37.39
			Max.		38.62	58.13	49.09	45.76	56.60	49.72	47.58	53.29
			Avg.		**32.50**	**48.92**	**41.31**	**38.50**	**47.62**	**41.84**	**40.04**	**44.84**
			98^{th} 'tile		38.39	57.79	48.80	45.49	56.27	49.43	47.30	52.98
2	$PM_{2.5}$ Conc.	µg/m³	Min.	60(24 Hours)	16.80	23.66	18.94	17.34	21.84	20.23	19.36	22.06
			Max.		23.94	33.72	27.00	24.71	31.13	28.84	27.59	31.44
			Avg.		**20.15**	**28.37**	**22.72**	**20.79**	**26.20**	**24.27**	**23.22**	**26.46**
			98^{th} 'tile		23.80	33.52	26.84	24.56	30.95	28.67	27.43	31.26
3	SO_2 Conc.	µg/m³	Min.	80(24 Hours)	6.93	7.24	8.78	11.56	11.79	7.69	8.37	11.89
			Max.		9.88	10.32	12.51	16.48	16.89	10.96	11.92	16.95
			Avg.		**8.32**	**8.69**	**10.53**	**13.87**	**14.05**	**9.23**	**10.04**	**14.26**
			98^{th} 'tile		9.82	10.26	12.43	16.39	16.83	10.90	11.85	16.85
4	NO_2 Conc.	µg/m³	Min.	80(24 Hours)	13.86	14.48	17.55	23.13	23.63	15.38	16.73	23.78
			Max.		19.75	20.63	25.01	32.96	33.57	21.92	23.85	33.89
			Avg.,		**16.63**	**17.37**	**21.05**	**27.74**	**28.42**	**18.45**	**20.07**	**28.52**
			98^{th} 'tile		19.64	20.51	24.87	32.77	33.51	21.79	23.71	33.69
5	Lead (Pb)	µg/m³	Avg.	1(24 hour)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)
6	Carbon monoxide (CO)	mg/m³	Avg.	4 (1hour)	BLQ(LOQ0.05)	BLQ(LOQ0.05)	BLQ(LOQ0.05)	0.34	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	0.28	0.32
7	Ozone O_3	µg/m³	Avg.	180(1hour)	BLQ(LOQ10)	BLQ(LOQ10)	BLQ(LOQ10)	BLQ(LOQ10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ10)	BLQ(LOQ10)
8	Benzene(C	ng/	Avg.	5(Annu	BLQ (LOQ	BLQ (LOQ	BLQ (LOQ	BLQ (LOQ	BLQ	BLQ	BLQ	BLQ

SL.NO.	Parameters	Units	Conc.	NAAQ Standards	Locations							
					Project site	Chavulahalli	Tadangam	Adiyaman kottai	Nagarkudal	Errappatti	Indur	Adagappadi
					A1	A2	A3	A4	A5	A6	A7	A8
	6H6)	m³		al)	1)	1)	1)	1)	(LOQ 1)	(LOQ 1)	(LOQ 1)	(LOQ 1)
9	**Benzo (a) Pyrene (C20H12 (a))**	**ng/m³**	**Avg.**	**1(Annual)**	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
10	**Arsenic (As)**	**ng/m³**	**Avg.**	**6 (Annual)**	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)
11	**Nickel as Ni**	**ng/m³**	**Avg.**	**20(Annual)**	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)
12	**Ammonia(NH_3)**	**µg/m³**	**Avg.**	**400(24 hour)**	BLQ(LOQ5)	BLQ(LOQ5)	BLQ(LOQ5)	BLQ(LOQ5)	BLQ(LOQ 5)	BLQ(LOQ 5)	BLQ(LOQ5)	BLQ(LOQ5)
13	**TVOC**	**ppm**	**Avg.**	**-**	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)

Note: *BLQ (Below Limit Of Quantification), LOQ (Limit of Quantification)*

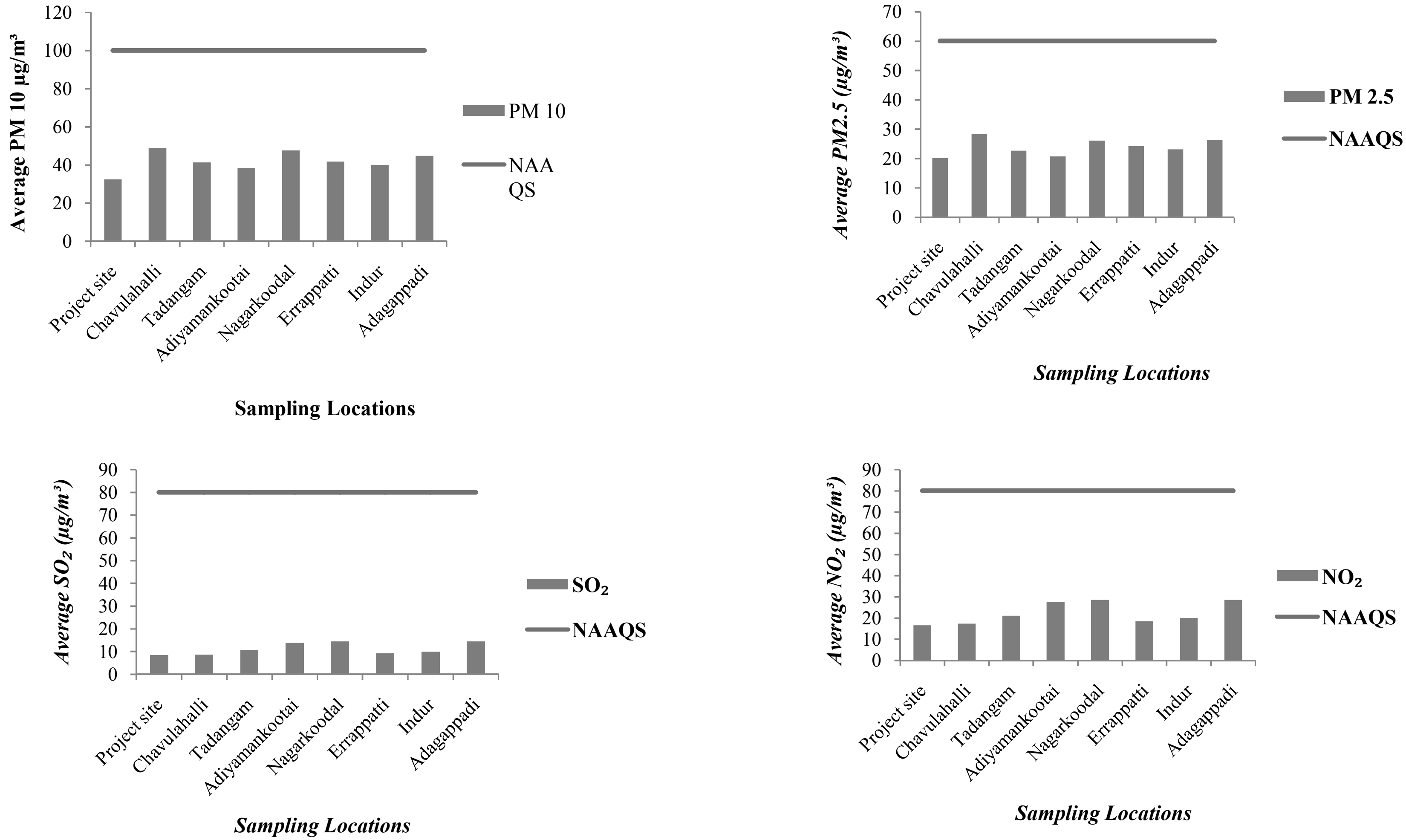


Figure 3-23: Trends of Measured Ambient Concentrations in the Study Area

Observations

The ambient air quality has been monitored at 8 locations as per NAAQS, 2009 within the study area. The results obtained are 168odeling168a as below:

- The average baseline levels of PM10 vary from 32.5 to 48.92 µg/m³.
- The average baseline levels of PM2.5 vary from 20.15 to 28.37 µg/m³.
- The average baseline levels of SO2 vary from 8.32 to 14.26 µg/m³.
- The average baseline levels of NO2 vary from 16.63 to 28.52 µg/m³.

The monitored concentrations for SO2, NO2, PM2.5, and PM10 are within the prescribed NAAQS limits.

3.7 Noise Environment

The prevailing ambient noise level at a particular location is nothing but the resultant (total) of all kinds of noise sources existing at various distances around that location. The ambient noise level at a location varies continuously depending on the type of surrounding activities. Ambient noise levels have been established by monitoring noise levels at Eight(08) locations in and around 10Km distance from project area during the study period using precision noise level meter. The noise monitoring locations in the study area were selected after giving due consideration to the various land use categories. The land use categories include commercial, residential,industries, rural and sensitive areas. Noise levels were recorded on an hourly basis for one complete day at each location using pre- calibrated noise levels. A map noise showing the noise monitoring locations is given in **Figure 3-24.**

3.7.1 Results and discussions

Based on the recorded hourly noise levels at each monitoring location, the day equivalent (Ld) and night equivalent (Ln) were calculated;

The Central Pollution Control Board constituted a Committee on Noise Pollution Control. The Committee recommended noise standards for ambient air and for automobiles, domestic appliances and construction equipment, which were later notified in Environment (Protection) Rules,1986 as Table given below:

S.NO	CODE	CATEGORY	DAY TIME (Ld)	NIGHT TIME(Ln)
1.	A	Industrial Area	75	70
2.	B	Commercial Area	65	55
3.	C	Residential Area	55	45
4.	D	Silence Zone	50	40

Ld: Average noise levels between 6:00 hours to 22.00 hours

Ln: Average noise levels between 22.00 hours to 6.00 hours

The day and night equivalent noise levels given in**Table 3-10**.

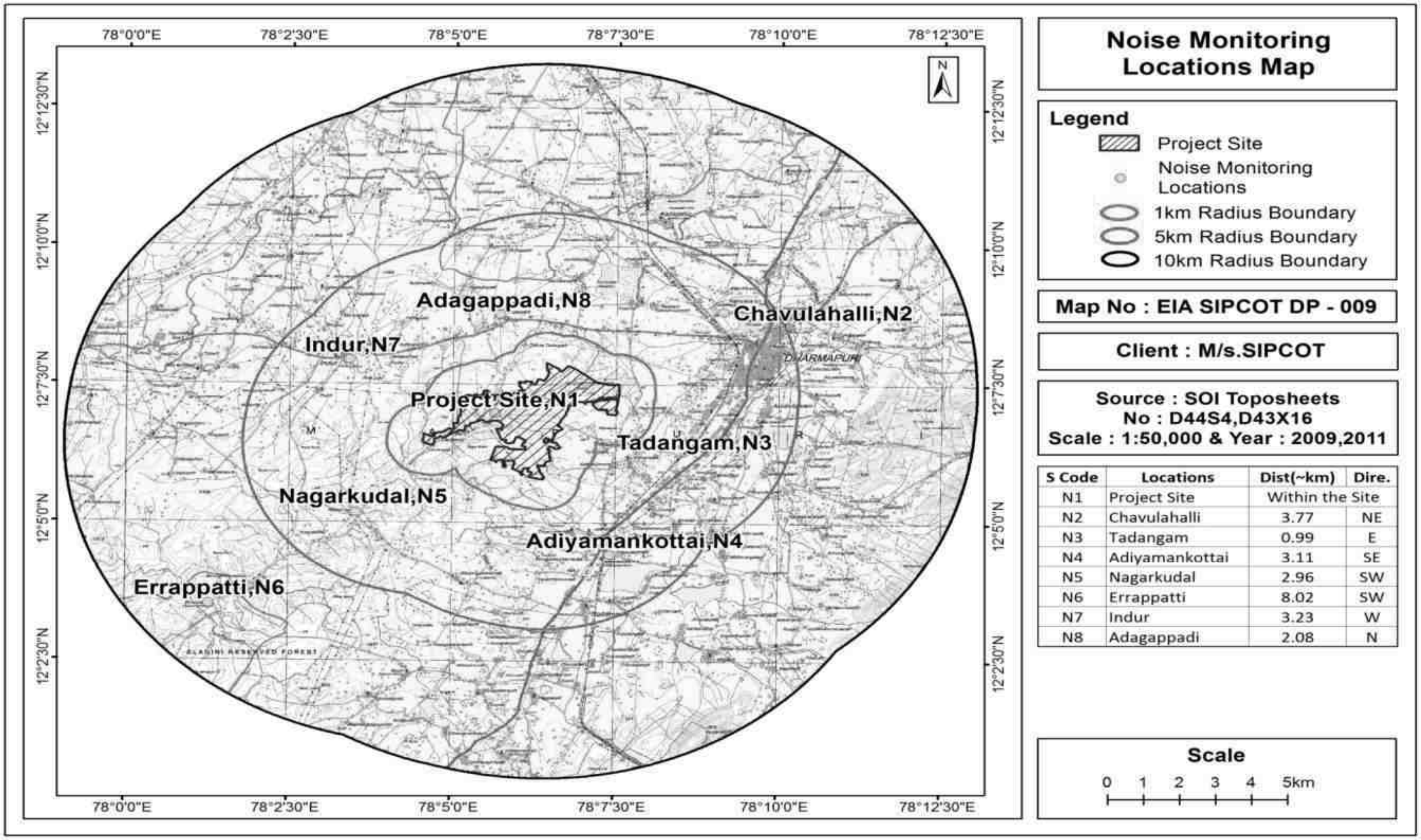
Table 3-10Day and Night Equivalent Noise Levels

S. No	Location	Location Code	Distance (~km) from Project boundary	Azimuth	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
				Direction	Day	Night	Lday (Ld)	Lnight (Ln)	
1	Project site	N1	Within Site		41.5	38.5	75	70	Industrial
2	Chavulahalli	N2	3.77	NE	48.1	42.7	55	45	Residential
3	Tadangam	N3	0.99	E	42.8	40.5	55	45	Residential
4	Adiyamankottai	N4	3.11	SE	46.2	42.8	55	45	Residential
5	Nagarkudal	N5	2.96	SW	44.8	40.8	55	45	Residential
6	Errappatti	N6	8.02	SW	45.9	40.1	55	45	Residential
7	Indur	N7	3.23	W	41.1	39.5	55	45	Residential
8	Adagappadi	N8	2.08	N	49.6	41.8	55	45	Residential

Observations

It is observed that the day equivalent and night equivalent noise levels at all locations are within prescribed CPCB standards:

- In Industrial area day time noise levels varied from 41.5 dB (A) and night time noise levels varied from 38.5 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels within the limit prescribed by CPCB for Industrial area (75 dB (A) Day time &70dB(A) Night time).
- In Residential area day time noise levels varied from 41.1 dB (A) to 49.6 dB (A) and night time noise levels varied from 39.5dB(A) to 42.8dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels in Residential area are within the limit prescribed by CPCB for Residential area (55 dB (A) Day time & 45 dB(A) Night time).



S Code	Locations	Dist(~km)	Dire.
N1	Project Site	Within the Site	
N2	Chavulahalli	3.77	NE
N3	Tadangam	0.99	E
N4	Adiyamankottai	3.11	SE
N5	Nagarkudal	2.96	SW
N6	Errappatti	8.02	SW
N7	Indur	3.23	W
N8	Adagappadi	2.08	N

Figure 3-24Map showing the Noise Monitoring location

3.8 Water Environment

The district is part of the composite east flowing river basin "Between Cauvery and Ponnaiyar as per the Irrigation Atlas of India.

3.8.1 Surface Water Resources

Dharmapuri district is drained by Cauvery and Ponnaiyar rivers and their tributaries. Cauvery riverflows along the south western boundary of the district. It flows in an easterly direction up to Bellgundla and then takes a more or less southerly course till it reaches the Stanley Reservoir. The Doddahalla and the Chinnar are important tributaries of Cauvery River in the district.

Ponnaiyar is the major river draining the district and is ephemeral in nature. It originates from Nandhi hills in Karnataka, enters Tamil Nadu west of Bagalur and flows almost in a south easterly direction till it reaches Daddampatti from where it takes an easterly course. Pambar, Vaniyar and Kallar are the important tributaries of Ponnaiyar draining the eastern part of the district whereas the Chinnar and Markandeya Nadhi drain the northern part of the district.

Source:http://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf

(**Ref**: Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Dharmapuri District")

3.8.2 Surface Water Quality Assessment

Water quality monitoring and assessment can be used to determine ambient water quality, the extent and causes of a water quality problem, or to measure the effectiveness of best management practices being implemented in water system. Monitoring helps to determine the trends in the quality of the aquatic environment and the impact due to the release of contaminants, other anthropogenic activities, and/or by waste treatment operations (impact monitoring).To establish the baseline status of water environment, the representative sampling locations for surface water within a radial distance of 10Km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters is given in**Table 3-11.**

Table 3-11Test methods used for the analysis of water quality parameters

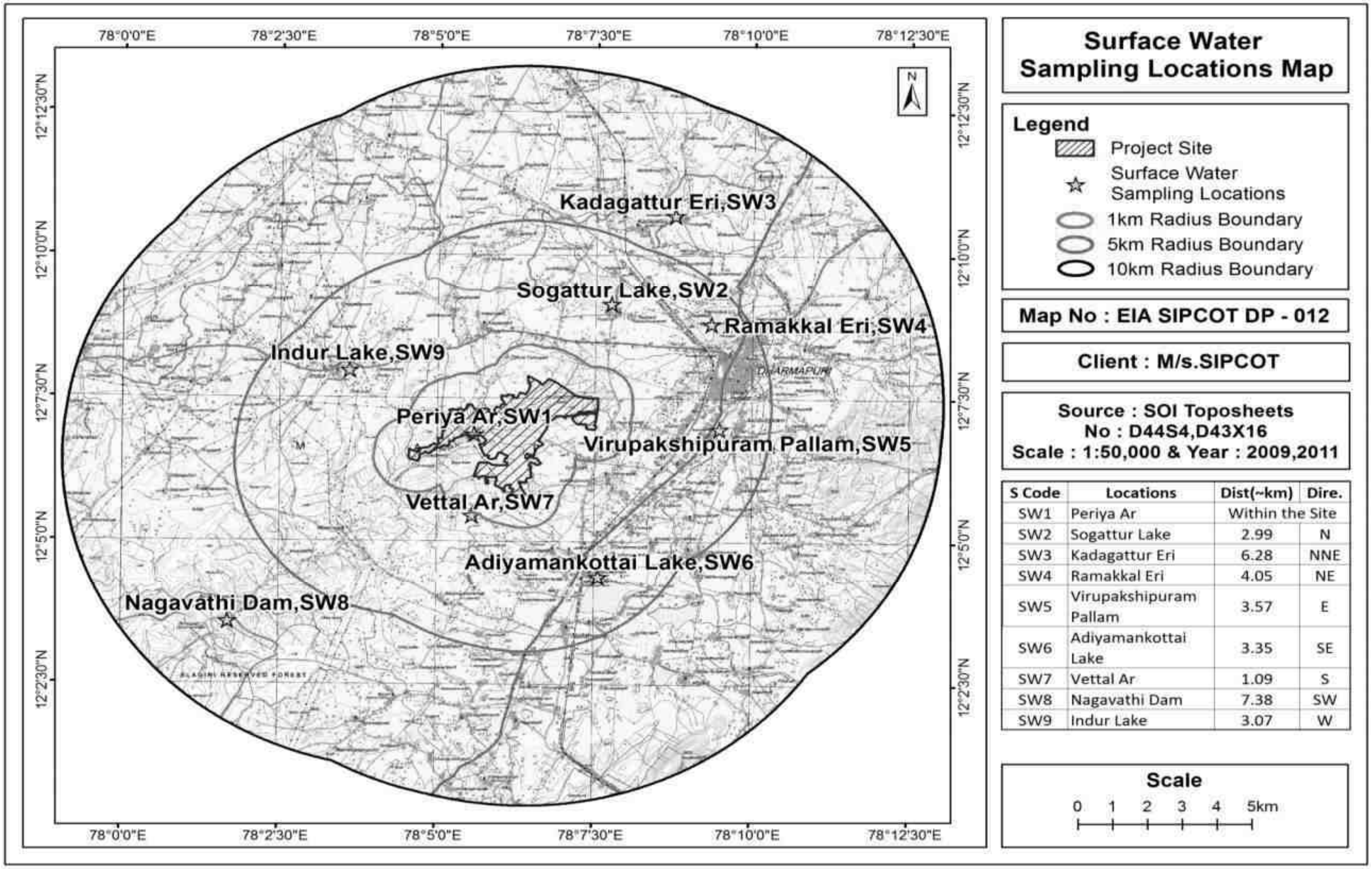
Sl. No	Parameter Measured	Test Method
1	Turbidity	IS 3025(Part – 10):1984
2	pH	IS:3025 (Part – 11): 1983 (Reaff: 2006)
3	Electrical Conductivity	IS:3025 (Part – 14): 1983 (Reaff: 2006)
4	Total Dissolve Solids	IS: 3025:1(Part – 16) 1984 (Reaff 2006)
5	Total Suspended Solids	IS 3025 (Part – 17) 1984 (Reaff 1996)
6	Total Alkalinity as CaCO3	IS:3025,1 (Part – 23) 1986 (Reaff 2009)
7	Total Hardness as CaCo3	IS:3025 (Part – 21) 1983 (Reaff 2006)
8	Sodium as Na	IS:3025,5(Part – 45) 1993 (Reaff 2006)
9	Potassium as K	IS:3025,5(Part – 45) 1993 (Reaff 2006)

Sl. No	Parameter Measured	Test Method
10	Calcium as Ca	IS 3025 (Part – 40):1991
11	Magnesium as Mg	IS 3025 (Part – 46) 1994
12	Chloride as cl	IS 3025 (Part – 32):1988
13	Sulphate as SO4	IS 3025(Part – 24):1986
14	Nitrate as NO3	ASTM (Part – 31)1978
15	Phosphate as PO4	IS 3025 (Pt 45) 1993 (R 2006)
16	Fluorides as F	IS 3025 (Part – 60):2008
17	Cyanide as Cd	IS 3025 (Part-27):1986
18	Arsenic as As	IS 3025☹Part-37):1988(Reaff 2009)
19	Cadmium as Cd	IS 3025 (Part – 41)1991
20	Chromium, Total	IS:3025 (Part – 52) 2003 (Reaff 2009)
21	Lead as Pb	IS:3025 (Part – 47) 1994 (Reaff 2009)
22	Manganese as Mn	IS 3025☹Part – 59):2006
23	Mercury as Hg	IS 3025 (Part48):1994 RA 1999
24	Nickel as Ni	IS 3025☹Part-54):2003(Reaff 2009)
25	Selenium as Se	IS 3025 Part (56)2003
26	Zinc as Zn	IS:3025 (Part – 49) 1994 (Reaff 2009)
27	Dissolved Oxygen (DO)	IS:3025 (Part – 38)1989 (Reaff 2009)
28	BOD, 3 days @ 27°C as O_2	5210B APHA22nd Edn 2012
29	Chemical Oxygen Demand as O_2	IS:3025 (Part-58)-2006

The prevailing status of surface water quality has been assessed during the study period.Surface water sampling locations are provided in **Table 3-12**. Surface water quality results are provided in **Table 3-13**. A map showing the surface water monitoring locations is given in **Figure 3-25**.

Table 3-12Details of Surface water sampling locations

S.No	Location	Location Code	Distance in Km	Direction
1	PeriyaAr	SW1	Within Site	
2.	Sogathur lake	SW2	2.99	N
3	Kadagathur lake	SW3	6.28	NNE
4	RamakkalEri	SW4	4.05	NE
5	Virupakshipurampallam	SW5	3.57	E
6	Adiyamankottai lake	SW6	3.35	SE
7	Vettal AR	SW7	1.09	S
8	Nagavathi dam	SW8	7.38	SW
9	Indur lake	SW9	3.07	W



S Code	Locations	Dist(~km)	Dire.
SW1	Periya Ar	Within the Site	
SW2	Sogattur Lake	2.99	N
SW3	Kadagattur Eri	6.28	NNE
SW4	Ramakkal Eri	4.05	NE
SW5	Virupakshipuram Pallam	3.57	E
SW6	Adiyamankottai Lake	3.35	SE
SW7	Vettal Ar	1.09	S
SW8	Nagavathi Dam	7.38	SW
SW9	Indur Lake	3.07	W

Figure 3-25 Map showing the surface water monitoring locations

Table 3-13: Physico chemical Parameters of Surface water samples from the study area

S.No.	Test Parameters	Units	Surface water Standards (IS 2296 Class-A)	Periya AR	Sogathur lake	Kadagathur lake	Ramakkal Eri	Virupakshipurampallam	Adiyamankottai lake	Vettalar	Nagavathi dam	Indur lake
				SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9
1	Biological Oxygen Demand (BOD)@ 27°C For 3 days	mg/l	2	No waterpresence during monitoring period.	3	3	4	2	4	3	3	2
2	Boron as B	mg/l	-		BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)
3	Calcium as Ca	mg/l	80.1		28.05	36.07	32.06	128.25	40.08	60.91	40.08	84.17
4	Chemical Oxygen Demand (COD)	mg/l	-		24	28	36	20	32	20	28	16
5	Chloride as Cl	mg/l	250		113.82	108.87	356.31	296.92	291.98	274.17	282.08	559.21
6	Chromium as Cr	mg/l	-		BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)
7	Dissolved oxygen	mg/l	6		6.5	6.4	6.1	6.2	5.9	6.2	6.1	6.1
8	Electrical Conductivity at 25°C	µS/cm	-		869	843	1817	2320	2100	1440	2080	2840
9	Fluoride as F	mg/l	1.5		0.39	0.37	0.41	0.45	0.44	0.47	0.42	0.47
10	Nitrate as NO3	mg/l	20		8.98	7.67	11.92	9.51	7.65	1.34	7.58	5.54
11	pH at 25°C		6.5-8.5		7.97	8.26	9.14	7.97	8.97	7.26	8.95	7.88
12	Total dissolved solids	mg/l	500		460	446	963	1230	1115	758	1102	1507
13	Cyanide as CN	mg/l	0.05		BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)

14	Magnesium as Mg	mg/l	24.28		29.16	24.3	46.17	68.04	77.76	26.7	70.47	85.05
15	Potassium as K	mg/l	-		5	4	15	14	13	19	13	21
16	Sodium as Na	mg/l	-		57	55	180	152	148	165	141	280
17	Sulphate as SO4	mg/l	400		12.05	13.68	17.32	31.02	162.79	108.18	183.05	157.74
18	Total alkalinity as CaCO3	mg/l	-		220	250	330	530	310	125	330	280
19	Total Hardness as CaCO3	mg/l	300		190	190	270	600	420	262	390	560
20	Total Suspended Solids	mg/l	-		31	54	92	15	57	18	54	5
21	Turbidity	NTU	1		13.9	24.7	41.7	6.9	25.1	4.8	23.8	2.1
22	Arsenic	mg/l	0.05		BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ:0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ:0.005)	BLQ (LOQ: 0.005)
23	Cadmium	mg/l	0.01		BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ:0.001)	BLQ (LOQ:0.001)	BLQ (LOQ: 0.001)
24	Copper	mg/l	1.5		BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)
25	Lead	mg/l	0.1		BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)
26	Manganese	mg/l	0.5		BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)
27	Mercury	mg/l	0.001		BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)
28	Nickel	mg/l	-		BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)

29	Selenium	mg/l	-		BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)

(Note: BLQ – Below Limit of Quantification; LOQ – Limit Of Quantification)

Results and Discussions

Surface water sample results are discussed below:

- The pH values in the collected surface water samples vary between **7.26 to 9.14**. According to Surface Water Standards (IS 2296 Class-A), the acceptable pH limit is **6.5-8.5**. However, samples from Ramakkal Eri (SW4), Adiyamankottai lake (SW6), and Nagavathi dam (SW8) exhibit slightly alkaline pH values, exceeding 8.5.
- The Total Dissolved Solids (TDS) values of the collected surface water samples range from **446 mg/l to 1507 mg/l**. According to Surface Water Standards (IS 2296 Class-A), the acceptable limit is 500 mg/L. However, samples from Ramakkal Eri (SW4), Virupakshipurampallam (SW5), Adiyamankottai lake (SW6), VettalAr (SW7), Nagavathi dam (SW8), and Indur lake (SW9) exceed the acceptable limit as per Surface Water Standards (IS 2296 Class-A).TDS levels are higher maybe due to anthropogenic activities at the water courses.
- The Total Hardness values of the collected surface water samples range from **190 mg/l to 600 mg/l.** According to Surface Water Standards (IS 2296 Class-A), the acceptable limit is 300 mg/L. However, samples from Virupakshipurampallam (SW5), Adiyamankottai lake (SW6), Nagavathi dam (SW8), and Indur lake (SW9) exceed the acceptable limit as per Surface Water Standards (IS 2296 Class-A).
- The BOD (Biochemical Oxygen Demand) values in the surface water samples range from 2 to 4 mg/l. BOD is an important parameter that indicates the amount of organic matter present in water and the level of oxygen required for microorganisms to break down that organic matter. These values suggest a relatively low to moderate level of organic pollution in the surface water.
- The COD (Chemical Oxygen Demand) values in the surface water samples range from 16 to 36 mg/l. These values may indicate the potential intrusion of domestic activities, suggesting the introduction of pollutants into the water from domestic sources.

***SW1-Periya AR- No waterpresence during monitoring period.**

Surface water standards (IS 2296:1992) given in**Table 3-14**.

Table 3-14Surface water Standards (IS 2296:1992)

S.No	Parameters	Unit	A	B	C	D	E
1	Turbidity	NTU	---	---	---	---	---
2	pH	--	8.5	8.5	8.5	8.5	8.5
3	Conductivity	µS/cm	---	---	---	1000	2250
4	Total Dissolved Solids	mg/l	500	---	1500	---	2100
5	Alkalinity as $CaCO_3$	mg/l	---	---	---	---	---
6	Total Hardness as $CaCo_3$	mg/l	300	---	---	---	---
7	Calcium as Ca	mg/l	---	---	---	---	---
8	Magnesium as Mg.	mg/l	----	---	---	---	---

S.No	Parameters	Unit	A	B	C	D	E
9	Sodium Na	mg/l	---	---	---	---	---
10	Potassium	mg/l	---	---	---	---	---
11	Chloride as Cl	mg/l	250	---	600	---	600
12	Sulphate as SO4	mg/l	400	---	400	---	1000
13	Phosphate	mg/l	---	---	---	---	---
14	Nitrate as NO_3	mg/l	20	---	50	---	---
15	Fluorides as F	mg/l	1.5	1.5	1.5	---	---
16	Cyanide	mg/l	0.05	0.05	0.05	---	---
17	Arsenic	mg/l	0.05	0.2	0.2	---	---
18	Cadmium	mg/l	0.01	---	0.01	---	---
19	Chromium, Total	mg/l	0.05	0.05	0.05	---	---
20	Copper	mg/l	1.5	---	1.5	---	---
21	Iron	mg/l	0.3	---	50	---	---
22	Lead	mg/l	0.1	---	0.1	---	---
23	Zinc	mg/l	15	---	15	---	---
24	Manganese	mg/l	0.5	---	---	---	---
25	Selenium	mg/l	0.01	---	0.05	---	---
26	Mercury	mg/l	0.001	---	---	---	---
27	Dissolved Oxygen	mg/l	6	5	4	4	---
28	COD	mg/l	---	---	---	---	---
29	BOD	mg/l	2	3	3	---	---

- **Class A** – Drinking water without conventional treatment but after disinfection.
- **Class B** –Water for outdoor bathing.
- **Class C** – Drinking water with conventional treatment followed by disinfection.
- **Class D** – Water for fish culture and wild life propagation.
- **Class E** – Water for irrigation, industrial cooling and controlled waste disposal

3.8.3 Ground Water Resources

The shallow alluvial aquifers along Cauvery and Ponnaiyar rivers serve as an important source of drinking water irrigation development for Dharmapuri district. Dug wells are the most common ground water abstraction structures used for irrigation in the district. The yield of dug wells range from 150 to 200 m3/day in weathered crystalline rocks and 20 to 200 m3/day in Recent alluvial formations along major drainage courses.

At district level, the seasonal fluctuation shows a rise in water level, which ranges from 3.71 to 7.06 m b.g.l. The piezometric head varied between 2.66 to 20.06 m b.g.l (May 2006) during pre monsoon and 1.19 to 14.57 m b.g.l during post monsoon(Jan 2007).

In the study area, pre-monsoon water level is 2- 5 m b.g.l (May 2006) and post-monsoon water level is 2- 5 m b.g.l (Jan 2007)

Source:http://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf

(**Ref**: Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Dharmapuri District")

PLATE - III

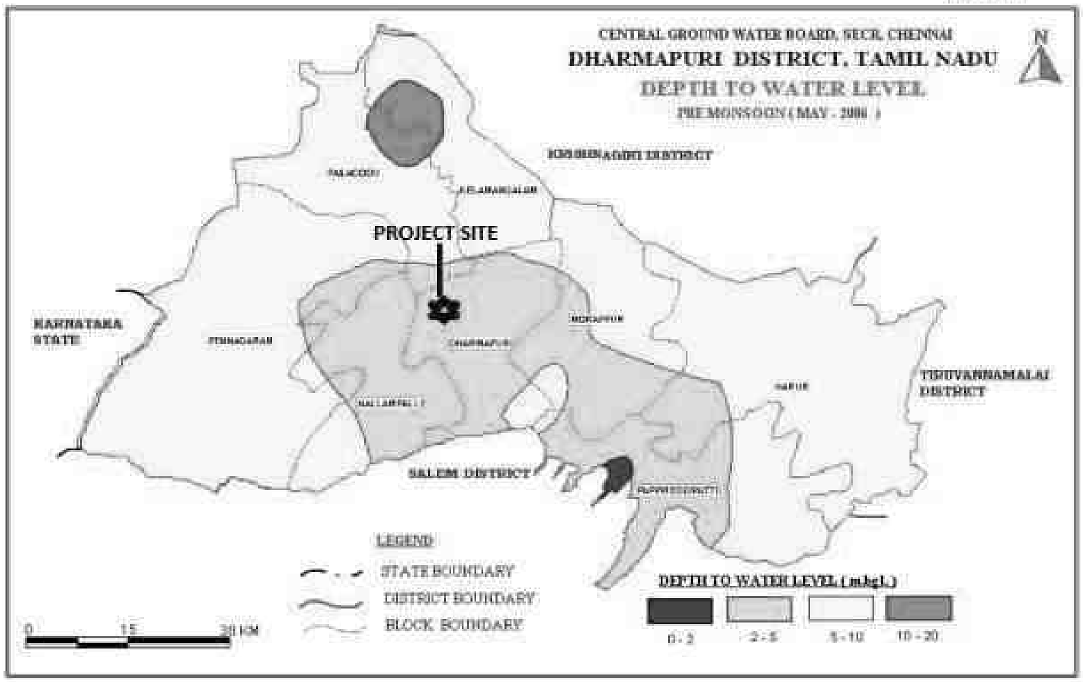
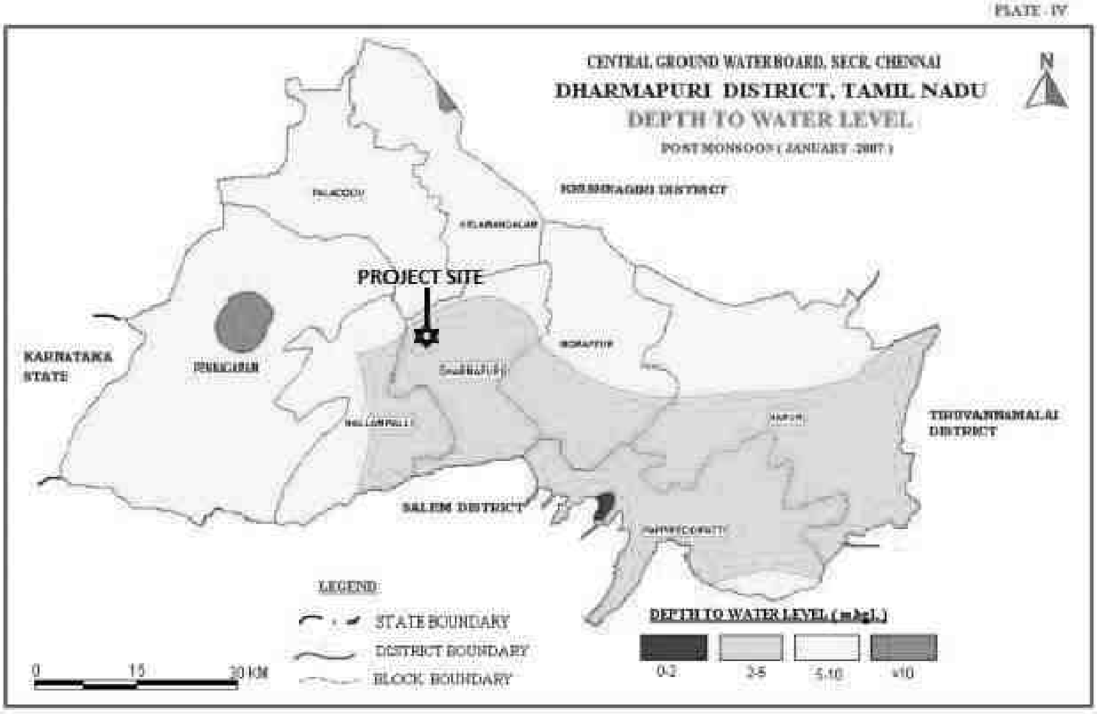


PLATE - IV



Source: http://cgwb.gov.in/sites/default/files/2022-10/dharmapuri.pdf

Figure 3-26Depth of water level during Pre-Monsoon & Post Monsoon in Dharmapuri District

3.8.3.1 Ground Water Quality

The chemical characteristics of ground water in the phreatic zone in Dharmapuri district has been studied using the analytical data of ground water samples collected from Network Hydrograph Stations of Central Ground Water Board. The study of quality of ground water in deeper aquifers in the district has been attempted using the data collected from exploratory bore\ tube wells constructed in the district.

Ground water in phreatic aquifers in Dharmapuri district in general, is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone (in MicroSeimens at 25ºC) during May 2006 was in the range of 320 to 6010 in the district. It is between 750 and 2250 µS/cm at 25ºC in the major part of the district. Conductance below 750 µS/cm have been observed in ground water in only one sample is Dharmapuri block Whereas Conductance exceeding 2250µS/cm have been observed in parts of Papireddipatti, Pennagaram and Morappur block.

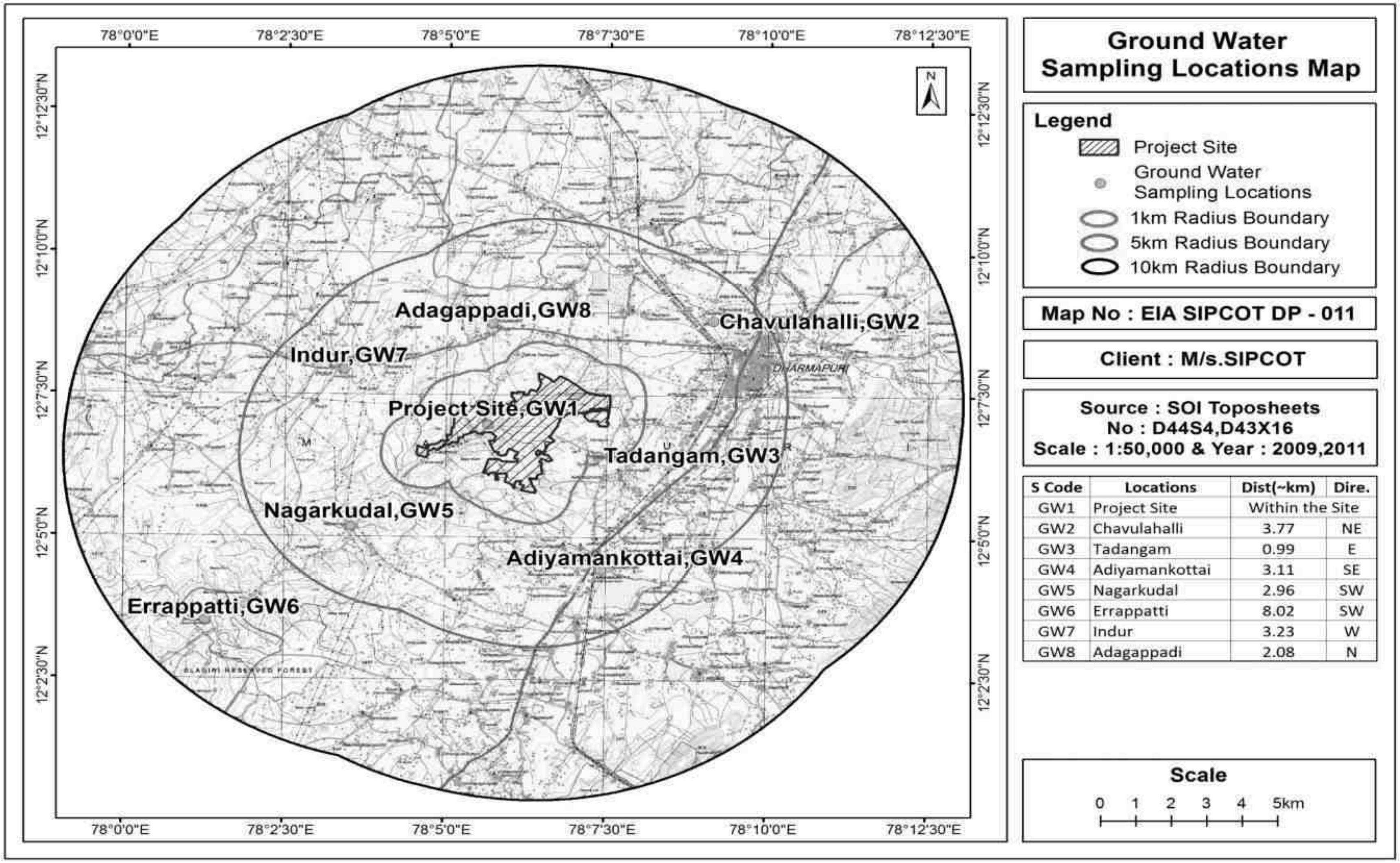
It is observed that the ground water is suitable for drinking and domestic uses in respect of all the constituents except total hardness and Nitrate in more than 90percent of samples analysed. Total Hardness as CaCO3 is observed in all samples have within the excess of permissible limits in about 40 percent of samples analysed whereas Nitrate is found in excess of 45 mg/l in about 32 percent samples. The incidence of high total hardness 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 pesticides and fertilizers for agriculture.

With regard to irrigation suitability based on specific electrical conductance and Sodium Adsorption 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 suing ground water for irrigation.

Groundwater quality monitoring locations and results are given in **Table 3-15** and Map showing the groundwater monitoring locations are given in**Figure 3-27.**

Table 3-15Details of Groundwater Quality Monitoring Locations

S.No	Locations	Location Code	Distance in Km	Direction
1	Project site	GW1	Within the site	
2	Chavulahalli	GW2	3.77	NE
3	Tadangam	GW3	0.99	E
4	Adiyamankottai	GW4	3.11	SE
5	Nagarkudal	GW5	2.96	SW
6	Errappatti	GW6	8.02	SW
7	Indur	GW7	3.23	W
8	Adagappadi	GW8	2.08	N



S Code	Locations	Dist(~km)	Dire.
GW1	Project Site	Within the Site	
GW2	Chavulahalli	3.77	NE
GW3	Tadangam	0.99	E
GW4	Adiyamankottai	3.11	SE
GW5	Nagarkudal	2.96	SW
GW6	Errappatti	8.02	SW
GW7	Indur	3.23	W
GW8	Adagappadi	2.08	N

Figure 3-27Map showing the groundwater monitoring locations

Table 3-16Physico chemical analysis of Ground Water samples from the study area

S. No	Test Parameters	Units	IS 10500 : 2012		Project site	Chavulahalli	Tadangam	Adiyamankottai	Nagarkudal	Errappatti	Indur	Adagappadi
			Acceptable limit (Max)	Permissible limit (Max)	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8
1	Boron as B	mg/l	0.5	2.4	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)
2	Calcium as Ca	mg/l	75	200	180.36	52.1	120.24	156.31	224.45	84.17	256.51	172.34
3	Chloride as Cl	mg/l	250	1000	252.38	405.8	212.79	287.03	643.34	232.59	702.73	217.75
4	Colour	Hazen units	5	15	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)	BLQ(LOQ:1.0)
5	Cyanide as CN	mg/l	0.05	No relaxation	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)
6	Electrical Conductivity at 25°C	µS/cm	NA	NA	2470	2940	1551	2830	5240	2360	4690	1935
7	Fluoride as F	mg/l	1	1.5	0.45	0.45	0.44	0.46	0.48	0.41	0.46	0.42
8	Magnesium as Mg	mg/l	30	100	109.35	63.18	68.04	82.62	340.2	77.76	131.22	46.17
9	Nitrate as NO3	mg/l	45	No relaxation	24.17	10.62	6.12	37.45	40.52	27.56	34.6	38.12
10	pH at 25°C	-	6.5-8.5	No relaxation	7.17	7.59	7.19	7.21	7.23	7.53	7.32	7.01
11	Potassium as K	mg/l	NA	NA	12	18	9	13	24	11	28	10
12	Sodium as Na	mg/l	NA	NA	130	197	110	145	321	120	350	112
13	Sulphate as SO4	mg/l	200	400	220.24	53.36	62.91	66.03	243.8	150.88	417.14	84.49
14	Total alkalinity as CaCO3	mg/l	200	600	490	570	320	550	560	520	570	370
15	Total dissolved solids	mg/l	500	2000	1309	1560	823	1498	2784	1251	2490	1025
16	Total Suspended Solids	mg/l	NA	NA	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)	BLQ(LOQ:2.0)

S. No	Test Parameters	Units	IS 10500 : 2012		Project site	Chavula halli	Tadang am	Adiyama nkottai	Nagark udal	Errappa tti	Indur	Adagap padi
			Acceptable limit (Max)	Permissible limit (Max)	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8
17	Total hardness as CaCO3	mg/l	200	600	900	390	580	730	1960	530	1180	620
18	Turbidity, NTU	NTU	1	5	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)	BLQ(LOQ:0.1)
19	Arsenic	mg/l	0.01	No relaxation	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)
20	Cadmium	mg/l	0.003	No relaxation	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)	BLQ (LOQ: 0.001)
21	Chromium	mg/l	0.05	No relaxation	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)
22	Copper	mg/l	0.05	1.5	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)
23	Lead	mg/l	0.01	No relaxation	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)
24	Manganese	mg/l	0.1	0.3	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)
25	Mercury	mg/l	0.001	No relaxation	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)	BLQ (LOQ: 0.0005)
26	Nickel	mg/l	0.02	No relaxation	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)

S. No	Test Parameters	Units	IS 10500 : 2012		Project site	Chavula halli	Tadang am	Adiyama nkottai	Nagark udal	Errappa tti	Indur	Adagap padi
			Acceptable limit (Max)	Permissible limit (Max)	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8
27	Selenium	mg/l	0.01	No relaxation	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)	BLQ (LOQ: 0.005)
28	Zinc	mg/l	5	15	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)	BLQ (LOQ: 0.01)

*(**Note:** BLQ – Below Limit of Quantification; LOQ – Limit of Quantification; NR – No Relaxation)*

Results and Discussions

A summary of analytical results are presented below:

- The pH of the collected groundwater samples ranges from 7.01 to 7.59. According to IS 10500:2012, the acceptable pH limit is 6.5-8.5. All pH values in the samples fall within the acceptable limit as per IS 10500:2012.
- The chloride concentrations in the collected groundwater samples range from 212.79 to 702.73 mg/l. According to IS 10500:2012, the acceptable limit is 250 mg/l. Samples from the Project site (GW1), Chavulahalli (GW2), Adiyamankottai (GW4), Nagarkudal (GW5), and Indur (GW7) fall within the permissible limit of 1000 mg/L as per IS 10500:2012.
- The Total Dissolved Solids (TDS) values in the collected groundwater samples range from 823 mg/l to 2784 mg/l. According to IS 10500:2012, the acceptable limit is 500 mg/l, and the permissible limit is 2000 mg/l. Groundwater samples from the Project site (GW1), Chavulahalli (GW2), Tadangam (GW3), Adiyamankottai (GW4), Errappatti (GW6), and Adagappadi (GW8) are within the permissible limit of 2000 mg/L. However, samples from Nagarkudal (GW5) and Indur (GW7) exceed the permissible limit, recorded values above 2000 mg/L.TDS levels are higher maybe due to anthropogenic activities at the water courses.
- Total hardness of the collected ground water sample ranges from 390 mg/l to 1960 mg/l. The sample locations of Chavulahalli (GW2),Tadangam(GW3), Errappatti (GW6) values are within Permissible limit of 600 mg/L as per IS 10500:2012. The sample Locations ofProject site (GW1), Adiyamankottai (GW4), Nagarkudal (GW5), Indur (GW7), Adagappadi (GW8) are above the Permissible limit of 600 mg/L as per IS 10500:2012.
- The concentrations of Sulphate in the collected groundwater samples range from 53.3 to 417.14 mg/l. According to IS 10500:2012, the acceptable limit is 200 mg/l, and the permissible limit is 400 mg/L. Samples from Chavulahalli (GW2), Tadangam (GW3), Adiyamankottai (GW4), and Adagappadi (GW8) are within the acceptable limit. All other samples (GW1, GW5, GW7) fall within the permissible limit. However, the sample from Indur (GW7) exceeds the permissible limit.

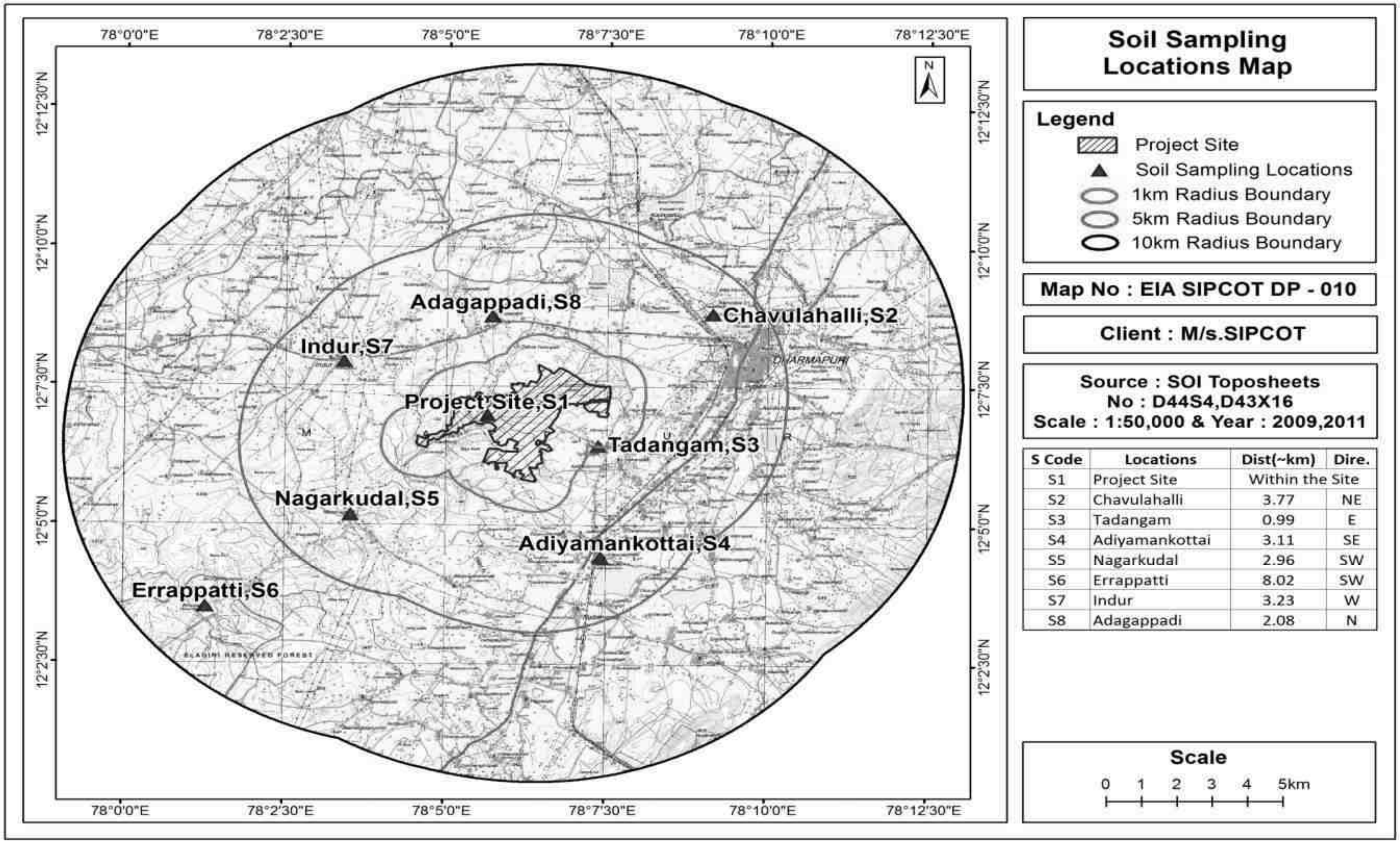
3.9 Soil quality

Soil quality monitoring locations & results are given in **Table 3-17 &Table 3-18.** Map showing the soil monitoring locations are given in **Figure 3-28.**

Table 3-17Soil & Sediment Quality Monitoring Locations

S.No	Locations	Location Code	Distance in Km	Direction
1	Project site	S1	Within the site	
2	Chavulahalli	S2	3.77	NE
3	Tadangam	S3	0.99	E
4	Adiyamankottai	S4	3.11	SE

5	Nagarkudal	S5	2.96	SW
6	Errappatti	S6	8.02	SW
7	Indur	S7	3.23	W
8	Adagappadi	S8	2.08	N



S Code	Locations	Dist(~km)	Dire.
S1	Project Site	Within the Site	
S2	Chavulahalli	3.77	NE
S3	Tadangam	0.99	E
S4	Adiyamankottai	3.11	SE
S5	Nagarkudal	2.96	SW
S6	Errappatti	8.02	SW
S7	Indur	3.23	W
S8	Adagappadi	2.08	N

Figure 3-28Map showing the soil monitoring locations

Table 3-18Soil & Sediment Quality Monitoring Results

S.No.	Test Parameters	Units	Project site	Chavulahalli	Tadangam	Adiyamankottai	Nagarkudal	Errappatti	Indur	Adagappadi
			S1	S2	S3	S4	S5	S6	S7	S8
1	Cadmium	mg/kg	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)
2	Chromium	mg/kg	10.127	7.33	8.667	7.618	7.637	8.979	9.027	9.865
3	Copper	mg/kg	59.183	63.711	30.958	26.484	66.893	20.12	33.604	32.944
4	Nickel	mg/kg	7.132	4.897	5.552	4.295	4.673	5.654	5.453	5.981
5	Selenium	mg/kg	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)
6	Zinc	mg/kg	6.082	4.871	5.834	4.418	4.987	5.425	6.02	5.386
7	Soil Texture		Loam	Clay	Loam	Loam	Clay loam	Sandy clay loam	Loam	Loam
8	Soil Texture i)Sand	%	30.9	26.6	32.7	29.7	35.3	47.1	38.6	48.3
9	Soil Texture ii)Silt	%	48.7	30.6	41.5	45.2	39.5	22.3	42.9	36.3
10	Soil Texture iii)Clay	%	20.4	42.8	25.8	25.1	30.7	30.6	18.5	15.4
11	pH Value @ 25 ° C (1 : 2.5)	-	8.18	8.92	7.36	7.88	7.40	7.62	8.26	7.52
12	Electrical conductivity @ 25 ° C (1 : 2)	µS/cm	220.1	766	128	84.5	63.1	95	69.8	48.3
13	Bulk Density	gm/cm3	1.04	0.96	1.08	1.02	1.11	1.06	1.1	1.18
14	Organic Carbon	%	0.33	0.21	0.37	0.24	0.38	0.27	0.41	0.26
15	Organic Matter	%	0.58	0.37	0.65	0.43	0.67	0.48	0.71	0.45
16	Available Phosphorous as P	µ g/g or mg/kg	5.91	BLQ(LOQ 5.0)	8.49	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	BLQ(LOQ 5.0)	6.67
17	Available Potassium	mg/kg	15.91	200.58	34.24	17.32	9.28	20.79	37.56	16.07
18	Total Nitrogen as N	mg/kg	90	112	142	139	119	120	132	117
19	Exchangable Calcium as Ca	mEq/L	15.95	21.03	17.75	13.86	14.7	16.48	14.1	18.28

S.No.	Test Parameters	Units	Project site	Chavulahalli	Tadangam	Adiyamankottai	Nagarkudal	Errappatti	Indur	Adagappadi
			S1	S2	S3	S4	S5	S6	S7	S8
20	Exchangable Magnesium as Mg	mEq/L	63.83	59.17	59.2	27.72	54.78	57.17	61.39	49.65
21	Available Sodium as Na	mg/kg	119.68	889.53	145.07	34.65	18.63	136.12	28.17	24.15
22	Cation Exchange Capacity	mEq/100g	2.2	8.5	7.8	4.2	7	7.4	7.6	6.3
23	Water Holding capacity	%	30.2	20.6	28.2	32.6	18.6	16.8	29.4	31.5
24	Manganese	mg/kg	120.021	99.113	114.79	71.322	66.018	97.564	114.023	112.073
25	Boron as B	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
26	Iron	mg/kg	7.32	6.29	3.97	7.17	8.76	9.46	10.39	12.74
27	Infiltration Rate	-	0.92	0.8	0.63	0.72	0.35	1.2	0.55	0.75
28	Moisture	%	3.04	7.98	2.61	3.86	1.92	2.78	3.94	4.12

Note: *BLQ – Below Limit of Quantification; LOQ – Limit of Quantification*

Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 7.36 to 8.92. The pH normal range is above 6 to 7.5. The pH level at the Nagarkudal (S5) sampling location falls within the normal range. However, at the project site (S1), Tadangam (S3), Adiyamankottai (S4), Errappatti (S6), Indur (S7), and Adagappadi (S8) sampling locations, the pH is slightly alkaline. The Chavulahalli (S2) sampling location exhibits a moderately alkaline pH.
- Conductivity of the soil samples ranged from 48.3 to 766 µS/cm. The non saline range is 1680 µS/cm according to the soil and land use survey of India.
- Nitrogen (N) content ranged from 90 to 142 mg/kg. The nitrogen levels at the project site (S1), Chavulahalli (S2), Nagarkudal (S5), Errappatti (S6), Indur (S7), and Adagappadi (S8) sampling locations fall within the low range(up to 125 mg/kg), as indicated by the Soil and Land Use Survey of India. In difference, Tadangam (S3) and Adiyamankottai (S4) sampling locations exhibit medium-range nitrogen levels (250 mg/kg) according to the soil and land use survey of India.
- Phosphorous(P) ranges upto 8.49 mg/kg. The low range is 4.45 mg/kg as per the soil and land use survey of India. The sampling locations are Chavulahalli (S2), Adiyamankottai (S4), Nagarkudal (S5), Errappatti (S6) and Indur (S7) have nitrogen levels within the low range. However, sampling locations Project site (S1), Tadangam (S3), and Adagappadi (S8) fall within the medium range, ranging from 4.45 mg/kg to 11 mg/kg.
- Potassium(K) content ranges from 9.28 to 200.58 mg/kg. The soil and land use survey of India classifies potassium levels into low (up to 53 mg/kg), medium (54 mg/kg to 124 mg/kg), and high (above 124 mg/kg) ranges. The sample location S2 was found to have potassium levels in the high range, while all other samples are within the low range, as per the soil and land use survey of India.

3.10 Biological Environment

An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if any. The biological study was under taken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining its health. Secondary information was collected to study the flora & fauna in 10 km radius. Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. All the available information was recorded about the wild plants and cultivated crop plants.

During secondary information, following aspects were considered for ecological studies:

- ❖ Assessment of present status of flora and fauna;

- Identification of rare and endangered species of plants and animals (if any);
- Identification of ecologically sensitive areas within the study area;
- Assessment of migratory route of wildlife (if any); and
- Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources.

3.10.1 Methodology

Terrestrial investigations for flora and fauna records were collected by primary and secondary information like research article, periodicals, floras and forest checklist.

3.10.2 Floral Study

- Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral, other related literature.
- Besides the identification of plant species, information was collected on the vernacular names and uses of plants made by local inhabitants.

3.10.3 Faunal Study

- Secondary information collected from published government data etc.
- List of the endangered and endemic species as per the schedule of The Wildlife Protection Act, 1972.
- Emphasis is given to identify avifauna and mammals to determine the presence and absence of Schedule-1 species, listed in The Wildlife Protection Act 1972, as well as in Red List of IUCN.

3.10.4 Floristic composition within the study area

For secondary information based on a total 116 species under 90 genera, 42 family found in the study area. The detailed list of plant species found in each quadrat provided is below:

Table 3-19 Checklist of floral diversity in and around the area

Sl.No.	Species	Family	Common Name	Habit	IUCN
1.	*Abrus precatorius*	Fabaceae	Kundumani	Shrub	NA
2.	*Abutilon indicum*	Malvaceae	Perun thuthi	Shrub	NA
3.	*Acacia catechu*	Mimosaceae	Karai	Tree	LC
4.	*Acacia nilotica*	Mimosaceae	Karuvelam	Tree	LC
5.	*Acacia planifrons*	Mimosaceae	Kodaivelam	Tree	NA
6.	*Acalypha indica*	Euphorbiaceae	Kuppaimeni	Herb	NA
7.	*Acanthospermumhispidum*	Compositae	--	Herb	NA
8.	*Achyranthes aspera*	Amaranthaceae	Nayurivi	Herb	NA
9.	*Aegle marmelos*	Rutaceae	Vilvam	Tree	NA
10.	*Aerva lanata*	Amaranthaceae	Peelai, Sirupeelai	Shrub	NA
11.	*Aerva persica*	Amaranthaceae	Perumpeelai	Shrub	NA
12.	*Aeschynomene americana*	Fabaceae	--	Herb	NA
13.	*Aeschynomene aspera*	Fabaceae	Thakkai	Shrub	NA
14.	*Ageratum conyzoides*	Compositae	Poom pillu	Herb	NA
15.	*Ailanthus excelsa*	Simaroubaceae	Perumaram	Tree	
16.	*Alysicarpus vaginalis*	Fabaceae	--	Herb	

17.	*Alloteropsiscimicina*	Poaceae	--	Grass	NA
18.	*Alternanthera sessilis*	Amaranthaceae	Ponnanganni	Herb	NA
19.	*Anisomeles indica*	Labiatae	--	Herb	NA
20.	*Annona squamosa*	Annonaceae	Seetha	Tree	NA
21.	*Arachis hypogaea*	Fabaceae	Verkadalai	Herb	NA
22.	*Argemone mexicana*	Papaveraceae	Braman Thandu	Herb	NA
23.	*Aristida adscensionis*	Poaceae	--	Grass	NA
24.	*Aristida hystrix*	Poaceae	--	Grass	NA
25.	*Aristolochiabracteolata*	Aristolochiaceae	Aduthinnappalai	Herb	NA
26.	*Azadiracta indica*	Meliaceae	Vembu	Tree	
27.	*Barleria acuminata*	Acanthaceae	--	Shrub	NA
28.	*Barlerialongiflora*	Acanthaceae	--	Shrub	NA
29.	*Barlerianoctiflora*	Acanthaceae	--	Shrub	NA
30.	*Boerhaviadiffusa*	Nyctaginaceae	Mookarattai	Herb	NA
31.	*Boerhaviaerecta*	Nyctaginaceae	Seemaimookarattai	Herb	NA
32.	*Carica papaya*	Caricaceae	Pappali	Tree	NA
33.	*Carissa carandas*	Apocynaceae	Kalaa, Perun kala	Shrub	NA
34.	*Cassia fistula*	Caesalpiniaceae	Kondrai	Tree	NA
35.	*Celosia argentea*	Amaranthaceae	Pannaikeerai	Herb	NA
36.	*Cissus quadrangularis*	Vitaceae	Pirandai	Shrub	NA
37.	*Citrullus colocynthis*	Cucurbitaceae	Peikkumatti	Herb	NA
38.	*Citrus aurantifolia*	Rutaceae	Elumichai	Tree	NA
39.	*Cleome viscosa*	Capparidaceae	Nai kadugu	Herb	NA
40.	*Coccinia grandis*	Cucurbitaceae	Kovai	Climber	NA
41.	*Croton bonplandianum*	Euphorbiaceae	Rail poondu	Herb	NA
42.	*Cucumis sativus*	Cucurbitaceae	Vellarikkaai	Climber	NA
43.	*Cyperus bulbosus*	Cyperaceae	—	Sedge	NA
44.	*Ecliptaprostrata*	Compositae	Karisaalai	Herb	NA
45.	*Eleocharis acutangula*	Cyperaceae	--	Sedge	NA
46.	*Eragrostistenella*	Poaceae	--	Grass	NA
47.	*Euphorbia antiquorum*	Euphorbiaceae	Sadura-kalli	Tree	NA
48.	*Euphorbia hirta*	Euphorbiaceae	Ammanpacharisi	Herb	NA
49.	*Euphorbia indica*	Euphorbiaceae	Ammanpacharisi	Herb	NA
50.	*Evolvulusalsinoides*	Convolvulaceae	Vishnukarandi	Herb	NA
51.	*Ficus benghalensis*	Moraceae	Aala maram	Tree	NA
52.	*Ficus religiosa*	Moraceae	Arasu	Tree	NA
53.	*Fimbristylis ovata*	Cyperaceae	-	Sedge	NA
54.	*Glinuslotoides*	Molluginaceae	Siruseruppadai	Herb	NA
55.	*Gynandropsisgynandra*	Capparidaceae	Nal vaelai, Vaelai	Herb	NA
56.	*Hedyotis aspera*	Rubiaceae	-	Herb	NA
57.	*Heliotropium indicum*	Boraginaceae	Thaelkodukku	Herb	NA
58.	*Hibiscus surattensis*	Malvaceae	--	Undershrub	NA
59.	*Hybanthusenneaspermus*	Violaceae	Orilaithamarai	Herb	NA
60.	*Hygrophilaschulli*	Acanthaceae	Neermulli	Herb	NA
61.	*Hyptissuaveolens*	Labiatae	--	Shrub	NA

62.	*Indigofera aspalathoides*	Fabaceae	Sivanaarvaembu	Herb	NA
63.	*Indigofera linnaei*	Fabaceae	-	Herb	NA
64.	*Indigofera tinctoria*	Fabaceae	Avuri, Neeli	Herb	NA
65.	*Ipomoea pes-caprae*	Convolvulaceae	Attukkal	Creeper	NA
66.	*Jasminum sambac*	Oleaceae	Malli	Shrub	NA
67.	*Jatropha curcas*	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
68.	*Jatropha gossypifolia*	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
69.	*Justicia adhatoda*	Acanthaceae	Adathodai	Shrub	NA
70.	*Justicia simplex*	Acanthaceae	-	Herb	NA
71.	*Kylinga bulbosa*	Cyperaceae	-	Sedge	NA
72.	*Lagenaria siceraria*	Cucurbitaceae	Surakkaai	Climber	NA
73.	*Lantana camara*	Verbenaceae	Unnichedi	Shrub	NA
74.	*Leucaena leucocephala*	Mimosaceae	Soundil	Tree	NA
75.	*Leucas aspera*	Labiatae	Thumbai	Herb	NA
76.	*Ludwigia perennis*	Onagraceae	--	Herb	NA
77.	*Martynia annua*	Martyniaceae	ThaelKodukku	Herb	NA
78.	*Melia azedarach*	Meliaceae	Malai vaembu	Tree	NA
79.	*Merremia hederacea*	Convolvulaceae	--	Herb	NA
80.	*Nyctanthes arbor-tristis*	Nyctanthaceae	Parijaatham	Tree	NA
81.	*Ocimumamericanum*	Labiatae	Ganjaankorai	Herb	NA
82.	*Pavonia odorata*	Malvaceae	Peramutti	Herb	NA
83.	*Pedalium murex*	Pedaliaceae	Perunerunji	Herb	NA
84.	*Phyllanthus acidus*	Euphorbiaceae	Aranelli	Tree	NA
85.	*Phyllanthus amarus*	Euphorbiaceae	Kizha-nelli	Herb	NA
86.	*Phyllanthus emblica*	Euphorbiaceae	Nelli, Muzhunelli	Tree	NA
87.	*Phyllanthus reticulatus*	Euphorbiaceae	Inkipazham	Shrub	NA
88.	*Pithecellobium dulce*	Mimosaceae	Kodukkaaipuli	Tree	NA
89.	*Plumbago zeylanica*	Plumbaginaceae	Chitthiragam	Herb	NA
90.	*Polygala javana*	Polygalaceae	--	Shrub	NA
91.	*Pongamia pinnata*	Fabaceae	Punga maram	Tree	NA
92.	*Portulaca oleracea*	Portulacaceae	Kari keerai	Herb	NA
93.	*Prosopis juliflora*	Mimosaceae	Velikkaathaan	Tree	NA
94.	*Psidium guajava*	Myrtaceae	Koyya	Tree	NA
95.	*Punica granatum*	Punicaceae	Madhulai	Shrub	NA
96.	*Rhynchosiaviscosa*	Fabaceae	--	Climber	NA
97.	*Ricinus communis*	Euphorbiaceae	Amanakku	Shrub	NA
98.	*Riveahypocrateriformis*	Convolvulaceae	Boodhikeerai	Climber	NA
99.	*Ruellia tuberosa*	Acanthaceae	--	Herb	NA
100.	*Sansevieria roxburghiana*	Dracaenaceae	Marun, Mottamamji	Herb	NA
101.	*Senna auriculata*	Caesalpiniaceae	Avaram	Shrub	NA
102.	*Senna occidentalis*	Caesalpiniaceae	Peiyavarai	Tree	NA
103.	*Sesamum indicum*	Pedaliaceae	Ellu	Herb	NA
104.	*Sida acuta*	Malvaceae	Malai thangi	Herb	NA
105.	*Sida cordata*	Malvaceae	Pazhampaasi	Herb	NA

106.	*Sida cordifolia*	Malvaceae	Nilatutthi	Herb	NA
107.	*Solanum americanum*	Solanaceae	Manatakkali	Herb	NA
108.	*Solanum melongena*	Solanaceae	Kathiri	Herb	NA
109.	*Solanum torvum*	Solanaceae	Chundai	Shrub	NA
110.	*Solanum trilobatum*	Solanaceae	Thoodhuvalai	Climber	NA
111.	*Solanum virginianum*	Solanaceae	Kandankathiri	Herb	NA
112.	*Spermacocehispida*	Rubiaceae	Nathaichoori	Herb	NA
113.	*Spermacoceocymoides*	Rubiaceae	--	Herb	NA
114.	*Tamarindus indica*	Caesalpiniaceae	Puliyamaram	Tree	NA
115.	*Tectona grandis*	Verbenaceae	Thekku	Tree	NA
116.	*Tephrosia purpurea*	Fabaceae	Kozhinji	Undershrub	NA

Table 3-20 Tree details in project site

Sr. No	Botanical Name	Total Tree	Cutting tree
1.	*Acacia catechu*	87922	10990
2.	*Acacia leucophloea*	610	76
3.	*Acacia nilotica*	9447	1181
4.	*Ailanthus excelsa*	305	38
5.	*Azadiracta indica*	8990	1124
6.	*Butea monosperma*	152	19
7.	*Cassia fistula*	610	76
8.	*Cassia siamea*	305	38
9.	*Chloroxylon swietenia*	152	19
10.	*Gmelina arborea*	152	19
11.	*Holoptelia integrifolia*	7314	914
12.	*Morinda tinctoria*	152	19
13.	*Phoenix pusilla*	914	114
14.	*Pongamia pinnata*	1067	133
15.	*Prosopis juliflora*	1067	133
16.	*Strychnos nux vomica*	152	19
17.	*Tecoma stans*	2438	305
18.	*Tectona grandis*	762	95
19.	*Terminalia arjuna*	610	76
20.	*Wrightia tinctoria*	5790	724
	Total	**128911**	**16114**

Tree numbers were generated using the Expert Committee Report as a basis.

Source:

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- Mathew, K. M. 1981. The Material for the Flora of the Tamilnadu Carnatic, Madras, India.

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- Nair, N.C. and A.N. Henry. 1983. Flora of Tamil Nadu, India.Series 1, Vol. 1, Botanical Survey of India, Southern Circle, Coimbatore. 1-184.
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3.10.5 Terrestrial Fauna of the Study Area

The core area is not a habitat for any Rare or endangered or threatened (RET) wildlife. Common rodents, reptiles and birds were seen. There was nothing unusual or special about the wild fauna of the core area. Within 5 Km from the core area, Elephant and Bison corridor is there. Among the large birds, Peacocks were found both in the forest and non-forest areas. A list of vertebrates other than Aves that were either spotted or reported from the study area is given in **Table 3-21**. A list of birds that were spotted and those that were recorded from the study area is given in **Table 3-22.**

Table 3-21 ListofTerrestrialVertebratesOtherThanBirdsReported

Sl.No	Scientificname	Commonname	Family	IUCN/WPA
MAMMALS				
1.	*Bandicotabengalensis*	LesserBandicootRat	Hystricidae	LC/IV
2.	*Bandicotaindica*	GreaterBandicootRat	Hystricidae	LC/IV
3.	*Cynopterussphinx*	GreaterShort-nosedFruit Bat	Pteropodidae	LC/IV
4.	*Felischaus*	JungleCat	Felidae	LC/III
5.	*Funambuluspalmarum*	Three-stripedPalm Squirrel	Sciuridae	LC/IV
6.	*Macacamulatta*	RhesusMacaque	Cercopithecidae	LC/II
7.	*Musbooduga*	LittleIndianFieldMouse	Hystricidae	LC/IV
8.	*Rattusrattus*	HouseRat	Hystricidae	LC/IV
9.	*Semnopithecusentellus*	CommonLangur	Cercopithecidae	LC/II
REPTILES				
10.	*Calotesrouxii*	Roux'sForestCalotes	Agamidae	LC/IV
11.	*Calotesversicolor*	IndianGardenLizard	Agamidae	LC/IV
12.	*Eutropiscarinata*	Keeled/CommonGrassSkink	Scincidae	LC/IV
13.	*Eutropismacularia*	BornzeGrassSkink	Scincidae	LC/IV
14.	*Hemidactylusbrooki*	Brooke'sHouseGecko	Geckonidae	LC/IV
15.	*Hemidactylusflaviviridis*	HouseGecko	Geckonidae	LC/IV
16.	*Hemidactylusfrenatus*	AsianHouseGecko	Geckonidae	LC/IV
17.	*Hemidactylusleschnaulti*	BarkGecko	Geckonidae	LC/IV
18.	*Najanaja*	SpectacledCobra	Colubridae	VU/II
19.	*Ophiophagushannah*	KingCobra	Elapidae	VU/II
20.	*Ptyasmucosa*	IndianRatSnake	Colubridae	LC/II

21.	*Xenochrophispiscator*	CheckeredKeelbackWaterSnake	Colubridae	LC/II
AMPHIBIANS				
22.	*Bufoscaber*	Furguson'sToad	Bufonidae	LC/ IV
23.	*Clinotarsuscurtipes*	Bi-coloredFrog	Dicroglossidae	LC/ IV
24.	*Duttaphrynusmelanostictus*	CommonIndianToad	Bufonidae	LC/ IV
25.	*Euphlyctiscyanophylyctis*	SkitteringFrog	Dicroglossidae	LC/ IV
26.	*Euphlyctishexadactylus*	IndiangreenFrog	Dicroglossidae	LC/ IV
27.	*Hoplobatrachuscrassus*	Jerdon'sBullFrog	Dicroglossidae	LC/ IV
28.	*Hoplobatrachustigerinu*	IndianbullFrog	Dicroglossidae	LC/ IV
29.	*Indiranabrachytarsus*	Short-leggedLeapingfrog	Ranixalidae	LC/ IV
30.	*Limnonecteslimnocharis*	Paddyfield/CricketFrog	Dicroglossidae	LC/ IV
31.	*Microhylaornata*	OrnateNarrow-mouthedFrog	Microhylidae	LC/ IV
32.	*Sphaerothecabreviceps*	IndianBurrowingFrog	Dicroglossidae	LC/ IV
33.	*Sphaerothecarolandea*	SouthernBurrowingFrog	Dicroglossidae	LC/ IV

Table 3-22Listof Birds spotted within the study area

S.No	Scientificname	Commonname	Family	IUCN/WPA
1.	*Acridotheresfuscus*	JungleMyna	Sturnidae	LC/ IV
2.	*Acridotherestristis*	CommonMyna	Sturnidae	LC/ IV
3.	*Acritillasindica*	YellowbrowedBulbul	Pycnonotidae	LC/ IV
4.	*Anthustrivialis*	TreePipit	Motacillidae	LC/ IV
5.	*Apusaffinis*	LittleSwift	Apodidae	LC/ IV
6.	*Athenebrama*	Spottedowlet	Strigidae	LC/ IV
7.	*Chrysocolapteslucidus*	GreaterFlameback	Picidae	LC/ IV
8.	*Chrysommasinense*	YelloweyedBabbler	Timaliidae	LC/ IV
9.	*Cinnyrisasiaticus*	PurpleSunbird	Nectariniidae	LC/ IV
10.	*Coraciasbenghalensis*	IndianRoller	Coraciidae	LC/ IV
11.	*Coracinamacei*	LargeCuckooshrike	Campephagidae	LC/ IV
12.	*Coracinamelanoptera*	BlackheadedCuckooshrike	Campephagidae	LC/ IV
13.	*Corvusculminatus*	IndianJungleCrow	Corvidae	LC/ IV
14.	*Corvussplendens*	HouseCrow	Corvidae	LC/V
15.	*Cuculusmicropterus*	IndianCuckoo	Cuculidae	LC/ IV
16.	*Cyornistickelliae*	Tickell'sBlueFlycatcher	Muscicapidae	LC/ IV
17.	*Cypsiurusbalasiensis*	AsianPalmSwift	Apodidae	LC/ IV
18.	*Dendrocittavagabunda*	RufousTreepie	Corvidae	LC/ IV
19.	*Dendrocoposmahrattensis*	YellowcrownedWoodpeck er	Picidae	LC/ IV
20.	*Dendrocoposnanus*	BrowncappedPygmyWoo dpecker	Picidae	LC/ IV
21.	*Dicrurusmacrocercus*	BlackDrongo	Cuculidae	LC/ IV
22.	*Elanuscaeruleus*	BlackwingedKite	Accipitridae	LC/IV
23.	*Eudynamysscolopaceus*	AsianKoel	Cuculidae	LC/ IV
24.	*Glaucidiumradiatum*	JungleOwlet	Strigidae	LC/IV
25.	*Lonchuramalacca*	TricolouredMunia	Estrildidae	LC/ IV
26.	*Lonchurapunctulata*	ScalybreastedMunia	Estrildidae	LC/ IV
27.	*Lonchurastriata*	WhiterumpedMunia	Estrildidae	LC/ IV
28.	*Megalaimahaemacephala*	CoppersmithBarbet	Megalaimidae	LC/ IV
29.	*Meropsorientalis*	GreenBee-eater	Meropidae	LC/ IV
30.	*Milvusmigrans*	BlackKite	Accipitridae	LC/IV

31.	*Motacillacinerea*	GreyWagtail	Muscicapidae	LC/ IV
32.	*Orthotomussutorius*	CommonTailorbird	Sylviidae	LC/ IV
33.	*Parusaplonotus*	IndianYellowTit	Paridae	LC/ IV
34.	*Passerdomesticus*	HouseSparrow	Passeridae	LC/ IV
35.	*Pavocristatus*	IndianPeafowl	Phasianidae	LC/ I
36.	*Pellorneumruficeps*	PuffthroatedBabbler	Timaliidae	LC/ IV
37.	*Phylloscopustrochiloides*	GreenishWarbler	Sylviidae	LC/ IV
38.	*Pittabrachyura*	IndianPitta	Pittidae	LC/ IV
39.	*Ploceusphilippinus*	BayaWeaver	Ploceidae	LC/ IV
40.	*Pomatorhinushorsfieldii*	IndianScimitarBabbler	Timaliidae	LC/ IV
41.	*Priniahodgsonii*	GreybreastedPrinia	Cisticolidae	LC/ IV
42.	*Priniainornata*	PlainPrinia	Cisticolidae	LC/ IV
43.	*Priniasocialis*	AshyPrinia	Cisticolidae	LC/ IV
44.	*Psittaculacyanocephala*	PlumheadedParakeet	Psittacidae	LC/ IV
45.	*Psittaculakrameri*	RoseringedParakeet	Psittacidae	LC/ IV
46.	*Pycnonotuscafer*	RedventedBulbul	Pycnonotidae	LC/ IV
47.	*Pycnonotusgularis*	Flame-throatedBulbul	Pycnonotidae	LC/IV
48.	*Pycnonotusjocosus*	RedwhiskeredBulbul	Pycnonotidae	LC/ IV
49.	*Saxicolacaprata*	PiedBushchat	Muscicapidae	LC/ IV
50.	*Saxicoloidesfulicatus*	IndianRobin	Muscicapidae	LC/ IV
51.	*Spilopeliachinensis*	SpottedDove	Columbidae	LC/ IV
52.	*Streptopeliadecaocto*	EurasianCollared Dove	Columbidae	LC/ IV
53.	*Tephrodornispondicerianus*	CommonWoodshrike	Tephrodornithidae	LC/ IV
54.	*Tephrodornissylvicola*	MalabarWoodshrike	Tephrodornithidae	LC/ IV
55.	*Terpsiphoneparadisi*	AsianParadiseFlycatcher	Monarchidae	LC/ IV
56.	*Turdoidesstriata*	JungleBabbler	Timaliidae	LC/ IV
57.	*Upupaepops*	Hoopoe	Upupidae	LC/ IV
58.	*Zootheracitrina*	OrangeheadedThrush	Turdidae	LC/ IV

3.10.6 Butterfly Species

Butterfly can also serve as useful indicators of habitat biodiversity. They are responsible for a large part of the complex interconnections that characterize natural ecosystems. The butterfly communities that are present in forests help to maintain crucial ecological processes and preserve biodiversity as a whole. They participate in most of the ecological processes that sustain ecosystems. A totally 24 species belonging to five families of butterflies recorded. The Nymphalidae were more dominant family followed by Lycaenidae, Pieridae, Papilionidae and Hesperiidae

Table 3-23Occurrence of butterfly species

S.No	Family	Species name	Common name	Status
1	Nymphalidae	Danaus chrysippus	Plain Tiger	LC
2	Nymphalidae	Danaus genutia	Striped Tiger	NA
3	Nymphalidae	Ariadne merione	Common Caster	NA
4	Nymphalidae	Neptishylas	Common Sailor	NA
5	Nymphalidae	Phalantaphalantha	Common Leopard	NA
6	Nymphalidae	Melanitisleda	Common Evening Brown	NA
7	Nymphalidae	Mycalesisperseus	Common Bush Brown	NA
8	Nymphalidae	Ypthimaasterope	Common Three Ring	LC

9	Nymphalidae	Euthalanais	Baronet	NA
10	Nymphalidae	Argynnishyperbius	Indian Fritillary	NA
11	Nymphalidae	Bybliailithya	Joker	NA
12	Pieridae	Colotisdanae	Crimson Tip	LC
13	Pieridae	Colotisetrida	Small Orange Tip	NA
14	Pieridae	Euremahecabe	Common Grass Yellow	NA
15	Pieridae	Catopsilliapomona	Common Emigrant	NA
16	Pieridae	Ceporanerissa	Common Gull	NA
17	Pieridae	Leptosianina	Psyche	NA
18	Lycaenidae	Castaliusrosimon	Common Pierrot	NA
19	Lycaenidae	Arhopalacentaurus	Large Obakblue	NA
20	Lycaenidae	Euchrysopscnejus	Gram Blue	NA
21	Lycaenidae	Freyeriatrochylus	Grass Jewel	LC
22	Papilionidae	Papilio polytes	Common Mormon	NA
23	Papilionidae	Papilio demoleus	Lime Butterflies	NA
24	Hesperiidae	Borbocinnara	Rice Swift	NA

LC- Least Concern, NT- Near Threatened, EN- Endangered, NE-Not Evaluated, DD –Data Deficient, VU-Vulnerable, IUCN- International Union for Conservation of Nature.

3.10.7 Conservation Plan for Indian Peafowl (Peacock)

An Indian Peafowl or Peacock *(Pavo cristatus)* is a large pheasant justifiably declared as the National Bird of India in 1963 due to its flagship value founded on its glorious position in mythology and its widespread distribution and grandeur. In India, it is given the utmost protection by inclusion in Schedule 1 of Indian Wildlife Act, 1972 (2002). Being a wide spread species, apart from the various urban habitats, it is also found in agriculture field, along stream with good vegetation and close to human habitation in semi – feral conditions. In the present study area this species have been confirmed from various habitats located near the village periphery.

Appearance

Male peacock has a spectacular glossy green long tail feathers that may be more than 60% of the total body length. These feathers have blue, golden green and copper colored eyes. The long tail feathers are used for mating rituals like courtship displays. The feathers are arched into a magnificent fan shaped from across the back of the bird and almost touching the found on both sides. Female do not have these graceful tail feathers. They have to fan like crest with whites face and throat, chestnut brown crown and hind neck, metallic green upper breast and mantle, white belly and brown back rump and tail. Their primaries are dark brown.

Study Approach

Since the buffer zone of the proposed Project site reported with Schedule 1 Species named as *Pavo cristatus* commonly known as peacock, a systematic study was conducted to assess their status in terms of movement and habitat use of the species. At first, a detailed biological survey of the core & buffer zone was carried out to understand the status distribution of the species in the study area. Also, questionnaire survey was carried out to understand the recent status of peacock sighting and their movements. The conclusion of the survey discussed the potential sighting & habitat use, and movement and food habitats of peacock in the study area.

Sighting and Habitat Use

From the core zone no any peacock was sighted. However, direct sighting of the peacock were located near the human dominated and associated surround habitats like agriculture fields and near water bodies. This species is well adapted to natural village environment setting. According to the villagers (interview), during day time that temporally move towards the surrounding areas like agricultural fields or water bodies for feeding while during night time roosts on the trees present in vicinity of the human settlement and also road side trees. Some villages emphasized that, sometime peacock roosts on the roof of the houses.

Food and Feeding Habitats

Peafowls are omnivores, eating plant parts, flower petals, seed heads, insects, and other arthropods, reptiles and amphibians. In the study area dense tree canopy cover supports good insect diversity which is very common food for peafowls.

Habitat Improvement Action Plan

Habitat improvement program will include plantation of various plant species like *Borassus flabiliber*, *Mangifera Indica, Tamarindus indica* and other grass species reported from the study area should be taken into priority. In order to improve vegetation cover, it is suggested to carry out extensive afforestation program in different phases. These species will help to provide habitat for faunal diversity, and also increases the species diversity and maintain the naturalness of the surrounding area.

Seed Distribution among the Villagers

During this habitat improvement programme the seed of *Borassus flabiliber*, *Mangifera indica, Tamarindus indica* and other grass seeds will be distributed in the various villages of the study area. Compost packets will be also provided at the intervals of the every one year by the proponent (in consultation of forest department).

Water Filing in the existing Water Bodies during Summer

Water will be filled in the existing water bodies by water tankers (five numbers in each water body).

Inference – Buffer Zone as Peacock Habitat

Presented survey of the peacock in the buffer zone of the project site shows that, peafowl is well adapted to the existing rural setting of the study area. However, the following points can give an insight on the overall status of peafowl in the study area and thereby plan for better management strategies related to proposed activities.

- Local resident of the study area well aware of the movement pattern of peafowl in their surrounding habitats.
- Peafowl uses agriculture and various rural habitats as a feeding ground during day time while during night time they take shelter on the trees as well as on the roof of the houses. It clearly indicates peafowl normally uses ecosystem or habitats adjacent to village.

From the above said facts, it can be inferred that, some villages of the buffer zone provide roosting and feeding ground for peafowl, while core zone do not have potential habitat for roosting or feeding ground for peafowl. Therefore, it has been visualized that, the proposed project will not have any significant impact on peacock in terms of their normal movements and other activities. However, it is necessity to take some management option like habitat improvement in the villages located in the immediate vicinity of the project site. So, habitat improvement programme (Plantation of recommended and local plant species) will be under taken in (in consultation of forest department) different villages located in the close vicinity of the project area. Under this programme sampling will be distributed in the nearby villages with the consultation of the local forest department.

In consultation of the forest department, following conservation measures will be adapted for peacock conservation:

1. Habitat improvement programme in the different villages will be undertaken in the buffer zone area for shelter and roosting of peacocks. This will be achieved by plantation of local varieties of the tree species near villages in buffer area. Plantation will also be carried in some forest patches identified by local forest department.
2. School level awareness programme will be conducted for conservation of peacock by organizing competition during “Wildlife Week” and “Van Mahotsav” celebration.

Following Plants will be planted on the periphery of Sipcot project area& along the Approachable Road			
S.No	**Botanical name**	**Common Name**	**Key future of Tree**
1	*Albizia lebbeck*	Vagai	A middle-sized deciduous tree with a spreading crown.
2	*Azadicrta Indica*	Vembu	It is adapted to various climate zones.
3	*Dalbergia latifolia*	Eeitti	It is common on deep loams or clays containing lime.
4	*Ficus benghalensis*	Allamaram	Nesting and food purpose for wildlife
5	*Ficus relegiosa*	Arasamaram	It is tolerant to various climate zones.
6	*Madhuca longifolia*	Illupai	A large deciduous shapely, long lived tree
7	*Pongamia pinnata*	Pungaimaram	Dust reduce
8	*Pterocarpus marsupium*	Vengai	--
9	*Syzygiumcumini*	Naval	It is tolerant to 200odeling200ab resistant.
10	*Termanilia arjuna*	Maruthu	It is reducing soil erosion

3.10.8 Conservation Plan and Budget Allocation

The Conservation Plan would focus on conservation of habitats of Schedule-I species identified during the study. We identified 2 IUCN red list birds' and 1 mammals species in the study area i.e. 10 km buffer area.

Fauna

S.No	Common Name	Species Name	IUCN	WPA 1972
Birds				
1	Brahminy Kite	*Haliasturindus*	LC	Schedule I
2	Indian Peafowl	*Pavo cristatus*	LC	Schedule I
Mammals				
3	Bonnet Macaque	*Macaca radiata*	Vulnerable	Schedule I

Bird species

- **Capacity Building:** Capacity building program on protection would be of high significance. Creation of awareness among local people as well as employees about the importance of protecting the habitat and foraging grounds.
- **Anti-Poaching Plan:** Poaching being one of the causes for depletion of wildlife in general and it being one of the main reasons for the poor faunal assemblage, it is necessary to increase protection for the RET species. The people living in the surrounding area should be rewarded for timely information about disturbing and/or poaching of the bird more specifically the threatened species.
- **Habitat Improvement:** Sufficient food, water resources, vegetation cover, and breeding sites must be available at the release location.

Mammals

- Bonnet macaques species is today considered threatened by the IUCN (International Union for Conservation of Nature). The Bonnet macaque is also endemic but to the entire south Indian region.
- Conservation strategy for commences would be to protect patches of scrub forests in hilly terrains. To prevent conversion of forests in the plains, and prevent translocation.

Good Practices:

- SIPCOT will be bound by rules and regulation of Wildlife (Protection) Act, 1972 of India and any others rule and guidelines, stipulated by the State Government.
- State Forest Department will be consulted for development of greenbelt within the project site. Further unauthorized pesticides / toxic materials will not be used for plant species.
- SIPCOT will not plant any alien and/or invasive species in the project site, which may spread in the forest areas.
- Employees will be made aware of presence of a few threatened and Schedule species in the area and legal consequences of hunting, poaching of animals and harvesting of forest produces.

The budgetary provision has been made for implementation of wildlife conservation measures. SIPCOT will allocate Rs. 20,00,000/- towards the conservation plan for implementing the following activities with the help of and in consultation with the Forest Department.

The proponent has proposed a sum of Rs. 20,00,000/-for the “Schedule – I species and habitat improvement” conservation plan under the following heads:

S.No	Work or Activity
1	Birds monitoring
2	One awareness programme
3	Habitat improvement (Tree planting)
4	Mammals monitoring

Detailed Biodiversity Report prepared byRamniranjan JhunjhunwalaCollege, University of Mumbai mentioning the Flora and Fauna within core and buffer zone of the project site is attached as an **Annexure -15a**. Conservation plan for the schedule species is attached as an**Annexure-15b**

3.11 Socio Economic Profile

Dharmapuri district having a population of 1,50,6843 consists of 7,74,303male populations and 7,32,540 female populations.

Source:Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.11.1 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure
- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

The following **Table 3-24** provides the certain important social indicators of Dharmapuri district in Tamil Nadu.

Table 3-24 Social Indicators

S.No	Social Indicators	Dharmapuri District
1	Decadal growth rate %	16.34
2	Urban population %	17.3
3	Sex ratio	946
4	0-6 age group %	10.02
5	Population density (Persons per square Km)	335
6	Scheduled caste population %	16.30
7	Scheduled tribe population %	4.18
8	Literacy rate %	68.50
9	Work Participation rate %	49.9
10	Main Workers %	86.90
11	Marginal Workers %	13.10
12	Cultivators %	26.80
13	Agricultural labourers %	35.59
14	Workers in household industries %	2.04
15	Other workers %	35.57

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.1 Population and Household Size

Dharmapuri district having a population of 1506843 consists of 774303 male populations and 732540 female populations.

Source:

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.2 Sex Ratio

As per 2011 Census the sex ratio was 946 for every 1,000 males, lower when compared to the State Sex Ratio of 996 in Dharmapuri district.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.3 Scheduled Castes

Dharmapuri has a population of 245392 persons belonging to Scheduled Castes which represents 16.30% of the total population of the district. The rural-urban SCs population share was 16.6 % and 14.6 % in 2011census respectively.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.4 Education & Literacy

The study of the education and literacy profile in the region is relevant in order to have an understanding whether the proposed project can utilize skilled human resources available within the area. According to 2011 census data, the literacy rate in the Dharmapuri district is 68.50%.The literacy rate has been the major determinant of the rise or fall of the other indicators. The accessibility of Primary and Upper Primary education has increased the literacy rate as well as reducing the dropout rate. **Table 3-25**show the details of education infrastructures in Dharmapuri District.

Table 3-25 Education Infrastructures in Dharmapuri district

Type of school	Total schools		Rural Schools	
	Government	Private	Government	Private
Primary	829	117	783	90
Primary + Upper Primary	328	13	316	13
P + UP+ Secondary + Higher Secondary	5	48	3	48
UP only	4	1	2	1
UP + Secondary + Higher Secondary	95	10	75	9
P + UP + Secondary	3	24	3	20
UP + Secondary	119	10	115	9

Source:*http://udise.in/Downloads/Publications/Documents/District_Report_Cards-2016-17-Vol-II.pdf*

3.11.1.5 Health Facility

Primary Health Centers (PHCs) and Sub-centers (SCs) are providing the preventive, curative and rehabilitative health care services to the rural people. The district has good number of public health systems accessible and affordable apart from the private health facilities. The Health Facilities given in Dharmapuri district is given in **Table 3-26.**

Table 3-26 Socio Economic analysis: Health care

Name of the District	Type of Facility	Facilities
Dharmapuri	SC	218
	PHC	43
	CHC	8
	SDH	3
	DH	1
	Total	273

*(**Note:** SC – Sub Center; PHC – Primary Health Center; CHC – Community Health Center; SDH – Sub District Hospital; DH – District Hospital)*

*(**Source:** National Health Mission)*

3.11.1.6 Economic Activity and Livelihood pattern

In Dharmapuri district, as per the Census 2011, there were a total of 751170 workers, comprising 201328 cultivators, 267345 agricultural labourers, 15341 household Industry workers and 267156other workers.

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.7 Social Economic Profile of the Study Area

The villages and towns covering 10 km radius from the boundary of the project site is taken for the study. **Table 3-27**shows the list of locations which comes under the study area.

Table 3-27Population profile within study area

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0 -5 km								
Dharmapuri District –PalacodeTaluk*								
1.	Sekkodi	1272	5334	2776	2558	629	222	0
0 -5 km								
Dharmapuri District –Dharmapuri Taluk								
2.	Dharmapuri (M)	17136	68619	34091	34528	6759	4748	98
3.	Palavadi	1176	4631	2372	2259	471	367	0
4.	Kadagathur	1456	6096	3151	2945	640	489	1
5.	Naduhalli	1255	4894	2568	2326	574	63	0
6.	A.Reddihalli	1477	6024	3112	2912	709	896	4
7.	Pappinaickanahalli	871	3789	1951	1838	470	242	5
8.	Adagapadi	2031	8457	4320	4137	1045	413	0
9.	Dhalavaihalli	1670	6724	3480	3244	796	274	17
10.	Somenahalli	1135	4782	2450	2332	564	649	1
11.	Kumbalapadi	600	2531	1370	1161	284	29	0
12.	Nathathahalli	1702	7239	3724	3515	896	742	9
13.	Thadangam	2221	8601	4299	4302	880	1109	259
14.	Settikarai	1475	6009	3056	2953	767	371	12
15.	Annasagaram	925	3489	1785	1704	345	289	0
16.	Ungaranhalli	1486	5730	2992	2738	587	17	0
17.	A.Jettihalli	2606	10339	5176	5163	1026	559	67
18.	Adiyamankottai	2410	9610	4940	4670	1080	1141	7
19.	Balajangamanhalli	1290	5137	2618	2519	565	346	200
20.	Nagarkudal	891	3898	2021	1877	450	219	0
21.	Mademangalam	1315	4982	2518	2464	534	767	0
22.	Noolahalli	1536	6366	3319	3047	702	202	0
23.	Mukkalnaickanahalli	1587	6576	3404	3172	733	278	0
24.	Hale-Dharmapuri (CT)	1231	4902	2521	2381	586	40	0
25.	Lakkiampatti (CT)	10193	39697	20148	19549	4048	6311	224
05 -10 km								
Dharmapuri Dt-Pennagaram Taluk								

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
26.	Papparapatti (TP)	3014	12174	6091	6083	1235	472	0
27.	Madehalli	1298	5388	2773	2615	659	0	7
28.	Andarahalli	32	132	73	59	22	16	0
29.	Pallipatti	191	723	378	345	85	2	0
30.	Velampatti	268	1056	541	515	85	0	0
31.	Kariappanahalli	194	801	413	388	110	62	0
32.	Onnappagoundanahalli	1515	6127	3041	3086	584	188	8
33.	Thithiyoppanahalli	1441	6139	3224	2915	754	353	0
34.	Sigaralahalli	1900	8639	4563	4076	922	546	10
35.	Arakasanahalli	1169	4767	2534	2233	623	422	0
05 -10 km								
Dharmapuri Dt-Palacode Taluk								
36.	Baisuhalli	1890	8181	4293	3888	1042	1204	0
37.	Pulikkarai	1376	5590	2883	2707	673	76	0
38.	Pumandahalli	1086	4442	2314	2128	552	377	718
39.	Mallikuttai	1295	5289	2746	2543	590	232	0
40.	Jagirburgur	593	2685	1366	1319	262	158	0
41.	Selliyampatti	1054	4434	2296	2138	517	13	0
05-10 km								
Dharmapuri Dt-Dharmapuri Taluk								
42.	Nallanahalli	1414	5962	3087	2875	671	412	0
43.	Konanginaickanahalli	1024	4378	2331	2047	471	1362	14
44.	Kuppur	1335	5453	2855	2598	660	706	0
45.	Pangunatham	1821	7730	4065	3665	884	327	917
46.	Konangihalli	1558	6445	3302	3143	793	956	0
47.	Naickanahalli	1762	7458	3866	3592	890	389	0
48.	Vellolai	814	3294	1717	1577	422	287	0
49.	Nekkundhi	1216	5352	2843	2509	663	810	363
50.	Errabaiyanahalli	510	1936	964	972	218	491	284
51.	Echanahalli	1156	4853	2485	2368	577	469	373
52.	Elagiri	1307	4947	2533	2414	502	348	71
53.	Pagalahalli	1827	7002	3573	3429	767	1137	6

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
54.	Nallampalli	1613	7079	3556	3523	761	1826	28
55.	Laligam	2002	7601	3833	3768	734	511	45
56.	Dhinnahalli	1373	5325	2770	2555	587	432	419
57.	Mittareddihalli	991	3977	2013	1964	440	712	29
58.	Budanahalli	585	2286	1200	1086	252	0	90
59.	Sivadi	796	3532	1799	1733	465	1960	42
60.	Palayam	1800	7136	3663	3473	806	406	30
61.	Dokkubodanahalli	1465	5667	2904	2763	656	54	0
62.	Boalanahalli	1548	6182	3245	2937	710	227	0
	Total	**107180**	**434618**	**222295**	**212323**	**47784**	**38726**	**4358**

**Note: As per the Status of Announcements made by the then Hon'ble Chief Ministers from 2011-12 to 2020-21 Under Rule 110 of the Tamil Nadu Legislative Assembly Rules- In Dharmapuri District, Paalakodu and Aroor Taluks will be reorganised to create new Kaarimangalam Taluk and Dharmapuri Taluk will be bifurcated to form New Nallampalli Taluk (Sl.No: 785, Page No: 136)*

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.8 Employment And Livelihood

Majority of population in the study area comes under other working categories. As agriculture cannot be a main sustenance for most of farmers, they have dual professions. Farming is mostly seasonal, they involve in other livelihood activities like business, non-agriculture labour, agriculture labour and other service sectors. Fragmentation of landholding leads to adopt to have additional occupation.Summaries of employment and livelihood within the study are given in **Table 3-28.**

Table 3-28Classification of workers within study area

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
0-5 km												
Dharmapuri Dt-Palacode Taluk*												
1)	Sekkodi	3007	1625	179	1214	30	990	84	35	10	589	55
0-5 km												
Dharmapuri Dt-Dharmapuri Taluk												
2)	Dharmapuri (M)	26943	24651	2292	606	54	427	77	1052	213	22566	1948
3)	Palavadi	2432	2030	402	856	185	547	171	9	5	618	41
4)	Kadagathur	2852	2277	575	491	65	480	201	54	19	1252	290
5)	Naduhalli	2691	2421	270	590	9	780	218	41	18	1010	25
6)	A.Reddihalli	2869	2567	302	211	35	73	100	143	35	2140	132
7)	Pappinaickanahalli	1894	1760	134	347	3	717	44	21	4	675	83
8)	Adagapadi	4298	3752	546	1141	43	1683	423	63	2	865	78
9)	Dhalavaihalli	3444	2625	819	909	55	337	177	53	26	1326	561
10)	Somenahalli	2493	1450	1043	560	55	206	519	5	13	679	456
11)	Kumbalapadi	1409	1401	8	354	0	514	2	5	0	528	6
12)	Nathathahalli	3128	2055	1073	529	197	331	388	47	8	1148	480
13)	Thadangam	3504	2953	551	327	22	351	189	45	55	2230	285
14)	Settikarai	2811	2389	422	691	40	546	151	52	52	1100	179
15)	Annasagaram	1706	1563	143	120	9	593	64	25	3	825	67
16)	Ungaranhalli	2650	1938	712	483	95	548	214	110	96	797	307
17)	A.Jettihalli	4207	3962	245	463	21	322	42	78	9	3099	173
18)	Adiyamankottai	4437	3768	669	764	82	725	246	176	33	2103	308
19)	Balajangamanhalli	2852	1891	961	455	91	741	676	15	10	680	184
20)	Nagarkudal	2198	1735	463	1140	111	142	116	8	7	445	229

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
21)	Mademangalam	2187	1885	302	288	113	743	127	27	7	827	55
22)	Noolahalli	2963	2466	497	1249	65	582	292	36	21	599	119
23)	Mukkalnaickanahalli	3438	2463	975	1076	30	579	608	24	18	784	319
24)	Hale-Dharmapuri (CT)	2266	2076	190	195	10	142	36	31	15	1708	129
25)	Lakkiampatti (CT)	14471	13622	849	290	32	426	61	218	66	12688	690
5-10 km												
Dharmapuri Dt-Pennagaram Taluk												
26)	Papparapatti (TP)	5310	4629	681	174	13	993	70	170	79	3292	519
27)	Madehalli	3048	2909	139	1368	4	480	13	46	5	1015	117
28)	Andarahalli	81	45	36	0	0	35	34	0	1	10	1
29)	Pallipatti	437	206	231	29	17	90	163	5	0	82	51
30)	Velampatti	640	474	166	137	39	94	30	61	8	182	89
31)	Kariappanahalli	385	197	188	88	16	86	162	0	0	23	10
32)	Onnappagoundanahalli	3104	2644	460	362	29	1261	205	140	140	881	86
33)	Thithiyoppanahalli	3610	2563	1047	1291	63	514	592	69	99	689	293
34)	Sigaralahalli	3988	3777	211	1329	48	1307	90	84	2	1057	71
35)	Arakasanahalli	2576	2308	268	813	31	1142	202	40	5	313	30
5-10 km												
Dharmapuri Dt-Palacode Taluk												
36)	Baisuhalli	3795	3676	119	991	5	1180	50	22	6	1483	58
37)	Pulikkarai	3270	2800	470	1211	62	1057	365	22	1	510	42
38)	Pumandahalli	2256	1772	484	543	294	725	144	16	7	488	39
39)	Mallikuttai	2739	2101	638	640	75	544	309	65	4	852	250
40)	Jagirburgur	1300	574	726	255	67	78	585	6	6	235	68
41)	Selliyampatti	2474	1785	689	732	93	508	91	16	10	529	495

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
5-10 km												
Dharmapuri Dt-Dharmapuri Taluk												
42)	Nallanahalli	2815	2335	480	401	27	660	282	83	25	1191	146
43)	Konanginaickanahalli	1763	1089	674	223	81	501	424	14	13	351	156
44)	Kuppur	2838	2682	156	868	22	838	59	57	2	919	73
45)	Pangunatham	3810	3213	597	1068	63	594	306	14	9	1537	219
46)	Konangihalli	3231	2462	769	774	54	686	463	17	7	985	245
47)	Naickanahalli	3879	3244	635	504	33	1358	84	11	29	1371	489
48)	Vellolai	1577	856	721	388	14	191	567	10	3	267	137
49)	Nekkundhi	2730	2651	79	1236	5	608	51	12	0	795	23
50)	Errabaiyanahalli	1067	965	102	399	4	243	18	13	2	310	78
51)	Echanahalli	2662	2616	46	1510	2	793	13	7	2	306	29
52)	Elagiri	2554	1805	749	566	49	377	617	19	3	843	80
53)	Pagalahalli	3482	2745	737	616	59	709	378	134	47	1286	253
54)	Nallampalli	2570	1688	882	189	46	89	381	27	41	1383	414
55)	Laligam	3688	3325	363	817	30	631	104	57	19	1820	210
56)	Dhinnahalli	2925	2907	18	966	4	1269	4	18	1	654	9
57)	Mittareddihalli	1947	1800	147	695	31	572	81	9	0	524	35
58)	Budanahalli	1276	1077	199	547	21	323	146	2	19	205	13
59)	Sivadi	1400	1167	233	191	4	260	28	28	12	688	189
60)	Palayam	3757	3578	179	1356	16	966	86	32	1	1224	76
61)	Dokkubodanahalli	2863	2518	345	886	87	1126	200	24	6	482	52
62)	Boalanahalli	2828	2468	360	802	33	707	244	19	0	940	83
	Total	**201825**	**170976**	**29646**	**40314**	**2993**	**37120**	**12867**	**3742**	**1359**	**91003**	**12427**

**Note*: As per the Status of Announcements made by the then Hon'ble Chief Ministers from 2011-12 to 2020-21 Under Rule 110 of the Tamil Nadu Legislative Assembly Rules- In Dharmapuri District, Paalakodu and Aroor Taluks will be reorganised to create new Kaarimangalam Taluk and Dharmapuri Taluk will be bifurcated to form New Nallampalli Taluk (Sl.No: 785, Page No: 136)*

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.9 Educational Infrastructure Within Study Area

The district has good primary and secondary education infrastructure in urban and rural areas. The people around the study area have well connected to educational infrastructures. **Table 3-29** shows the literates population.

Table 3-29Details of Education facilities within study area

S. No	Type of School	Numbers
1	Government Pre-Primary school	0
2	Private Pre-Primary school	32
3	Government Primary school	221
4	Private Primary school	40
5	Government Middle school	120
6	Private Middle school	20
7	Government Secondary school	38
8	Private Secondary school	28
9	Government Senior Secondary school	26
10	Private Senior Secondary school	14

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

The following **Table 3-30** shows the literates population and the percentage within the study area.

Table 3-30Literates population and the percentage within the study area

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	% Literates	Illiterates Population	Illiterates Population Male	Illiterates Population Female	% Illiterates
0-5 km										
Dharmapuri Dt-Palacode Taluk*										
1.	Sekkodi	5334	3097	1844	1253	41.94	2237	932	1305	58.06
0-5 km										
Dharmapuri Dt-Dharmapuri Taluk										
2.	Dharmapuri (M)	68619	52892	27725	25167	22.92	15727	6366	9361	77.08
3.	Palavadi	4631	2744	1609	1135	40.75	1887	763	1124	59.25
4.	Kadagathur	6096	3950	2320	1630	35.20	2146	831	1315	64.80
5.	Naduhalli	4894	2930	1733	1197	40.13	1964	835	1129	59.87
6.	A.Reddihalli	6024	3681	2122	1559	38.89	2343	990	1353	61.11
7.	Pappinaickanahalli	3789	2086	1246	840	44.95	1703	705	998	55.05
8.	Adagapadi	8457	4941	2871	2070	41.58	3516	1449	2067	58.42
9.	Dhalavaihalli	6724	3961	2337	1624	41.09	2763	1143	1620	58.91
10.	Somenahalli	4782	2620	1548	1072	45.21	2162	902	1260	54.79

11.	Kumbalapadi	2531	1241	791	450	50.97	1290	579	711	49.03
12.	Nathathahalli	7239	4067	2362	1705	43.82	3172	1362	1810	56.18
13.	Thadangam	8601	6155	3269	2886	28.44	2446	1030	1416	71.56
14.	Settikarai	6009	3565	2021	1544	40.67	2444	1035	1409	59.33
15.	Annasagaram	3489	2266	1289	977	35.05	1223	496	727	64.95
16.	Ungaranhalli	5730	3319	1975	1344	42.08	2411	1017	1394	57.92
17.	A.Jettihalli	10339	7584	4088	3496	26.65	2755	1088	1667	73.35
18.	Adiyamankottai	9610	6440	3705	2735	32.99	3170	1235	1935	67.01
19.	Balajangamanhalli	5137	3335	1892	1443	35.08	1802	726	1076	64.92
20.	Nagarkoodal	3898	2092	1233	859	46.33	1806	788	1018	53.67
21.	Mademangalam	4982	3258	1856	1402	34.60	1724	662	1062	65.40
22.	Noolahalli	6366	3349	1991	1358	47.39	3017	1328	1689	52.61
23.	Mukkalnaickanahalli	6576	3381	2075	1306	48.59	3195	1329	1866	51.41
24.	Hale-Dharmapuri (CT)	4902	3076	1782	1294	37.25	1826	739	1087	62.75
25.	Lakkiampatti (CT)	39697	31459	16782	14677	20.75	8238	3366	4872	79.25
5-10 km										

Dharmapuri Dt-Pennagaram Taluk										
26.	Papparapatti (TP)	12174	8936	4869	4067	26.60	3238	1222	2016	73.40
27.	Madehalli	5388	2865	1699	1166	46.83	2523	1074	1449	53.17
28.	Andarahalli	132	73	45	28	44.70	59	28	31	55.30
29.	Pallipatti	723	461	274	187	36.24	262	104	158	63.76
30.	Velampatti	1056	701	392	309	33.62	355	149	206	66.38
31.	Kariappanahalli	801	445	249	196	44.44	356	164	192	55.56
32.	Onnappagoundanahalli	6127	4072	2266	1806	33.54	2055	775	1280	66.46
33.	Thithiyoppanahalli	6139	3309	1988	1321	46.10	2830	1236	1594	53.90
34.	Sigaralahalli	8639	5169	3154	2015	40.17	3470	1409	2061	59.83
35.	Arakasanahalli	4767	2370	1447	923	50.28	2397	1087	1310	49.72
5-10 km										
Dharmapuri Dt-Palacode Taluk										
36.	Baisuhalli	8181	4946	2947	1999	39.54	3235	1346	1889	60.46
37.	Pulikkarai	5590	3091	1836	1255	44.70	2499	1047	1452	55.30
38.	Pumandahalli	4442	2476	1470	1006	44.26	1966	844	1122	55.74
39.	Mallikuttai	5289	3035	1846	1189	42.62	2254	900	1354	57.38

40.	Jagirburgur	2685	1776	1001	775	33.85	909	365	544	66.15
41.	Selliyampatti	4434	2728	1543	1185	38.48	1706	753	953	61.52
5-10 km										
Dharmapuri Dt-Dharmapuri Taluk										
42.	Nallanahalli	5962	3711	2190	1521	37.76	2251	897	1354	62.24
43.	Konanginaickanahalli	4378	2724	1643	1081	37.78	1654	688	966	62.22
44.	Kuppur	5453	3364	2009	1355	38.31	2089	846	1243	61.69
45.	Pangunatham	7730	4143	2532	1611	46.40	3587	1533	2054	53.60
46.	Konangihalli	6445	3712	2248	1464	42.40	2733	1054	1679	57.60
47.	Naickanahalli	7458	4111	2383	1728	44.88	3347	1483	1864	55.12
48.	Vellolai	3294	1655	987	668	49.76	1639	730	909	50.24
49.	Nekkundhi	5352	2676	1637	1039	50.00	2676	1206	1470	50.00
50.	Errabaiyanahalli	1936	1148	657	491	40.70	788	307	481	59.30
51.	Echanahalli	4853	2648	1575	1073	45.44	2205	910	1295	54.56
52.	Elagiri	4947	2865	1712	1153	42.09	2082	821	1261	57.91
53.	Pagalahalli	7002	4270	2482	1788	39.02	2732	1091	1641	60.98
54.	Nallampalli	7079	5149	2828	2321	27.26	1930	728	1202	72.74

55.	Laligam	7601	5218	2985	2233	31.35	2383	848	1535	68.65
56.	Dhinnahalli	5325	3027	1812	1215	43.15	2298	958	1340	56.85
57.	Mittareddihalli	3977	2483	1415	1068	37.57	1494	598	896	62.43
58.	Budanahalli	2286	1338	810	528	41.47	948	390	558	58.53
59.	Sivadi	3532	2100	1189	911	40.54	1432	610	822	59.46
60.	Palayam	7136	4446	2597	1849	37.70	2690	1066	1624	62.30
61.	Dokkubodanahalli	5667	3082	1872	1210	45.61	2585	1032	1553	54.39
62.	Boalanahalli	6182	3363	2026	1337	45.60	2819	1219	1600	54.40
Total		**434618**	**281175**	**159081**	**122094**	**39.90**	**153443**	**63214**	**90229**	**60.10**

****Note*: As per the Status of Announcements made by the then Hon'ble Chief Ministers from 2011-12 to 2020-21 Under Rule 110 of the Tamil Nadu Legislative Assembly Rules- In Dharmapuri District, Paalakodu and Aroor Taluks will be reorganised to create new Kaarimangalam Taluk and Dharmapuri Taluk will be bifurcated to form New Nallampalli Taluk (Sl.No: 785, Page No: 136)*

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.10 Health Facilities Within The Study Area

The majority of people visit nearby Hospitals/health services provided by the Government. The area has got good public health facilities at easily reachable distances. There was no major health issues reported in our survey. Even for any minor ailments they contact medical facilities immediately as it is very accessible to them. The local transport facilities and the communication facilities are the main reasons to get immediate medical attention. The incidents of institutional delivery are high due to awareness, education, economic development, proximity to health delivery system. The Infant mortality rate and the maternal mortality rate have significantly reduced. The health facilities within the study area are given in below.

Table 3-31Health facilities available in the study area

Sl.No	Type	Numbers
1	Community health centre	0
2	Primary health centre	9
3	Primary health sub-centre	77
4	Maternity and Child Welfare Centre	11
5	TB hospital/Clinic	10
6	Hospital Allopathic	0
7	Hospital Alternative Medicine	1
8	Dispensary Health Centre	11
9	Veterinary hospital	15
10	Mobile health clinic	1
11	Family Welfare Centre	10
12	Non-Government Medical facilities Out Patient	42

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

3.11.1.11 Summary

The Socioeconomic profile of the study area shows that the majority of people in the study area work in non-agricultural sector, however in rural area majority of the people in the rural area depends on agricultural sector. They have good educational infrastructures and the people in the study area are well connected to the educational infrastructures. The average literacy rate of the study area is 79.82%. The people in the study area are well connected to Government primary health centres and Primary health sub-centresshows the socio-economic indicators within the study area given in **Table 3-32.**

Table 3-32Summaries of Socio-economic indicators within the study area

S.No	Particulars	Study area	Unit
0- 5 Km			
1.	Number of villages in the Study Area	25	Nos.
2.	Total Households	60947	Nos.
3.	Total Population	244456	Nos.
4.	Children Population (<6 Years Old)	26140	Nos.
5.	SC Population	20783	Nos.
6.	ST Population	904	Nos.

7.	Total Working Population	107150	Nos.
8.	Main Workers	91325	Nos.
9.	Marginal Workers	14622	Nos.
10.	Cultivators	16801	Nos.
11.	Agricultural labours	18751	Nos.
12.	Household Industries	3118	Nos.
13.	Other Workers	68480	Nos.
14.	Literates	167489	Nos.
15.	Illiterates	76967	Nos
5 – 10Km			
16.	Number of villages in the Study Area	37	Nos.
17.	Total Households	46233	Nos.
18.	Total Population	190162	Nos.
19.	Children Population (<6 Years Old)	21644	Nos.
20.	SC Population	17943	Nos.
21.	ST Population	3454	Nos.
22.	Total Working Population	94675	Nos.
23.	Main Workers	79651	Nos.
24.	Marginal Workers	15024	Nos.
25.	Cultivators	26506	Nos.
26.	Agricultural labours	31236	Nos.
27.	Household Industries	1983	Nos.
28.	Other Workers	34950	Nos.
29.	Literates	113686	Nos.
30.	Illiterates	76476	Nos

Source :https://censusindia.gov.in/nada/index.php/catalog/1146

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Dharmapuri District",Series-34 Part XII-A)

CHAPTER-4
ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Impact Identification& Evaluation

Once identified anticipated impacts are analyzed and evaluated based on available information, the method used for evaluating the overall importance of impacts is based on four fundamental criteria:

- Nature (positive or negative, and direct or indirect);
- Duration (temporary or permanent);
- Area extent (regional, local, or isolated); and
- Intensity (low, moderate, or high).

These criteria enable the determinationof the overall importance or significance (low, moderate, or strong negative/positive) of each impact identified. Even if a particular evaluation is merely based on a value judgment rather than quantitative data that is not available, the methodology enables the establishment of acceptable levels and defines necessary mitigation and monitoring measures to minimize or eliminate impacts.

4.1.1 Nature of impact

Nature of the impact can be described as positive or negative. Positive impacts enhance the quality or facilitate access to baseline socioeconomic and environmental elements as described in the above chapter, while negative impacts degrade their quality or limit access. Impacts are also described as direct or indirect. A direct impact appears as an immediate result of a project activity, such as the damage to vegetation caused by the development of project land. An indirect impact arises from a project activity at the secondary level, such as the enhanced opportunities for economic development enabled by the project.

4.1.2 Duration of impact

The duration of an impact can be temporary or permanent. Careful attention has been made to distinguish between the duration and the source of the impact. For example, a source of impact of short duration (such as turbidity of river water caused by storm runoff from the construction site during construction) can exert an impact of permanent duration on the downstream environment (sedimentation of the riverbed). The presence and operation of the infrastructure works generally impose impacts of permanent duration.

The duration of impact can be classified as below:

Construction Phase: 1-2 years;

The immediate community within the radius of 5 km are envisioned for impact. However the impact will be mainly as below:

Traffic Impacts:

- Caused by vehicular movements of men, materials and machineries.

Air quality impacts:

Due to construction activities viz. dust and particulates.

Water Quality impacts:

- Due to runoff during rainy time of construction materials.
- Sewage generation and its disposal.

Noise Quality impacts:

- Caused by vehicular movements of men, materials and machineries.

4.1.3 Area extent of impact

The aerial extent of an impact refers to its area of influence and can be regional, local, or isolated to a particularly small and well defined area. An impact of regional extent exerts an influence far beyond the surroundings of the project area. And lastly, an isolated impact is limited in extent to a small, readily defined area or experienced by a small number of individuals.

4.1.4 Intensity of impact

The intensity of an impact concerns the scale or size of the impact on socioeconomic and environmental elements such as the productivity of natural habitat, a community, or the utilization of resources. Intensity is evaluated as low, moderate or high. Impacts are evaluated as a function of how they affect the overall integrity of elements and their vulnerability to degradation or loss in value.

4.1.5 Irreversible and Irretrievable commitments of environmental components

Irreversible commitments of resources are those which cause either direct or indirect use ofnatural resources such that the resources cannot be restored or returned to their original condition. Construction activities of the proposed project will result in an irretrievable and irreversible commitment of natural resources though direct consumption of fossil fuels and use of materials.

- The proposed project activities requires connections to existing power sources, which would increase the short-term use of electricity and petroleum products during the operation of construction equipments (Mainly HSD).
- However, the energy consumption for construction will not result in long-term depletion of non-renewable energy resources and will not permanently increase the impact on energy resources that are not renewable.
- Construction activities would not reduce or interrupt existing electrical services such that existing supplies would be constrained.
- Depending upon the project components, Alternatives will result in progressively greater irreversible and irretrievable commitment of energy and material resources during theproject construction, operation, and maintenance, in the following forms:

a. Energy- in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles, and during operation
b. Construction materials and Labor- The use of the 224odeling224able resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region

4.2 Project planning & Design

The most important phase of the project is to get the strategic planning of the project components to ensure the following;

- Processes which require less water
- Choice of Industry selection that require
    - Least foot print
    - Safe for operation
    - Least energy requirements
    - Least residue generation
    - Man power optimization

The planning Phase should draw

- Water requirement
- Wastewater generation & management
- Power requirement & source
- Ancillary facilities proposed for the Industrial Area

To ensure the prevention of sources of pollution, reduce the pollutant concentration and enable the operation schedule to manage the effects of pollution.

4.3 Construction phaseImpacts

The impacts on Air, Noise, Water, Soil, and Ecology of the surrounding environment due to the activities carried out during the construction phase are discussed below;

Impact assessment during the construction phase of the project is of importance as the construction activities lead to adverse effects on the environment on a short term basis. The major activities that are undertaken during this phase are civil works, mechanical works, machinery works and transportation works.

During the construction phase, the following activities among many are considered to be important towards creating environmental impacts:

- Site preparation (fencing, boundary & clearing of site).
- Excavation, and backfilling
- Hauling and dumping of earth materials & construction spoils.
- Foundation works.
- Fabrication erection of Steel structures such as, Tanks, Pipelines and Sheds.
- Construction of internal roads drains & water supply.

- Painting and finishing.
- Cleaning, landscaping and plantations.

4.3.1 Loss of vegetation

During Construction there will be essentially entail the removal and loss of some, of the existing trees and underlying grassland at the project site, and the permanent erection of block and steel concrete structures associated within the project site new infrastructures. This would constitute a loss of alternative land use, an irreversible commitment of land resources and thus a direct long-term impact. The site is not extensively or heavily vegetated prior to construction and did not support any significant ecological habitats or fauna. Therefore, the impacts from erecting the new buildings are considered to be insignificant in terms of habitat loss. Impact mitigation is not required during the construction phase. Landscaping of the site, after building completion, will see the introduction of plants and trees that should offset any negative impacts associated with the removal and loss of existing trees at the project site. The numbers and types of vegetation to be introduced during the landscaping exercise are expected to be greater and more diverse than presently obtained, and these are expected to play a greater role in terms adding ecological value and attracting birds and other terrestrial fauna during the operational phase of the project, apart from being more pleasing aesthetically.

4.3.2 Impact on Fauna

SIPCOT Project area is Government Poramboakke and pattaland. There is no reserve forest at the immediate vicinity / within 5Km from the project site. Hence no direct impact is anticipated due to the project. Three Schedule – I species are present in the study area i.e., 10 Km radius, however the Faunal species mentioned under various groups are widely distributed in the Indian subcontinent.Impact mitigation is not required during the construction phase.

During Operation phase to minimize the impact, adequate pollution control measures such as provision of 41.30% of developable area i.e 250.929 Ha under Greenbelt Development, mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilersetc as per CPCB/ TNPCB guidelines., will be provided. Due the proposed Mitigation measures the impact will be very negligible. In addition, conservation plan for Schedule I species were also proposed and the same is enclosed as **Annexure-15b.**

4.3.3 Impact on drainage pattern

The overall topography of the project site will be radically changed by the erection of buildings and this will bring moderately significant change in the existing pattern of surface drainage. Mainly, the impact will arise from the creation of impermeable surfaces (roofs, pavements, etc.,) and the corresponding reduction in the amount percolation in the soil and capacity of the site to absorb rainfall.

4.3.4 Erosion of cleared area

Vegetation clearance and excavation works related to construction will expose soils in the affected areas which could leave them vulnerable to erosion by surface run-off and create the threat of turbidity and sediment deposition in drains & nearby rivers. The topography of the site and the pervious nature of the soil will cause erosive surface flows during the construction works before landscaping and drainage works reduce the susceptibility to soil erosion. Significant surface features such as gullies, streams or rivers in close proximity to the site that could be affected by soil erosion.

4.3.5 Impacts of Material Transportation

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

4.3.6 Air Quality Impacts

During construction phase the ambient air quality in and around the proposed project site will have marginal adverse impacts due to construction activities. Construction activities likesite preparation, approach roads, excavation, drilling, foundation, deployment of machinery, erection, transportation, dumping will cause dust and gaseous emissions. The pollutant released during the construction activities may cause immediate effect on the construction workers. **Table 4-1** gives the emissions from various construction equipments.

Table 4-1Trem and CEV Stage IV – V emission standards for Construction Vehicles

<table>
<tr><th>Engine Power</th><th rowspan="2">Date</th><th>CO</th><th>HC</th><th>Nox</th><th>PM</th><th>PN</th><th rowspan="2">Test Cycle</th></tr>
<tr><th>kW</th><th colspan="4">g/kWh</th><th>1/kWh</th></tr>
<tr><td colspan="8">Trem Stage IV and CEV Stage IV</td></tr>
<tr><td>37 ≤ P < 56</td><td rowspan="3">CEV: 2021.04
Trem: 2023.01</td><td>5.0</td><td colspan="2">4.7*</td><td>0.025</td><td>-</td><td rowspan="3">NRSC and NRTC</td></tr>
<tr><td>56 ≤ P < 130</td><td>5.0</td><td>0.19</td><td>0.4</td><td>0.025</td><td>-</td></tr>
<tr><td>130 ≤ P < 560</td><td>3.5</td><td>0.19</td><td>0.4</td><td>0.025</td><td>-</td></tr>
<tr><td colspan="8">Trem Stage V and CEV Stage V</td></tr>
<tr><td>P < 8</td><td rowspan="5">2024.04</td><td>8.0</td><td colspan="2">7.5*</td><td>0.4</td><td>-</td><td rowspan="2">NRSC</td></tr>
<tr><td>8 ≤ P < 19</td><td>6.6</td><td colspan="2">7.5*</td><td>0.4</td><td>-</td></tr>
<tr><td>19 ≤ P < 37</td><td>5.0</td><td colspan="2">4.7*</td><td>0.015</td><td>1×10^{12}</td><td rowspan="3">NRSC and NRTC</td></tr>
<tr><td>37 ≤ P < 56</td><td>5.0</td><td colspan="2">4.7*</td><td>0.015</td><td>1×10^{12}</td></tr>
<tr><td>56 ≤ P < 130</td><td>5.0</td><td>0.19</td><td>0.4</td><td>0.015</td><td>1×10^{12}</td></tr>
</table>

130 ≤ P < 560		3.5	0.19	0.4	0.015	1×10^{12}	
P ≥ 560		3.5	0.19	3.5	0.045	-	NRSC
* Nox + HC							

(**Source**: Ministry of Road Transport and Highways, "Notification no. G.S.R. (201) (E) dated 05.03.2018 regarding Emission standards for CEV and Agricultural tractors," May 3, 2018)

Due to the short duration of the planned action, any impacts on Ambient Air Quality during construction activities are expected to be short term.

4.3.7 Noise Environment

Foundation work will involve land excavation, affecting environment by noise. Structural work, deployment of machinery, approach of road construction and erection of roads will result in noise and vehicular traffic. Material handling and transportation would also lead to significant noise pollution. Continuous exposure of workers to high sound levels may result in annoyance, fatigue. This negative impact will be short-term (limited to the duration of the road construction works) and is not considered to be a significant threat to the health or wellbeing of humans. Distance will help to minimise noise effects.

4.3.8 Water Environment

Construction phase requires water for various processing such as material preparation in equipment's. Change in quality of water is an important concern associated with the project particularly during the construction phase. Earth works, crushing of stones, cutting and modification of the terrain, alteration of drainage systems and soil erosion are the major factors that affect the water quality during construction phase.

During rainy season, the runoff water joining the water courses in nearby areas of the development sites will add to debris and soil particles to enhance the level of suspended solids in the water bodies. This will adversely affect the fishes and other aquatic life forms apart from the human beings who are dependent on the surface water for their daily use.

Following are the most susceptible locations for contamination of water during construction:

- Surface and ground water resources close to construction material storage yard, concrete mixer plants and maintenance sites of construction vehicles;
- Leakage of lubricant or spill may cause water pollution of surface and ground water body.
- Impact due to accidental spills or due to bad construction practice, will be short term and low in magnitude and confined to the construction period only.

4.3.9 Biological Environment

Dust from the construction activities will affect the plant and animal respiration activity. Construction activities change the natural environment. But it also creates a built environment for the surrounding.

Emissions such as PM_{10}, $PM_{2.5}$, NO_X, CO from vehicles may also cause respiration problem for the surrounding organisms.

4.3.10 Possible accidents during construction phase

Possible accidents that are expected during construction phase are

- Falls
- Electrocution
- Struck by objects
- Fire & explosions
- Machinery accidents

4.3.11 Socio Economic Environment

4.3.10.1 Positive Impacts

Income to the local material suppliers

This project will promote the procurement of equipment's and machineries for various activities of construction phase. Procurement of material from local suppliers will promote the growth of the economy of area.

Employment Opportunities

Proposed project will create employment opportunities to the local people living near the Project Site.It is estimated that 250 people will be required for construction phase. These levels of short-term employment opportunities would have a positive impact on the local economy.

4.3.10.2 Negative Impacts

OHS Risk to Construction Workers

4.4 Measures for minimizing the adverse impacts identified during Construction Phase

Mitigation is the implementation of measures designed to reduce the undesirable effects of a proposed project on the environment. As companies and individuals, we have an important role to play in protecting the environment, which is very sensitive to change and once damaged can take a long time to recover.

The mitigation measures on Air, Noise, Water, Soil, and Ecology of the surrounding environment due to the activities carried out during the construction phase are discussed below:

4.4.1 Loss of Vegetation

- Development of green belt during construction stage will offset the negative impacts associated with the removal and loss of existing trees at the project site.
- The numbers and types of vegetation to be introduced during the landscaping exercise are expected to be greater and more diverse and will be pleasing aesthetically.

4.4.2 Drainage Pattern

- Proper storm water drainage system is proposed for the project so that the runoff during monsoon is not concentrated. The storm water drainage system will be connected to rainwater harvesting pits& existing waterbodies.
- If during excavation, if water accumulates in the excavated areas, it I pumped out and disposed in recharge soak pits of dry bore wells.

4.4.3 Material Transportation

- All the materials will be covered during transportation to the site to prevent spillage and dusting.
- Trucks used for transportation of materials will be fitted with tailgates that close properly and with tarpaulins to cover the materials.
- The cleanup of spilled earth and construction material on the main roads will be the responsibility of the contractor and will be done in a timely manner (say within 4 -6 hours) so that there is noinconvenience or endanger to other road users. These requirements will be included as clauses within contracts made with relevant sub-contractors.
- Transportation of lubricants and fuel to the site will be doneonly in the appropriate vehicles and containers, i.e. fuel tankers and sealed drums.
- As far as possible, transport of construction materials will be scheduled for off-peak traffic hours. This will reduce the risk of traffic congestion and road accidents on the access roads to the site.
- Transportation management plan will be proposed for the project, so thate there is no congestion of vehiclies within or outside the site.

4.4.4 Ambient Air Quality

4.4.4.1 Mitigation measures for Air Pollution

Site clearance, excavation and earthmoving

The working area by uprooting of shrubs or vegetation, removal of boulders or temporary or permanent structures will be sprayed with water for dust suppression immediately before, during and immediately after the operation so as to reduce dust emissions.

Access road

Every main haul road will be paved with concrete, bituminous materials and kept clean byspraying water so as to reduce dust emissions.

Construction equipments

- All machineries to be used for construction purpose will be of highest standard of reputed make and compliance of noise pollution control norms by these equipments will be emphasized by company.
- Acoustic laggings and silencers will be used in equipments wherever possible.
- Feasibility of putting up acoustic enclosure / temporary barrier around areas with high noise levels will also be explored.
- Transport vehicles and construction equipments / machineries will be properly maintained to reduce air emissions.
- Equipments will be periodically checked for pollutant emissions against stipulated norms.
- Exhaust vent from DG set will be kept at proper height to ensure quick dispersal of gaseous emissions.

Use of vehicle

- Immediately before leaving the construction site, every vehicle shall be washed to remove any dust from its body and wheels.
- A vehicle leaving a construction site carrying a load of dusty materials,will be covered entirely by clean impervious sheet.

Stock Piles

- All loose material either stocked or transported shall be provided with suitable covering such as tarpaulin, etc.
- Water sprinkling shall be done at the location where dust generation is anticipated.
- Over Burden (OB) waste dumps shall be sprayed with water as they are major sources of air borne particulate matter/dust.
- OB waste dumps shall be reclaimed / afforested to bind the loose soil and to prevent soil erosion.

DG Set

- D.G. set will be placed in an acoustic enclosure.

4.4.4.2 Materials Storage

- The stockpiling of construction materials will be properly managed and controlled. Fine grained materials (sand, marl etc.) will be stockpiled away from surface drainage channels and features.
- Low beams will be placed around the piles and/or tarpaulin will be used to cover open piles of stored materials to prevent them from being washed away during rain.
- Safe storage areas will be identified and retaining structures will be constructed prior to the arrival of material.

- Hazardous chemicals (e.g. fuels) will be properly stored in appropriate containers and these will be safely locked away. Conspicuous warning signs (e.g. 'No Smoking') will be posted around hazardous waste storage and handling facilities.
- In order to reduce groundwater contamination, an impervious sump or container will be placed under the spigots of fuel drums to collect drippings.

4.4.5 Noise Environment

- Construction activities will be restricted to normal working hours.
- Workers operating at high noise areas will be providedwithearmuffsand ear plugs.
- Construction activities will be restricted to the daytime and no construction will be practiced during night.
- Barricades will be provided around the construction site to confine noise within the site.

4.4.6 Water Environment

- Excavation will be avoided during monsoon season.
- Check dams will be provided at appropriate location to prevent construction runoff from the site to the surrounding water bodies.
- Sewage will be treated through Packaged STP during construction phase.
- To prevent surface and ground water contamination by oil/grease, leak proof containers will be used for storage and transportation of oil/grease.
- There will be no abstraction of groundwater during construction.
- Storehouse will be located at a distance away from the water storage area to prevent accidental release or spillage.
- Proper management of rain water run-off during monsoon by creating bunds to utilize the rain water for construction purpose.

4.4.7 Biological Environment

- The dust emissions will be suppressed by spraying water.
- Emissions from D.G sets and vehicles will be minimized by proper maintenance and by avoiding use of adulterant fuels and will be maintained withinthe standard limits prescribed by competent authority.
- Important species of trees will be identified and marked and will be merged with landscape plan.

4.4.8 Construction Waste Disposal

- A site waste management plan will be prepared by the contractor prior to commencement of construction activities. This will include the designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring. Preparation and implementation of the plan must be made the responsibility of the building contractor with the system being monitored independently.

- Special attention will be given forminimizing and reducing the quantities of solid waste produced during site preparation and construction. To reduce organic waste, softer vegetation will be composted onsite and used for soil amendment during landscaping.
- Most of the construction materials like soil, bricks, concrete will be reused in backfilling, road construction, sub-grade reparation works. Metals, wood scraps & bitumen junks will be recycled either within site or outside with help of the local authority. The measures like reusing materials on-site and /or donating /selling salvaged items reduces waste, virgin material use and disposal cost.
- Vegetation and combustible waste will not be burntat site.
- Reusable inorganic waste (e.g. excavated sand) will be stockpiled away from drainage features and used for filling where necessary.
- Unusable construction waste, such as damaged pipes, formwork and other construction materials, will be disposed of at an approved dumpsite.

4.4.9 Land Environment

- Topsoil (soil on the top 15 cm patch) will be preserved separately in a stack covered by tarpaulin. Efforts will be made to reinstate the soil for backfilling purposes. Topsoil will be reused for horticultural areas.
- The spillage of oil from the machinery or cement residue from concrete mixer plants will be properly collected and disposed off.

4.4.10 Measures to minimize accidents

- Employees will be briefed about the different safety measures with respect to each specific jobsite. Safety meetings have to be conducted on regular basis.
- Minimising late work hours and dark environments which create a greater potential for accidents.
- Providing Personnel Protective gears like hardhats, eye protection, hearing protection and harnesses. Slip-resistant boots, heavy duty gloves and masks to the construction workers.
- Enforcing regular breaks to improve safety.
- Wires and high voltage areas should be marked and the electricity should be deactivated when it is not in use.

- Substitution of explosive materials as far as possible, good ground exploration and trained workers reduce the likelihood of explosions.
- Proper planning and supervision of the work, and effective inspection, maintenance and repair arrangements will reduce the risk of accidents due to machinery.

4.4.11 Health & safety measures during construction phase

- Construction related activities will be confined only to project site area, hence no health related impact are envisaged within the project influenced area during the construction stage and will be limited to occupant levels.
- At the project site much direct exposure to dust generation and high noise generation sources likely to cause occupant health related impact such as asthma, bronchitis and Noise Induced Hearing Loss (NIHL) etc. on the construction workers. In order to offset such effects, proper drinking water, sanitation and first aid facility will be provided at the construction site by the contractor, with trained shift supervisors, to ensure minimum adverse occupational health impacts on the construction workers.
- Periodic monitoring of health of construction phase workers will be carried out by the contractor.

4.5 Impact and Measures for minimizing the adverse impacts identified during Operation Phase

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. Both positive and negative impacts may be expected in the surrounding environment due to various activities associated with the operations of the proposed projects. The impacts on various environmental attributed as detailed below:

- Air Quality
- Noise quality
- Water Resources and Water Quality
- Soil Quality, landscape and land use
- Ecology/Biodiversity
- Socio-economics

4.5.1 Air Quality

SIPCOT will not install any DG sets for providing backuppower supply for the Industrial Park. Individual industries will be mandated provide adequate Air Pollution control as per CPCB / TNPCB Norms.

Baseline data reveals that ambient air quality in the study area for the Parameters PM_{10}, SO_2, NO_2 and CO are well within the permissible limits as prescribed in the National Ambient Air Quality Standards (NAAQS) for Industrial Area, Residential, Rural & Other areas.

The major air pollutant from the proposed activity will be PM, SO_2, NO_x and CO emissions.

4.5.1.1 Meteorological Data

The meteorological data for a month, i.e. from 01/03/2023 to 31/05/2023 was considered for the study. Data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformats meteorological data so that it can be used as input for AERMOD model. Meteorology considered for 234odeling is shown below in **Figure 4-1**.

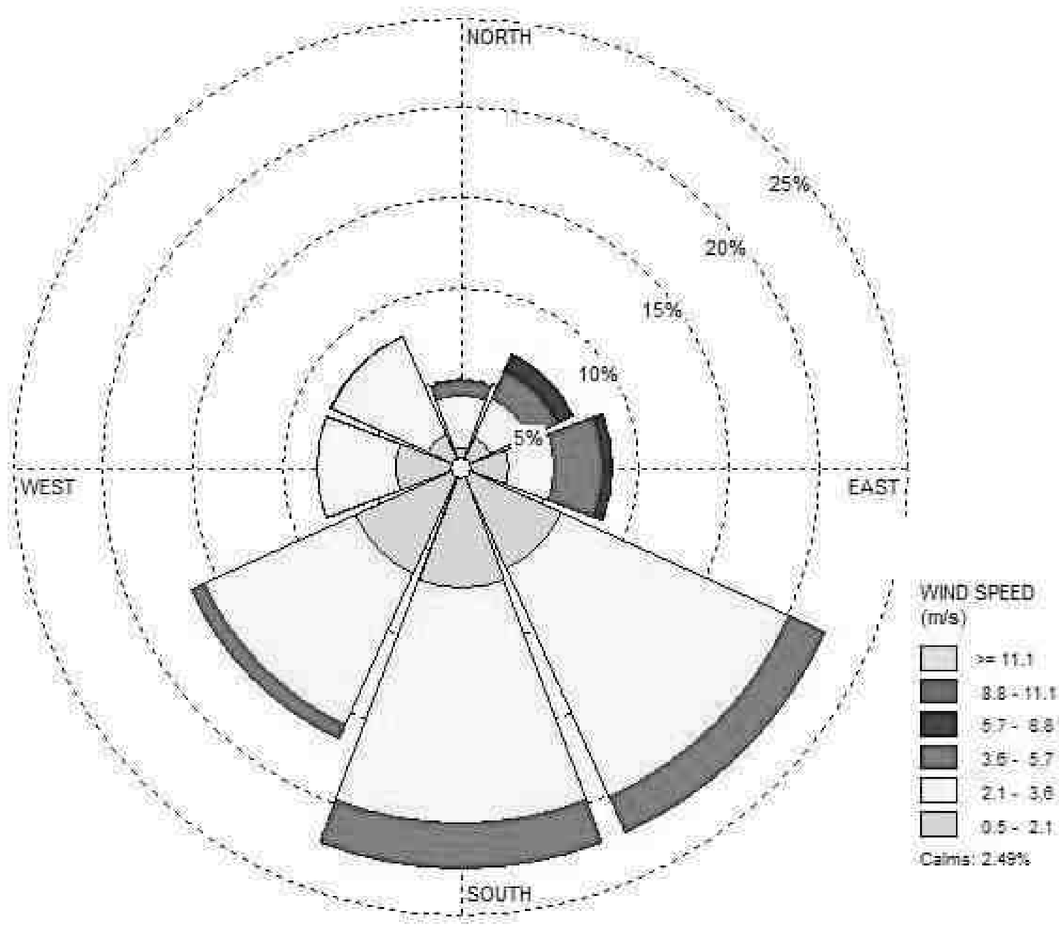


Figure 4-1Windrose diagram considered for Modeling (March 2023 to May 2023)

4.5.1.2 AERMET Process

For the 3 phase AERMET processing of the meteorological data, specifications of the land use in the area are required to determine the terrain roughness for 234odeling. The land use was characterized for in and around the site. The surfacecharacteristics for the site and surroundings were selected and used to calculate the Albedo, Bowen ratio and surface roughness parameters.

4.5.1.3 AERMOD Process

AERMOD Software Version 8.0.5 was used for air dispersion 234odeling and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straight forward cases, AERMOD is also suitable for complex terrain and urban dispersion scenarios.

AERMOD is a steady-state plume model. In the stable boundary layer (SBL), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the convective boundary layer (CBL), the horizontal distribution is also assumed to be Gaussian, but the vertical distribution is described with a bi-Gaussian probability density function (pdf). This behavior of the concentration distributions in the CBL was demonstrated by Willis and Deardorff (1981) and Briggs (1993). Additionally, in the CBL, AERMOD treats “plume lofting,” whereby a portion of plume mass, released from a buoyant source, rises to and remains near the top of the boundary layer before becoming mixed into the CBL. AERMOD also tracks any plume mass that penetrates into the elevated stable layer, and then allows it to re-enter the boundary layer when and if appropriate. For sources in both the CBL and the SBL AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions from proposed stacks are estimated and used for the air dispersion modeling as shown in **Table 4-2**. Maximum incremental value for PM, SO_2, NO_x&CO are shown in **Figure 4-2, 4-3, 4-4** and **4-5** and Ground Level Concentration (GLC) from proposed stacks are given in **Table 4-3, 4-4, 4-5** and **4-6**respectively.

4. Point Source:

Table 4-2Proposed Stack Emissions

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
1	1	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
2	2	DG 100 KVA	HSD	1	32.5	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
3	3	DG 650 KVA	HSD	1	35.0	220	0.3	10	2192.59	8.05E-03	7.50E-03	1.70E-02	2.45E-02
4	4	DG 575 KVA	HSD	1	34.5	220	0.3	10	2192.59	7.12E-03	6.64E-03	1.51E-02	2.16E-02
5		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
6	5	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
7		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
8	6	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
9		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
10	7	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
11		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
12	8	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02
13	9	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
14	10	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02
15		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
16	11	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02
17		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
18	12	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
19		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
20	13	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
21		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
22	14	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
23	15	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
24	16	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
25	17	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
26	18	DG 30 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.72E-04	3.46E-04	7.86E-04	1.13E-03
27	19	DG 35 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.34E-04	4.04E-04	9.17E-04	1.32E-03
28	20	DG 45 KVA	HSD	1	31.0	160	0.1	8.5	207.08	5.58E-04	5.20E-04	1.18E-03	1.69E-03
29	21	DG 45 KVA	HSD	1	31.0	160	0.1	8.5	207.08	5.58E-04	5.20E-04	1.18E-03	1.69E-03
30	22	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
31	23	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
32	24	DG 140 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.73E-03	1.62E-03	3.67E-03	5.27E-03
33	25	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
34	26	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
35	27	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
36	28	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
37	29	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
38	30	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
39	31	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
40	32	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
41	33	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
42	34	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
43	35	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
44	36	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
45	37	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
46	38	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
47	39	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
48	40	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
49	41	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
50	42	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
51	43	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
52	44	DG 72 KVA	HSD	1	31.0	170	0.1	9	219.26	8.92E-04	8.31E-04	1.89E-03	2.71E-03
53	45	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
54	46	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
55	47	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
56	48	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
57	49	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
58	50	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
59	51	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
60		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
61	52	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
62		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
63	53	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
64		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
65	54	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
66		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
67	55	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
68		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
69	56	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
70		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
71	57	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
72	58	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
73	59	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
74	60	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
75	61	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
76	62	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
77	63	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
78	64	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
79	65	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
80		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
81	66	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
82		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
83	67	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
84		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
85	68	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
86		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
87	69	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
88		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
89	70	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
90		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
91	71	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
92		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
93	72	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
94		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
95	73	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
96		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
97	74	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
98		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
99	75	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
100		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
101	76	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
102		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
103	77	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
104		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
105	78	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
106		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
107	79	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
108		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
109	80	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
110	81	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
111	82	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
112	83	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
113	84	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
114	85	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
115	86	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
116	87	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
117	88	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
118	89	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
119	90	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
120	91	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
121	92	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
122	93	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
123		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
124	94	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
125		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
126	95	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
127		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
128	96	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
129		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
130	97	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
131		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
132	98	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
133		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
134	99	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
135		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
136	100	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
137		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
138	101	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
139		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
140	102	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
141		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
142	103	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
143		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
144	104	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
145		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
146	105	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
147		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
148	106	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
149		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
150	107	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
151		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
152	108	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
153		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
154	109	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
155		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
156	110	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
157		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
158	111	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
159		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
160	112	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
161		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
162	113	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
163	114	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
164	115	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
165	116	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
166	117	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
167	118	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
168	119	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
169	120	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
170	121	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
171	122	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
172	123	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
173	124	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
174		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
175	125	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
176		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
177	126	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
178		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
179	127	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
180		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
181	128	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
182		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
183	129	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
184		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
185	130	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
186		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
187	131	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
188		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
189	132	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
190		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
191	133	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
192		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
193	134	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
194		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
195	135	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
196		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
197	136	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
198		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
199	137	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
200		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
201	138	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
202		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
203	139	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
204		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
205	140	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
206		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
207	141	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
208		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
209	142	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
210	143	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
211	144	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
212	145	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
213	146	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
214	147	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
215	148	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
216	149	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
217	150	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
218		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
219	151	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
220		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
221	152	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
222		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
223	153	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
224		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
225	154	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
226		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
227	155	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
228		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
229	156	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
230		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
231	157	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
232		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
233	158	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
234		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
235	159	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
236	160	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
237	161	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
238	162	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
239	163	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
240	164	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
241	165	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
242	166	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
243	167	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
244	168	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
245	169	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
246	170	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
247	171	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
248	172	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
249	173	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
250	174	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
251	175	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
252	176	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
253	177	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
254	178	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
255	179	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
256	180	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
257	181	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
258	182	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
259	183	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
260	184	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
261	185	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
262	186	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
263	187	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
264	188	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
265		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
266	189	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
267		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
268	190	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
269		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
270	191	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
271		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
272	192	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
273		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
274	193	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
275		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
276	194	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
277		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
278	195	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
279		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
280		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
281		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
282	196	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
283	197	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
284	198	DG 320 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.97E-03	3.69E-03	8.38E-03	1.20E-02
285		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
286		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
287		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
288	199	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
289		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
290		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
291		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
292	200	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
293		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
294		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
295		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
296	201	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
297	202	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03

Sl.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
298	203	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
299		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
300		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
301		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
302	204	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
303		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
304		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
305		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
306	205	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
307		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
308		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
309		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
310	206	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
311		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
312		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
313		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
314	207	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
315	208	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
316	209	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
317	210	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
318	211	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
319	212	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
320	213	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
321	214	DG 320 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.97E-03	3.69E-03	8.38E-03	1.20E-02
322	215	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
323	216	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
324	217	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
325	218	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
326	219	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
327	220	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
328	221	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02
329	222	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
330	223	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
331	224	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
332	225	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
333	226	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
334	227	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
335	228	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
336	229	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
337	230	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
338	231	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
339	232	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
340	233	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
341	234	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
342	235	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
343	236	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
344	237	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
345	238	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
346	239	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
347	240	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
348	241	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
349	242	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
350	243	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
351	244	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
352	245	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
353	246	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
354	247	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
355	248	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
356	249	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
357	250	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
358	251	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
359	252	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
360	253	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
361	254	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
362	255	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
363	256	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
364	257	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
365	258	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
366	259	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
367	260	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
368	261	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
369	262	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
370	263	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
371	264	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
372	265	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
373	266	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
374	267	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
375	268	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
376	269	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
377	270	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
378	271	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
379	272	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
380	273	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
381	274	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
382	275	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
383	276	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
384	277	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
385	278	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
386	279	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
387	280	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
388	281	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
389	282	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
390	283	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
391	284	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
392	285	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
393	286	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
394	287	DG 160 KVA	HSD	1	32.5	190	0.2	9.5	925.76	1.98E-03	1.85E-03	4.19E-03	6.02E-03
395	288	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
396	289	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
397	290	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
398	291	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
399	292	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
400	293	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
401	294	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
402	295	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02
403	296	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
404	297	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
405	298	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
406	299	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
407	300	DG 700 KVA	HSD	1	35.0	220	0.3	10	2192.59	8.67E-03	8.08E-03	1.83E-02	2.63E-02
408	301	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
409	302	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
410	303	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
411	304	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
412	305	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
413	306	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
414	307	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
415	308	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
416	309	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
417	310	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
418	311	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
419	312	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
420	313	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
421	314	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
422	315	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
423	316	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
424	317	DG 25 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.10E-04	2.89E-04	6.55E-04	9.41E-04
425	318	DG 30 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.72E-04	3.46E-04	7.86E-04	1.13E-03
426	319	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
427	320	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
428	321	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
429	322	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
430	323	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
431	324	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
432	325	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
433	326	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
434	327	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
435	328	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
436	329	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
437	330	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
438	331	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
439	332	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
440	333	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
441	334	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
442	335	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
443	336	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
444	337	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
445	338	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
446	339	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
447	340	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
448	341	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
449	342	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
450	343	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
451	344	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
452	345	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
453	346	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
454	347	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
455	348	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
456	349	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
Total										**5.96E-01**	**4.61E-01**	**1.36E+00**	**2.03E+00**

Note:

1. DG is considered as sources for this project. DG capacity is assumed based on the plot size.
2. HSD is assumed as fuel for DG, Boiler, Kiln and Furnace.
3. DG height is calculated based on the formula:

Tentative Height of building is assumed as 30 m.

i. DG Stack Height (H) = Height of the building (h) + 0.2 SQRT(DG set capacity in KVA).

4. NO_x emission control measure followed by SCR (Selective Catalytic Reduction) for DG and Low Nox Burner for Boiler, Kiln and Furnace.

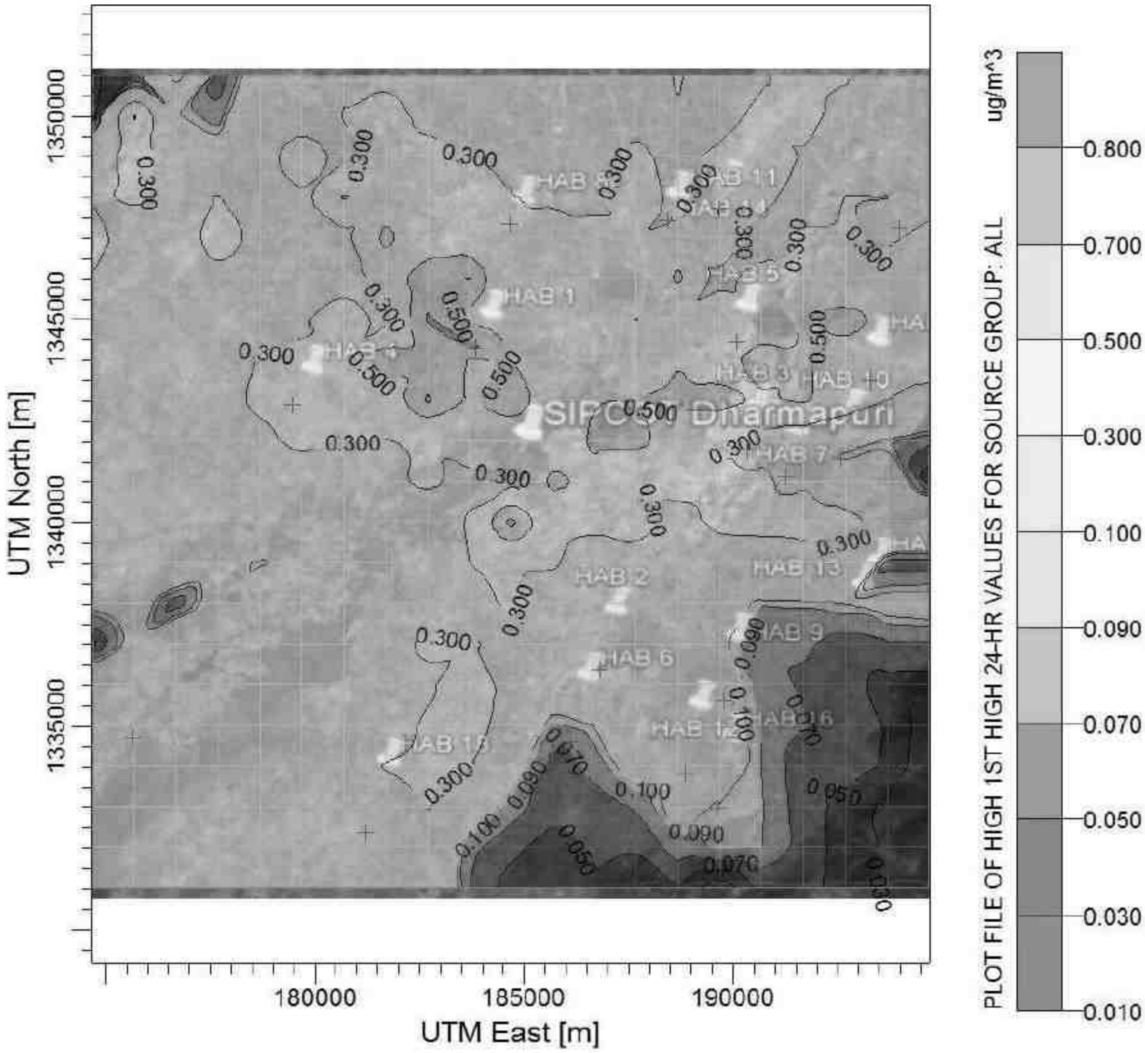


Figure 4-2Predicted 24-Hrs GLC's of PM within10 km Radius of the Study Area

Table 4-3Estimated Top 10 Highest Concentrations of Particulate Matter PM obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	0.76087	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.72055	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.14526	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.2031	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.36175	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.38928	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.07223	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.26105	3.87	E

9	Selekodi	HAB 8	184664.49	1347371.9	0.31067	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.11707	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.09316	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.27872	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.12206	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.05954	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.50257	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.4794	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.09574	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.08179	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.19124	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.22502	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.24635	8.44	NE

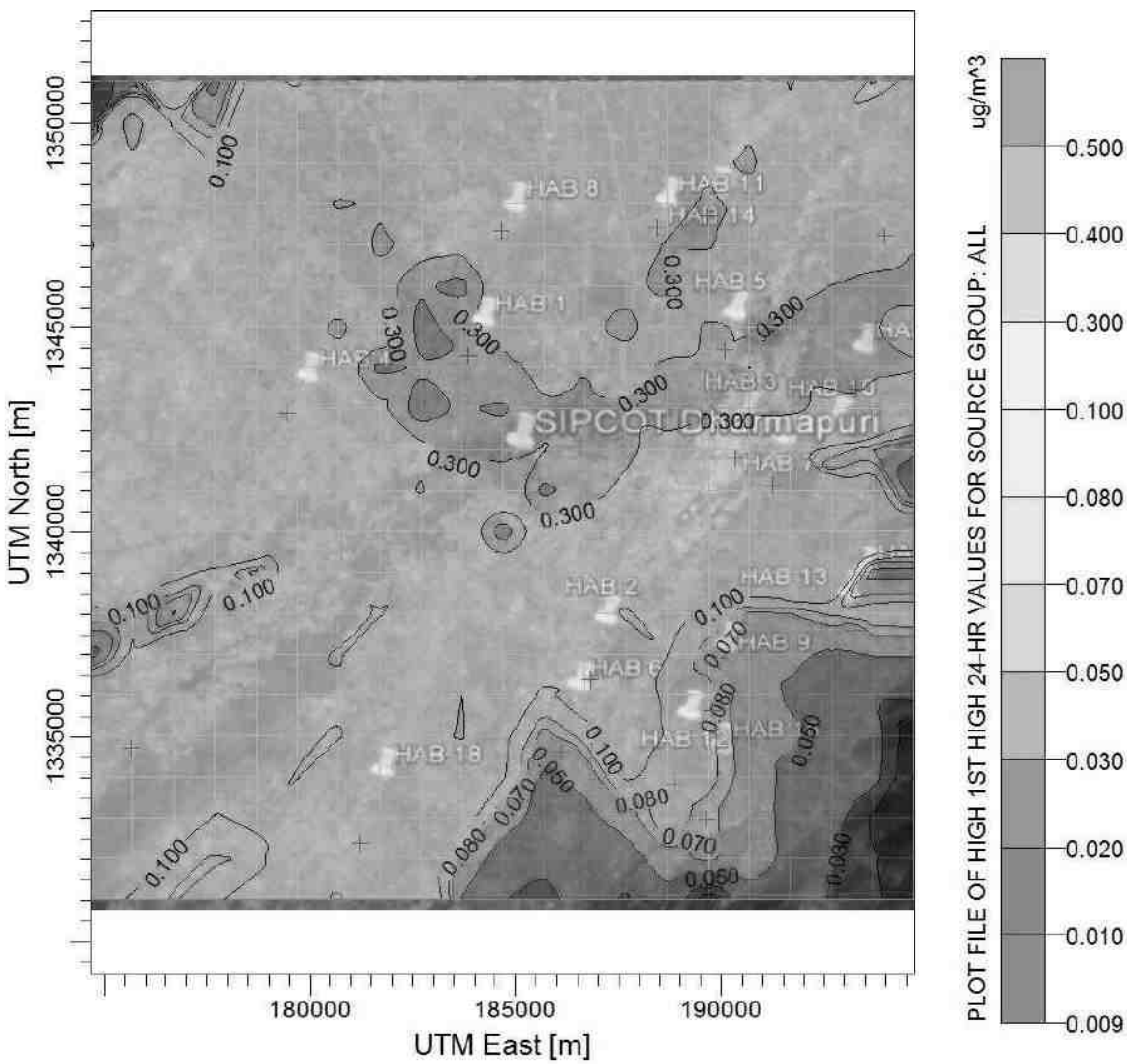


Figure 4-3Predicted 24-Hrs GLC's of SO_2within 10 km Radius of the Study Area

Table 4-4Estimated Top 10 Highest Concentrations of SO_2 Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	182683	1343023	0.48896	2.82	NW
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.38778	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.11621	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.14099	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.25223	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.31557	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.05372	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.19788	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.21229	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.07991	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.07152	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.22797	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.0918	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.04702	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.35461	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.31926	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.07141	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.06145	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.12444	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.14978	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.20508	8.44	NE

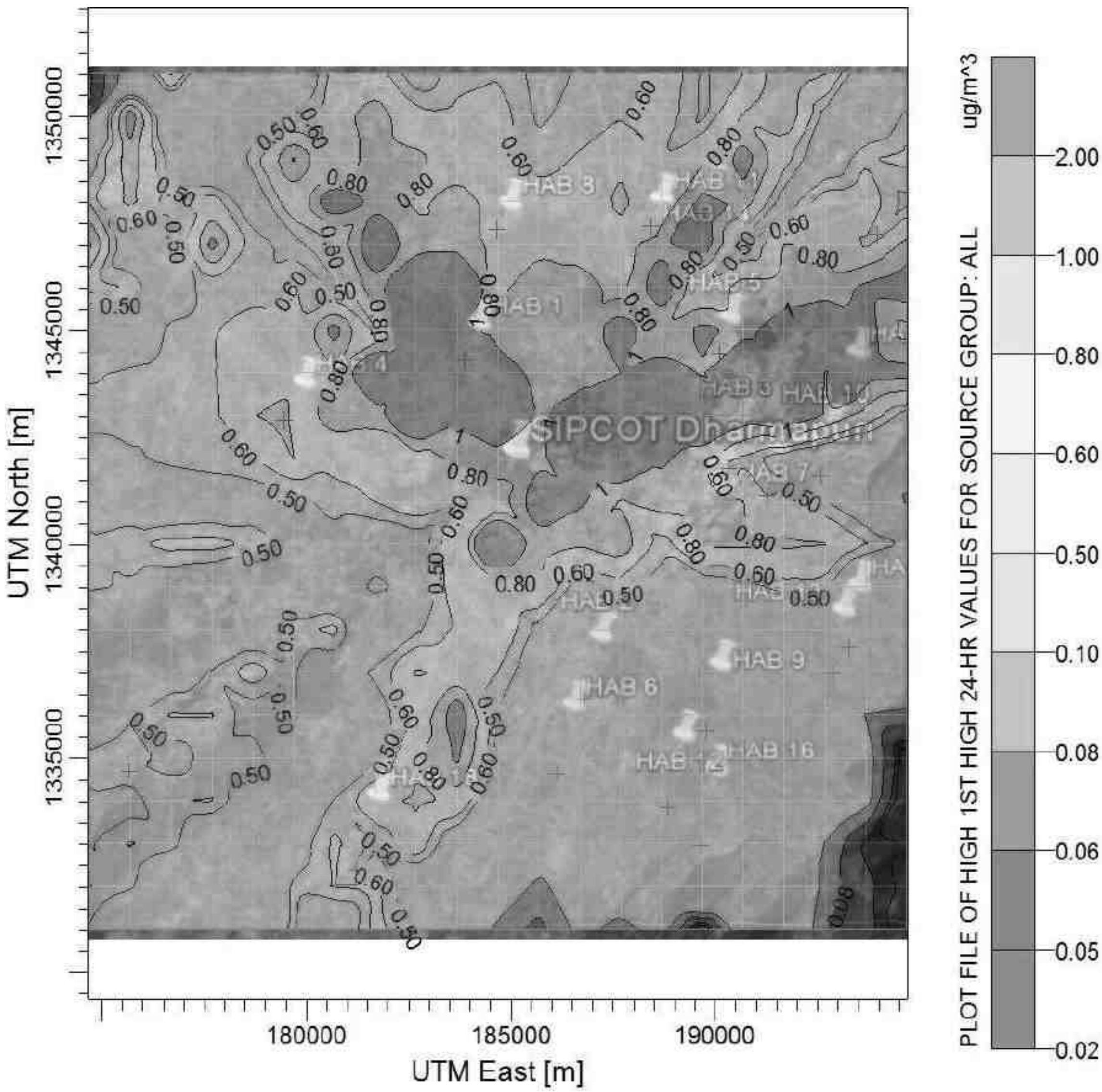


Figure 4-4Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 4-5Estimated Top 10 Highest Concentrations of oxide of Nitrogen Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	1.85422	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	1.80531	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.32601	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.4775	2.00	E

5	Indur	HAB 4	179465.61	1342905.71	0.84906	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.9165	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.16617	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.59667	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.73361	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.2764	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.21552	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.62048	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.27979	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.13426	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	1.17558	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	1.14017	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.22007	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.18755	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.45771	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.53534	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.54477	8.44	NE

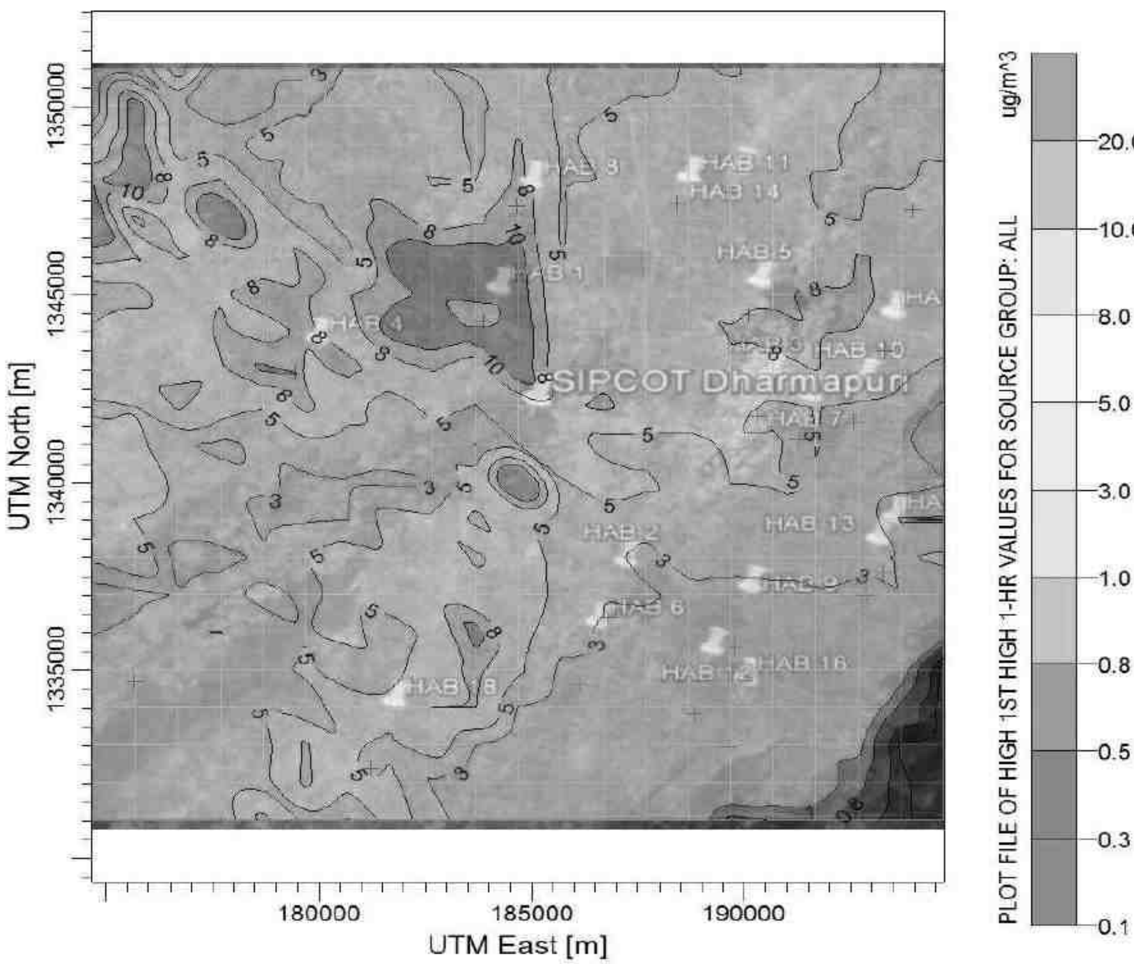


Figure 4-5Predicted 1-Hrs' GLC's of CO within 10 km Radius of the Study Area

Table 4-6Estimated Top 10 Highest Concentrations of CO Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	15.27078	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	8.35706	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	2.86435	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	4.55914	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	10.0819	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	8.18996	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	2.26482	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	4.45978	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	9.77875	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	2.23979	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	4.40234	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	6.44073	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	1.93325	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	2.33156	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	7.16358	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	7.48861	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	1.38866	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	3.20246	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	4.58705	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	4.13506	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	7.2342	8.44	NE

4.5.1.4 Conclusion

Maximum pollutant concentrations of PM, SO2 and NO_x observed due to proposed for an 24hr-average period have been studied and CO maximum concentration for 1 hr- average period have been studied . The total increase in concentrations above baseline status to estimate the percentage increase and summarized in**Table 4-7.**

Table 4-7 Total Maximum GLCs from the proposed Stack Emissions

Pollutant	Max. Base line Conc. (µg/m³)	Estimated Incremental Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQ standard (µg/m³)
PM	58.13	0.76	58.89	100
SO2	16.95	0.48	17.43	80
NO_x	33.89	1.85	35.74	80
CO	340	15.27	355.27	4000

From the above table, it is evident that even from controlled emissions from the proposed project, the total Concentration for PM, SO_2, NO_x and CO are well within the NAAQ Standards.

Industries will be instructed to have their Air Pollution Control measures, so that the estimated incremental concentrations for PM, SO2 and Nox will be further reduced for the proposed project after establishment.

5. Line Source:

Table 4-8Proposed project Transportations Emission

S.No	Type of Vehicle	No. of Vehicle	Emission (g/s)		
			PM	Nox	CO
1	2w	380	9.29E-04	1.39E-03	2.32E-02
2	4w	150	3.67E-04	7.34E-04	1.83E-02
3	3w	60	1.47E-04	5.13E-04	5.13E-03
4	Truck	170	8.31E-03	4.16E-02	1.45E-02
5	Bus	75	2.75E-03	1.83E-02	6.42E-03
Total			**1.25E-02**	**6.25E-02**	**6.77E-02**

Source:
Indian Emission Regulations by the Automotive Research Association of India

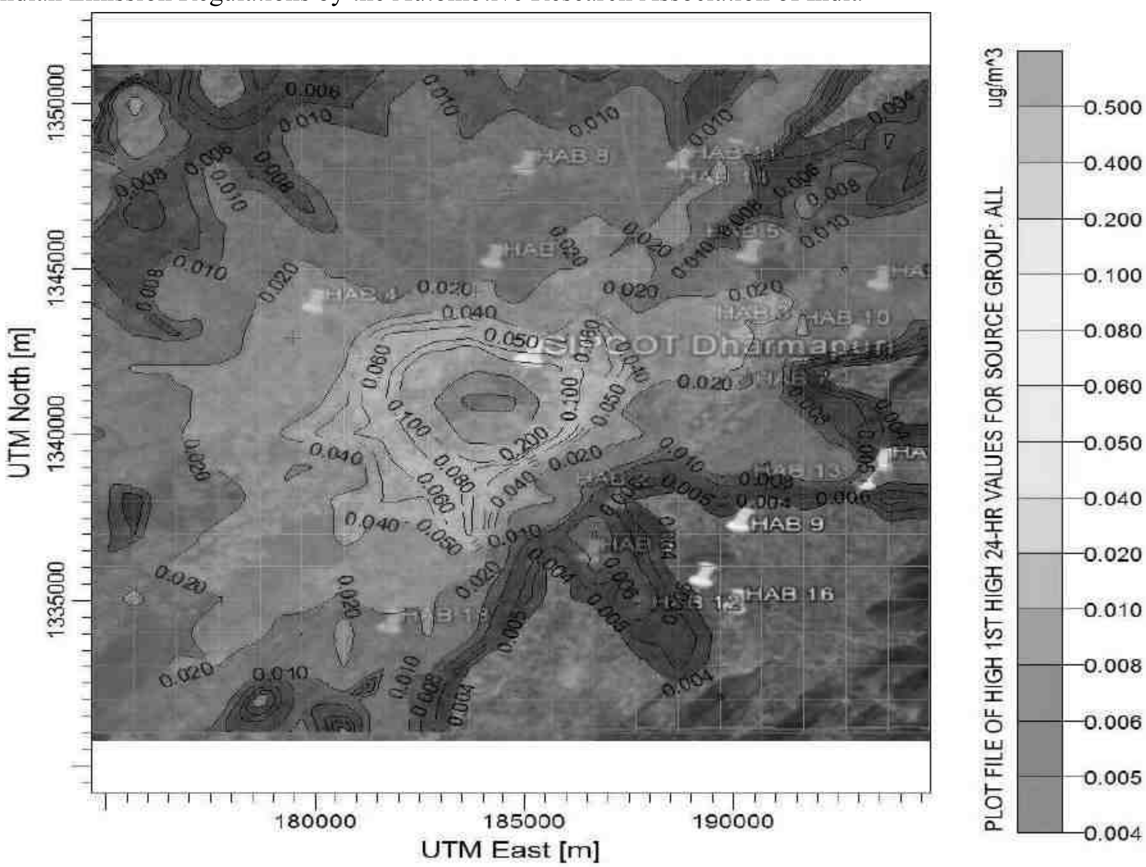


Figure 4-6Predicted 24-Hrs GLC's of Particulate matter PM within 10 km Radius of the Study Area

Table 4-9Estimated Top 10 Highest Concentrations of Particulate Matter PM obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. ($\mu g/m^3$)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	183683	1341023	0.46606	1.00	W
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.02146	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.00911	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.00915	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.03532	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.01884	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.00228	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.00934	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.01513	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.00303	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.00286	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.01346	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.00572	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.00293	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.02275	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.01709	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.0034	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.00303	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.00525	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.01913	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.00611	8.44	NE

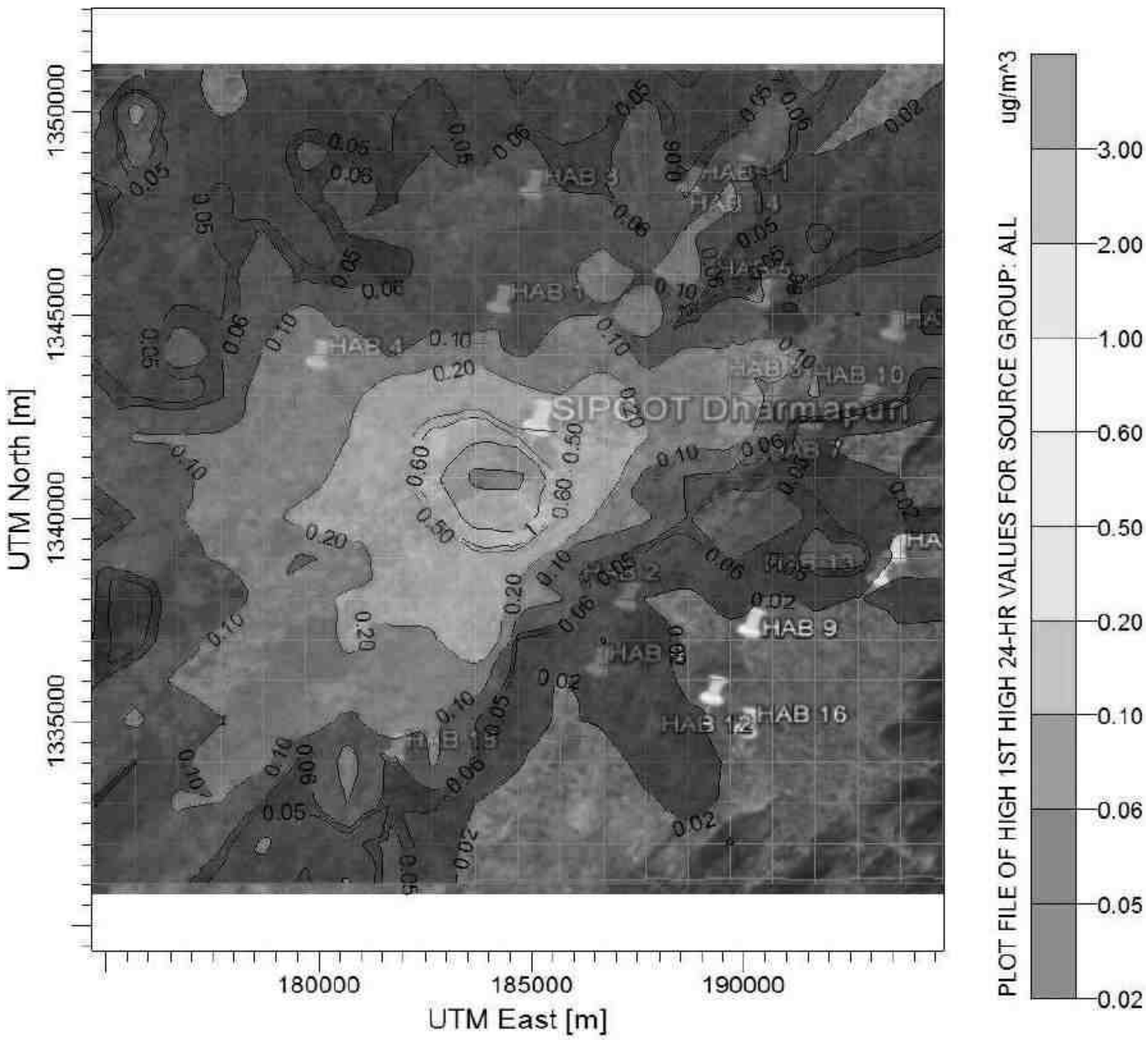


Figure 4-7Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 4-10Estimated Top 10 Highest Concentrations of oxide of Nitrogen Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	183683	1341023	2.32281	1.00	W
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.10694	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.04542	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.04562	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.17605	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.09392	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.01135	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.04656	3.87	E

9	Selekodi	HAB 8	184664.49	1347371.9	0.07542	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.01509	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.01424	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.06709	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.0285	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.01458	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.11337	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.0852	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.01696	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.01512	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.02618	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.09536	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.03043	8.44	NE

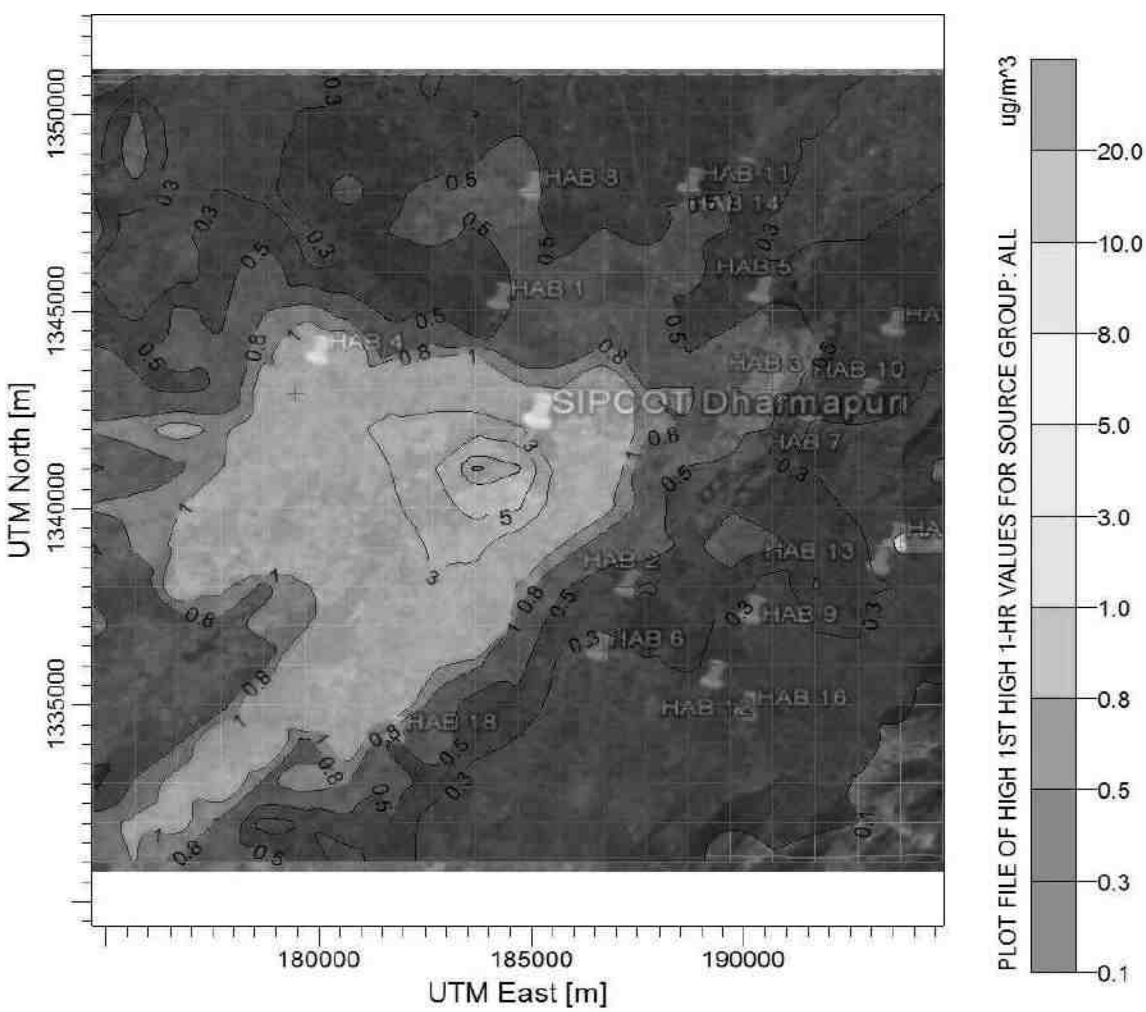


Figure 4-8Predicted 1-Hrs' GLC's of CO within 10 km Radius of the Study Area

Table 4-11Estimated Top 10 Highest Concentrations of Carbon Monoxide Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	183683	1341023	10.47453	1.00	W
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.46827	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.21002	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.29831	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	1.12092	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.62924	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.1783	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.2854	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.60943	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.18823	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.26988	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.51269	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.20678	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.28997	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.51432	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.43688	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.1325	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.21621	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.30713	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.58741	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.3756	8.44	NE

Conclusion

Maximum pollutant concentrations of PM and NO_xobserved due to proposed for an 24hr-average period have been studied and CO maximum concentration for 1 hr- average period have been studied . The total increase in concentrations above baseline status to estimate the percentage increase and summarized in **Table 4-15**.

Table 4-12 Total Maximum GLCs from the Transportations Emissions

Pollutant	Max. Base line Conc. (µg/m^3)	Estimated Incremental Conc. (µg/m^3)	Total Conc. (µg/m^3)	NAAQ standard (µg/m^3)
PM	58.13	0.46	58.59	100
NO_x	33.89	2.32	36.21	80
CO	340	10.47	350.47	4000

6. Cumulative emission:

Table 4-13Proposed project Stack & Transportations Emission (Cumulative)

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
1	1	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
2	2	DG 100 KVA	HSD	1	32.5	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
3	3	DG 650 KVA	HSD	1	35.0	220	0.3	10	2192.59	8.05E-03	7.50E-03	1.70E-02	2.45E-02
4	4	DG 575 KVA	HSD	1	34.5	220	0.3	10	2192.59	7.12E-03	6.64E-03	1.51E-02	2.16E-02
5		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
6	5	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
7		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
8	6	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
9		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
10	7	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
11		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
12	8	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02
13	9	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
14	10	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02

Sl.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
15		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
16	11	DG 350 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	4.34E-03	4.04E-03	9.17E-03	1.32E-02
17		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
18	12	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
19		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
20	13	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
21		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
22	14	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
23	15	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
24	16	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
25	17	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
26	18	DG 30 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.72E-04	3.46E-04	7.86E-04	1.13E-03
27	19	DG 35 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.34E-04	4.04E-04	9.17E-04	1.32E-03
28	20	DG 45 KVA	HSD	1	31.0	160	0.1	8.5	207.08	5.58E-04	5.20E-04	1.18E-03	1.69E-03
29	21	DG 45 KVA	HSD	1	31.0	160	0.1	8.5	207.08	5.58E-04	5.20E-04	1.18E-03	1.69E-03
30	22	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
31	23	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
32	24	DG 140 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.73E-03	1.62E-03	3.67E-03	5.27E-03
33	25	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
34	26	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
35	27	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
36	28	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
37	29	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
38	30	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
39	31	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
40	32	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
41	33	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
42	34	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
43	35	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
44	36	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
45	37	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
46	38	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
47	39	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
48	40	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
49	41	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
50	42	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
51	43	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
52	44	DG 72 KVA	HSD	1	31.0	170	0.1	9	219.26	8.92E-04	8.31E-04	1.89E-03	2.71E-03
53	45	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
54	46	DG 500 KVA	HSD	1	34.5	220	0.3	10	2192.59	6.20E-03	5.77E-03	1.31E-02	1.88E-02
55	47	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
56	48	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
57	49	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
58	50	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
59	51	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
60		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
61	52	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
62		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
63	53	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
64		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
65	54	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
66		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
67	55	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
68		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
69	56	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
70		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
71	57	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
72	58	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
73	59	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
74	60	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
75	61	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
76	62	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
77	63	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
78	64	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03

Sl.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
79	65	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
80		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
81	66	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
82		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
83	67	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
84		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
85	68	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
86		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
87	69	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
88		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
89	70	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
90		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
91	71	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
92		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
93	72	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
94		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
95	73	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
96		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
97	74	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
98		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
99	75	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
100		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
101	76	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
102		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
103	77	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
104		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
105	78	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
106		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
107	79	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
108		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
109	80	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
110	81	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
111	82	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
112	83	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
113	84	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
114	85	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
115	86	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
116	87	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
117	88	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
118	89	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
119	90	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
120	91	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
121	92	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
122	93	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
123		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
124	94	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
125		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
126	95	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
127		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
128	96	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
129		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
130	97	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
131		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
132	98	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
133		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
134	99	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
135		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
136	100	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
137		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
138	101	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
139		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
140	102	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
141		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
142	103	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
143		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
144	104	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
145		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
146	105	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
147		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
148	106	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
149		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
150	107	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
151		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
152	108	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
153		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
154	109	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
155		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
156	110	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
157		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
158	111	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
159		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
160	112	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
161		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
162	113	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
163	114	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
164	115	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
165	116	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
166	117	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
167	118	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
168	119	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
169	120	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
170	121	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
171	122	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
172	123	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
173	124	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
174		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

Sl.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
175	125	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
176		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
177	126	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
178		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
179	127	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
180		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
181	128	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
182		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
183	129	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
184		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
185	130	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
186		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
187	131	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
188		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
189	132	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
190		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
191	133	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
192		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
193	134	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
194		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
195	135	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
196		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
197	136	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
198		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
199	137	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
200		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
201	138	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
202		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
203	139	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
204		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
205	140	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
206		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
207	141	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
208		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
209	142	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
210	143	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
211	144	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
212	145	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
213	146	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
214	147	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
215	148	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
216	149	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
217	150	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
218		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
219	151	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
220		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
221	152	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
222		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03

Sl.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3/hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
223	153	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
224		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
225	154	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
226		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
227	155	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
228		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
229	156	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
230		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
231	157	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
232		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
233	158	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
234		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
235	159	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
236	160	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
237	161	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
238	162	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
239	163	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
240	164	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
241	165	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
242	166	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
243	167	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
244	168	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
245	169	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
246	170	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
247	171	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
248	172	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
249	173	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
250	174	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
251	175	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
252	176	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
253	177	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
254	178	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
255	179	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
256	180	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
257	181	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
258	182	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
259	183	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
260	184	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
261	185	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
262	186	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
263	187	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
264	188	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
265		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
266	189	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
267		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
268	190	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
269		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
270	191	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
271		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
272	192	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
273		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
274	193	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
275		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
276	194	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
277		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
278	195	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
279		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
280		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
281		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
282	196	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
283	197	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
284	198	DG 320 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.97E-03	3.69E-03	8.38E-03	1.20E-02
285		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
286		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
287		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
288	199	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
289		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
290		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
291		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
292	200	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
293		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
294		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
295		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
296	201	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
297	202	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
298	203	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
299		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
300		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
301		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
302	204	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
303		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
304		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
305		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
306	205	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
307		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
308		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
309		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
310	206	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
311		Boiler 400 kg/hr	HSD	1	40.0	180	0.1	8	194.90	9.10E-04	1.25E-04	2.65E-03	4.42E-03
312		Kiln 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
313		Furnace 100 kg/hr	HSD	1	40.0	180	0.1	8	194.90	2.28E-03	3.13E-04	6.62E-03	1.10E-02
314	207	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
315	208	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
316	209	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03
317	210	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
318	211	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
319	212	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
320	213	DG 300 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.72E-03	3.46E-03	7.86E-03	1.13E-02
321	214	DG 320 KVA	HSD	1	33.5	200	0.25	9.5	1446.50	3.97E-03	3.69E-03	8.38E-03	1.20E-02
322	215	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02
323	216	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
324	217	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
325	218	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
326	219	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
327	220	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
328	221	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02
329	222	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
330	223	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
331	224	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
332	225	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
333	226	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
334	227	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
335	228	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
336	229	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
337	230	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
338	231	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
339	232	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
340	233	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
341	234	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
342	235	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
343	236	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
344	237	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
345	238	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
346	239	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
347	240	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
348	241	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
349	242	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
350	243	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
351	244	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
352	245	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
353	246	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
354	247	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
355	248	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
356	249	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
357	250	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
358	251	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
359	252	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
360	253	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
361	254	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
362	255	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
363	256	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
364	257	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
365	258	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
366	259	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
367	260	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
368	261	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
369	262	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
370	263	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
371	264	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
372	265	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
373	266	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
374	267	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
375	268	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
376	269	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
377	270	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
378	271	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
379	272	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
380	273	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
381	274	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
382	275	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
383	276	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
384	277	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
385	278	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
386	279	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
387	280	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
388	281	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
389	282	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
390	283	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
391	284	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
392	285	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
393	286	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
394	287	DG 160 KVA	HSD	1	32.5	190	0.2	9.5	925.76	1.98E-03	1.85E-03	4.19E-03	6.02E-03
395	288	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
396	289	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
397	290	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
398	291	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
399	292	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
400	293	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
401	294	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
402	295	DG 275 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.41E-03	3.18E-03	7.20E-03	1.03E-02
403	296	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
404	297	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
405	298	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
406	299	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
407	300	DG 700 KVA	HSD	1	35.0	220	0.3	10	2192.59	8.67E-03	8.08E-03	1.83E-02	2.63E-02
408	301	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
409	302	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
410	303	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
411	304	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
412	305	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
413	306	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
414	307	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
415	308	DG 82.5 KVA	HSD	1	31.5	170	0.1	9	219.26	1.02E-03	9.53E-04	2.16E-03	3.10E-03
416	309	DG 180 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.23E-03	2.08E-03	4.71E-03	6.77E-03
417	310	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
418	311	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
419	312	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
420	313	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
421	314	DG 40 KVA	HSD	1	31.0	160	0.1	8.5	207.08	4.96E-04	4.62E-04	1.05E-03	1.50E-03
422	315	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
423	316	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
424	317	DG 25 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.10E-04	2.89E-04	6.55E-04	9.41E-04
425	318	DG 30 KVA	HSD	1	31.0	160	0.1	8.5	207.08	3.72E-04	3.46E-04	7.86E-04	1.13E-03
426	319	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
427	320	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
428	321	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
429	322	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
430	323	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
431	324	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
432	325	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
433	326	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
434	327	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
435	328	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
436	329	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
437	330	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
438	331	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
439	332	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
440	333	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
441	334	DG 62.5 KVA	HSD	1	31.5	170	0.1	9	219.26	7.74E-04	7.22E-04	1.64E-03	2.35E-03
442	335	DG 200 KVA	HSD	1	32.5	190	0.2	9.5	925.76	2.48E-03	2.31E-03	5.24E-03	7.52E-03
443	336	DG 50 KVA	HSD	1	31.5	160	0.1	8.5	207.08	6.20E-04	5.77E-04	1.31E-03	1.88E-03
444	337	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
445	338	DG 150 KVA	HSD	1	32.5	180	0.15	9.5	520.74	1.86E-03	1.73E-03	3.93E-03	5.64E-03
446	339	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^{0}C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
447	340	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
448	341	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
449	342	DG 100 KVA	HSD	1	32.0	170	0.1	9	219.26	1.24E-03	1.15E-03	2.62E-03	3.76E-03
450	343	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
451	344	DG 75 KVA	HSD	1	31.5	170	0.1	9	219.26	9.29E-04	8.66E-04	1.96E-03	2.82E-03
452	345	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
453	346	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
454	347	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
455	348	DG 125 KVA	HSD	1	32.0	180	0.15	9.5	520.74	1.55E-03	1.44E-03	3.27E-03	4.70E-03
456	349	DG 250 KVA	HSD	1	33.0	195	0.2	9.5	925.76	3.10E-03	2.89E-03	6.55E-03	9.41E-03

Transportations

S.No	Type of Vehicle	No. of Vehicle	PM (g/s)	SOx (g/s)	NOx (g/s)	CO (g/s)
1	2w	380	9.29E-04	-	1.39E-03	2.32E-02
2	4w	150	3.67E-04	-	7.34E-04	1.83E-02
3	3w	60	1.47E-04	-	5.13E-04	5.13E-03

SI.No	Plot no	SOURCE	FUEL TYPE	Stack Details						Emissions			
				No. of Stack	Height (m)	Temp (^0C)	Dia (m)	Exit Velocity (m/s)	Flow Rate (Nm^3 / hr)	PM (g/s)	Sox (g/s)	Nox (g/s)	CO (g/s)
4	Truck			170						8.31E-03	-	4.16E-02	1.45E-02
5	Bus			75						2.75E-03	-	1.83E-02	6.42E-03
Total										**6.09E-01**	**4.61E-01**	**1.42E+00**	**2.10E+00**

Note:

1. DG is considered as sources for this project. DG capacity is assumed based on the plot size.
2. HSD is assumed as fuel for DG, Boiler, Kiln and Furnace.
3. DG height is calculated based on the formula:

Tentative Height of building is assumed as 30 m

i. DG Stack Height (H) = Height of the building (h) + 0.2 SQRT(DG set capacity in KVA)

4. NO_x emission control measure followed by SCR (Selective Catalytic Reduction) for DG and Low NO_x Burner for Boiler, Kiln and Furnace.

Source:

1. Emission reference: AP-42: Compilation of Air Emissions Factors (USEPA)
2. Automotive Research Association of India (ARAI)

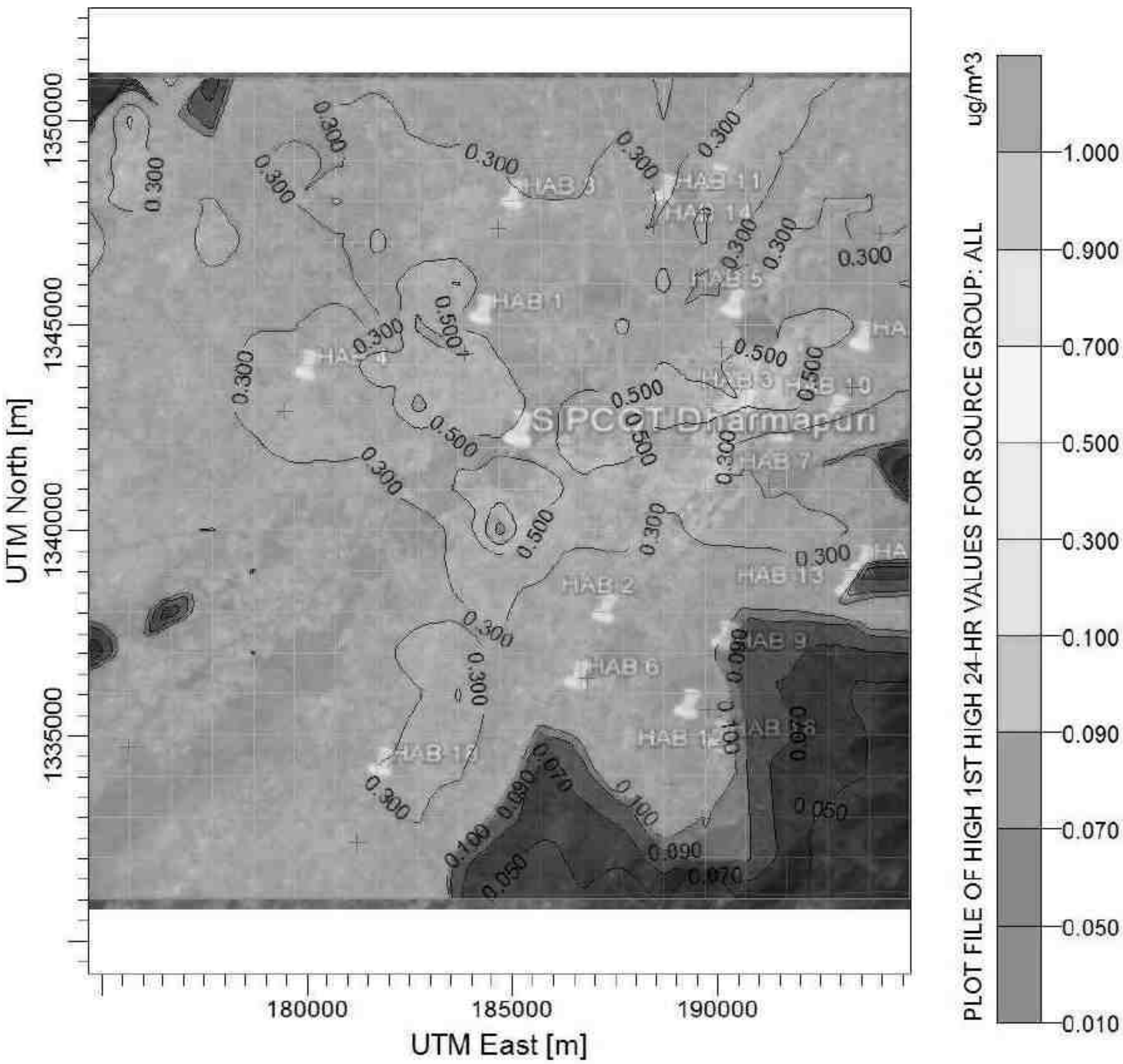


Figure 4-9Predicted 24-Hrs GLC's of Particulate matter PM within 10 km Radius of the Study Area

Table 4-14Estimated Top 10 Highest Concentrations of Particulate Matter PM obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	0.98151	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.72613	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.15437	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.21225	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.37534	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.40812	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.07451	3.48	S

8	Annasagaram	HAB 7	191263.93	1341146.76	0.27039	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.32581	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.11876	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.09602	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.29219	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.12778	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.06158	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.52531	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.4965	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.09915	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.08482	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.19438	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.23486	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.25246	8.44	NE

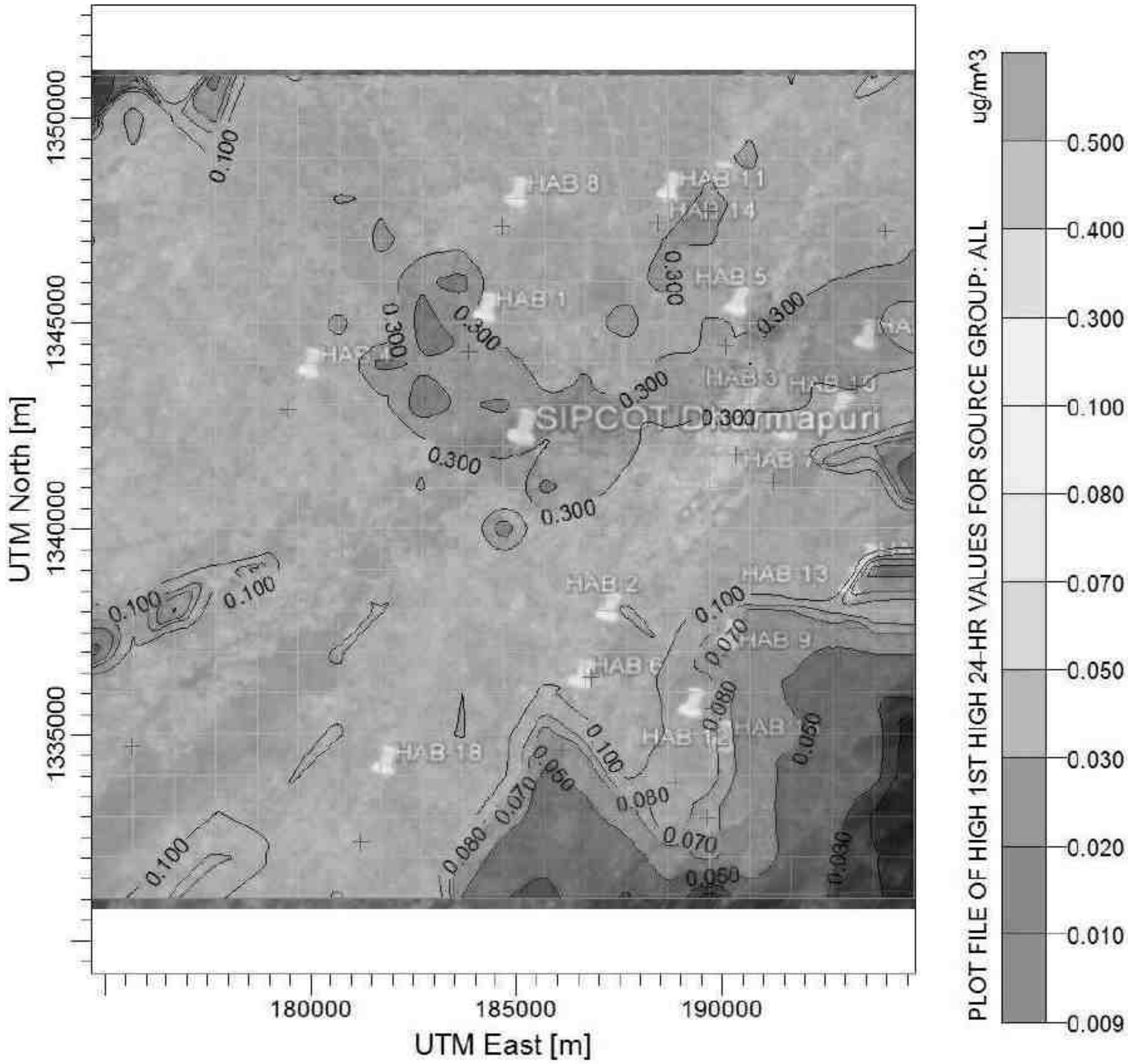


Figure 4-10Predicted 24-Hrs' GLC's of SO_2 within 10 km Radius of the Study Area

Table 4-15Estimated Top 10 Highest Concentrations of SO_2 Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	182683	1343023	0.48896	2.82	NW
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	0.38778	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.11621	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.14099	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.25223	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.31557	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.05372	3.48	S

8	Annasagaram	HAB 7	191263.93	1341146.76	0.19788	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.21229	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.07991	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.07152	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.22797	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.0918	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.04702	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	0.35461	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	0.31926	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.07141	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.06145	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.12444	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.14978	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.20508	8.44	NE

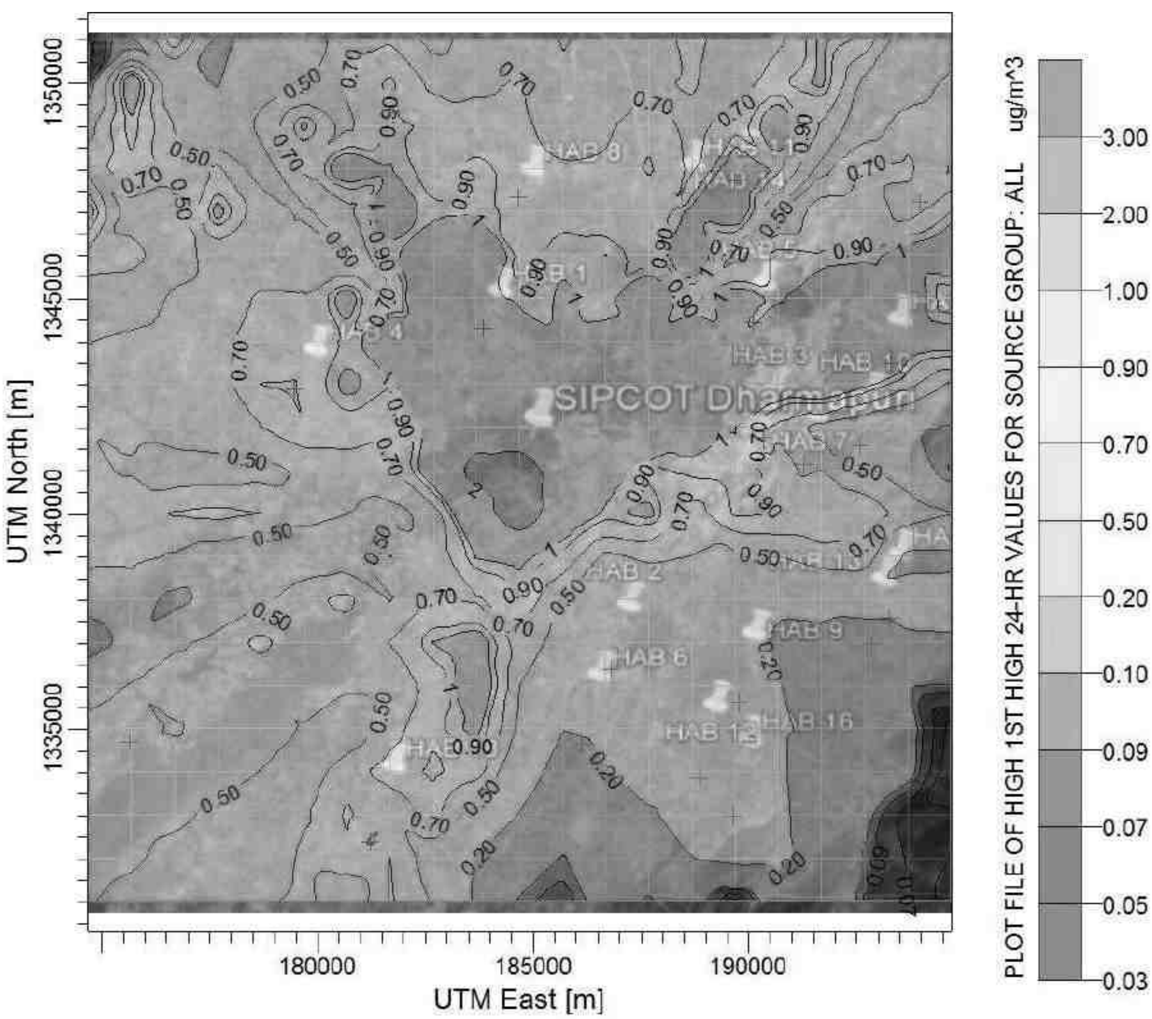


Figure 4-11Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 4-16Estimated Top 10 Highest Concentrations of oxide of Nitrogen Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	2.9539	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	1.83315	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	0.37143	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	0.52312	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	0.91678	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	0.96332	3.44	NE
7	Nallampalli	HAB 6	186114.07	1334644.34	0.17752	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	0.64323	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	0.80903	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	0.28481	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	0.22976	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	0.68757	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	0.30829	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	0.14444	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	1.28895	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	1.22537	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	0.23703	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	0.20266	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	0.47336	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	0.58435	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	0.5752	8.44	NE

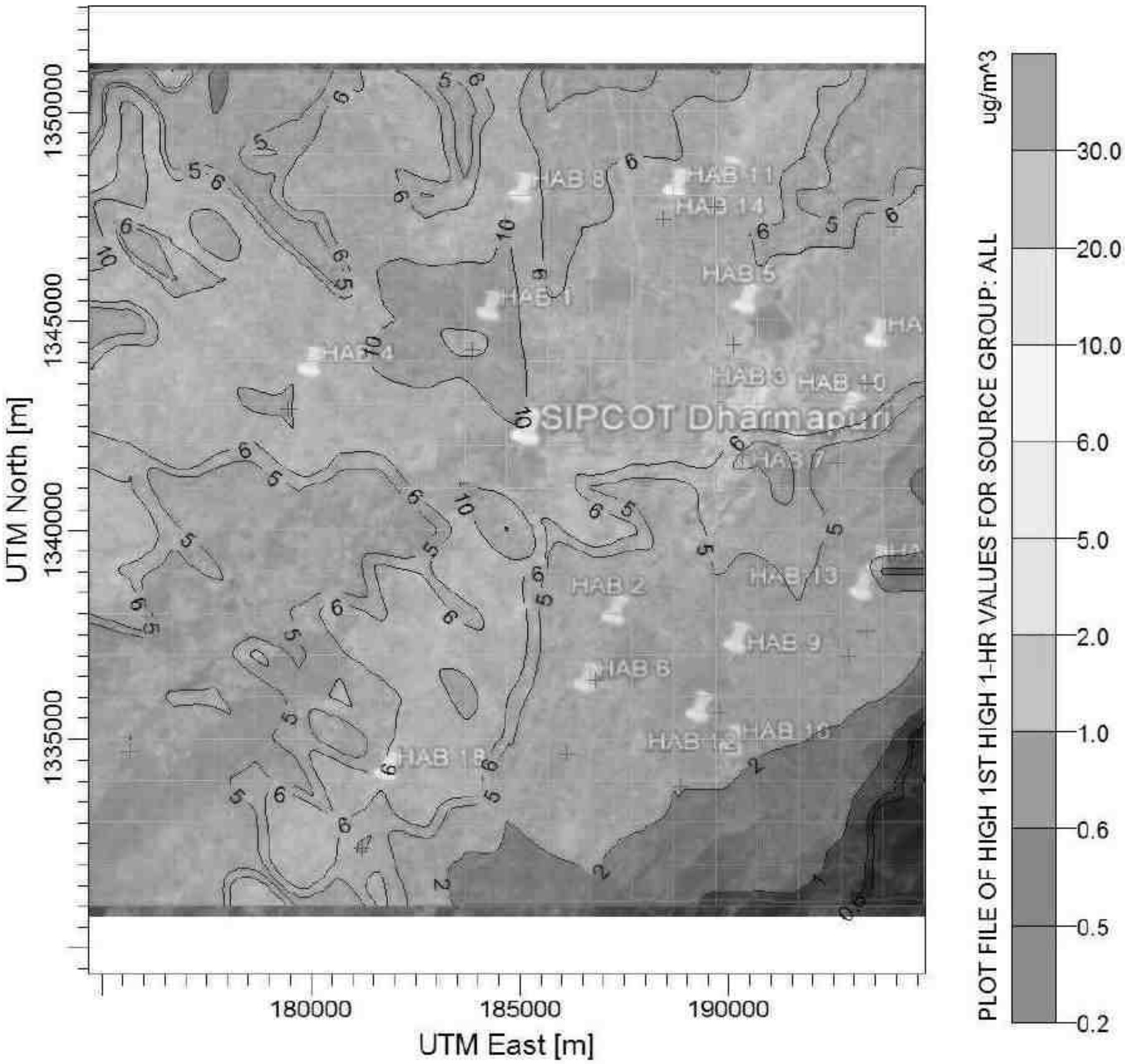


Figure 4-12Predicted 1-Hrs' GLC's of CO within 10 km Radius of the Study Area

Table 4-17Estimated Top 10 Highest Concentrations of Carbon Monoxide Obtained through Modeling

S.NO	Name of the Receptor		UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project (km)	Direction from project Centre
	Description	As per contour	E	N			
Highest Concentration for Study Area							
1	Max.conc.	Max.conc.	184683	1340023	20.51393	1.00	S
Habitation Area							
2	Adagappadi	HAB 1	183847.12	1344321.76	8.38978	1.61	N
3	Adiyamankottai	HAB 2	186812.57	1336403.3	2.90038	1.96	SSE
4	Dharmapuri	HAB 3	190334.75	1341793.37	4.6753	2.00	E
5	Indur	HAB 4	179465.61	1342905.71	10.87859	3.25	WNW
6	Chavulahalli	HAB 5	190095.53	1344448.76	8.8192	3.44	NE

7	Nallampalli	HAB 6	186114.07	1334644.34	2.38281	3.48	S
8	Annasagaram	HAB 7	191263.93	1341146.76	4.64798	3.87	E
9	Selekodi	HAB 8	184664.49	1347371.9	10.19043	4.23	N
10	Guttur	HAB 9	189776.69	1335646.1	2.31347	4.57	SE
11	Gollappatti	HAB 10	192569.82	1341604.86	4.53063	5.03	E
12	Kadagattur	HAB 11	188429.08	1347445.55	6.95341	5.13	N
13	Narthampatti	HAB 12	188844.04	1333860.16	2.04783	5.47	SSE
14	Nulahalli	HAB 13	192847.63	1336987.87	2.62153	6.02	ESE
15	Kollagattur	HAB 14	189656.79	1347737.65	7.66298	6.16	NNE
16	Rajapettai	HAB 15	193281.03	1343510.24	7.83466	6.19	ENE
17	Laligam	HAB 16	189631.17	1332987.03	1.47352	6.57	SSE
18	Mukkilinayakkanpatti	HAB 17	193253.25	1337607.84	3.34905	6.87	E
19	Elagiri	HAB 18	181224.02	1332398.33	4.76354	6.98	S
20	Errappatti	HAB 20	175661.14	1334713.44	4.50402	7.58	SW
21	Kottaiyur	HAB 21	193960.17	1347246.37	7.59508	8.44	NE

Conclusion

Maximum pollutant concentrations of PM, SO2 and NO_xobserved due to proposed for an 24hr-average period have been studied and CO maximum concentration for 1 hr- average period have been studied .All the parameters are well within the NAAQ Standards.The total increase in concentrations above baseline status to estimate the percentage increase and summarizedin**Table4-18.**

Table 4-18Total Maximum GLCs from the Stack & Transportations Emissions-Controlled

Pollutant	Max. Base line Conc. (µg/m^3)	Estimated Incremental Conc. (µg/m^3)	Total Conc. (µg/m^3)	NAAQ standard (µg/m^3)
PM	58.13	0.98	59.11	100
SO_2	16.95	0.48	17.43	80
NO_x	33.89	2.95	36.84	80
CO	340	20.51	360.51	4000

Cumulative Impact Assessment of the project along with Industries in 10 km radius is provided in **Annexure-16.**

4.5.1.5 Mitigation Measures

- Individual industries will provide Air pollution control devices (such as Scrubers,etc) apart from this, individualindustries will be mandated to provide 33% greenbelt along the periphery.
- Individual industries will be instructedto provide proper stack height for DG sets, furnaces& boilers as per CPCB/ TNPCB guidelines.
- Ambient air quality monitoring will be carried out periodicallyat selected locations in order to check and compare the predicted concentrations with the measured concentrations. NAAQS exceedance if any may be checked thoroughly and adequacy /Performance of Air Pollution Control measures shall be reviewed.

- Water sprinkling will be carried out on road surfaces in the project area.
- Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary, 50m along the peripehery of river and 15m along other water bodies. Overall green belt area of the park will be 250.929 Ha i.e.,41.30% of developable area.

4.5.2 Traffic and Transport

Approach road to the site isNH 44 (Srinagar -Kanyakumari) which is located at a distance of ~0.67 km (E). Google image of road connectivity to the site is given in **Figure 4-13**.**Table 4-19** gives the existing and proposed vehicular movement due to the project at NH 44 (Srinagar -Kanyakumari) respectively and**Table 4-20**gives the traffic volume due to the proposed project atNH 44 respecitvely. **Table 4-21** gives the traffic Categorisation.

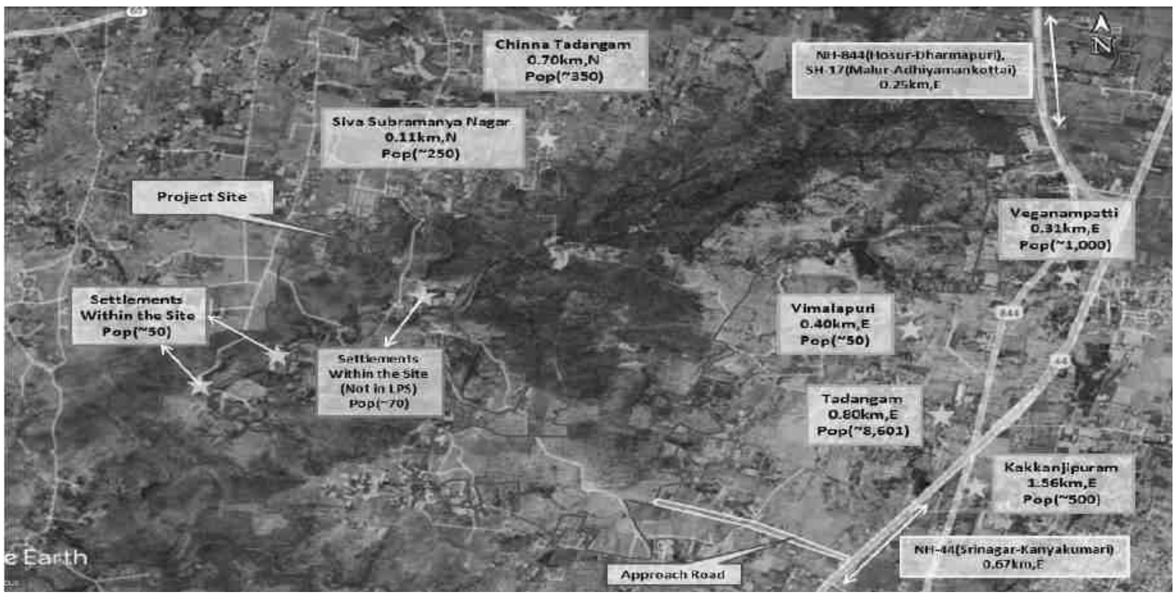


Figure 4-13 Google image showing site connectivity

Table 4-19 Existing and proposed vehicular movement in NH 44 (Srinagar –Kanyakumari)-Tadangam Junction

S. No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	2 Wheeler	1278	959	380	285	1658	0.75	1244
2	3 Wheelers	417	834	60	120	477	2	954
3	4 Wheelers/ Cars	4789	4789	150	150	4939	1	4939
4	Truck/Lorry	1879	6952	245	907	2124	3.7	7859
5	Agricultural Tractor	35	175	0	0	35	5	175

6	Light Emission Vehicle	1678	3356	0	0	1678	2.0	3356
	Total	**10076**	**17065**	**835**	**1462**	**10911**	**-**	**18526**

Table 4-20 Traffic volume after implementation of the project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	10076	17065	35000	0.49	“B”	StableTraffic flow
After implementation	10911	18526	35000	0.53	“B”	StableTraffic flow

Table 4-21Categorisation of traffic

V/C	LOS	Classification
<0.35	A	Free flow Traffic
0.35-0.55	B	Stable flow Traffic
0.55-0.77	C	Restricted flow
0.77-0.92	D	High Density flow
0.92-1.0	E	Unstable Flow
>1.0	F	Forced Traffic flow

Due to propose Project, there will be increment in the vehicle movement and the level of service (LOS) anticipated is Stable Traffic flow for NH-44(Srinagar -Kanyakumari) ~0.67km (E). Traffic circulation plan for the proposed IP is attached as an **Annexure-17**.

4.5.3 Noise Environment

The impacts of the proposed project on the noise levels of the surrounding areas were assessed. Allequipments in the plant is designed/operated to have a noise level not exceeding 85 to 90 dB(A) as per the requirement of Occupational Health and Safety Administration Standard (OHSAS). In addition, since most of the noise generating equipment would be in closed structures, the noise transmitted outside would be still lower.

4.5.3.1 Impact

Noise generation sources during operation phase are classified into two categories:

- Stationary sources due to operation of heavy duty machineries at the project site like Boilers, Compressors, DG sets, Pumps etc.
- Mobile sources correspondes to mainly vehicular traffic for staff mobilization, materials, material transportation, liquid fuel transportation to project site, etc.
- Vibrations are expected to be generated by various activities associated with the proposed project during operational phase. The impact of vibrations beyond the site

would be negligible during normal operation phase. However, the impacts on workers engaged in the plant area would be considerable due to occupational exposure. The proposed fixed major equipment/units such as boiler house, compressors, pumps, DG sets etc., also generate vibrations during operational phase and may cause exposures to the workers/operators engaged at these units.

4.5.3.1 Noise modelling

Software – CUSTIC 3.2 English

Ambient Data:

Terrain:

1. Temperature – 25 °C
2. Relative Humidity – 70%

Source of Noise Modelling:

For modelling purpose two cases was assumed,

Case 1- Equipment activity is considered (Point Source)

Case 2- Truck activityis considered (Line Source)

Table 4-22 Source of Noise Modelling - Equipment Activity (Case-1)

S.no	Equipment	Nos.	Noise Level	Unit dB(A)
1	DG Sets	349	81	dB(A)
2	Boilers	91	92	dB(A)

Table 4-23 Source of Noise Modelling – Loading & Unloading Activity (Case-2)

Sl. No	For Production Activity	Nos.	Noise Level	Unit
1	Vehicles	170	90	dB(A)

Source:*https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm*

Receptor: Noise contours are generated based on receptors at 1.5m height above ground.

Grid size – 200

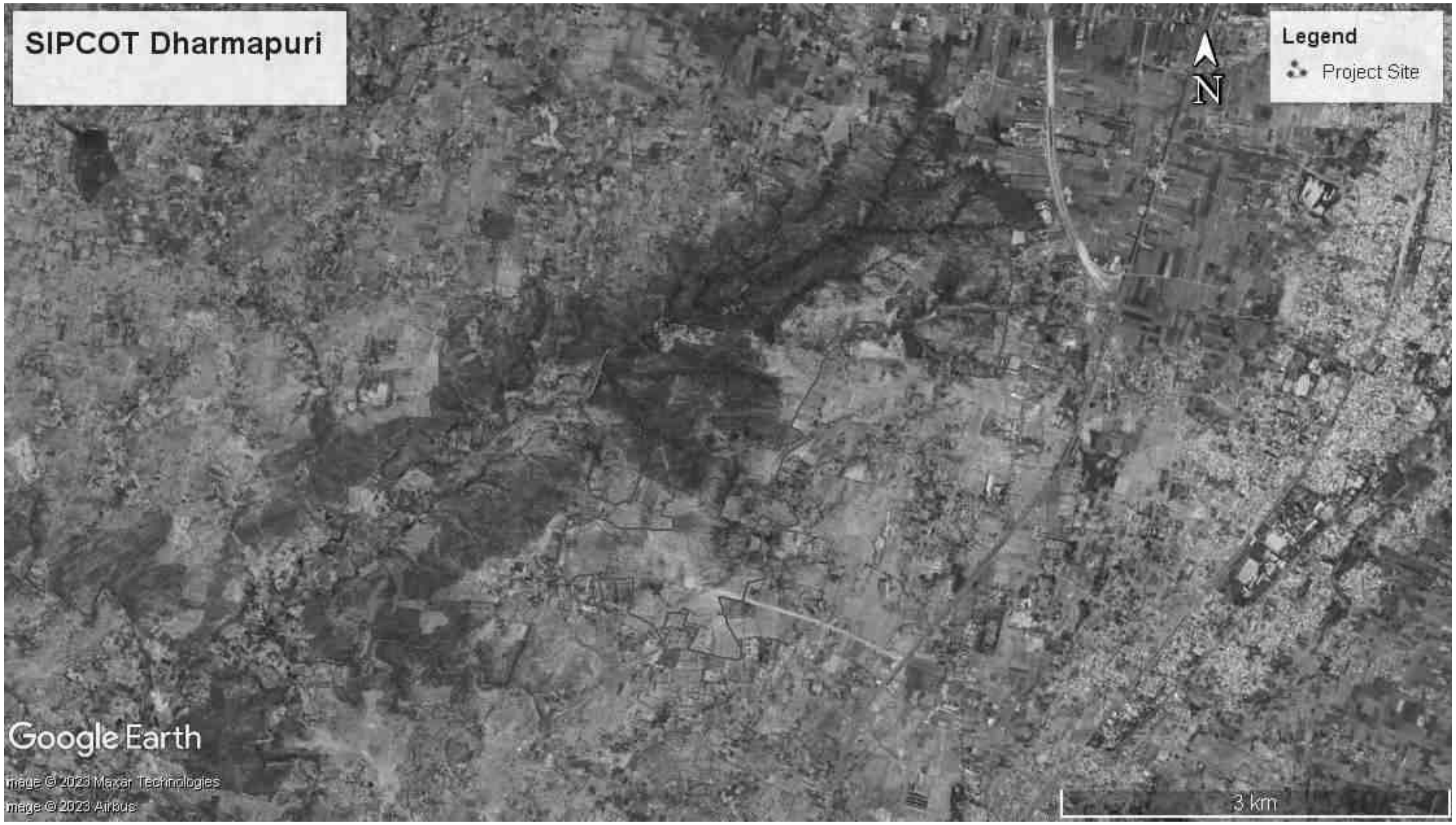


Figure 4-14 Base Map

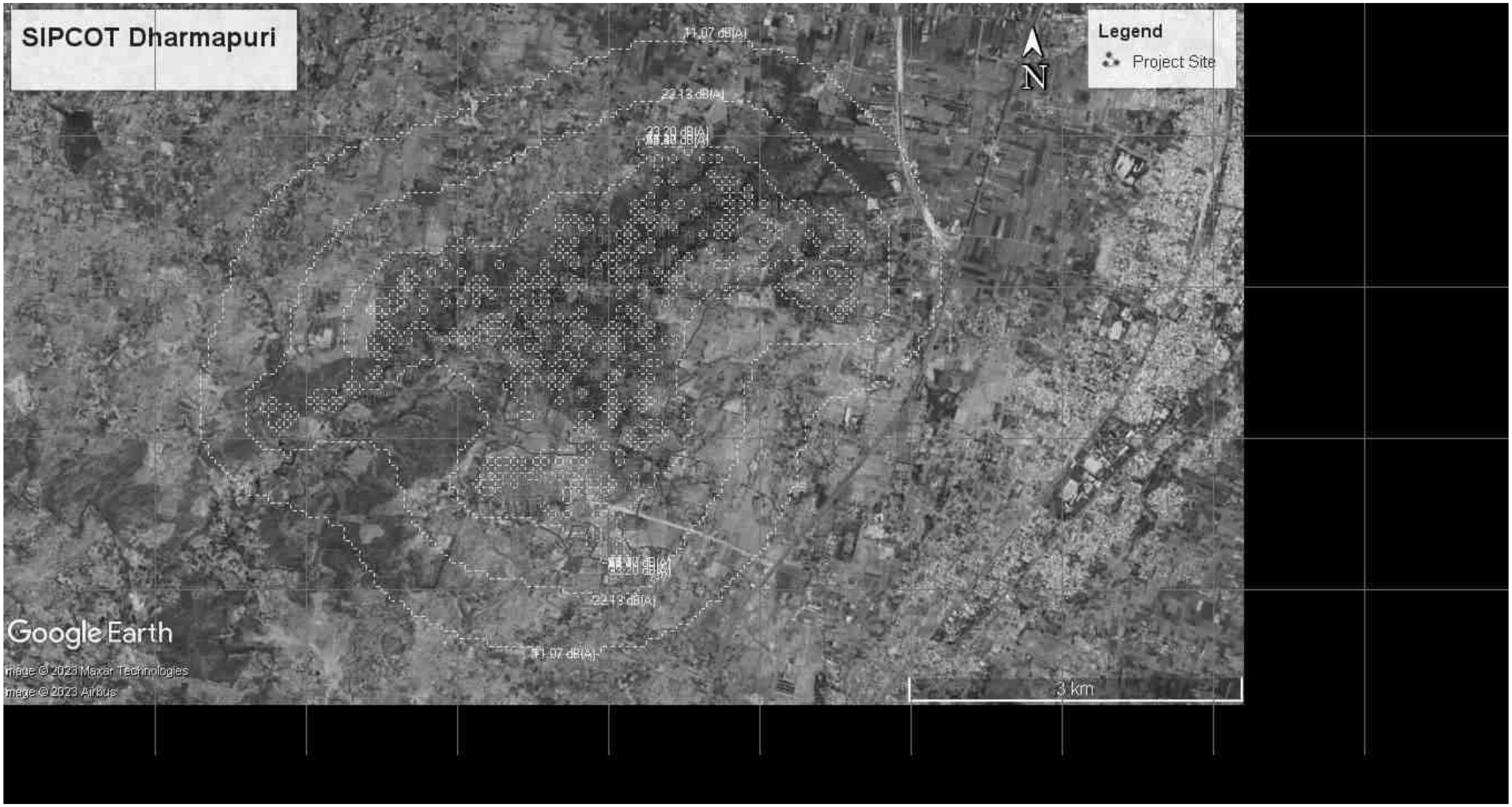


Figure 4-15 Equipment activity

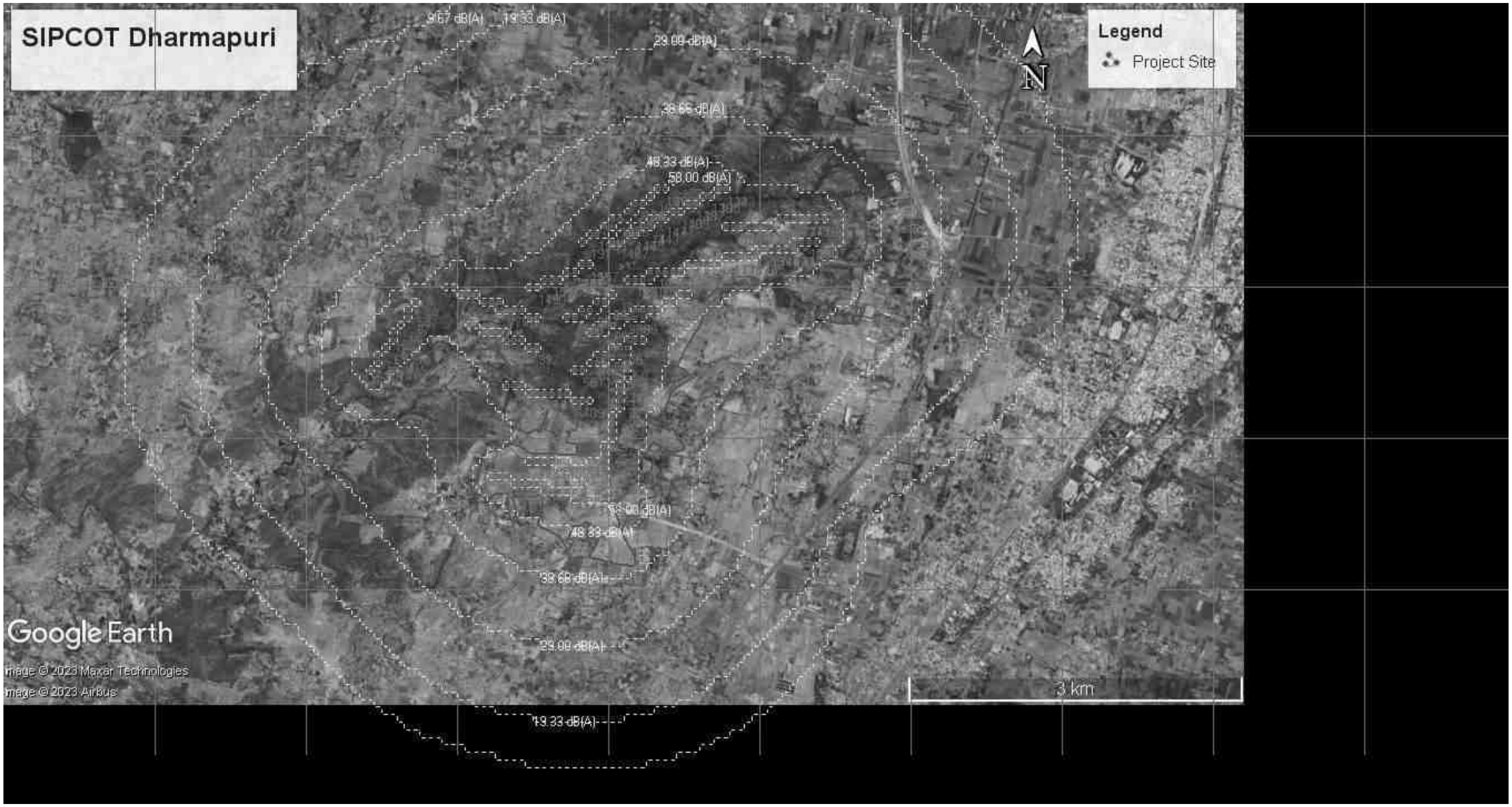


Figure 4-16Noise Contour map for Loading & Unloading (Truck) Activity

Summary:

The Noise level ranges within the limit for the proposed Equipment & Loading & Unloading (Truck) activity. The noise range for Adjacent to the Source, Within Project Boundary and Within 0.5Km radius from the project boundary is givenbelow.

Table 4-24Summary of noise modeling- for Proposed IP

Activities	Adjacent to the Source dB (A)	Within Project Boundary dB (A)	Within 0.5Km radius from the project boundary dB (A)	Noise Standard (Industrial - Day) dB (A)
Equipment Activity	66.60	44.27	33.20	75
Loading & Unloading(Truck) activity	58.00	48.33	38.66	75

4.5.3.2 Mitigation Measures

- The major noise generating equipment like Compressors, DG sets, Boiler Feed water pumps etc. will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
- Major noise generating equipment will be designed with 85 dB (A) ensuring cumulative noise at 1.0 m remains at 85 dB (A).
- The occupational noise exposure to the workers in the form of eight hourly time weighted average will be maintained well within the prescribed Occupational Safety and Health Administration (OSHA) standard limits.
- Acoustic silencers will be provided in equipment wherever necessary.
- Acoustic design with sound proof glass panelling will be provided for critical operator cabins / control rooms of individual modules as well as central control facilities.
- Use of personal protective equipments/devices such as ear-muffs, ear plugs etc. will be strictly enforced for the workers engaged in high noise areas.
- Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimise noise emissions.
- Implementation of greenbelt for noise attenuation will be undertaken.
- Ambient noise levels will be monitored at regular intervals during operational phase of the project.
- Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimise vibrations and secured properly.
- Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.

- Vibration dampers will be provided around the source of generation.
- Transportation Management Plan will be prepared and the transportation of raw materials and finished goods will be planned in line with the same.

4.5.4 Water Environment

During the operation phase, Fresh water of 9.425MLD is required for IP. Fresh water will be sourced from Tamil Nadu Water upplyand Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23.Hence there will not be any abstraction of ground water in the project site.

4.5.4.1 Impact

Untreated wastewater if discharged into nearby surface water may affect the surface water and/or if disposed off on land without treatment may pollute the ground and surface water.

4.5.4.2 Mitigation measures

Individual industries will have their own Sewage Treatment Plants. Treated sewage will be recycled for flushing and green belt developmentas per CPCB/TNPCB guidelines.

Individual industries will have their own Effluent Treatment Plants and will be mandated to ensure Zero Liquid Discharge conceptas per CPCB/TNPCB guidelines. Treated effluent will be recycled for process and utilities purpose. Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.Details of wastewater generation and treatment method is given in **Table 4-25.**

Table 4-25Wastewater generation and treatment

S.No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			
1	Sewage	10	Will be treated in15 KLD mobile STP and treated sewage will be used for green belt development during construction phase
Operation Phase			
2	Sewage from industries	755	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.
3	Effluent from individual industries	3158	Will be treated by individual industries and reused for process and utilities. ZLD will be maintained by individual industries.

Characteristics of raw and treated sewage are given in **Table 4-26**.

Table 4-26Characteristics of raw and treated sewage

S No	Description	Unit	STP Inlet	STP Outlet	UF Outlet

1	pH	-	7-8	6.5-8.5	6.5-8.5
2	TSS	mg/l	150-200	<30	<5
3	BOD	mg/l	300-350	<20	<10
4	COD	mg/l	400-500	<250	<150

Characteristics of effluent generated from various types of industries are given in below.

Table 4-27Effluent characteristics of Electronics and Electrical parts manufacturing

S.No.	Parameters	Range
1	pH	7.2-7.9
2	Total Suspended Solids (mg/l)	70-200
3	COD (mg/l)	40-100
4	Fe (ppm)	30-50
5	Zn (ppm)	200-300
6	Mn (ppm)	4-6
7	Pb (ppm)	2-3
8	Cu (ppm)	01 -0.5

Table 4-28Automobile partsmanufacturing industries (3a)

S.No.	Parameters	Range
1	pH	8.2-9.7
2	Total Suspended Solids (mg/l)	15- 400
3	Total Dissolved Solids (mg/l)	800-4200
4	BOD (mg/l)	3.5-150
6	Cadmium (mg/l)	45-1200
7	Oil & Grease (mg/l)	2.3 - 5.0
8	Zn (mg/l)	0.1- 3.7

Table 4-29Effluent characteristics of Engineering & Fabrication Industries (3a)

S.No	Parameters	Range
1	pH	6-9
2	TSS (mg/l)	50-75
3	Oil & Grease(mg/l)	5-10
4	Copper (mg/l)	0.3-0.6
5	Zinc(mg/l)	1-3
6	Temperature increase	3 to 5 C

Table 4-30Effluent characteristics of 5F Industries

S.No	Parameters	Range
1	pH	7-7.7
2	TSS (mg/l)	200-300
3	Oil & Grease(mg/l)	60-90
4	Colour (mg/l)	50-60
5	TDS(mg/l)	700-800
6	BOD(mg/l)	575-650

S.No	Parameters	Range
7	COD(mg/l)	1250-1350

Table 4-31 Effluent characteristics of Anode(5e) manufacturing

S.No	Parameters	Range
1	pH	6.9-7.0
2	TSS (mg/l)	27.3-28.9
3	Oil & Grease(mg/l)	2.6
4	BOD(mg/l)	9.81-9.83
5	COD(mg/l)	48.1-50.2

Individual industries will be mandated to provide ZLD system and recycle the treated effluent for process and utilities.

4.5.5 Land Environment

Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District vide G.O(Ms)No.284 dated 30.12.2015 (**Annexure-2**).

4.5.5.1 Impact due to discharges on Land

Discharge of untreated sewage, effluent and solid waste will have adverse impact on the land. Poor garbage management would lead to unsanitary conditions including fly infestation and odors as well as unsightly conditions.Spillage of waste oil from the D.G sets may also have an impact on soil quality.

4.5.5.2 Mitigation Measures

- Individual industries will be mandated to treat the sewage generated in STP and recycle treated sewage for green belt development.
- Individual industries will be mandated to treat the effluent generated in ETP and propose Zero Liquid discharge system.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.
- Individual industries will ensure the treated wastewater quality as per standards before using it for various requirements.
- Individual industries will segregate their solid waste.Organic waste will be composted and used as manure for green belt development. Inorganic waste will be disposed to TNPCB authorized recyclers/vendors.As a provision to have in house and independent Solid Waste

Management facility, 5 Acres (Sheds for recovery and recycling facilityincludinga shed for E-Waste Management) has been earmarked for Solid Waste Management Facility.

- Individual industries will have their own hazardous waste storage areas and the hazardous wastes generated will be disposed by the individual industriesas per Hazardous waste (Management, Handling and Transboundary movement) amendment Rules 2016.
- Good housekeeping and best practices of waste handling will be adopted to eliminate/minimize the risks of soil contamination.

4.5.6 Plastic waste management

According to the Tamil Nadu Government Order (Ms) No.84 Environment and Forests (EC.2) department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. SIPCOT will instruct the individual industries to comply with the above G.O.Individual industries will follow the mitigation/action plan given below:

Action Plan:

SIPCOT will instruct all industries to comply with the following:

- Not to use/manufacture 'Single Use Plastic' within the premises.
- To support and promote use of eco alternatives.
- Create plastic free industrial campuses & canteens.
- To support the District Administration with CSR funds to stop plastic pollution.

SIPCOT will strict the use of plastic item except the few plastics used for the following purpose:-

a) The plastic carry bags manufactured exclusively for export purpose against any export order located in the Industrial estate.
b) The plastic bags which constitute of form an integral part of packaging in which goods are sealed prior to use at manufacturing/processing units.
c) Carry bags made from compostable plastics bearing a label “compostable” and conforming to the Indian Standard: IS or ISO 17088:2008 titled as specifications for “compostable plastics”.

4.5.7 Hazardous waste Generation & Management

Hazardous wastes from the allotted industries will be managed them and it will be stored in designated areas within theirpremises and disposed as per Hazardous and Other waste (Management and Transboundary) Rules 2016.

E-waste Management: E-wastes from the allotted industries will be managed them and it will be stored in designated areas within their premises and disposed as per E-waste Management Rules 2022.

4.5.8 Biological Environment

As per the ToR condition, RamniranjanJhunjhunwallaCollege has conducted the Biodiversity study within 10 kilometre range from the project site. There are few water bodies and reserved forests located within the 10km radius of the site. Bio Diversity Report is enclosed as **Annexure-15a.**

4.5.8.1 Impacts

The impact on terrestrial ecology will be due to emission of gaseous pollutants like PM, NO_X, SO_2. The gaseous pollutants at higher doses, are injurious to vegetation.The release of effluent and sewage, dumping of solid and hazardous waste will also affect the ecology of the region.

- **Impact on Flora and Fauna:**
  SIPCOT Project area is Government Porambokke and dry patta land. There is no reserve forest at the immediate vicinity / within 5Km from the project site. Hence no direct impact is anticipated due to the project. Three Schedule – I species are present in the study area i.e., 10 Km radius, however the Faunal species mentioned under various groups are widely distributed in the Indian subcontinent.

4.5.8.2 Mitigation measures

- Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary,15m peripheral green belt along the water bodies and 50m along the peripheral of the river and 33% area by individual industries.Overall green belt area of the park will be 250.929 Ha i.e41.30% of developable area.
- Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.
- Individual industries will be mandated to treat the sewage generated in STP and recycle treated sewage for green belt development.
- Individual industries will be mandated to treat the effluent generated in ETP and propose Zero Liquid discharge system.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.
- Individual industries will ensure the treated wastewater quality as per standards before using it for various requirements.
- Municipal solid wastes will be segregated by individual industries and organic waste will be composted in the Solid waste management area and used for green belt development. Inorganic wastes will be sold to authorised recyclers.

- Individual industries will have their own hazardous waste storage areas and the hazardous wastes generated will be disposed as per Hazardous waste (Management, Handling and Transboundary movement) amendment Rules 2016.
- E-waste will be collected by Individual industries and disposed as per E-Waste (Management) rules, 2022
- Conservation plan for Schedule I species is enclosed as **Annexure-15b.**

4.5.9 Socio Economic Environment

The project is likely to have positive impacts on socio economic environment.Various modes of indirect employment i.e. increased business opportunities will reflect in the improved quality of life of the people in the study area.The proposed project by SIPCOT will improve the quality of life of nearby villages. Thus, it can be said that the proposed project will have significant beneficial impact on the socio economic scenario in the study area.

Impacts of the proposed Project:

- Proposed project will create Direct and Indirect employment Nearby villages.
- Proposed project will increase the Economic condition of nearby villages
- Proposed project may cause mild impact to Human health due to air pollution, water pollution and Noise pollution which will be significantly reduced with proper mitigation measures.
- Proposed project will cause land pollution if there is any disposal of untreated effluent and sewage nearby land.

Mitigation Measures

- Industrial plots has been planned in such a way that there will not be any impact on the nearest habitation.
- Adequate air pollution control devices and adequate stack height will be proposed by individual industries as per CPCB/TNPCB Norms
- Total Green belt area of 41.30% will be proposed(250.929 Ha) including 50m along the River, 15m along the water bodies and peripherialboundary,apart from this Individual industries will provide acoustic enclosures for their D.Gsets.
- Individual industries will be mandated to treat the effluent in their ETP. Treated effluent will be utilized for process and utility. Zero liquid discharge (ZLD) will be mandated by SIPCOT to individual industries.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.

4.5.10 Occupational Health and Safety

All safety and health codes prescribed by the Department of Factories and Boilers will be strictly implemented by individual industries within the IP. All appropriate fire protection and safety measures will be provided in the project office and by individual industries of the Industrial Park. Personal protective equipment's like gloves, nose mask, aprons, shoes, etc., will be provided for all working employees in the industry by individual industries. Health records will be maintained regularly by the industries. Other safety aspects to be followed by member industries are:

- Occupational Health Surveillance shall be undertaken as regular exercise for all the employees especially for those engaged in handling hazardous substances.
- The medical records of each employee shall be maintained separately by the member industries. Pre-employment medical examination shall be conducted.
- All workers shall be medically tested once in a year and at the end of his term of employment.
- Noise levels at the critical areas will be monitored regularly and the workers at high noise generating areas will undergo audiometric tests once in six months.
- Various types of fire extinguishers (Foam type, water type) will be provided inside the factory premises.
- Proper earthing will be done for all the electrical equipments.
- Training will be provided to all the employees on safety and health aspects.
- Pre-employment and routine periodical medical examinations for all the employees shall be undertaken on regular basis.
- Maintaining Good Management Practices (GMP).
- Providing Personnel protective equipments to the all employees.

4.5.11 Green Belt Development

Total green belt area of 41.30 % of developable area will be proposed in the Industrial Park. Green belt area breakup is given in **Table 4-32.**

Table 4-32 Green belt area breakup

Green belt	Area (Acres)	Area (Ha)	Percentage of developable area
Green belt in plot area(33% by industries)	333.180	134.891	22.20
Green belt by SIPCOT	286.615	116.038	19.10
Total	**619.795**	**250.929**	**41.30**

List of Trees within the site:

Total number of trees within the site is 128911 out of which 16114 trees will felled down due to proposed project.To Compensate that 161140 trees will be planted in green belt area.

Sr. No	Botanical Name	Total Tree	Cutting tree
1.	*Acacia catechu*	87922	10990
2.	*Acacia leucophloea*	610	76
3.	*Acacia nilotica*	9447	1181
4.	*Ailanthus excelsa*	305	38
5.	*Azadiracta indica*	8990	1124
6.	*Butea monosperma*	152	19
7.	*Cassia fistula*	610	76
8.	*Cassia siamea*	305	38
9.	*Chloroxylon swietenia*	152	19
10.	*Gmelina arborea*	152	19
11.	*Holoptelia integrifolia*	7314	914
12.	*Morinda tinctoria*	152	19
13.	*Phoenix pusilla*	914	114
14.	*Pongamia pinnata*	1067	133
15.	*Prosopis juliflora*	1067	133
16.	*Strychnos nux vomica*	152	19
17.	*Tecoma stans*	2438	305
18.	*Tectona grandis*	762	95
19.	*Terminalia arjuna*	610	76
20.	*Wrightia tinctoria*	5790	724
	Total	**128911**	**16114**

Around 784153numbers of trees will be planted (for **250.929**ha @ 1500 trees / Ha by considering 80% survival rate and tree compensation of 161140 nos).

The purpose of developing the greenbelt in and around the industrial site is for:

- Preventing land degradation and erosion of topsoil due to activities during construction phase.
- Containment and abatement of pollution in the industrial environment, capturing of fugitive emissions if any and thereby improving the quality of the surrounding environment.
- Substantially reducing the adverse environmental impacts due to the proposed industrial activity.
- Serving as a barrier for attenuating the intensity of noise generated.
- Enhancing the biodiversity index of the region.
- Adding aesthetic value to the project area.
- Maintaining the ecological equilibrium of the area.

The following general guidelines and measures will be adopted:

- The plantation of trees will be initiated during construction stage so that substantial growth may be achieved when the project is completed. The greenbelt development programme will be drawn to conform to natural climatic conditions and adaptability of the species.

- Species involved in green belt development will be indigenous, fast growing and eco-friendly.
- Proper drainage system and proper plantation techniques will be adopted.
- Plantation will be properly maintained and protected by fencing from grazing and felling.

The plantations would consist of a mixture of carefully chosen locally available species of trees, shrubs and herbs, preferably evergreen and resistant to pollution.

List of green belt species proposed is given in **Table 4-33**.

Table 4-33Proposed green belt Species

Sl.no	Species Name	Common Name
1	Aegle marmelos (L.) Correa	Bael
2	Albizia lebbeck (L.) Benth.	Lebbek tree
3	Azadirachta indica A. Juss.	Neem Tree
4	Cassia fistula L.	Indian laburnum
5	Cordia dichotomaG.Forst.	Clammy cherry
6	Cordia sebestena L.	Scarlet Cordia
7	Dalbergia sissoo DC.	Indian rosewood
8	Delonix regia (Boj. ex Hook) Rafin.	Royal poinciana
9	Ficus benghalensis L.	Indian banyan
10	Ficus religiosa L.	Sacred fig
11	Millingtonia hortensis L.f.	Tree jasmine
12	Mimusopselengi L.	Spanish cherry
13	Pongamia pinnata (L.) Pierre	Indian beech
14	SpathodeacampanulataP.Beauv.	Squirt tree
15	Syzygiumcumini (L.) Skeels	Jamun
16	Tamarindus indica L.	Indian date
17	Tectona grandis L.f.	Teak
18	Terminalia arjuna (Roxb.) Wight & Arn.	Arjun tree
19	Thespesia populnea (L.) Soland ex Correa	Portia tree
Total (Nos)		**784153**

(Note: The plant species proposed are based on the guidelines for developing green belt by CPCB- March 2000)

Layout plan showing green belt area is given in **Figure 4-17** and Green belt layout is attached as **Annexure-13.**

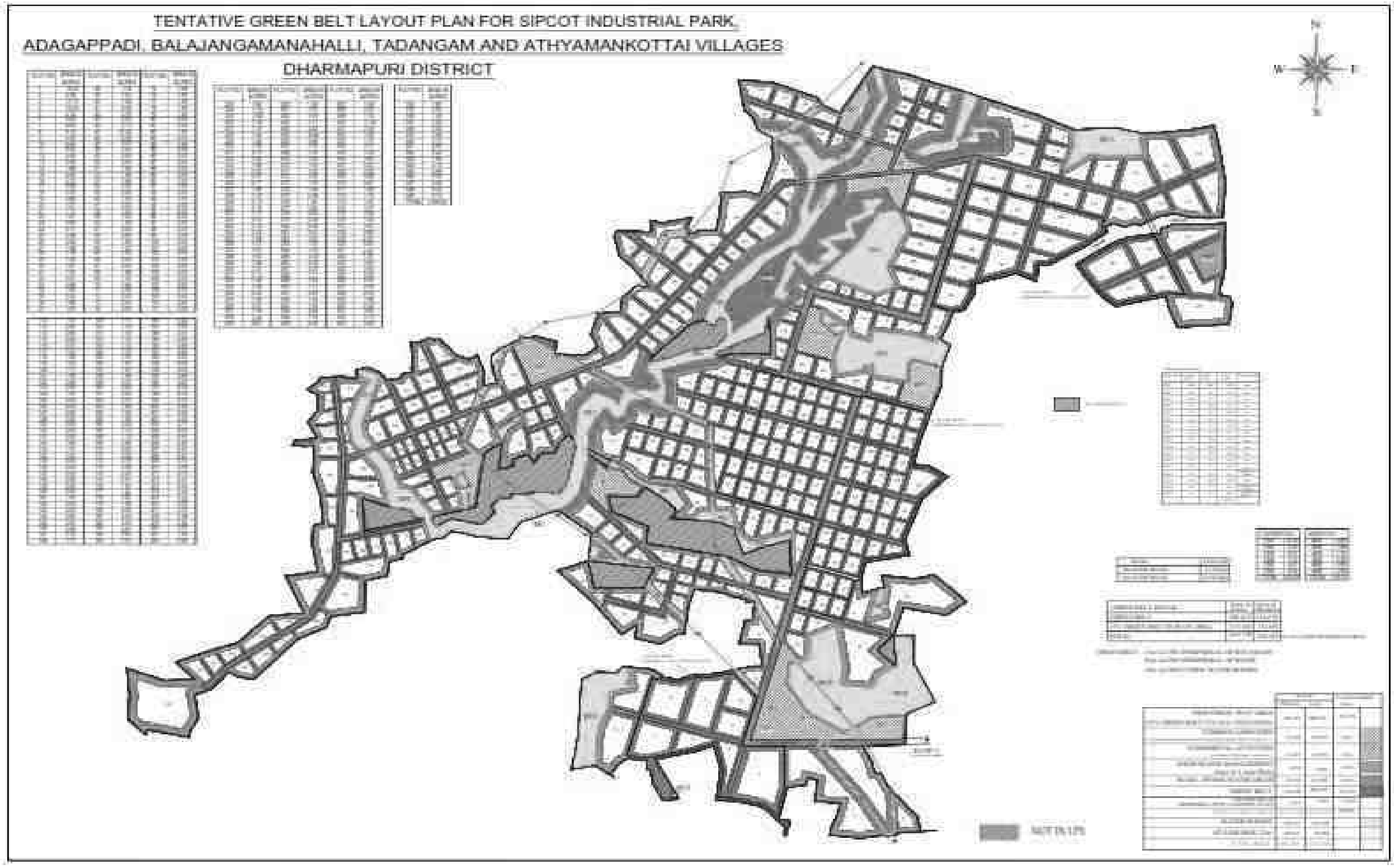


Figure 4-17Green belt layout for the Industrial Park

4.6 Decommissioning Stage

The project proposal is development of Industrial Park by proposing various industries. The project will be in operation for a longer period. Hence there will not be any de-commissioning stage for project.

4.7 Assessment of significance of Impacts - by Matrix method

Water, Air and Land are the most vulnerable environmental attributes in serving the proposed industrial activities. Solid waste is another significant environmental issue from the proposed member industries. More discharges, discards and disposals can be listed to have significant impact on water, air and land environment.

A number of techniques are available for the assessment of impacts. Each of these techniques has their own advantages and disadvantages. The selection of any of these techniques for any particular project depends largely upon the choice of judgment of the analysis. The technique chosen should be comprehensive, easy to understand, systematic and flexible. Considering these criteria, for this project, the matrix method was used, with an impact scale of -4 to +4.

Impact identification and assessment of the site can be assessed by the matrix method, popularly known as Leopold matrix method, which is a universal tool for the EIA studies. The matrix used for the EIA consists of project activities on the x-axis and the environmental components likely to be affected by these activities on the y-axis. Each cell of the matrix represents a subjective evaluation of the impact of the particular components, in terms of magnitude importance. A blank cell indicates no impact of the activity on the component. The magnitude (m) is represented by a number from 1-4 where,

1= Minimal

2= Appreciable

3= Significant

4= Severe

A positive sign indicates a beneficial impact and the negative sign indicates an adverse impact. The impact classification is given below in **Table 4-34.**

Table 4-34 Overall impact classification

S.No	Project impact scale	Magnitude of impact
1	-100 to -75	Severely adverse
2	-75 to -50	Significantly adverse
3	-50 to -25	Appreciably adverse
4	-25 to 0	Low Adverse Impact
5	0 to 25	Minimally beneficial
6	25 to 50	Appreciably beneficial
7	50 to 75	Significantly beneficial
8	75 to 100	Highly beneficial

4.7.1 Impact Scenarios

Impact score for the project was calculated for two scenarios using the matrix methoddescribed above. Matrices were prepared to represent each of these scenarios namely

- Project without EMP
- Project with EMP

4.7.1.1 Project without EMP

In this scenario, the proposed Industrial Area development is considered without proposing Environmental Management plans. The magnitude of the environmental compoenents likely to be affected with the values for importance are tabulated in **Table 4-35.**

Table 4-35 Project scenario without EMP

S.No	Environmental components likely to be affected		Construction phase: Transportation of construction materials	Construction phase: Civil works with machinery	Construction phase: Water requirement	Construction phase: Use of DG sets	Construction phase: Disposal of construction waste & sewage	Operation phase: Transport of men & materials	Operation phase: Emissions from Manufacturing process	Operation phase: Water requirement	Operation phase: Waste disposal (solid & liquid)	Operation phase: Chemical storage	Impact on the components	Remarks
1	Air quality	Magnitude	-3	-3	0	-2	-3	-3	-3	0	-3	-2	-46	Significantly adverse
		Importance	2	3	0	1	2	2	3	0	2	2		
2	Noise	Magnitude	-3	-2	0	-2	0	-3	-3	0	0	0	-37	Appreciably adverse
		Importance	3	3	0	2	0	3	3	0	0	0		
3	Surface water quantity	Magnitude	-1	1	-3	-1	-4	-1	-1	-3	-4	-2	-56	Significantly adverse
		Importance	1	2	3	1	4	1	1	3	4	2		
4	Ground water quantity	Magnitude	0	0	0	0	-4	0	0	0	-4	-1	-33	Appreciably adverse
		Importance	0	0	0	0	4	0	0	0	4	1		
5	Soil qualtity	Magnitude	-2	-2	0	-1	-4	-2	-2	0	-4	-2	-53	Significantly adverse
		Importance	2	2	0	1	4	2	2	0	4	2		
6	Flora & fauna	Magnitude	0	-1	-1	-1	-4	0	-2	-1	-4	-1	-41	Appreciably adverse
		Importance	0	1	1	1	4	0	2	1	4	1		
7	Land use pattern	Magnitude	0	0	0	0	-1	0	0	0	-1	0	-2	Low adverse impact
		Importance	0	0	0	0	1	0	0	0	1	0		
8	Socio economics	Magnitude	2	0	-1	-2	-3	2	-2	-1	-3	-2	-26	Low adverse impact
		Importance	2	0	1	2	3	2	2	1	3	2		

The impact was found to be -36.75which is Appreciably adverse impact

4.7.1.2 Project scenario with EMP

In this scenario, the proposed Industrial Area development is considered with all the Environmental Management plans. The magnitude of the environmental compoenents likely to be affected with the values for importance are tabulated in **Table 4-36**.

Table 4-36 Project scenario with EMP

S.No	Environmental components likely to be affected		Construction phase					Operation phase					Impact on the components	Remarks
			Transportation of construction materials	Civil works with machinery	Water requirement	Use of DG sets	Disposal of construction waste & sewage	Transport of men & materials	Emissions from Manufacturing process	Water requirement	Waste disposal (solid & liquid)	Chemical storage		
1	Air quality	Magnitude	-1	-1	0	2	1	1	-1	1	-1	-1	-5	Low adverse impact
		Importance	2	3	0	1	2	2	3	2	2	3		
2	Noise	Magnitude	-1	-1	0	2	-1	-1	-1	-1	-1	-1	-11	Low adverse impact
		Importance	3	3	0	2	0	2	2	0	0	2		
3	Surface water quantity	Magnitude	2	1	2	1	1	1	1	1	1	1	27	Minimally beneficial
		Importance	2	2	3	1	4	1	1	4	2	2		
4	Ground water quantity	Magnitude	1	1	0	1	1	1	1	3	1	1	19	Minimally beneficial
		Importance	0	0	0	0	4	0	0	4	1	2		
5	Soil qualtity	Magnitude	1	1	1	1	1	1	1	1	1	1	20	Minimally beneficial
		Importance	2	2	0	1	4	2	2	4	2	1		
6	Flora & fauna	Magnitude	1	1	1	1	1	1	1	3	1	1	23	Minimally beneficial
		Importance	0	1	1	1	4	0	2	4	1	1		
7	Land use pattern	Magnitude	1	1	1	1	1	1	1	1	1	0	2	Minimally beneficial
		Importance	0	0	0	0	1	0	0	1	0	0		
8	Socio economics	Magnitude	3	2	2	2	1	3	-1	1	-1	0	20	Minimally beneficial
		Importance	2	0	1	2	3	2	2	3	2	0		

The impact was found to be 8.167 which is minimally beneficial.

4.8 Mitigation measures proposed for the project

4.8.1 Construction phase

Environmental impacts during the construction phase can be attributed to the site preparation activity and the mobilization of workforce. The impacts of the construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the project is completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

In order to mitigate such impacts and restrict them within tolerable levels, the following measures shall be adopted:

- Proper and prior planning of approach and access roads, and appropriate sequencing and scheduling of all major construction activities.
- Adoption of appropriate soil conservation programme and its timely implementation in the proposed project site.
- Water sprinkling in the vulnerable areas to suppress the dust generated during excavation, leveling and other operations.
- Use of properly tuned construction machinery & vehicles in good working condition with low noise & emission and engines turned off when not in use.
- Control of quality of construction wastewater within the construction site by settling the construction wastewater and reusing it for construction purpose.
- Implementation of suitable disposal methods of sediment/ construction debris at designated places to avoid water logging at construction site.
- Provision of protective gears such as ear mufflers etc. for construction personnel exposed to high noise levels and locating the temporary labour sheds for housing the construction labourers away from the construction site.

4.8.2 Operation phase

- Air Pollution: Individual industries will be instructed to provide Air Pollution control measures for dispersion of flue gases as per CPCB/ TNPCB guidelines.
- Wastewater Management:Individual industries will be mandated to treat the effluent generated and adopt ZLD system. Treated effluent will be used for process and utilities by individual industries.So there is minimum impact in soil and ground water.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.

- Individual industries will be mandated to treat the Sewage in STP. The treated sewage will be used for green belt development within the proposed Industrial Park.
- Storm water Management: storm water will be managed and controlled within the premises and utilized for rain water harvesting. The excess flow will be diverted to nearby water bodies after filtration.
- Solid and Hazardous waste: Individual industries will segregate their solid waste. Organic waste will be composted in common municipal waste processing area and converted into manure. Inorganic waste will be disposed to TNPCB authorized recyclers. Hazardous waste will be disposed to TNPCB authorized TSDF/recyclers as applicable by individual industries.
- Individual industries will have their own E-waste storage areas and the same will be disposed by individualindustries as per E-waste management rules 2022. Apart from that, a shed for E-Waste Management will be designated in the Solid Waste Management Facility.Construction and demolition waste generated during the site clearance activities will be collected and disposed as per C&D rules, 2016.
- As per Tamil Nadu Government Order (Ms) No.84 Environment and Forests (EC.2) department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. SIPCOT will instruct the individual industries to comply according with the G.O
- Noise: Individual industries will be mandated to provide 33% (134.891 Ha) green belt in their area. Apart from this SIPCOT is providing 19.10 % green belt area in the project site and its periphery. Total green belt proposed for the project is 250.929 Ha (41.30% of developable area) Individual industries will provide acoustic enclosures for their D.G.sets and Boilers/Kiln.

CHAPTER-5
ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 Introduction

SIPCOT propose to develop an Industrial Park over an extent of 698.205 Ha (1724.566 Acres) at Adhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of NallampalliTaluk,Dharmapuri District and Tamil Nadu state.

The Industrial Park is planned with The Industrial Park is planned with27.49% of industrial plot area for EC category industries industries falling under categories 3(a), 5(e), and 5(f), specifically focusing on EV products such as battery compounds and other related parts and balance 72.51% Industrial plot area for non EC-category Industries including EV Battery Separator & Cathode, Other E-vehicles parts and Automobile parts etc.fallingunder Red, Orange, Green and White category industries. Thus, as per the EIA Notification 2006 and its amendments the project is termed under Schedule 7(c), Category A (If at least one industry in the proposed industrial estate falls under the Category A, entire Industrial Park shall be treated as Category Airrespective of the area).

5.2 Choice of Each Alternatives

SIPCOT considered three alternative sites based on the need for promoting anIndustrial Park in the proposed project location. Industrial growth, preciously, require good connectivity to the urban areas and other facilities like port, airports etc.

The alternative sites considered as per SOI Topo map were:

- **Site-I**: Nallamapalli Site was considered but due to the presence of limited land space (Approx. 436 hectare) more fertile/productive agricultural land (Landuse pattern as per Bhuvan: Agricultural Crop Land -75% ,Builtup Rural-15% and Waterbodies Tanks/Lakes/Ponds-10%) and habitations within the site, the site was not selected for the development of Industrial Park.

- **Site-II:** Settihalli Site was considered but due to limited land space (approx. 431 hectare) and more fertile/productive agricultural (Landuse pattern as per Bhuvan: Agricultural Crop Land -65% , Agriculture fallow-25% and barren scrub land-10%) land within the site, the site was not selected for the development of Industrial Park.

- **Site-III:** Lands at Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages were considered. Around 69% are poramboke lands and 31% are dry patta lands (Landuse pattern as per Bhuvan: Barren Scrub Land-72.6%, Agricultural Crop Land -15% , Agriculture fallow-12% and Builtup urban-0.4%). As the majority of the land is Government Porambokke, the project will have no impact on agricultural land.

5.3 Site Matrix

The choice among the alternative sites in Dharmapuri District was made by constructing a Matrix using Standard set of guidelines and set of recommendations in the Technical Guidance Manual of MoEF&CC. The environmental and coastal compatibility of the location which is with respect to the following were studied and compared for all the threelocations;

- Area
- Access
- Soil Conditions
- Ecological Index
- R& R Requirements

5.4 Evaluation of selected sites

The importance of environmental and coastal attributes was examined for their relevance to the proposed project of IP and arbitrary values were assigned. The site matrix Selection criteria are given in**Table 5-1**.

Table 5-1 Site Matrix- Selection Criteria (SIPCOT IP)

S.No	Environmental Attributes	Site –I (Nallampalli)	Site –II (Settihalli)	Site –III (Dharmapuri)
1	Land availability	Limited	Limited	Readily Available
2	Road access	Available	Available	Available
3	Soil Conditions	Red Sandy Soil & Black soil	Red Sandy Soil & Black soil	Red Sandy Soil & Black soil
4	Ecological Sensitivity	No	Yes	No
5	Change in Land use	Required	Required	G.O. for industries use is available
6	Fresh water source Availability	Yes	Yes	Yes
7	R&R Requirements	Yes	Yes	Nil
8	Project Timelines	More	More	Optimum
9	Economics	More	More	Less

The assigned values of importance for evaluation of candidate sites are listed in **Table 5-2.**

Table 5-2Site Selection Criteria- Arbitrary Value of Importance

S. No	Selection Criteria	Value of Importance
1	Land Availability	200
2	Road Access	100
3	Soil Conditions	100
4	Ecological Sensitivity	200
5	Change in land use	100
6	Fresh water source Availability	100

7	R& R Requirements	100
8	Project Timeline	50
9	Economics	50
	Net Score	**1000**

The Exact Score of values of each site were listed in **Table 5-3.**

Table 5-3Site Matrix- Score (SIPCOT IP)

S. No	Selection Criteria	Importance Values	Site –I (Nallampalli)	Site –II (Settihalli)	Site –III (Dharmapuri)
1	Land Availability	200	100	50	200
2	Road Access	100	100	50	75
3	Soil Conditions	100	50	50	50
4	Ecological Sensitivity	200	200	100	200
5	Change in land use	100	50	50	100
6	Fresh water source Availability	100	100	100	100
7	R&R Requirements	100	50	50	100
8	Project Timeline	50	25	25	50
9	Economics	50	25	25	50
Total Score		**1000**	**700**	**500**	**925**
Choice Ranking			**II**	**III**	**I**

The maximum score of **925** is seen for Adhagapadi Village, Adhiyamankottai, Thadangam and Balajangamanahalli Villages (**Site III Dharmpari**) and hence only, the land assignment and project development is recommended for the above site.

The project site is well connected to state highways and the entire required infrastructure will be made availablefor the development of Industrial Park by SIPCOT. So, alternate sites were not considered.The connectivity to the project site is summarized in **Table 5-4**.

Table 5-4 Connectivity to the Project Site

S No.	Description	Name of Connectivity
1.	Nearest Highway	NH-844(Hosur-Dharmapuri)/SH-17(Malur-Adhiyamankottai) ~0.25 km, E NH-44(Srinagar-Dharmapuri-Kanyakumari) ~0.67km, E
2.	Nearest Railway Station	Dharmapuri RS ~2.98 km (E)
3	Nearest Airport	Salem Airport ~33.98 km (S)
4.	Nearest seaport	Cuddalore Port ~185 km (ESE)
5.	Nearest major Town	Dharmapuri Town ~ 2km (E)

CHAPTER-6

ENVIRONMENTAL MONITORING PROGRAMME

6. ENVIRONMENTAL MONITORING PROGRAMME

6.1 Technical Aspects of Monitoring in the Effectiveness of Mitigation Measures

The primary aim of environmental monitoring program is to formulate a systematic, site-specific plan for monitoring the environmental parameters within the impact area, during and after commissioning of the project, which would aid in assessing the effectiveness of mitigation and environmental protection measures implemented for the proposed project based on the existing environmental scenario and the probable environmental impacts appraisal.

The plan framed for proposed Industrial Park will describe:

- The details of the proposed mitigation measures taken for safeguarding the environment at the project site as well as in the vicinity of the industrial area.
- Details of management plans (Greenbelt development plan, Solid waste management plan etc)
- Environmental monitoring programme to be undertaken during construction phase and after commissioning of the project.
- The associated cost components of the pollution control systems that will be installed at the site.

For each of the environmental attributes, the monitoring plan specifies the parameters to be monitored, location of monitoring sites, frequency and duration of monitoring and it also denotes the applicable standards, implementation and supervising responsibilities.

6.2 Objectives

- Ensure day to day operational activities are conducted in a manner in compliance with the applicable regulatory approvals including legislation and industry standards.
- Evaluate the adequacy of mitigation and pollution control measures implemented for reducing the adverse impacts caused during the construction and operation stage and suggest additional mitigation measures, if appropriate, in the light of the results.
- Define a detailed framework to monitor and document for achieving full compliance with statutory requirements.
- Encourage good environmental management practices through planning, commitment and continuous improvement.
- Develop clearly defined environmental monitoring program designed to assess the nature and extent of environmental impacts of the proposed operations and progressively refine such programs against the targets.

- Define roles and responsibilities of site personnel and ensure that all people onsite are fully informed of their responsibilities and accountabilities with regard to the environment.
- To comply with all regulations stipulated by the Central Pollution Control Board (CPCB)/ State Pollution Control Board (SPCB) related to air emission and liquid effluent discharge as per air and water pollution control act/ laws
- To handle hazardous wastes as per the Hazardous and Other Wastes (Management, Handling and Transboundary Movement) Rules 1989 and subsequent amendment in 2016.
- Review, improve and update environmental management procedures and standards.
- Establish response procedures for actual/potential environmental impacts including community complaints and ensure corrective action is taken.
- Perspective budgeting and allocation of funds for environmental management expenditure, Continuous development and search for innovative technologies for a cleaner and better environment.

6.3 Environmental Monitoring Programme

Monitoring will be carried out to assess the quality of environment during construction phase and after commissioning of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and identify the effectiveness of mitigation measures suggested in the EMP

6.3.1 Environmental Monitoring Program – Construction Phase

During construction, to assess the environmental parameters, monitoring will be carried out which will include Ambient Air Quality, noise, water and soil quality of site and surrounding areas. Monitoring programme including areas, number and location of monitoring stations, frequency of sampling and parameters to be covered is summarized in **Table 6-1.**

Table 6-1 Environmental Monitoring Programme- Construction Phase

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1	Ambient Air Quality	Three stations(one at site, one in upwind direction and one in down wind direction)	Half yearly	All the parameters as per NAAQ Standards
2	Noise	Three locations at site in	Half yearly	Ambient Equivalent continuous

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
		different places		Sound Pressure Levels (Leq) at day and Night time.
3	Water	Two number of surface and ground water samples near the site	Half yearly	All the parameters as per IS 10500:2012 and IS 2296:1992
4	Solid waste / Hazardous waste	Storage areas of solid and hazardous waste	Half yearly	Quantity
5	Soil	Three locationswithin/Near the site	Half yearly	Physico chemical properties, Nutrients, Heavy metals

6.3.2 Environmental Monitoring Program – Operation Phase

After commissioning of the project, post project monitoring of environmental parameters will be carried out at regular intervals. The monitoring programme in different areas of the environment has been based on the findings of the impact assessment studies. The post project monitoring programme including areas, number and location of monitoring stations, frequency of sampling and parameters to be covered is summarized in **Table 6-2.**

Table 6-2 Environmental Monitoring Programme –Operation Phase

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1.	Ambient Air Quality	3 Stations (one in up wind and one in downwind and one at site)	Half yearly	All the 13 parameters as per NAAQ Standards
2.	Noise	3 (three location within the study area)	Half yearly	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
3.	Water	Two surface and three ground waterwithin the study area	Half yearly	All the parameters as per IS 10500:2012 and IS 2296:1992
4.	Solid waste *	Municipal Solid and waste storage area	Half yearly	Quantity
5.	Soil	Three locations (Within the study area)	Half yearly	Physico chemical properties, Nutrients, Heavy metals

*Will be done by the private players as per TNPCB norms to whom the MSW management is given on BOOT basis.

6.4 Submission of Compliance Reports

As a part of environmental monitoring programme, following compliance report will be submitted to TNPCB and Regional Office of MoEF&CC.

- Half yearly compliance reports of Environmental Clearance terms and conditions on 1st June and1st December every calendar year.

- Environmental statement (Form-V) for the financial year ending March 31 to TNPCB on or before September 30 every year.

6.5 Emergency Procedures

6.5.1 On-site Mock Drills

On-site mock drills are very important as it helps employees to be aware of the safety procedures and how to react during the time of crisis. Conducting mock drills at regular intervals enhances preparedness and checks the viability of environmental/disaster management plan. Mock drills are essential for the following reasons:

- Helps in revising/improving the environmental/disaster management plan
- Helps to evaluate whether the responsible officials are trained efficiently for the unforeseen event
- Helps in evaluating whether the emergency equipments are being maintained at the Industrial Area premises.

To ensure efficient environmental/disaster management, EMP cell shall conduct periodic on-site mock drills in case of occurrence of the following activities:

- Fire, Natural calamities (cyclones, floods, earthquakes)
- Power break down
- Oil spill
- Bomb threats; War alerts/terrorist attacks

Mock drills should also involve fire department, police, municipal authorities, hospitals and other department/agencies that are mandated to provide emergency support. Documenting the outcome of mock drills is an important aspect as this helps in revising the existing plan more efficiently. In all safety programmes the right personnel need to be employed and this is of utmost importance.

6.6 Budget for Environmental Monitoring

Environmental monitoring for the project will be outsourced to NABL accredited laboratories & there will be no procurement for Environmental monitoring. Budget for Environmental monitoring is given in **Tables 6-3** & **6-4.**

Table 6-3 Budget for Environmental monitoring – construction phase

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Rate per sample (INR)	Total cost / year (INR)
1	Ambient Air Quality	Three stations (one at site, one in upwind direction and one in down wind direction)	Half yearly	3,500	21,000
2	Noise	Three locations at site	Half yearly	500	3,000

		in different places			
3	Water	Two number of surface and ground water samples near the site.	Half yearly	3,000	24,000
4	Solid waste / Hazardous waste	Storage areas of solid and hazardous waste	Half yearly	1,000	2,000
5	Soil	Three locations within/near the site	Half yearly	3,500	21,000
Total				**11,500**	**71,000**

Table 6-4 Budget for Environmental monitoring – operation phase

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Rate per sample (INR)	Total cost / year (INR)
1	Ambient Air Quality	3 (three location within the study area)	Half yearly	3,500	21,000
2	Noise	Three locations at site in different places	Half yearly	500	3,000
3	Water	Two surface and three ground water within the study area	Half yearly	3,000	24,000
4	Solid waste *	Municipal Solid and waste storage area	Half yearly	1,000	2,000
5	Soil	Three locations (Within the study area)	Half yearly	3,500	21,000
Total				**11,500**	**71,000**

CHAPTER-7

ADDITIONAL STUDIES

7. ADDITIONAL STUDIES

7.1 Public Consultation

As per issued ToR vide File No. 10/34/2023-IA.III, dated: 02.11.2023, Public Hearing is Mandatory for project.The Draft EIA report has been prepared as per the obtained ToR for Public Hearing (PH) submission. After completion of Public Hearing, the Final EIA report along with action plan for commitment by the proponent will be submitted to MoEF&CC for further appraisal ofthe project and obtaining Environment Clearance.

7.2 Rehabilitation and Resettlement

There is no R & R for the proposed IP.

- Government of Tamil Nadu has issued Administrative sanction for acquisition of 222.81.5 Ha of patta dry land & 478.97.0 Ha of Poramboke land for the development of new Industrial Park by SIPCOT in Adhagapadi, Adhiyamankottai, Thadangam and Balajangamanahalli Villages, Dharmapuri District vide G.O(Ms)No.284 dated 30.12.2015 (**Annexure-2**).

7.3 Risk Analysis

A systematic Risk Analysis will help in identification of the hazards and associated risk. This study assesses risks associated with the construction and operation of the proposed Industrial Park. Member industries or units coming up in the Industrial Park has to carry out risk analysis by considering the hazards associated with handling of different chemicals or hazardous materials which will be used as per requirement of production/manufacturing process may include the use of numerous potentially hazardous chemicals. Material specific chemical protection programs shall be developed and implemented. Worker shall be protected from exposure to process chemicals including but not limited to acids, bases, solvents and metal sludge etc. Risks associated with handling storage of paints/chemical/equipment at proposed Industrial Park are considered and accordingly mitigation measures are suggested in this DMP. This study provides inputs for formulating the onsite Disaster Management Plan (DMP) at Industrial Park level. The Risk Analysis has been broadly divided into three categories.

- Hazard Identification
- Failure Frequency
- Risk Reducing Measures

7.3.1 Hazard Identification

A classical definition of hazard states that "hazard is the characteristics of a system/ plant/ process that presents potential for an accident." Hence, all the components of a system such as process, storage of chemicals, handling, etc., need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/ sequence of events, which can be termed as an accident.

Identification of hazards is of primary significance for analysis, quantification and cost effective control of accidents. Potential Hazards identified in proposed Industrial Area have been broadly classified as below:

7.3.1.1 Hazards during Construction Phase

a) Mechanical Hazards

Mechanical hazards during the construction phase arise due to moving / rotating parts of the machinery, especially the belts and bolts of the construction equipment, which are heavy and pose a threat to the personnel working in that area.

Other hazards include falling from height (working at heights), falling objects like handheld tools, etc., failure of slips and traps created for scaffolding, and due to faulting of electrical equipment.

b) Transportation Hazards

The planning of access/ egress to the construction site also plays a significant role in minimizing the associated hazards such as vehicles collision.

c) Physical Hazards

The noise and vibrations generated during the construction phase may affect the worker's health, hinder effective communication and may jeopardise sensitive organs. In addition to noise and vibration, hot works also pose a considerable hazard to the workers.

d) Storage and Handling of Hazardous Materials

Storage of hazardous materials like fuel for the engines, lubricants, paints and other flammable materials are likely to pose a fire and explosion risk.

e) Electrical hazards

Poor wiring of the electrical appliances like lights, exhausts, etc., which causes short circuit and electrocution.

7.3.1.2 Hazards during Operation Phase

The proposed Industrial Area will house different type of industries and hazards associated during operation phase are discussed below:

a) Accidental Hazards

- Fall from ladder, stairs, elevated platforms etc., falls into pits and fall on the floor level due to wet, slippery or greasy garage floors.
- Injuries due to collapse of jacking, lifting or hoisting equipment / vehicles and materials falling from lifting equipment
- Crushed toes resulting from fall of heavy objects
- Eye injury from splinters & flying objects from grinding & machining operations, while operating compressed-air equipment, during cleaning and similar operations
- Injuries as a result of being caught in or between moving and stationary objects
- Injuries caused by rotating parts of machine tools and equipment.
- Acute musculo skeletal injuries (inter vertebral disk rupture, hernia etc.) due to overexertion while lifting or otherwise handling heavy vehicle parts, etc. and due to awkward work postures (underneath vehicle, etc.)
- Burns due to contact with hot surfaces, exhaust pipes or hot-melt chemicals, sudden release of hot water and steam lines, radiator and cooling system pipes; soldering, brazing and welding operations, etc.
- Electrocution as a result of defects, short circuits or improper use of electromechanical equipment, or contact with live wires, e.g., electric shocks from portable power tools, defective wires on floor.
- Carbon monoxide poisoning
- Fires and explosions of spilled or leaked flammable/explosive substances, or by ignition of batteries, or during flame cutting and welding operations, etc.
- Increased rate of road accidents during test driving.
- Punctures and cuts caused by sharp edges of hand tools, vehicle parts and sheet materials.
- Bursting of compressed-air lines or containers
- Bursting of tires.
- Accidents due to improperly installed and maintained steam/water pressure cleaners.

b) Physical Hazards

- Exposure to direct and reflected ultraviolet and infrared radiation (esp. from welding operations)
- Exposure to microwave and radiofrequency radiation (esp. in heat-sealing of panels and upholstery, drying of trim base panels, etc.)
- Exposure to hand-arm vibration from power-driven hand tools,resulting in development of White Finger Syndrome, etc.
- Exposure to excessive noise (> 85 dB(A), especially during engineering work (for. eg. car body work, engine testing, etc.)
- Exposure to excessive heat or cold, especially in open garages or during roadwork (the use of improvised heating may cause fire and CO poisoning)

c) Chemical Hazards

- Exposure to a wide range of industrial chemicals including heavy metals, contained in brake fluids, degreasers, detergents, lubricants, metal cleaners, paints, fuel, solvents, etc., resulting in various forms of chronic poisoning
- Skin diseases and conditions (various types of dermatitis, skin sensitization, eczema, oil acne, etc.) caused by various chemicals, e.g.: adhesives, antifreeze and brake fluids, epoxy resins, gasoline, oils, nickel, colophon etc.
- Eye irritation, dizziness, nausea, breathing problems, headaches, etc., caused by contact with irritating chemicals and their dusts and fumes, e.g.: antiknock agents.
- Asbestosis and mesothelioma caused by asbestos dust from brake drum cleaning and processing operation.
- Chronic poisoning resulting from exposure to lead and its dust and fumes (especially While repairing radiators, handling storage batteries, welding, using paints and lubricants, etc.)
- Increased risk of cancer due to inhalation of diesel exhaust fumes or contact with certain heavy metals and their compounds, asbestos, benzene etc.
- Increased risk of organic brain damage due to inhalation of diesel exhaust fumes
- Acute eye and mucous membrane irritation, headaches, breathing difficulties, chest tightness etc., caused by inhalation of NOx and respirable particulates

- Gastrointestinal disturbances as a result of accidental or chronic ingestion of adhesives.

d) Health Hazards

- Ergonomic, Acute musculoskeletal injuries (intervertebral disk rupture, tendon rupture, hernia etc.) caused by physical psychosocial and organizational factors overexertion and incorrect combination of weight and posture during lifting and moving of heavy loads.
- Cumulative trauma disorders, including carpal tunnel syndrome, caused by long-time repetitive work.
- Psychological stress when working under time pressure.

e) Material Hazards

During operation, various types of raw materials, products and other materials will be handled at industrial units. Industrial plants deal with materials, which are generally hazardous in nature by virtue of their intrinsic chemical properties or their operating temperatures or pressures or a combination of these. Fire, explosion, toxic release or combinations of these, are the hazards associated with industrial plants using hazardous chemicals. Some of these materials can be flammable, explosive, toxic or corrosive etc. Hazardous substances may be classified into three main classes namely, flammable substances, unstable substances and toxic substances.

- Flammable substances require interaction with air for their hazard to be released. Under certain circumstances the vapours arising from flammable substances when mixed with air may be explosive especially in confined spaces. However, if present in sufficient quantity such clouds may also explode in open air.
- Unstable substances are liquids or solids, which may decompose with such violence, so as to give rise to blast waves.
- Toxic substances are dangerous and can cause substantial damage to life when released into the atmosphere at certain concentrations.
- The ratings for a large number of chemicals based on flammability, reactivity and toxicity are given in NFPA (National Fire Protection Association) Codes and Material Safety Data Sheets (MSDS).The proposed industries in the Industrial Park will have to maintain the records of MSDS and NFPA classification and hazards due to exposure of materials to be handled.

f) Mechanical and Physical Hazards

Injuries may be caused toworking personnel due to the operations like cutting, lifting, moving and rotating machinery. Lifting and carrying heavy or awkwardly shaped objects, such as bags, can result in manual handling injuries.

g) Handling, Storage and Transportation Hazards

Proposed Industrial Park will involve in handling of various materials in the form of Solid, Liquid and Gases which are required for the operations. The individual industry may have material transport from the nearest road/rail route. The hazards related to material transport may be due to accidents of vehicles, failure in mechanical transmission components etc., The Handling hazards include:

- Insufficient knowledgeon hazardous nature of chemicals in use leading to inappropriate handling of the chemical.
- Failure to use appropriate control measures and Personal Protective Equipments (PPEs).
- Use of expired/ worn Personal Protective Equipments (PPEs).
- Failure of liquid/solid or gas delivery tools.
- Using of container with narrow opening for a process that evolves heat and/or gases.
- Mixing of oxidizing agents with flammable / combustible substances, etc.

h) Storage and Handling of Chemicals

Storage and Handlingof Hazardous chemical is inevitable, they carry inherent characteristic risk to the employees due to the properties ofchemicals such as toxicity and flammability. Chemicals are to be handled in standard containers like MS, HDPE, GI Drums, PVC Carboys, etc.All the chemicals, if any are to be arranged and stored, that should be in accordance withtheir compatibility, the area should be dry& well ventilated, the electrical fittings, equipment and lights should be of flameproof and the material should be stored with dyke / secondary containment. All the chemicals are to be provided with identification labels. Eye wash/Drench shower, first aid kit and spill kits are to be provided at a strategic location for emergency purpose. Chemical Safety Data Sheets and handling procedure, First Aid measures and list of first aiders are to be prepared and displayed for information and safety of the working personnel.

7.3.1.3 Hazards common in individual industries

Various types of hazards that are common in individual idustres of proposed Industrial Park are as follows

- **Fire Hazard**

  Flammable chemicals are used in the manufacturing processes of various industries. So it is susceptible to catch fire either at the places of storage, transportation and processing if source of ignition is available. These chemical fires may cause to catastrophic effects. The sudden development of pressure ruptures the container and causes shock waves which cause the structure damage and outburst of reaction vessel. Fire is considered very dangerous if occurs in uncontrolled manner. It should be clearly understood that when a liquid is used having flash point below the normal ambient temperature, it could, in suitable circumstances, liberate a sufficient quantity of vapors to give rise to flammablemixtures with air.

- **Explosion Hazard**

  Release of energy in a rapid and uncontrolled manner gives rise to explosion. Extra care shall be taken by providing rupture disc, pressure release valve and temperature controller.

- **Corrosion Hazard**

  Most corrosive substances will produce chemical burns, while certain chemical produce deep ulceration. Other has detailing effect on skin and may cause dermatitis. This has adverse effects on weakening the strength of material in contact.

- **Electric Hazard**

  Electrical power is the main driving force of the industry.There is a potential hazard in electrical equipment like electric cables, motors, heaters, lights,electrical equipment/ machinery operations, welding, motors& heavy lift devices, cabling, human intervention electrical devises (short circuit possibility), maintenance work (due to machinery breakdown etc.),plant lighting related electrical hazards etc. there will be a fire hazard due to electrical sparks and short circuits in the electrical systems. Static electricity generated during the transfer of flammable chemical from one vessel to another vessel may leads to sparks, if there is no proper grounding and bonding system, the electrical sparks will act as ignition source for flammable chemicals.

- **Other Hazards**

Other toxic hazards due to acids/other toxic spillages (mainly limited to spillage area). The spillage if comes in contact with metal parts will produce hydrogen which is highly flammable gas. Any person moving in area and getting splash will be injured. In addition, the spillage will cause pollution problem. The spillage is to be collected and neutralized for toxic contents before disposal. Hazards due to individual soft spots (like walking casually and not noticing a pit and falling or colliding/stumbling or slipping, not noticing a wet place, etc.).

- **Fire and Explosion Indices**

Dow'sFire and Explosion Index is a step-by-step objective evaluation of the realistic fire, explosion and reactivity potential ofprocess equipment and its contents.The quantitative measure shall be employed based on historical loss data, the energy potential of the material under study and the extent to which loss prevention practices are currently applied. This is helpful in identifying high-risk process areas needing more detailed hazard analysis to ensure that the facilities do not pose unacceptable risks.

7.3.1.4 Hazards due to Natural Calamities

In case of natural disasters such as earthquake, flood, cyclone etc., occurring at the proposed Industrial Area, may resultin fire and explosions/toxic gas release due to failure of equipment. The damage consequences will be similar whether the damage is because of man-made disaster or naturalcalamity for the worst cases.

7.3.2 Risk Mitigation Measures

- Consider feasibility of substitution of hazardous chemicals such as solvent based paints with less hazardous alternatives. Label chemicals with appropriate, internationally recognized, hazard symbols.
- Chemicals with different hazard symbols should not be stored together - clear guidance on the compatibility of different chemicals can be obtained from the Materials Safety Data Sheets (MSDS) which willbe readily available from the manufacturer and on site.
- Store chemicals in a dedicated, enclosed and secure facility with a roof and a paved/concrete floor. Also adequate ventilation to be provided. Chemical tanks should be completely contained within secondary containment and the storage should be grounded.Procedures / work instruction for loading and unloading of chemicals should be displayed in English as well as in local language.

- The underground storage tanks of chemicals shall be of double wall construction or within the dyke construction to prevent soil contamination due to sub soil leakage.
- Install devices to prevent spills and overfills, e.g. Alarms to warn of overfilling and automatic shut-off devices or secondary spill containment.
- Maintain and inspect storage units regularly.
- Consider installation and use of groundwater monitoring points on site tocheck for contamination.
- Implement a Solvent/Hazardous Materials Management Plan to monitor and control the use of solvents and hazardous materials on site.
- Necessary arrangement of firefighting facility as per various national and international codes for the facilities to avoid any major incident.
- To identify the hazards present in the system, a hazard identification study such as a Hazard and Operability study (HAZOP) should be undertaken by the individual industries. All hazards identified should be examined and appropriate mitigating measures developed and implemented.
- For all the hazardous material tanks where there is a single in/outlet line, a Remotely Operated Vehicle (ROV) (or an equivalent design to allow isolation of the tank from the line in an emergency) should be provided.
- First aid equipment and manpower resources are at place to deal with emergencies, in consultation with emergency services to rescue any personnel, trapped or immobilized by an accident scenario.
- Carryout regular checks/maintenance and testing of instruments, valves and flange joints as per strict schedule. Pipelines, flanges, hoses, PSV's and valves require special attention to minimize the failure rate.
- Facilities should also be equipped with Automatic Fire Detection & alarm system and suppression equipment such as Fire tenders, all types of fire extinguishers like DCP, CO_2, water CO_2 foam types in adequate numbers, Fire Hydrant and monitor system as per National Building Codes 2016 and relevant Indian Standard to take care of any fire hazard.
- FireDetection/alarm system to be provided for Control Rooms, cable Galleries, Transformers area and Administrative building and these may be of ionization, optical and heat sensing type. Manual Call Point to be installed across the factory.

- LPG detectors to be installed at LPG station. Flash back arrestors and grounding and bonding facility to be provided in the LPG pipeline.
- Firefighting equipment shall be provided as per applicable standards and guidelines.
- Consider linking foam and fire water system. Considerations should be given to directly inject AFFF (Aqueous Film Forming Foam) compound into the respective fire mains (at 6 percent strength), which can act as a vehicle to transport foam solution to user points on either side for mobile response foam branches / cannons.
- Facilities should be properly equipped with fire suppression equipment that meets internationally recognized technical specifications for the type and amount of flammable material stored at the facility.
- Passive fire protection (for. eg.fire rated doors and walls) with appropriate fire rating to be provided for electrical panel room, transformer area, chemical storage rooms etc.
- Provision of fire safety training and response as part of workforce health and safety induction/training, including training the use of fire suppression equipment and evacuation, with advanced fire safety training provided to a designated firefighting team.
- Pipeline should be protected against external / internal corrosion
- Caution boards shall be displayed for all working person.
- No smoking signs
- No flames or pilot lights or electrical gadgets.
- Emergency contact numbers.
- All electrical equipment shall be provided with proper Grounding & Bonding arrangement to create continuity and dissipate static electricity. Earthed electrode should be calibrated, periodically tested and maintained.
- All electrical equipment shall be free from carbon dust, oil deposits, and grease.
- All the electrical cables shall be properly laid in cable trays, cable trenches shall be sealed with fire rated material or filled with sand at its compartmentation.
- Use of approved insulated tools, rubber mats, shockproof gloves and boots, tester, fuse tongs, discharge rod, safety belt, hand lamp, wooden or insulated ladder and not wearing metal ring and chain is insured.
- Danger from excess current due to overload or short circuit is prevented by providing fuses, circuit breakers, thermal protection.

- Do's and Don'ts shall be displayed prominently in the site near the pipelines and at all workplaces. Regular maintenance shall be carried out under the supervision of an authorized person.

Site Specific risk assessment is attached as an **Annexure-18b.**

7.4 Disaster Management Plan

The Disaster Management Plan (DMP) is aimed to ensuresafety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of DMP, it should be widely circulated and a personnel training is to be provided through rehearsals/drills. To tackle the consequences of a major emergency at the project location or its immediate vicinity, a DMP has to be formulated.

The objective of the DMP is to make use of the combined resources of the Industrial Area and the outside services to achieve the following:

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

7.4.1 Causes of Disaster

Causes for Disaster as follows:

- Natural: Flood, Earth Quakes, Lightning, Cyclonic winds
- System failure, design deficiency, bad operating practice and sabotage resulting in Fire.
- Explosion
- Release of toxic/ inflammable gases

A broad framework of EEP and DMP is given in **Annexure-18a.** The specific industrial team where the emergency has arisen would be in charge of the situation while the other teams would assist them as and when required.

7.4.2 Proposed First Aid Centre

First Aid Centreis proposed for the Industrial Parkinside the Project office.Adequate number of first aid boxes will be kept at noticeable locations. Required stock of first aid medicines will also be maintained. Trained first aiders will be made available for the Industrial Park.

CHAPTER-8

PROJECT BENEFITS

8. PROJECTBENEFITS

- The proposed project site is located in Dharmapuri District. Its nearness to Dharmapuri town is 2.0km (E) and direct access to other parts of state throughNH-844 (Hosur-Dharmapuri)/SH-17 (Malur Adhiyamankottai) ~0.25 km, E&NH-44 (Srinagar-Dharmapuri-Kanyakumari) ~0.67km, E from the project site and nearness to Salem Airport ≈33.98 km (S)are the major advantages for the present proposal by SIPCOT.
- The project will help in increasing its contribution to the overall development of the area as well as the Country's share in the international business.

8.1 Improvement in physical infrastructure

The proposed IPwill eventually improve the public infrastructure like roads, water, power line, drainage lines, tele communication, etc., in the surrounding regions. The existing roads will also be suitably widened.

8.2 Improvement in Social infrastructure

The project is likely to have positive impacts on socio economic environment.Various modes of indirect employment i.e. increased business opportunities will reflect in the improved quality of life of the people in the study area.

Thus, it can be said that the proposed project will have significant beneficial impact on the socio economic scenario in the study area.

8.3 Employment potential

The proposed project will provide direct employment to 18300 people during operation phase and indirect employment opportunities to local people in contractual works like housing construction, transportationfor supply of goods and services to the project and other community services.

8.4 Other Tangible benefits

- There will be positive impact on social conditions in and around the site due to the proposed project.
- There will be increase in market and business establishment facilities.
- Proposed project will also attract generation of additional revenue to the Government by means of Taxes and duties.
- Growth in exports.
- Investment Catalysation.

CHAPTER-9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

Cost benefit analysis of the project is given hereunder:

9.1 Comparative Analysis:

Earmarking 50m buffer around river and 15m around other water bodies (as per revenue records) would reduce the industrial plot area by 59.65 acres. 69% of land in this site are government poramboke lands. Alienation cost of poramboke land is considerably less than private lands. Hence, providing additional buffer will not affect the viability of the project.

9.2 Economic Benefit:

SIPCOT intends to develop the industrial park to promote the industries and to enhance the employment opportunities for the state, with profit not being the main focus.

9.3 Social and Environmental Benefit:

Dharmapuri district being an industrially backward area, development of the industrial park will pave the way for socio economic development of the region in terms of employment generation, skill development, and flow of income to rural areas, development of service sector, etc. Further, sustainable practices and green initiatives proposed in the industrial park reduce carbon emissions.

9.4 Conclusion:

Considering the lower land alienation cost of poramboke lands, difficulty in acquiring private lands and anticipated socio economic benefits, the project is economically viable.

CHAPTER-10
ENVIRONMENTAL MANAGEMENT PLAN

10. ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

This Environmental Management Plan (EMP) identifies the principles, procedures and methods that will be used to control and minimize the environmental impacts of the proposed construction and operational activities associated with the project development. It is intended to ensure that commitments are made by proponent to minimize project related environmental and social impacts.

10.2 Objectives of EMP

- To suggest the formation of a core group (Environment Management Cell) responsible for implementation of environmental control & protective measures as well as monitoring of such implementation.
- To ensure project components comply with all laws and approval conditions.
- Facilitate a continual review of post construction and operation activities.
- To suggest preventive and mitigation measures to minimize adverse impact and to maximize beneficial impacts like.
- Preparation of Greenbelt Development scheme.
- Preparation of rain water harvesting scheme and energy conservation actions.
- To prepare a capital cost estimate and annual recurring cost for Environmental Management Plan.
- To prepare a detailed action plan for implementation of mitigation measures.
- Measure the effectiveness and success of proposed mitigation measures

10.3 EMP Roles and Responsibilities

10.3.1 Environmental Management System

For effective implementation of the mitigation measures and consistent functioning of the proposed project, an Environmental Management System (EMS) is proposed. The EMS includes the following:

- Environmental Management Cell
- Environmental Monitoring Program
- Personnel Training
- Regular Environmental Audits and Corrective Action Plan
- Documentation-Standard Operating procedures of Environmental Management

All the activities will be monitored to ensure appropriate implementation of all environmental mitigation activities and to identify areas where environmental management plan compliance is not satisfied.

For effective implementation of the system, it is also necessary to have a permanent organizational set-up as Environmental Management Cell (EMC) for the effective implementation and monitoring of environmental management system. This is done by assigning responsibility to the concerned personnel for implementation of environmental control measures.

SIPCOT Environmental Management Cell consist of 7 team members headed by SIPCOT Managing Director, General Manager (Projects), Manager and two Environmental Consultants assisted by two Office Staffs which will enforce and implement the Environmental Plan.

The Organization of Environmental Management Cell (EMC) proposed is given in **Figure 10-1.**

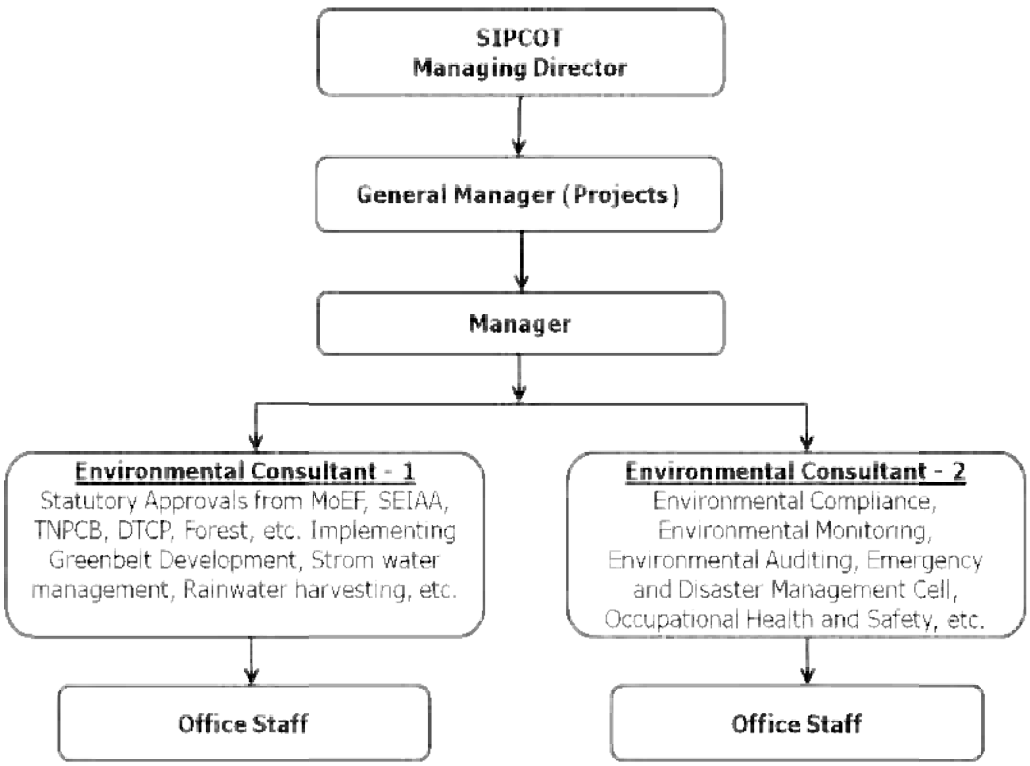


Figure 10-1 Organogram for Environmental Management Cell

10.3.2 Responsibilities of Environmental Management Cell

Environmental Management Cell (EMC) shall obtain all applicable statutoryclearances and approvals as mandated by the regulatory authorities and maintainthe Industrial Park in compliance with all applicablerules and regulations.

Other responsibilities of the cell will include:

- Review the progress of regulatory compliance of SIPCOT and initiatenecessary action for the compliance of the same.
- The EMC will review, implement, update, and comply with the Environment Policy to ensure the effective implementation of environmental safeguardmeasures.

- Keeping the Board updated on regular basis about the activities carried out under environmental measures and suggests measures to improveenvironment preservation and protection.
- Encourages allottee units to implement, adopt and use of green and sustainable technologies such as Solar, Wind, Thermal, Biomass, Electric lamp; Hybrid vehicles, etc. to achieve more resource-efficient, clean and resilient growth towards reducing pollution during their process, manufacturing andtransportation of goods and encourages energy recovery for selfsustainability from their Industrial process.
- Instruct industries to reduce the use of one time use plastics, Styrofoam and other plastic material during the packing and delivery of goods.

Table 10-1 Responsibilities of Environmental Management Cell

S.No.	Designation	Responsibilities
1	Managing Director	➢ Responsible for overall environmental management. ➢ Regularly conduct meeting with EMC and take feedback regarding all the activities performed under Environmental Management and give directions tosucceeding component. ➢ Approval of funds for carrying out environmental management activities.
2	GM – Projects	➢ Keep aware about all the activities performed under EMC in the industrial parks. ➢ Issuing direction to Project officers for implementing Greenbelt development, Storm water management, rainwater harvesting, etc. ➢ To deal with legal entity pertaining to environmental issues.
3	Manager	➢ To prepare and allocate budget for Environment Management Plan. ➢ Ensuring compliance to the conditions prescribed by statutory authority. ➢ Mandating member industries to comply with theconditions stipulated in the statutory approvals and non-compliance if any shall be reported to GM and immediately required action will be taken.
4	Environmental Consultant 1 & 2	➢ Obtaining Statutory Approvals from MoEF&CC / SEIAA /TNPCB, etc.

S.No.	Designation	Responsibilities
		➢ Addressing the various queries received from statutory authorities on environmental front. ➢ Submitting Environmental compliance report and coordinating with project officers for Environmental monitoring, audit, etc. ➢ Compliance with the environmental laws and implications which dynamically changes from time to time due to the emerging challenges.

10.4 EMP for Construction Phase

Environmental impacts during the construction phase can be attributed to the site preparation activity and the mobilization of workforce. The impacts of the construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the project is completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

In order to mitigate such impacts and restrict them within tolerable levels, the following measures shall be adopted:

- Proper and prior planning of approach and access roads, and appropriate sequencing and scheduling of all major construction activities.
- Adoption of appropriate soil conservation programme and its timely implementation in the proposed project site.
- Initiation of an appropriate landscape programme including plantation of trees and flowering plants in and around the project site particularly, at all available spaces which would serve the dual purpose of controlling fugitive dust and abatement of noise levels in addition to improving the aesthetics of the area.
- Water sprinkling in the vulnerable areas to suppress the dust generated during excavation, levelling and other operations.
- Use of properly tuned construction machinery & vehicles in good working condition with low noise & emission and engines turned off when not in use.
- Control of quality of construction wastewater within the construction site through suitable drainage system with traps for arresting the sediment load for its proposed disposal into the main natural drainage system around the site.

- Implementation of suitable disposal methods of sediment/ construction debris at designated places to avoid water logging at construction site.
- Provision of protective gears such as ear mufflers etc. for construction personnel exposed to high noise levels and locating the temporary labour sheds for housing the construction labourers away from the construction site.

10.4.1 COVID health management plan for construction workers

- Screening will be done for all employees on daily basis for temperature
- Use of masks will be enforced for all employees
- Social distance will be enforced for all employees.
- Hand sanitizer / soap will be kept at various locations for use by employees.
- Screening will be done for all the employees for COVID-19 once a month on regular basis.

10.5 EMP for Operational Phase

Monitoring during the operation phase will reflect those environmental and socio-economic issues that may persist upon completion of construction activities. Monitoring will focus on evaluating the effectiveness of project mitigation measures and continue baseline monitoring and sampling. The mitigation measures to prevent adverse impact during the operation phase of the project shall focus on the following:

1. Air quality
2. Noise environment
3. Water quality and water resources
4. Solid and hazardous waste
5. Land environment

10.5.1 Air Quality Management

The major air pollution sources from the industries will be DG set, Vehicular movements and other emissions. Individual industries will have air Pollution control measures as per CPCB/ TNPCB norms to disperse the pollutants. Adequate green belt will be developed to mitigate the pollution arising due to movement of vehicles.

10.5.2 Noise Environment

Individual industries will adhere to the following measures to mitigate negative impact of operation phase of the project on the surrounding noise environment:

- All the noise generating equipments will be designed / operated to ensure that noise level does not exceed 55-45 dB (A) at plant boundary as per the requirement of Central / State Pollution Control Board.
- Noise generating sources will be maintained properly to minimize noise generated by them.
- Wherever feasible, acoustic enclosures will be provided for compressors, DG sets.
- Compliance with noise control norms will be given due importance at the time of purchase of various equipments and it will be mentioned while placing the purchase orders and guarantee for noise standards will be sought from suppliers.
- Green belt will act as a noise barrier. Overall41.30% of developable area will be provided for green belt development.
- Training will be imparted to personnel to generate awareness about effects of noise and importance of using PPEs.

10.5.3 Water and Wastewater Management

During operation phase, individual industries will have their own STP/ETP as applicable to treat the sewage/effluent generated. Zero Liquid Discharge system will be proposed by individual industries. Treated sewage will be recycled for green belt development and treated effluent will be recycled for process &utilities within the industry. Rejects from RO will be taken to MEE/ ATFD and the condensate will be again recycled to utilities/ process. MEE /ATFD salt will be disposed as hazardous waste by individual industries.

SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.

10.5.4 Rainwater Harvesting

Rainwater harvesting is an important component of wise resource use and environmental management. The total amount/quantity of water i.e., received in the form of rainfall over an area is called the rain water endowment of that area, out of which the amount of water that can be effectively harvested is called the rain water harvesting potential. The collection efficiency accounts for the fact that all the rain water falling over an area cannot be effectively harvested due to losses on account of evaporation, spillage or run off etc. Individual industries will have their own rain water harvesting system to recharge ground water upon establishment.

Rainwater harvesting pits are proposed for recharging the ground water table. The calculation on the number of pits for rainwater harvesting is arrived as given in **Table 10-2**.

Table 10-2Rainwater harvesting calculation

Land Allocation Breakup	Area in Hectares	Area (A) in (Sq.m)	Run off Coefficient (C)	Intensity of rainfall- I (m/day)	Total Discharge-Q (m3/day)
Roads and Pavement Area	49.101	491010	0.7	0.117	40213.719
Common amenities	12.15	121500	0.7	0.117	9950.85
Commericial activities	18.227	182270	0.7	0.117	14927.913
Green belt	116.038	1160380	0.15	0.117	20364.669
Total	**195.516**	**1955160**	**-**	**-**	**85457.15**

Design parameters:

Intensity of Rain fall Considered =117 mm/day (IMD Dharmapuri for the Period of 09.07.2010)

Formula:

Discharge, Q= CIA (m3/day)

Where,

Q= Discharge (in m3/day)

C=Coefficient of Runoff7

I= Intensity of rainfall (in mm/day)

A= Area (in Sq.m)

Runoff calculation:

- Total runoff Load = 85457.15m3/day.
- Rainwater harvesting will be done for 50% of total Runoff. So it will be 85457.15/2 = 42728.58 m3/day.
- Total runoff load per hour = 42728.58/24 = 1780.36 m3/Hr.
- RWH pits of 1 m Dia and 3.5 m depth (Volume of 2.75 m3/hr) (Assuming 50% percolation rate). Considering the percolation rate as 50%, total harvesting capacity of each pit per hour = 2.75 *0.5 =1.375 m3.
- Total runoff load per hour = 42728.58/24 = 1780.36 m3/Hr.

No of Rainwater harvesting pits proposed =1780.36 /1.375 = 1294.80 ~**1295nos** and Remaining 50% runoff will be diverted into nearby water bodies through storm water drain after filteration.Layout with storm water drain is attached as an **Annexure 11**.

10.5.5 Utilization of solar energy

Solar panels will be proposed in the roof top of Project office. Solar power will be utilized for the IP internal road lighting /common areas /whereverpossible. Apart from this, individual industries will be advised to provide roof top solar panels & solar lighting to reduce power consumption.

10.5.6 Solid and Hazardous waste Management

During operation phase is likely to generate various types of solid waste which can be broadly categorized as Hazardous Waste and Municipal Solid Waste.

Further, the generated solid waste may include biodegradable, recyclable and inert compounds. Municipal solid wastes will be segregated as organic and inorganic wastes. Organic wastes will be collected and composted in Organic waste convertor by individual industries. The compost will be used as manure for green belt development. Inorganic wastes will be sold to authorized recyclers by individual industries.

Hazardous waste from individual industries will be stored separately in hazardous waste storage area within their premises and given for recycling to TNPCB authorized vendors or disposed to TNWML within a stipulated period of time. Hazardous waste materials will be properly disposed as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 1989 and subsequent amendment in 2016.

E-waste: Individual industries will have their own E-waste storage areas and the same will be disposed by individualindustries as per E-waste management rules 2022

10.5.7 Land Environment

Following measures are proposed to mitigate negative impact during operational phase of the project on the land environment.

- Organic Solid wastes generated during the operation phase will be composted by individual industries and used as manure. Inorganic solid Wastes will be sold to authorised recyclers.
- Individual industries will have their Air Pollution control Measures to control the release of air pollutants to a greater extent. In addition, thick green belt will attenuate air pollutants released into the environment.
- During operation phase, individual industries will have their own STP/ETP as applicable to treat the sewage /effluent generated.
- Zero Liquid Discharge system will be proposed by individual industries
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out

into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.

- Noise generating sources will be maintained properly to minimize noise generated by them.
- Green belt development will help in abatement of air and noise pollution and will improve the aesthetics of the Industrial Park.

10.5.8 Ecology

- Organic Solid wastes generated during the operation phase will be composted and used as manure. Inorganic solid Wastes will be sold to authorised recyclers.
- Individual industries will have their Air Pollution control Measures to control the release of air pollutants to a greater extent.In addition, thick green belt will attenuate air pollutants released into the environment.
- Individual industries will have their own STP/ETP as applicable to treat the sewage /effluent generated. Zero Liquid Discharge system will be proposed by individual industries.
- It is expected that the ecology of the region is preserved by these mitigation measures.

10.5.9 Socio – Economic Environment

Various modes of indirect employment i.e., transportation, increased business opportunities to shopkeepers, small scale business entrepreneurs etc. will lead to development of the area.

10.6 First aid centre

Individual Industries will have their own Occupational Health Centre as per norms.First Aid Centreis proposed for the Industrial Parkinside the Project office.Adequate number of first aid boxes will be kept at noticeable locations. Required stock of first aid medicines will also be maintained. Trained first aiders will be made available for the Industrial Park.

10.6.1 First aid

A first aid kit is a collection of supplies and equipment for use in giving first aid. First Aid boxes will be kept available in First Aid Centre. First Aid items will be issued to injure only by authorized persons.
Following are the contents of First Aid Box,

- Dettol – Antiseptic solution
- Ciplox – Eye Drops

- Soframycin – Skin ointment
- Silverex – Burn ointment
- Betadine – Microbicidal solution
- Muscle Pain relieving gel
- Sterilized Cotton Wool
- Surgical Paper Tape
- Small Sterilized Dressings
- Medium Sterilized Dressings
- Roller Bandage – 5 cm wide
- Roller Bandage – 10cm wide
- Band Aid
- Crocin / Paracetamol Tablet

10.7 Corporate Environmental responsibility (CER)

Initially,SIPCOT will allocate INR 25.76Crores towards Environment Management Plan (EMP).As per the MoEF&CC Office Memorandum No. 22-65/2017-IA.III, dated 25.02.2021 concerns raised during public consultation will also be included towards EMP instead of allocation of funds under Corporate Environment Responsibility (CER).

10.8 Budgetary Provisions for EMP

Adequate budgetary provisions have been made for execution of environmental management plan. The details of capital and recurring budget earmarked are given in **Table 10-3.**

Table 10-3Budgetfor Environmental Monitoring Plan

S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
1	Solid Waste Management Facility	800	64
2	Greenbelt development	776.48	32.5
3	Rain water harvesting	100	8
4	Garland drain along the periphery of the EC category plots	900.00	9
5	Environmental Monitoring during Construction Phase and Operation Phase	0	5
	Total EMP Cost	**2576.48**	**118.50**

CHAPTER-11

SUMMARY & CONCLUSION

11. SUMMARY & CONCLUSION

11.1 Overall justification for implementation of the project

An Environmental Impact Assessment Study has been carried out and assessed for the proposed Industrial Park at Dharmapuri, based on the ToR and baseline quality data collected for the study area. Identification and anticipation of the potential environmental impacts due to the proposed project with a delineation of appropriate impact mitigation measures in an Environmental Management plan during both construction and operation phases is provided in the EIA report.

The marginal impacts that might be caused by the proposed activity will be mitigated by the pollution control and environmental management measures.

In a true and a larger sense, in view of the considerable benefits from the project with no major impacts, the proposed project is said to be more beneficial to the nation.

The EMP implemented for the construction and operation stages of the project will include:

- Air Pollution control and management
- Noise Control and Management
- Solid and Hazardous Waste Management
- Sewage treatment and Management
- Effluent treatment and Management

In order to effectively implement the EMP, an environmental management system will be formulated.

11.2 Explanation on how adverse effects will be mitigated

The baseline study carried out for the study area indicates that all the physical, chemical and biological characteristics of the environmental attributes in the surrounding area are well within the permissible limits.

Based on this environmental assessment, the possible impacts during both pre-project and post-project phase are anticipated and the necessary adequate control measures are formulated to meet the statutory compliances.

Follwing mitigation measures are proposed for the project:

- Water environment - Fresh water will be sourced from Tamil Nadu Water Supply and Drainage Board (TWAD Board). Water allocation given by TWAD for providing 2MLD of water from Hogenakkal Water supply project vide its letter dated 26.05.23 and for the supply of 49MLD of water to SIPCOT's existing and proposed Industrial parks in Krishnagiri and Dharmapuri districts (including water supply for the proposed park) from Hogenakkal CWSS Phase-II its letter dated 03.05.23.

- Individual industries will be mandated to treat the effluent in their ETP. Treated effluent will be utilized for process and utility. Zero liquid discharge (ZLD) will be mandated by SIPCOT to individual industries.
- SIPCOT will provide Garland Drain of min.1.3 m wide x 1.0 m depth around the periphery of the EC category Industrial Plots. Only the excess rain water from EC plot area, will be let into the Garland Drain which will be filtered and then let out into the regular storm water drain which would outfall into nearby water bodies. Storm water outlet will be monitored frequently by SIPCOT.
- Individual industries will be mandated to treat the sewage in their STP. The treated sewage will be used for Green belt development.
- Storm water will be collected in RWH pond through storm water drains and only excess storm water will be let into nearby water bodies after filteration.
- Air Pollution: Individual industries will be mandated to provide Air Pollution control measures for dispersion of flue gases
- Solid and Hazardous waste: Individual industries will segregate their solid waste. Organic waste will be composted and used as manure for green belt development. Inorganic waste will be disposed to TNPCB authorized recyclers/vendors. As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facilityincludinga shed for E-Waste Management)) has been earmarked for Solid Waste Management Facility. Hazardous waste will be disposed to TNPCB authorized TSDF/recyclers as applicable by individual industries.
- Noise: 41.30 % green belt is proposed for the Industrial Area. Individual industries will provide acoustic enclosures for their D.G.sets, Boiler/klin etc.
- Environmental Monitoring: SIPCOT will be conducting periodical monitoring of AAQ, noise, water, soil and traffic, to ensure the parameters are within the prescribed limits.
- Environmental Management Cell is available to take care of the mitigation measures proposed for the project.

With very minimal negative impacts, the project positively leads to commercial business opportunities, employment opportunities, increased revenue and infrastructural development.

Thus, this project may kindly be granted Environmental Clearance.

CHAPTER-12

DISCLOSURE OF CONSULTANTS ENGAGED

12 DISCLOSURE OF CONSULTANTS ENGAGED

In order to assess the potential environmental impacts due to the development of SIPCOT Industrial Parkover an extent of 698.205 Ha (1724.566 Acres) atAdhagapadi Village of Dharmapuri Taluk &Adhiyamankottai, Thadangam and Balajangamanahalli Villages of Nallampalli Taluk, Dharmapuri District and Tamil Nadu state. SIPCOT has engaged ITCOT Limited, Chennai (Project Consultant) and Hubert Enviro care System Pvt. Ltd., Chennai (EIA Consultant) to undertake EIA study. The nature of consultancy service rendered covers terrestrial environmentalassessment.

12.1 ITCOT Limited (ITCOT)

ITCOT Limited, is a reputed Central Public Sector Consultancy Organisation found in 1979 as a joint venture of leading Financial Institutions, State Industry Development Corporations and Banks. The company is registered under Companies Act, 1956 on 17th July 1979. The Registered Office of the company is located at 50-A, Greams Road, Chennai, Tamil Nadu - 600 006.

ITCOT has more than 44 years of track record in offering various industrial and technical consultancy services to Govt. departments, Banks, Financial Institutions, Corporate, SME, etc.

ITCOT is known for impartial and client neutral approach. ITCOT is an approved consultancy agency for the provision of various consultancy services such as preparation of Techno-Economic Feasibility Report, Techno-Economic Appraisal Report, Detailed Project Report, Project Appraisals, Project Management Consultancy, Tender Process Management, Lender’s Independent Engineer, Owner’s Engineer, Environment Impact Assessment, Cluster Development, Statutory Compliance Consulting, Energy & Environmental Consulting, Financial Restructuring, Asset valuation, Skill Assessment etc., to Govt. departments, Banks, Financial Institutions, Industrial Development agencies, Corporates, SME, etc. for industrial growth and development.

12.2 Hubert Enviro Care Systems (P) Limited (HECS)

HECS is a total Environmental management company which provides Environmental consultancy services, Analytical testing services, turnkey solutions and Operation-Maintenance services for water and wastewater facilities.

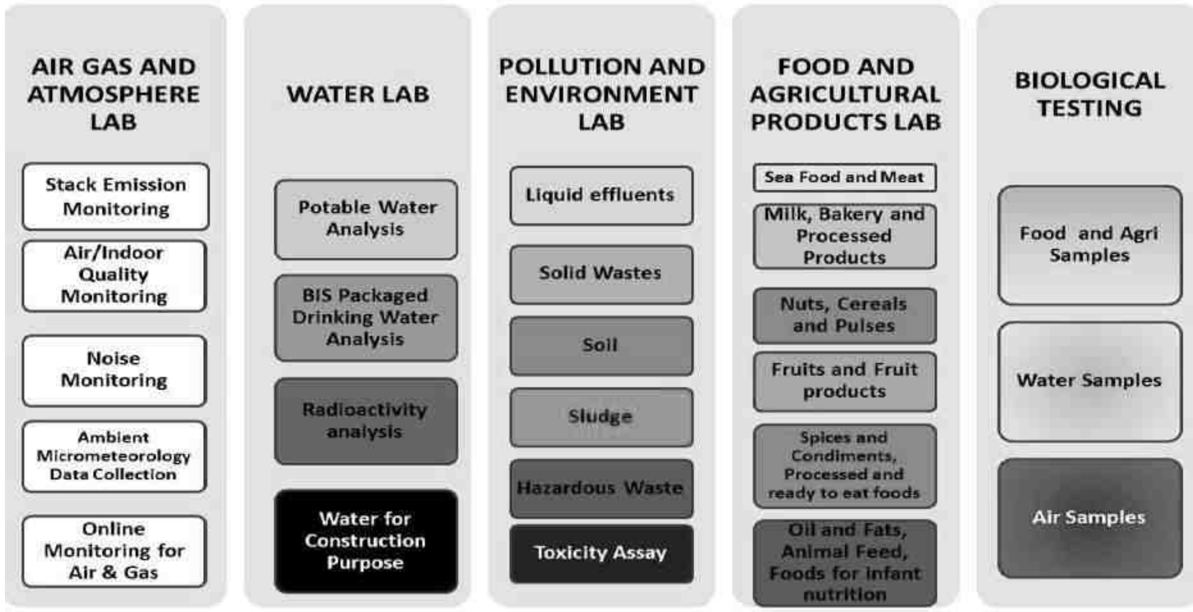
The company provides solutions to several industries like Refineries, Thermal Power Plant, Pharma, R&D Facilities, Electroplating and Manufacturing, IT Parks, Residential Complexes, Mines, Dairies, Food Processing, Textile mills, Breweries, etc.

The company is specialized in executing projects right from concept development, supply, erection, commissioning and operation on turnkey basis. HECS has successfully executed more than 300 environmental engineering projects for various industrial sectors both in India and overseas.

This EIA/EMP Study has been carriedout by Hubert Enviro Care systems (P) Ltd. accredited by QCI-NABET for 7(c) – 'A' Category.

12.2.1 Consultancy Profile:

- HECS is accredited by QCI-NABET
- An approved consultant for carryout EIA studies across India
- India's leading multidisciplinary Environmental Consultancy organization
- HECS- Consultancy division comprises of technical skilled and competent Team of 40 people. The team consists of Three Doctorates & about thirty postgraduates
- HECS has industry specific prominent expert to provide solutions & recommendations
- Serving client more than 25 years & pan India presence in the following sectors:
    - Environmental Clearance
    - Coastal Regulation Zone
    - Risk Assessment, DMP, HAZOP studies
    - Feasibility/ treatability studies
    - Due diligence studies
    - Ground water Clearance
    - DISH, PESO and other statutory approvals
    - Consent to Establish, Consent to Operate
    - Hazardous waste, bio medical waste authorization
    - Other environmental approvals
- Has an in-house laboratory wherein the following activities are being carried out:



12.2.2 QCI – NABET Accreditation

Consultancy	Hubert Enviro Care Systems Pvt. Ltd., Chennai
NABET Certificate No	NABET/ EIA/ 2224/ SA0190 Valid up to 27/07/2024
NABL Cerificate No	TC-5786 Valid up to 29/04/2024

National Accreditation Board for Education & Training (NABET) is a constituent board of the Quality Council of India (QCI). QCI, NABET has accredited HECS for carrying out Category 'A & Category B' EIA studies in the following sectors:

QUALITY COUNCIL OF INDIA
QCI Creating an Ecosystem for Quality

NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Hubert Enviro Care Systems Pvt. Ltd.,

A-21, (Behind Lions Club School) III Phase, Thiru Vi Ka Industrial Estate, Guindy, Chennai - 600 032.

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

S. No	Sector Description	Sector (as per) NABET	Sector (as per) MoEFCC	Cat.
1	Mining of minerals including open cast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation	7	2 (b)	A
6	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	B
7	Cement plant	9	3 (b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Pesticides industry and pesticide specific intermediates(excluding formulations)	17	5 (b)	A
10	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	18	5 (c)	A
11	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes	20	5 (e)	A
12	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	28	-	B
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Industrial estates/ parks/ complexes/ Areas, export processing zones(EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
15	Ports, harbours, break waters and dredging	33	7 (e)	A
16	Highways	34	7 (f)	B
17	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
18	Common municipal solid waste management facility (CMSWMF)	37	7 (i)	B
19	Building and construction projects	38	8 (a)	B
20	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Feb 3, 2023 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/23/2696 *dated March 6, 2023. The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems Pvt. Ltd, following due process of assessment*

Sr. Director, NABET
Dated: March 6, 2023

Certificate No.
NABET/EIA/2224/SA 0190

Valid up to
July 27, 2024

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