

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT
FOR THE
**DEVELOPMENT OF INDUSTRIAL PARK AT MANALLUR AND
SOORAPOONDI VILLAGES, GUMMIDIPOONDI TALUK,
THIRUVALLUR DISTRICT, TAMIL NADU OVER AN EXTENT OF
279.995HA. (691.587ACRES)**

**VILLAGES: MANALLUR AND SOORAPOONDI
TALUK: GUMMIDIPOONDI
DISTRICT :THIRUVALLUR
STATE: TAMIL NADU**

**Project scheduled under 7 (c) Category A – Industrial Estates/
Parks/ SEZ etc as per EIA Notification 2006 and its amendments
(General Condition Applicable)**

By



**M/s .STATE INDUSTRIES PROMOTION
CORPORATION OF TAMILNADU LIMITED**

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**NABET Certificate No.: NABET/ EIA/ 2224/ SA0190 (Valid up to
27/07/2024)**

ITCOT LIMITED, CHENNAI – Project Consultant

July 2023



Projects-III/EC/Manallur/2023

Date: 06.07.2023

DECLARATION BY THE PROJECT PROPONENT

I, Tmt E. Sundaravalli, I.A.S., Managing Director of State Industries Promotion Corporation of Tamil Nadu Limited (SIPCOT), give the declaration / undertaking that owing the contents (information and data) of EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) for the "Development of Industrial Park at Manallur and Soorapondi Villages, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu over an extent of 279.995 Hectares (691.587 Acres)" and the information and contents provided in the report are factually correct.


E. SUNDARAVALLI, I.A.S.
MANAGING DIRECTOR

State Industries Promotion Corporation of Tamil Nadu Limited

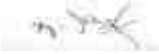
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Declaration by Experts contributing to the EIA for "Development of Industrial Park At Manallur And Soorapoondi Villages, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu Over An Extent Of 279.995ha. (691.587acres)"

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

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Signature:	
Date:	30.06.2023

Period of involvement :

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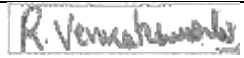

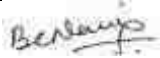
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2.	AQ	FAE	Dr. J R Moses	Mid of January to Till date	
3.	WP	FAE	Mr. Vamsee Krishna Navooru	Mid of January to Till date	
4.	SHW	FAE	Mr.P.V.R.S. Surendra	Mid of January to Till date	
5.	SE	FAE	Mr.V.Dhivakar	Mid of January to Till date	
6.	EB	FAE	Dr. V. Sundararaj	Mid of January to Till date	
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- 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*
- Geo - Geology*
- N - Noise*
- 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 Manallur And soorapoondi Villages, GummidipoondiTaluk,Thiruvallur District, Tamil Nadu Over An Extent Of279.995ha. (691.587acres)". I also confirm that, the Consultant Organization, shall be fully accountable for any misleading information mentioned in the document.

Signature: 

Date: 30/06/2023

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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Annexure-2b	GO No. 285 dated 03/08/2018 regarding alienation of 283.08 Ha of poramboke land to SIPCOT for the development of Industrial Park
Annexure-2c	Thiruvallur district Collector Letter No. 14888/2018 dated 10/06/2019 regarding exclusion of 3.08.5 Ha of land
Annexure-2d	Land Delivery Receipt in proof of taking over possession of 279.99.5 Ha of poramboke land from Zonal Deputy Tahsildar
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Annexure-12	Contour map of proposed Industrial Park
Annexure-13	Detailed Cumulative Impact Assessment
Annexure-14	Biodiversity Report
Annexure-15	Hydrogeology Report
Annexure-16	Undertaking for No textile manufacturing industry will be established
Annexure-17	Conservation Plan for Schedule 1 Species

Annexure No.	Details
Annexure-18	Noise Modelling Details
Annexure-19	NGT Order

1. INTRODUCTION

1.1 Project Background

SIPCOT propose to establish an Industrial Park at Manallur and Soorapoondi villages Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu over an extent of 279.995Ha. (691.587Acres).

The Industrial Park is planned with 10% Industrial plot area for 5(f) category industries(Non-Pharma) and balance 90% Industrial plot areaplot area for non ECcategory. 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). Besides TN – AP interstateboundary is ~3.13 Km (towards NNW) from the project boundary and Pulicat lake bird Sanctuary is ~5.77 Km (towards NE). Therefore, General Condition is applicable.

- SIPCOT has obtained Environmental Clearance from MoEF&CC for the Development of Industrial Park vide File no .:21-59/2015 IA.IIIon 10.11.2020for this project.
- Subsequently, Appeal No. 32/2020 and Appeal No. 34/2020 was filed in the Hon'ble National Green Tribunal (NGT) challenging against the Environmental Clearance issued for Manallur Industrial Park.
- In respect of the above Appeals, the Hon'ble National Green Tribunal has passed Judgment vide Order dated 30.09.2022 stating that the Environmental Clearance issued by MoEF&CC to SIPCOT for establishing Manallur Industrial Park is suspended for sometime till conducting further studies and appraisal to be done by MOEF&CC.The copy of NGT Order is Enclosed as Annexure-19.
- NGT has directed MoEF&CC to refer the matter to EAC for the issual of Additional ToR.
- As per direction of NGT, the MOEF&CC has considered the project in 312th EAC Meeting held on 04.11.2022.EAC requested SIPCOT to submit online application in PARIVESH portal for the grant of ToR.

Accordingly,application for ToR was uploaded vide Proposal No. : **IA/TN/INFRA1/407090/2022** dated 18.11.2022and the project was taken in 316thEAC meeting held on 16/12/2022.ToR was issued for the project vide File no .:21-59/2015 IA.IIIIdated 25/01/2023.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 the nodal agency of Government of Tamil Nadu to ensure sustainable development of industries. The objective of SIPCOT is to establish, develop, maintain and manage industrial complexes, parks and Growth Centres at various locations across the State of Tamil Nadu.

SIPCOT has so far developed 28 Industrial Parks/Complexes including 6 Sector Specific Special Economic Zones (SEZs) in 16 districts across Tamil Nadu. SIPCOT is the Nodal Agency for Government of Tamil Nadu to sanction and for the disbursement of Structured Package of Financial Assistance to large industrial units. The role of SIPCOT in the industrialization of the State is not only quantitative but also qualitative. Instead of just accelerating the pace of industrial growth, SIPCOT strives to ensure that disbursement 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 Lakshmi pathy Road, Egmore, Chennai - 600 008. The authorized signatory for the project is Tmt.E.Sundaravalli, I.A.S., Managing Director.

SIPCOT propose to establish an Industrial Park at Manallur and Soorapoondi villages Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu-Land area 279.995Ha. (691.587Acres).The Industrial Park is planned with 10% Industrial plot area for 5(f) category industries(Non-Pharma) and balance 90% Industrial plot area Industrial plot area for non EC category. 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 A, irrespective of the area). Besides TN – AP interstate boundary is ~3.13 Km (towards NNW) from the project boundary and Pulicat lake bird Sanctuary is ~5.77 Km (towards NE). Therefore, General Condition is applicable.

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 Chennai, SIPCOT propose to develop an Industrial Park at Manallur and Soorapoondi villages Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu.

Originally, Administrative Sanction was given for acquisition of 303.75 Ha (300.765 Ha of poramboke land and 2.985 Ha of patta land) for the development of Industrial Park at Manallur vide G.O (Ms) No.119 dated 07.06.2013. The same is enclosed as Annexure-2a. Later, poramboke land extent was reduced to 283.08 Ha vide Government of Tamil Nadu land alienation G.O(Ms) No.285 dated 03.08.2018, enclosed as Annexure -2b. Further, 3.085 Ha of poramboke land has been excluded vide Thiruvallur District Collector vide letter no. 14888/2018 dated 10.06.2019, enclosed as Annexure -2c and 2.985 Ha of patta land is also excluded from land acquisition and the total area of the Industrial Park is reduced to 279.99.5 Ha. Land Delivery Receipt in proof of taking over possession of 279.99.5 Ha of poramboke land from Zonal Deputy Tahsildar along with survey number wise land extent and classification is enclosed as Annexure-2d.

The Industrial Park is planned with only 10% Industrial plot area for non- pharma 5(f) category industries like Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc. and balance 90% Industrial plot area for non-EC category industries like E vehicle and its components manufacturing, Automobile and automobile accessories manufacturing, Engineering and fabrication, etc., falling under 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 A, irrespective of the area). Besides TN – AP interstate boundary is ~3.13 Km (towards NNW) from the project boundary and Pulicat lake bird Sanctuary is ~5.77 Km (towards NE). Therefore, General Condition is applicable.

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 of Chennai, SIPCOT propose to develop an Industrial Park at Manallur and Soorapoondi villages Gummidipoondi Taluk,Thiruvallur District, Tamil Nadu. 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 identifying the schedule and category of the project-Earlier EC 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 preprationofdraft EIA report for review and finalization.
- Conducting Public Hearing.
- Preparation of Final EIA Report by Encorporating Public Hearing queries.

- Uploading of EIA report for appraisal by EAC for Environmental Clearance.
- The flow chart for EIA methodology is given in **Figure 1-1**.

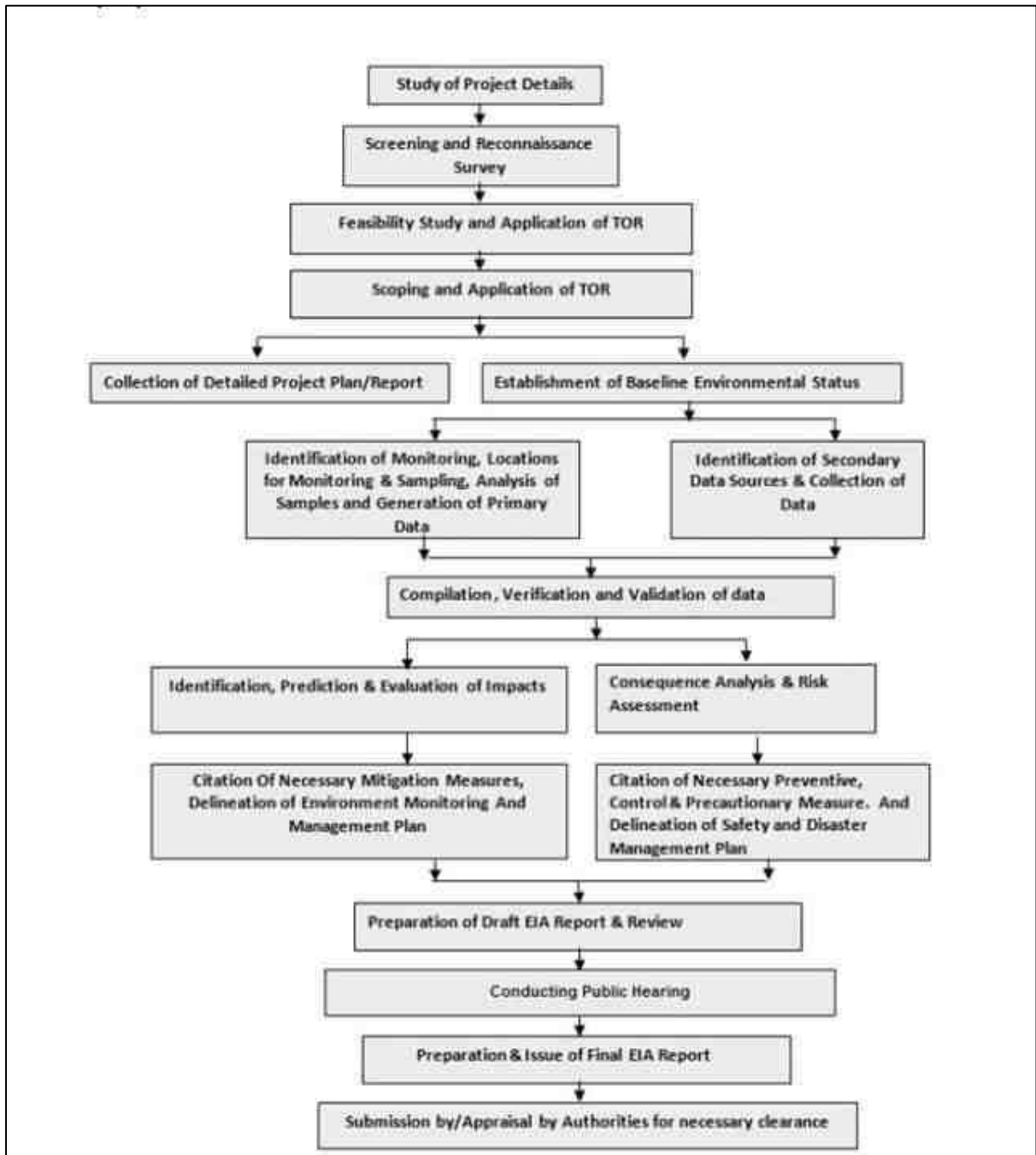


Figure 1-1 EIA methodology adopted for the project

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–(Environmentl 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 Compliance to the Terms of Reference Issued

S. N o	Terms of Reference	Compliance
Specific conditions		
1	PP shall comply the Hon'ble NGT Judgement dated 30th September 2022 in the matter of D. Ranjith Kumar Versus Union of India with G. Praveena Versus Union of India. Appeal No.32 of 2020 (SZ) With Appeal No.34 of 2020 (SZ). The verbatim of the court order is as	<p>Noted.Same is being compiled.</p> <p>Progress of Project as per NGT Order</p> <ol style="list-style-type: none"> 1) ToR issued by MOEF&CC on 25-01-2023. 2) Baseline studies Conduced on Mid of January 2023-Mid of April 2023. 3) Submission of Draft EIA report for Public Hearing. 4) Conduction of Public Hearing. 5) Final EIA report submission to MoEF&CC. 6) NBWL clearance for the project. 7) Approval of MoEF&CC.

	following:																										
2	A fresh baseline data has to be collected for one season and secondary data will have to be collected for the remaining period so as to assess the impact of the project in the project area and the neighboring villages	<ol style="list-style-type: none"> 1) Fresh baseline was collected for the period of One season- Mid of January 2023 to Mid of April 2023 and the details given in Chapter-3 section number 3.6 to 3.13 of EIA Report. 2) Secondary data was collected from Government and semi-government organization's published data(Such as Bhuvan,Census 2011,District Profile,IMD, etc) since November 2022 3) The impact of the project in the project area and the neighbouring villages have been studied and the details given in Chapter 4 of EIA Report. 																									
3	Mention about the number of villages that is coming within 10 Km radius and the nature and categorization of the land and the	<p>Around 65 villages comes within 10 km Radius of the project site.Details given in Table 3-22 in Chapter-3 Landuse Table for 10 km Radius is given as per Bhuvan 2015-16.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>sq.Km</th> <th>Acr</th> <th>Hec</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Crop land</td> <td>181.63</td> <td>44881.68</td> <td>18163</td> <td>45.65</td> </tr> <tr> <td>Fallow</td> <td>42.78</td> <td>10571.15</td> <td>4278</td> <td>10.75</td> </tr> <tr> <td>Plantation</td> <td>31.86</td> <td>7872.77</td> <td>3186</td> <td>8.01</td> </tr> <tr> <td>Rural</td> <td>27.06</td> <td>6686.66</td> <td>2706</td> <td>6.80</td> </tr> </tbody> </table>	Description	sq.Km	Acr	Hec	%	Crop land	181.63	44881.68	18163	45.65	Fallow	42.78	10571.15	4278	10.75	Plantation	31.86	7872.77	3186	8.01	Rural	27.06	6686.66	2706	6.80
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nature of land use for which it has been put and impact of the project on those lands if they are agricultural lands and agricultural activities are being undertaken.	Scrub land	23.26	5747.66	2326	5.85
	Tanks / Lakes / Ponds	23.16	5722.95	2316	5.82
	Deciduous	22	5436.31	2200	5.53
	Urban	16.19	4000.63	1619	4.07
	Forest Plantation	15.68	3874.61	1568	3.94
	Coastal wetland	9.28	2293.13	928	2.33
	Scrub Forest	2.42	597.99	242	0.61
	River / Stream / Canals	1.56	385.48	156	0.39
	Sandy area	0.41	101.31	41	0.10
	Gullied / Ravinous	0.34	84.02	34	0.09
	Evergreen / Semi Evergreen	0.14	34.59	14	0.04
	Mining	0.11	27.18	11	0.03
	Total	397.88	98318.14	39788	100.00
<p>The agricultural activities has seen above is 53.66% .Predominately viz.,Puvalai(Poovalai) ,karuru(karur), Ramapuram, Chinna puliyur,kannankottai, kolladam, kondamanallur(Sanaputhur village) ,Amarambedu(Periya Puliyur village) and Guruvarajakandigai(Egumadurai Village) are the villages under agricultural land and activities which are within 10 km vicinity.</p> <p>The zonation has been planned such that 90% Industrial plot area is Non EC Category Industries(Automobile , Electrical and Electronic ,Engineering fabrication) and only 10% of the Industrial plot area will be for EC Category Industry (Synthetic organic chemicals).</p> <p>Adequate pollution control measures such as provision of 38.07% of developable area i.e 106.575 Ha under Greenbelt development(including 50m GB near habitat areas),mandating individual industries to</p>					

adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers as per CPCB/ TNPCB guidelines., will be provided to reduce the impact of the project.

The Anticipated impacts and their Mitigation measure are given below :

S.no	Anticipated impacts	Mitigation measures
1	<p>Water Environment : 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</p>	<ul style="list-style-type: none"> • Individual industries will have their own Sewage Treatment Plants. Treated sewage will 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.
2	<p>Air Environment: Uncontrolled emission from the proposed project may lead to negative impact on the farm such as infertility of plant growth</p>	<ul style="list-style-type: none"> • Individual industries will be instructed to provide proper stack height for DG sets, furnaces & boilers 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

				<p>the boundary, additional 35m near habitat areas (to maintain 50 m as per ToR condition), 33% area by individual industries, 3m along road side and in other areas. Overall green belt area of the park will be 106.575 Ha i.e 38.07% of developable area.</p> <ul style="list-style-type: none"> • Individual industries will be instructed to provide all pollution control measures as per CPCB/TNPCB norms.
		3	<p>Soil 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. Spillage of waste oil from the D.G sets may also have an impact on soil quality.</p>	<ul style="list-style-type: none"> • Individual industries will be mandated to treat the sewage generated in STP and recycle treated sewage for flushing and green belt development as per CPCB/TNPCB guidelines. • Individual industries will be mandated to treat the effluent generated in ETP and propose Zero Liquid discharge system. • 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 by Individual units using Organic waste convertor (which will avoid odour, fly infestation and unsightly condition) and used as manure for green belt development. Inorganic waste will be disposed to TNPCB authorized recyclers/vendors. As a provision to have in

			<p>house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facility) has been earmarked for Solid Waste Management Facility.</p> <ul style="list-style-type: none"> Individual industries will have their own hazardous waste storage areas and the hazardous wastes (including waste oil from DG sets) generated will be disposed by the individual industries as per Hazardous and Other wastes (Management and Transboundary movement) Rules 2016.
		<p>4</p> <p>Noise Environment</p> <ul style="list-style-type: none"> Stationary sources due to operation of heavy duty machineries at the project site like Boilers, Compressors, DG sets, Pumps etc. 	<ul style="list-style-type: none"> 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.

		5	Traffic Management	<ul style="list-style-type: none"> • Internal roads will be provided within the Industrial Park • Sign boards will be provided near the crossing, merging and diverging points to regulate the traffic flow
4	<p>Ascertain the number of industries (if any) situated within a distance of 10 Km and conduct a cumulative impact assessment of the project area and nearby area and then submit a mitigating measures that they are going to take to overcome the possible pollution that is likely to be caused on account of the industrial</p>	<p>1)List of Industries present within 10 km Radius is given in Table 3-1 S.no.6</p> <p>2) Detailed Cumulative Impact Assessment by considering the industries situated within 10 km Radius is enclosed as Annexure-13</p> <p>3) Adequate pollution control measures such as provision of 38.07% of developable area i.e 106.575 Ha under Greenbelt development, mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers as per CPCB/ TNPCB guidelines., will be provided to reduce the impact of the project.</p>		

	park																																																							
5	While conducting the Ambient Air Quality test, the monitoring stations will have to be located in such a way that it must cover the reserve forest area, lake which are situated within a distance of 10 Km and then assess the impact of the project on those areas as well.	<p>Noted.</p> <p>1) Monitoring Location details are as Follows</p> <table border="1"> <thead> <tr> <th>Station Code</th> <th>Location</th> <th>Type of Wind</th> <th>Distance (~km) from Project boundary</th> <th>Azimuth Directions</th> <th>Justification</th> </tr> </thead> <tbody> <tr> <td>A1</td> <td>Project Site</td> <td>-</td> <td colspan="2">Within the Site</td> <td>-</td> </tr> <tr> <td>A2</td> <td>Nagarjunakandigai</td> <td>c/w</td> <td>5.60</td> <td>E</td> <td>Village</td> </tr> <tr> <td>A3</td> <td>Ramachandrapuram</td> <td>u/w</td> <td>0.45</td> <td>SE</td> <td>Village</td> </tr> <tr> <td>A4</td> <td>Manali</td> <td>c/w</td> <td>8.79</td> <td>SSE</td> <td>Near Pallavada Lake</td> </tr> <tr> <td>A5</td> <td>Kannankottai</td> <td>c/w</td> <td>6.80</td> <td>SSW</td> <td>Village</td> </tr> <tr> <td>A6</td> <td>Madarpakkam</td> <td>c/w</td> <td>1.18</td> <td>WSW</td> <td>Near Nemalur Reserve Forest</td> </tr> <tr> <td>A7</td> <td>Manallur</td> <td>d/w</td> <td>0.49</td> <td>NW</td> <td>Village</td> </tr> <tr> <td>A8</td> <td>Pondavakkam</td> <td>d/w</td> <td>3.12</td> <td>N</td> <td>Near Irukulam Reserve Forest</td> </tr> </tbody> </table> <p>Ambient Air Quality monitoring stations were selected which includes Madarpakkam(A6) near Nemalur Reserve Forest and Pondavakkam(A8) near Irukulam Reserve Forest. Manali(A4) is selected since it is near to Pallavada Lake.</p> <p>2) Ambient Air quality in the above said location is Within NAAQ standards.</p> <p>3) Predominant wind direction is East. Nearest Reserve forest is Satyavedu, which is located in west direction at a distance of 5.87 km. To minimize the impact, individual industries will provide Air Pollution Control Measures as per the as per CPCB /TNPCB Norms and also adequate stack height will be provided as per CPCB /TNPCB Norms. Further, 15m greenbelt will provided all along the site boundary and additional 35m(To maintain 50 m greenbelt) greenbelt is proposed near the habitat</p>	Station Code	Location	Type of Wind	Distance (~km) from Project boundary	Azimuth Directions	Justification	A1	Project Site	-	Within the Site		-	A2	Nagarjunakandigai	c/w	5.60	E	Village	A3	Ramachandrapuram	u/w	0.45	SE	Village	A4	Manali	c/w	8.79	SSE	Near Pallavada Lake	A5	Kannankottai	c/w	6.80	SSW	Village	A6	Madarpakkam	c/w	1.18	WSW	Near Nemalur Reserve Forest	A7	Manallur	d/w	0.49	NW	Village	A8	Pondavakkam	d/w	3.12	N	Near Irukulam Reserve Forest
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A8	Pondavakkam	d/w	3.12	N	Near Irukulam Reserve Forest																																																			

		<p>areas. Zero liquid discharge is mandated to all industries. So, there is no impact to the lakes present within the study area (i.e. 10 km).</p>
6	<p>Furnish the details regarding the flora and fauna in the nearby reserve forest which are situated within a distance of 10 Km which admittedly are in existence as per the EIA Report and the impact of the project on those flora and fauna on account of the establishment of the project</p>	<p>Biodiversity Report is Enclosed as Annexure-14</p> <p>Impact of the Project and its Mitigation measures</p> <p>Project site situated in open habitat landscape and surrounded by agriculture fields, industries, etc. Pulicat lake Bird Sanctuary is located at a distance of 5.77 Km of project site and tail end portion of Pulicat Lake is located at 8.92 Km. As a wetland ecosystem, the Pulicat lake area is important for the breeding and roosting birds and several other fauna and flora but only edge is covered in project buffer area. Therefore no direct impact is envisaged on the wetland.</p> <p>Adequate pollution control measures such as provision of 38.07% of developable area i.e. 106.575 Ha under Greenbelt development (including 50m GB near habitat areas), mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers as per CPCB/ TNPCB guidelines, will be provided to reduce the impact of the project.</p>

7	<p>While considering the impact of the project, mention about the nature of industries that are likely to be housed, the probable pollution that is likely to be caused with pollution index which are likely to be projected by similar industries in other areas so as to assess the likely impact of the project on environment and the neighboring areas and on that basis, they are expected</p>	Types of industries proposed for the project				
		S.No	Type Industries	Approximate % of Industrial plot area	Industrial plot area in Ha	Industrial plot area in Acres
		1	5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc.,	10	19.838	49.00
		2	Non EC Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc.,	90	178.866	441.80
			Total	100	198.704	490.80
		<p>1. The probable air pollution due to proposed industries are predominately PM, CO ,SO₂, NO_x and their estimated ground level concentration along with the existing industries are calculated the increase values are given below</p>				
		Pollutant	Estimated Incremental Conc. (µg/m³) (Without SIPCOT Manallur)	Estimated Incremental Conc. (µg/m³) (With SIPCOT Manallur)	NAAQ Standard(µg/m³)	
PM	7.74	7.78	100			
SO ₂	37.28	37.32	80			
NO _x	26.81	27.15	80			
CO	11.73	13.46	4000			
<p>AQI for the existing air environment as per baseline studies done during the period of mid of January to mid of April 2023 is as follows:</p>						

LOCATION	PM ₁₀	PM _{2.5}	SO ₂	No _x	CO	O ₃	NH ₃	AQI	AQI Category
Max. Base line Conc. (µg/m³)	72.83	48.91	10.95	27.51	330	12.01	13.28	82	Satisfactory
Total Conc. (µg/m³)	73.32	48.91	11.41	31.11	336.1	12.01	13.28	82 (Worst Case Scenario)	Satisfactory

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

(Source: CPCB .nic.in)

2. The probable water pollution impacts due to proposed industries may not be impact the neighbouring areas, since zero liquid discharge is proposed.
3. The probable Noise pollution impact may not be to the neighbouring areas, because Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary, additional 35m near habitat areas (to maintain 50 m as per ToR condition), 33% area by individual industries, 3m along road side and in other areas. Overall green belt area of the park will

be 106.575 Ha i.e 38.07% of developable area.Details given in Chapter-10Section 10.5.2

To suggest necessary mitigation measures and also the CSR that will have to be provided to mitigate the loss that is likely to be caused to the neighboring villages and they are not only expected to consider the villages which are

There will be minimal impact due to the proposed project. Adequate pollution control measures such as provision of 38.07% of developable area i.e 106.575 Ha under Greenbelt development, mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers as per CPCB/ TNPCC guidelines., will be provided to reduce the impact of the project.

As per the MoEF&CC Office Memorandum No. 22-65/2017-IA.III, dated 25.02.2021,the concerns raised during Public Hearing will be addressed and it will be considered as part of EMP.EMP plan along with cost estimates will be prepared including the activities required to fulfill the commitments made during Public Hearing and Final EIA report will be submitted to MoEF&CC.

Tentative EMP budget is given here under.

Environmental Management PlanBudget

S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
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coming within the project area alone for the purpose of establishment of the unit alone but the neighboring villages abutting the industrial park as well	1	Solid Waste Management Facility	800.00	64
	2	Greenbelt development	325.00	32.50
	3	Rain water harvesting	100.00	8
	Total EMP Cost		1225.00	104.50
9	Consider the groundwater table in the neighboring areas by conducting proper hydrological study and thereafter, provide necessary mitigation measures to reduce the impact of the project	<ol style="list-style-type: none"> 1) The water level observed in the study area during May 2023 based on the piezometric analysis varies from 2.9 m (Madrapakkam) to 6.2 m (Manellore) . 2) Ground water level near area earmarked for 5f category(Non Pharma) industries ranges from 4.3 to 4.7 below ground level.Since Zero liquid discharge will be mandated to individual industries there will be no impact on ground water.Detailed hydrogeology study conducted and enclosed as Annexure-15 3) There will not be any ground water extraction as the water source from Thervoykandigai pump house SIPCOT.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. 		

<p>1 0</p> <p>On the basis of the further ToR issued, the project proponent is directed to prepare a draft EIA Report and conduct a fresh public hearing as required under Para (7) of the EIA Notification by uploading the EIA Report on the basis of the ToR issued along with the EIA Report already prepared by them and after getting the views of the public, prepare a final EIA and EMP and place the same before</p>	<p>Public hearing will be conducted as per "PUBLIC HEARING Guidelines –As per EIA Notification 2006(Given in Appendix IV)"</p>
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	the MoEF&CC for further appraisal.	
1 1	On receipt of the same, the MoEF&CC is directed to refer the same for further appraisal to EAC and the EAC is directed to conduct a further appraisal in an effective manner and address all the issues and then make their recommendations or findings and then refer the matter to the MoEF&CC for further appraisal	Noted
1	After getting the	Noted

2	recommendations/ findings from the EAC, the MoEF&CC is directed to appraise the same and make further amendments incorporating the conditions or otherwise based on the recommendations/ findings of the EAC and make amendment to the EC already granted, if it proposes to grant EC, after taking into account all the impacts and the restrictions of housing such units
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	in the eco sensitive zone etc.	
1 3	<p>The NBWL is also directed to consider these aspects while considering the application for clearance to be granted under the Wildlife (Protection) Act, 1972. Till such time, the MoEF&CC is directed to await the clearance granted by the NBWL for the purpose of appraisal of the project by the EAC as well as the MoEF&CC and then</p>	<p>NBWL application with all necessary details/documents will be submitted. Meanwhile the draft report is being submitted for conducting Public Hearing for the project.</p>

	take appropriate decision in this regard	
1 4	The MoEF&CC is directed to issue ToR as directed after getting recommendation from the EAC within a period of 1 month from the date of receipt of this Judgment and on receipt of the same, the project proponent is directed to complete the study and prepare the draft EIA Report within a further period of 5 months and thereafter,	Noted

	<p>public hearing will have to be conducted within a further period of 2 months after complying with the procedure provided under the EIA Notification and then, final EIA Report will have to be prepared and appraisal and consideration have to be completed by the EAC and the MoEF&CC within a further period of 6 months of completion of the public hearing</p>	
<p>1 5</p>	<p>The 4th respondent is</p>	<p>Noted. Same is being complied. SIPCOT has not commenced or carry out any activity in the project area.</p>

<p>directed not to carry out any activity in the project area without completion of the above process as directed by this Tribunal and further directions to be issued by the MoEF&CC in this regard</p>	
<p>Additional Points</p>	
<p>1 Detailed biodiversity studies be undertaken by a reputed institute such as Zoological Survey of India or other nationally reputed institute with a knowledge</p>	<p>Biodiversity study was undertaken by M/s.Green Works Trust (GWT). Green Work Trust (GWT) is an NGO established in 2016. In 2017-18, GWT conducted a year-long comparative biodiversity survey at two sites at Lamkani, Dhule district, Maharashtra. Currently, GWT is conducting a long-term bird monitoring programme at 2 protected areas- Karnala Bird Sanctuary and Phansad Wildlife Sanctuary in Maharashtra organized by Maharashtra Forest Department. GWT has a team of biodiversity experts who bring a vast collective experience to the organisation. Biodiversity Report is Enclosed as Annexure-14</p>

	of the region and its biodiversity	
2	All water bodies within the site should be marked and plan to protect it be submitted in EIA-EMP	No Water Bodies are present within the site as per revenue record.
3	Old and large and heritage trees if any should be identified and geo-tagged and will not be allowed to cut. Details of the same are provided in the EIA-EMP.	There is no old and large and heritage trees present within the project site.
4	Details about achieving Zero Liquid Discharge be detailed out in the EIA-EMP.	1) SIPCOT will mandate individual industries to establish Zero liquid discharge (ZLD) based effluent treatment plants to reuse their treated effluent in their Process/utilities. The same will be stipulated as a condition in the land allotment order itself. 2) Details of waste water generation and Recycled water used for the process is given in Chapter-2 Section 2.8.2
5	As per the	Noted.

<p>Ministry's Office Memorandum F. No. 22-65/2017-IA.III dated 30th September, 2020, the project proponent, based on the commitments made during the public hearing, shall include all the activities required to be taken to fulfil the commitments in the Environment Management Plan along with cost estimates of these activities, in addition to the activities proposed as per</p>	<p>EMP plan along with cost estimates will be prepared including the activities required to fulfill the commitments made during Public Hearing and Final EIA report will be submitted to MoEF&CC.</p>
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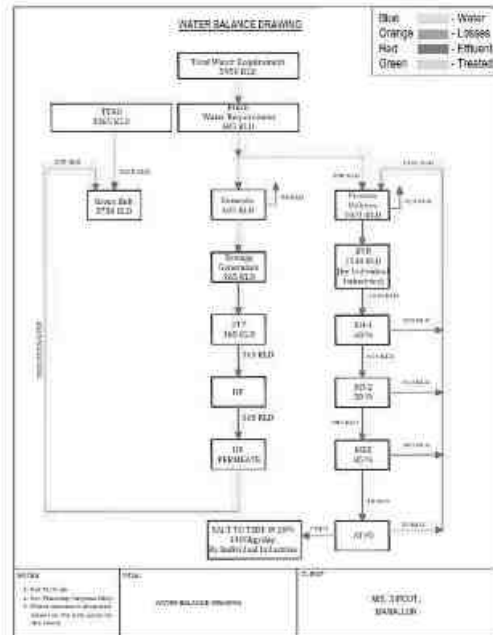
	<p>recommendations of EIA Studies and the same shall be submitted to the ministry as part of the EIA Report. The EMP shall be implemented at the project cost or any other funding source available with the project proponent</p>	
6	<p>The drainage pattern of the existing land use shall be plotted and submitted along with the conservation plan for the drainage passing through the area</p>	<ol style="list-style-type: none"> 1)No Water Bodies are present within the site as per revenue record. 2)Storm water layout is enclosed as Annexure-11 3) Around 785 numbers of Rain water harvesting Pits will be proposed for the Project.

7	Proper water drainage system should be intended to set aside the impervious roads, lined drains, routing surface drainage to settlement tanks/pits etc	1)Storm water drains will be provided along the Road side and apart from this 785 numbers of Rain Water Harvesting pits will be provided along storm drain for rain water harvesting.Excess runoff will be filtered and collected in the pond adjacent to the site.
8	No textile manufacturing industry should be established in the proposed industrial area.	Noted. Undertaking for No textile manufacturing industry(wet process)will be established in the park is Enclosed as Annexure-16
9	Water treatment plant of effluent, recycle/ reuse and disposal should be well planned.	SIPCOT will mandate individual industries to establish Zero liquid discharge (ZLD) based effluent treatment plants to reuse their entire treated effluent in their Process/utilities.The same will be stipulated as a condition in the land allotment order itself.
10	In the project area adjacent to villages	Green belt Layout is revised as per ToR condition and Green belt Buffer of 50m is provided near habitat areas.The revised Green belt layout is Enclosed as Annexure-9

	<p>boundaries width of the green belt should be minimum 50 meters</p>
<p>1 1</p> <p>The planning of Industrial Estate should be based on the criteria mentioned in this Ministry's Technical EIA Guidance Manual for Industrial Estate (2009) as well as CPCB's Zoning Atlas Guidelines for siting industries. No ground water shall be used in any case. Proponent is required to obtain</p>	<ol style="list-style-type: none"> 1) Noted Draft EIA prepared based on the Technical EIA Guidance Manual for Industrial Estate (2009) 2) There is no Ground water Extraction for the proposed Project. The zonation map prepared based on this Ministry's Technical EIA Guidance Manual for Industrial Estate (2009) as well as CPCB's Zoning Atlas Guidelines for siting industries is enclosed as Annexure –6 3) Total water requirement for the project during operation phase is 5956 KLD. Fresh water requirement of 685 KLD and TTRO water requirement of 3365KLD will be sourced from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). The balance water of 1906 KLD will be met from recycling of treated wastewater. Letters from CMWSSB for the supply of raw water from SIPCOT Industrial Park, Thervoykandigai (from Red Hills) and TTRO water from Kodungaiyur TTRO plant are enclosed as Annexure-7.

<p>permission from competent authority to use water from river or other surface water sources. Consent to Operate shall not be issued without obtaining permission from competent authority for use of surface water.</p>	
<p>1 Provide detailed water balance statement a scheme to achieve ZLD by each industrial unit as well as for utilization of treated sewage. xvi. Since, natural</p>	<p>1) Detailed water Balance is given below</p>

drainage pattern is seen in/around the proposed project site, it is important to have a detailed hydrogeological study on the catchment area of the drainage system within core zone of the project area



- 2) As per Revenue record, no waterbodies present within the site. So, There is no catchment within the core zone of the project area. Storm water will be collected in RWH pits through storm water drains along the road side and only excess storm water will be let into nearby water bodies after filtration .
- 3) Detailed Hydrogeology Report is Enclosed as **Annexure-15**

1	The Action Plan on	All the condition stipulated in Circular will be compiled.
3	the compliance of	
	S.NO	Condition
		Reply

the recommendations of the CAG as per Ministry's Circular No.J11013/71/2016-IA.I (M) dated 25th October, 2017 needs to be submitted at the time of appraisal of the project and included in the EIA/EMP Report	1	Revalidation of data with respect of grant of TOR / EC to be carried out on regular basis with NIC.	Noted
	2	While scrutinizing the EIA reports, may ensure that they are as per the TOR, comply with the genetic structure, baseline data is accurate and concerns raised during the public hearing are accurately addressed	Noted and prepared EIA report as per ToR, complied with generic structure, baseline data is accurate and concerns raised during the public hearing were addressed accurately.
	3	The EIA reports / EC letters should be clearly mentioned cost of activities under EMP and ESR along with the timelines for their implementation	Noted. The break-up of EMP is given in Chapter 10 Table 10-3
	4	EMP /EC conditions should be more specific for the area to be developed under green belt and species to be planted in consultation with Forest/ Agriculture Department along with post EC Third Party evaluation	Noted and list of species identified for greenbelt is given in Chapter 4 Table4-31
	5	Copy of EC letter to these projects should be endorsed to CGWA to ensure monitoring of GW extraction	Noted. There is no ground water extraction for proposed Project.
	6	While appraising the EC application, the name and number of posts to be engaged by the proponent for implementation and monitoring of environmental parameters be specified	Noted. The Organizational set up for environmental management cell is given in Figure 10-1 and Table 10-1
	7	While prescribing the conditions of EC please mention installation of monitoring stations and frequency of monitoring of various environment parameters in	Noted

		respect of air, surface water, ground water, noise etc	
	8	While scrutinizing the EC application, should ensure that the EIA report is prepared by accredited consultant having no conflict of interest with any committee processing the case	Noted. The EIA report was prepared by accredited consultant having no conflict of interest with any committee processing the case. The accredited certificates are given in the EIA report.
	9	The conditions of EC should be compatible with the nature and type of project in-order to avoid non uniformity in similar kinds of projects	Noted
	10	The EIA Report should clearly mention activity wise EMP and ESC cost details and should depict clear break-up for the capital and recurring costs along with the timeline for incurring the capital cost. The basis of allocation of EMP and ESC cost should be detailed in EIA report to enable the comparison of compliance with the commitment by the Central and State monitoring agencies. The capital and revenue expenditure amount to be spent on EMP and CSR cost should be distinctly specified in the EC letter. It should be ensured that there is a time bound action plan for fulfilling the EMP commitment mentioned in the EIA report to the EC letter.	Noted. The break-up of EMP is given in Chapter 10 Table 10-3
	11	On maintenance of separate account of EMP and ESC, EC conditions should be more specific like opening a separate bank account and accounting format with	Noted and separate account will be maintained for EMP/CER

			specific heads of accounts in order to provide financial accountability by project proponent. This should be made compulsory part of the Annual Environment Statement.		
1 4	As per the Ministry's Office Memorandum F. No. 22-65/2017-IA.III dated 30th September, 2020, the project proponent, based on the commitments made during the public hearing, shall include all the activities required to be taken to fulfill these commitments in the Environment Management Plan	<p>Noted.</p> <p>EMP plan along with cost estimates will be prepared including the activities required to fulfill the commitments made during Public Hearing and Final EIA report will be submitted to MoEF&CC.</p>			

	<p>along with cost estimates of these activities, in addition to the activities proposed as per recommendations of EIA Studies and the same shall be submitted to the ministry as part of the EIA Report. The EMP shall be implemented at the project cost or any other funding source available with the project proponent</p>
<p>1 5</p>	<p>In pursuance of Ministry's OM No stated above the project proponent</p> <p>Noted, same will be done in Final EIA report after Public Hearing</p>

<p>shall add one annexure in the EIA Report indicating all the commitments made by the PP to the public during public hearing and submit it to the Ministry and the EAC</p>	
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Standard ToR

<p>1 Reasons for selecting the site with details of alternate sites examined/ rejected/ selected on merit with comparative statement and reason/ basis for selection. The</p>	<p>SIPCOT considered three alternative sites based on the need for promoting an Industrial Park in the proposed project location. Industrial growth, preciously, require good connectivity to the urban areas and other facilities like port, airports etc. Hence only, the present location is proposed.</p> <p>The alternative sites considered as per SOI Topo map were:</p> <ul style="list-style-type: none"> • Site-I: Arur (Kannambakkam) • Site II: Sanaputhur, Iguvarpalaiyam&Lakshminarasimapuram • Site III: Manallur and Surapundi (hereinafter referred as Manallur and Soorapoondi villages as per land alienation GO Ms No 285). <p>Based on the alternate site Matrix The maximum score of 95/130 is seen for Manallur&Soorapoondi site. Hence the land available at Manallur&Soorapoondi Villages is selected for development of this Industrial Park. Details given in Chapter 5</p>
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	<p>examination should justify site suitability in terms of environmental damage, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.</p>																			
2	<p>Submit the details of the land use break-up for the proposed project. Details of land use around 10 km</p>	<p>Land use for proposed project</p> <table border="1"> <tr> <td rowspan="2">Area break up</td> <td colspan="3">During 316th EAC Meeting- ToR PPT</td> <td colspan="3">Revised for EIA</td> </tr> <tr> <td>Acres</td> <td>Ha</td> <td>Percentage of developable</td> <td>Acres</td> <td>Ha</td> <td>Percentage of developable area</td> </tr> </table>						Area break up	During 316th EAC Meeting- ToR PPT			Revised for EIA			Acres	Ha	Percentage of developable	Acres	Ha	Percentage of developable area
Area break up	During 316th EAC Meeting- ToR PPT			Revised for EIA																
	Acres	Ha	Percentage of developable	Acres	Ha	Percentage of developable area														

radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images.

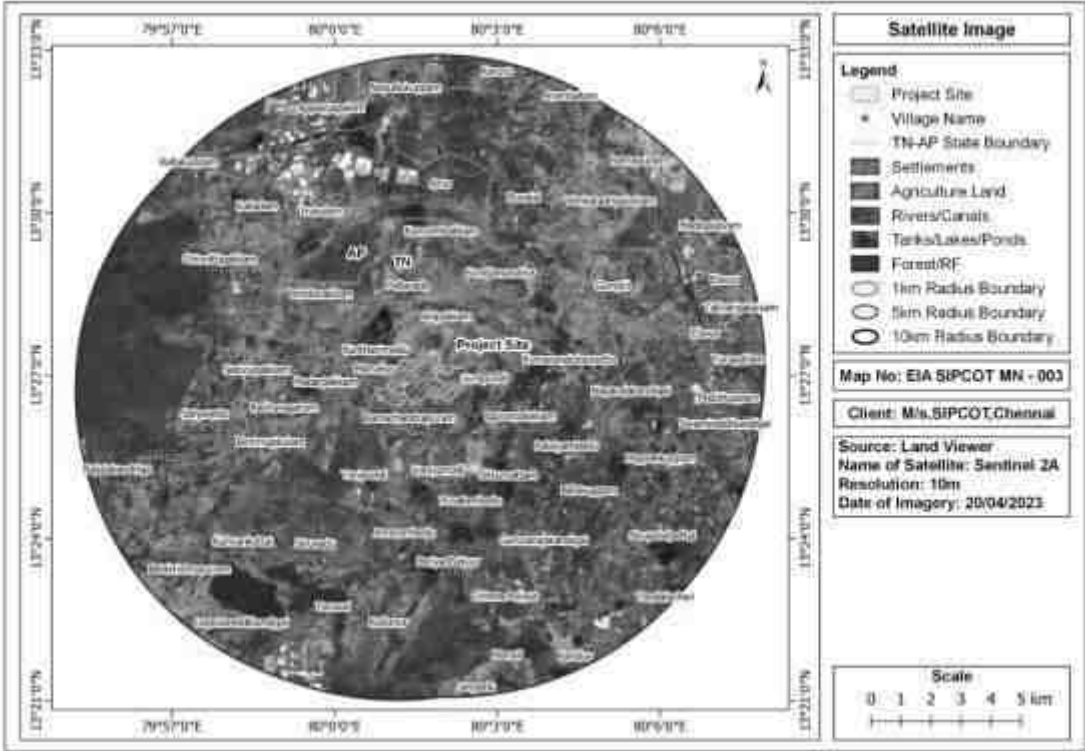
			area (%)			(%)
Industrial plot area	514.540	208.316	74.40%	490.800	198.704	70.97%
Common amenities	11.390	4.611	1.65%	19.040	7.709	2.75%
Commercial activities	20.750	8.401	3.00%	20.750	8.401	3.00%
Solid waste management	5.000	2.024	0.72%	5.000	2.024	0.72%
Road, storm water drains	52.300	21.174	7.56%	54.720	22.154	7.91%
Green belt	87.607	35.469	12.67%	101.277	41.003	14.65%
Developable area	691.587	279.995	100.00%	691.587	279.995	100.00%

Land use within 10 km Radius of the project site

S.No	Division of Land Use/Land Cover	Area in Sq.Km	Area in Acres	Area in Ha	Total Area %
1	Agriculture,Crop land	1834.25	453252.35	183425	53.59
2	Agriculture,Plantation	87.77	21688.41	8777	2.56
3	Agriculture,Fallow	115.92	28644.41	11592	3.39
4	Barren/unculturable/ Wastelands, Salt Affected land	7.42	1833.52	742	0.22
5	Barren/unculturable/ Wastelands, Scrub land	190.58	47093.27	19058	5.57
6	Barren/unculturable/ Wastelands, Sandy area	12.83	3170.36	1283	0.37
7	Barren/unculturable/Wastelands, Gullied/Ravinous Land	0.11	27.18	11	0.00

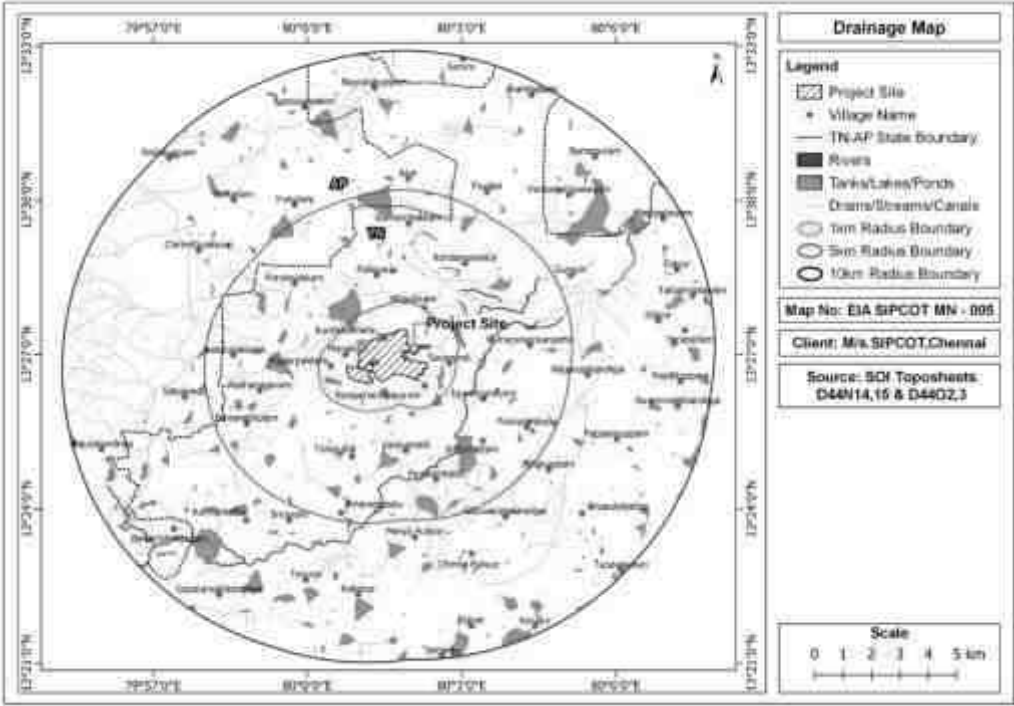
8	Barren/unculturable/ Wastelands, Barren rocky	2.39	590.58	239	0.07
9	Builtup,Urban	295.16	72935.51	29516	8.62
10	Builtup,Rural	272.76	67400.36	27276	7.97
11	Builtup,Mining	7.54	1863.17	754	0.22
12	Forest,Evergreen/ Semi evergreen	18.22	4502.25	1822	0.53
13	Forest,Deciduous	68.13	16835.26	6813	1.99
14	Forest,Forest Plantation	10.57	2611.90	1057	0.31
15	Forest,Swamp/ Mangroves	3.03	748.73	303	0.09
16	Forest,Scrub Forest	0.03	7.41	3	0.00
17	Wetlands/Water Bodies, Inland Wetland	0.65	160.62	65	0.02
18	Wetlands/ Water Bodies, Reservoir/Lakes/Ponds	341.57	84403.65	34157	9.98
19	Wetlands/Water Bodies, River/Stream/canals	67.33	16637.58	6733	1.97
20	Wetlands/Water Bodies,Coastal Wetland	86.74	21433.89	8674	2.53
Total		3423	845840.42	342300	100

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

		 <p>Satellite Image</p> <p>Legend:</p> <ul style="list-style-type: none"> □ Project Site • Village Name — TN-AP State Boundary ■ Settlements ■ Agriculture Land ■ Rivers/Canals ■ Tanks/Lakes/Ponds ■ Forest/RF ○ 1km Radius Boundary ○ 5km Radius Boundary ○ 10km Radius Boundary <p>Map No: EIA SIPCOT MN - 003</p> <p>Client: M/s.SIPCOT,Chennai</p> <p>Source: Land Viewer Name of Satellite: Sentinel 2A Resolution: 10m Date of Imagery: 20/04/2023</p> <p>Scale 0 1 2 3 4 5 km</p>
3	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/ villages and	<ol style="list-style-type: none"> 1) Environmental sensitive places are given in Chapter 3, Table 3-1 2) Entire Land is Acquired By SIPCOT .Land Delivery Receipt is enclosed asAnnexure-2d 3) There is no R&R for Proposed project

	present status of such activities.																																																																				
4	Examine the impact of proposed project on the nearest settlements.	<p>1) Settlements near project area given below</p> <table border="1"> <thead> <tr> <th colspan="3">Villages</th> <th>Pop</th> </tr> </thead> <tbody> <tr> <td>Hamlet(Kunthanimedu)</td> <td>Adjacent to Site</td> <td>N</td> <td>200</td> </tr> <tr> <td>Madarpakkam</td> <td>Adjacent to Site</td> <td>W</td> <td>4,737</td> </tr> <tr> <td>Manallur</td> <td>0.01km</td> <td>W</td> <td>4,534</td> </tr> <tr> <td>Ramachandrapuram</td> <td>0.08km</td> <td>S</td> <td>300</td> </tr> <tr> <td>Sankaranarayanapuram</td> <td>0.35km</td> <td>N</td> <td>350</td> </tr> <tr> <td>Surapundi</td> <td>0.52km</td> <td>E</td> <td>1,480</td> </tr> <tr> <td>Pannur</td> <td>0.58km</td> <td>S</td> <td>400</td> </tr> </tbody> </table> <p>2) Result of Cumulative Impact Assessment shown below</p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)</th> <th>Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)</th> <th>Total Conc. ($\mu\text{g}/\text{m}^3$)</th> <th>NAAQ standard ($\mu\text{g}/\text{m}^3$)</th> <th>% increase</th> </tr> </thead> <tbody> <tr> <td>PM10</td> <td>72.83</td> <td>0.50</td> <td>73.33</td> <td>100</td> <td>0.68</td> </tr> <tr> <td>SO2</td> <td>10.95</td> <td>0.46</td> <td>11.41</td> <td>80</td> <td>4.2</td> </tr> <tr> <td>NO_x</td> <td>27.51</td> <td>3.66</td> <td>31.17</td> <td>80</td> <td>13.30</td> </tr> <tr> <td>CO</td> <td>330</td> <td>50.81</td> <td>380.81</td> <td>4000</td> <td>15.39</td> </tr> </tbody> </table> <p>All parameters are well within NAAQ standards.</p> <p>3) Predominant wind direction is East. The Nearest Settlement in the west direction is Madarpakkam (Adjacent to site) and Manallur(0.01 km). To minimize the impact,adequate stack height will be provided as per CPCB /TNPCB Norms.Further, 15m greenbelt will provided all along the site boundary and additional 35m(To maintain 50 m greenbelt) greenbelt is proposed near the habitat areas. Site Layout Plan is attached as Annexure-5</p>						Villages			Pop	Hamlet(Kunthanimedu)	Adjacent to Site	N	200	Madarpakkam	Adjacent to Site	W	4,737	Manallur	0.01km	W	4,534	Ramachandrapuram	0.08km	S	300	Sankaranarayanapuram	0.35km	N	350	Surapundi	0.52km	E	1,480	Pannur	0.58km	S	400	Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard ($\mu\text{g}/\text{m}^3$)	% increase	PM10	72.83	0.50	73.33	100	0.68	SO2	10.95	0.46	11.41	80	4.2	NO _x	27.51	3.66	31.17	80	13.30	CO	330	50.81	380.81	4000	15.39
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5	Examine baseline environmental quality along with projected incremental load due to the project taking into account of the existing developments nearby.	Detailed Cumulative Impact Assessment by considering the industries situated within 10 km Radius is enclosed as Annexure-13
6	Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater, (c) surface water,	Details given in Chapter-3 Section 3.7 to 3.13

	(d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health.	
7	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area.	<p>1) Contour Map of site is Enclosed as Annexure-12</p> <p>2) Drainage map of 10 km Radius is Enclosed</p> 
8	Details regarding project boundary	The project site is located 5.77 km(NE) away from the Pulicat Lake Bird Sanctuary

	<p>passing through any eco-sensitive area and within 10 km from eco-sensitive area.</p>																	
9	<p>Green buffer in the form of green belt to a width of 15 meters should be provided all along the periphery of the industrial area. The individual units should keep 33% of the allotted area as a green area.</p>	<p>Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary, additional 35m near habitat areas (to maintain 50 m as per ToR condition), 33% area by individual industries, 3m along road side and in other areas. Overall green belt area of the park will be 106.575 Ha i.e 38.07% of developable area. Detailed green belt break up is given below</p> <table border="1"> <thead> <tr> <th>Green belt</th> <th>Area (Acres)</th> <th>Area (Ha)</th> <th>Percentage of developable area</th> </tr> </thead> <tbody> <tr> <td>Green belt in plot area (33% by industries)</td> <td>161.964</td> <td>65.572</td> <td>23.42</td> </tr> <tr> <td>Green belt by SIPCOT</td> <td>101.277</td> <td>41.003</td> <td>14.65</td> </tr> <tr> <td>Total</td> <td>263.241</td> <td>106.575</td> <td>38.07</td> </tr> </tbody> </table>	Green belt	Area (Acres)	Area (Ha)	Percentage of developable area	Green belt in plot area (33% by industries)	161.964	65.572	23.42	Green belt by SIPCOT	101.277	41.003	14.65	Total	263.241	106.575	38.07
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Total number of trees within the site is 2153 out of which 170 trees will felled down due to proposed project .To Compensate that trees 1700 trees will be planted in green belt area.Details Given below

S.NO	TYPE OF TREE	NO. OF PLANTS	NO. OF PLANTS to be Removed
1	Mango Tree	1294	103
2	Coconut	471	38
3	Guava	89	7
4	Sapota	24	2
5	Eucalyptus	38	3
6	Amla	95	8
7	Cashew	16	1
8	Banyan	2	-
9	Neem	50	4
10	Papaya	19	1
11	Palm	1	-
12	Naga	6	-
13	Teak	48	3
Total		2153	170

10	Submit the details of the trees to be felled for the project.	
11	Submit the details of the infrastructure to be developed.	<ol style="list-style-type: none"> 1) Road with storm water drains. 2) Common Amenities (i.e Project office including Medical dispensary, Water supply, EB, Fire station, ,etc) 3) Commercial Area (i.e Bank, ATM, Shops, Canteen,etc) 4) Solid waste Management
1	Submit the present	1) As per Bhuvan 2015-2016, the proposed site is predominantly classified as Barren -Scrub land

2	land use and permission required for any conversion such as forest, agriculture etc.	<p>(85%) with Agriculture- crop and fallow land (15%).</p> <p>2) As per the revenue records, the entire land (279.995 Ha) is government Poramboke land, which is alienated for the development of Industrial Park.</p>										
1 3	Submit details regarding R&R involved in the project	<p>1) There is No R&R</p> <p>2) Originally, Administrative Sanction was given for acquisition of 303.75 Ha (300.765 Ha of poramboke land and 2.985 Ha of patta land) for the development of Industrial Park at Manallur vide G.O (Ms) No.119 dated 07.06.2013. The same is enclosed as Annexure-2a. Later, poramboke land extent was reduced to 283.08 Ha vide Government of Tamil Nadu land alienation G.O(Ms) No.285 dated 03/08/2018, enclosed as Annexure -2b. Further, 3.085 Ha of poramboke land has been excluded vide Thiruvallur District Collector vide letter no. 14888/2018 dated 10.06.2019, enclosed as Annexure -2c and 2.985 Ha of patta land is also excluded from land acquisition and the total area of the Industrial Park is reduced to 279.99.5 Ha. Land Delivery Receipt in proof of taking over possession of 279.99.5 Ha of poramboke land from Zonal Deputy Tahsildar along with survey number wise land extent and classification is enclosed as Annexure-2d</p>										
1 4	Zoning of the area in terms of 'type of industries' coming-up in the industrial area based on the resource	<p>Type of Industries proposed for the project are given below</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Type Industries</th> <th>Approximate % of Industrial plot area</th> <th>Industrial plot area in Ha</th> <th>Industrial plot area in Acres</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc.,</td> <td>10</td> <td>19.838</td> <td>49.00</td> </tr> </tbody> </table>	S.No	Type Industries	Approximate % of Industrial plot area	Industrial plot area in Ha	Industrial plot area in Acres	1	5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc.,	10	19.838	49.00
S.No	Type Industries	Approximate % of Industrial plot area	Industrial plot area in Ha	Industrial plot area in Acres								
1	5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc.,	10	19.838	49.00								

	requirement along with likely pollutants with quantity from the various industries.	2	Non EC Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc.,	90	178.866	441.80
		Total		100	198.704	490.80
		Project zoning Details are given in Chapter-2 Section 2.7.1 .Layout showing Zoning of industries is attached as Annexure -6				
1 5	The project boundary area and study area for which the base line data is generated should be indicated through a suitable map. Justification of the parameters, frequency and locations shall be discussed in the EIA	Details Baseline monitoring and its results provided in Chapter 3, Section 3.6 3.7, 3.8, & 3.9 along with monitoring locations map , parameters and frequency.				
1	Submit Legal frame	The Organization of Environmental Management Cell (EMC) proposed given hereunder:				

6	work for the implementation of Environmental Clearance conditions - to be clearly spelt out in the EIA report.	<pre> graph TD A[SIPCOT Managing Director] --> B[General Manager (Projects)] B --> C[Manager] C --> D["Environmental Consultant - 1 Statutory Approvals from MoEF, SEIAA, TNPCB, DTCP, Forest, etc. Implementing Greenbelt Development, Storm water management, Rainwater harvesting, etc."] C --> E["Environmental Consultant - 2 Environmental Compliance, Environmental Monitoring, Environmental Auditing, Emergency and Disaster Management Cell, Occupational Health and Safety, etc."] D --> F[Office Staff] E --> G[Office Staff] </pre> <p>The details are given in Chapter-10 Section 10.3.1</p>
1 7	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under	<p>The Organization of Environmental Management Cell (EMC) proposed given hereunder:</p>

<p>the provisions of EP Act.</p>	<pre> graph TD A[SIPCOT Managing Director] --> B[General Manager (Projects)] B --> C[Manager] C --> D["Environmental Consultant - 1 Statutory Approvals from MoEF, SEIAA, TNPCB, DTCP, Forest, etc. Implementing Greenbelt Development, Storm water management, Rainwater harvesting, etc."] C --> E["Environmental Consultant - 2 Environmental Compliance, Environmental Monitoring, Environmental Auditing, Emergency and Disaster Management Cell, Occupational Health and Safety, etc."] D --> F[Office Staff] E --> G[Office Staff] </pre> <p>The details along with Roles and Responsibilities are given in Chapter-10 Section 10.3.1</p>
<p>1 8</p> <p>Site justification of the identified industry sectors from environmental angle and the details of the</p>	<p>SIPCOT considered three alternative sites based on the need for promoting an Industrial Park in the proposed project location. Industrial growth, preciously, require good connectivity to the urban areas and other facilities like port, airports etc. Hence only, the present location is proposed.</p> <p>The alternative sites considered as per SOI Topo map were:</p> <ul style="list-style-type: none"> • Site-I: Arur (Kannambakkam) • Site II: Sanaputhur, Iguvarpalaiyam&Lakshminarasimapuram • Site III: Manallur and Surapundi (hereinafter referred as Manallur and

	<p>studies conducted if any.</p>	<p>Soorapoondi villages as per land alienation GO Ms No 285).</p> <p>Based on the alternate site Matrix The maximum score of 95/130 is seen for Manallur&Soorapoondi site. Hence the land available at Manallur&Soorapoondi Villages is selected for development of this Industrial Park.Details given in Chapter 5.</p> <p>Due to issues raised in earlier public hearing and considering the water table it is proposed to accommodate industries sector viz. 5f (Non Pharma) in 10% of industrial plot area and Non EC category industries in 90%area.</p> <p>There will be minimal impact due to the proposed project. Adequate pollution control measures such as provision of 38.07% of developable area i.e 106.575 Ha under Greenbelt development, mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers as per CPCB/ TNPCB guidelines., will be provided to reduce the impact of the project.</p>
19	<p>Ground water classification as per the Central Ground Water Authority.</p>	<p>As per CGWA Report 2007 Project site fall under Semi critical Area.</p>
20	<p>Submit the source of water, requirement vis-à-vis waste water to be generated along with treatment facilities,</p>	<p>Total water requirement for the project during operation phase is 5956 KLD. Fresh water requirement of 685 KLD and TTRO water requirement of 3365KLD will be sourced from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). The balance water of 1906 KLD will be met from recycling of treated wastewater.Lettersfrom CMWSSB for the supply of raw water from SIPCOT Industrial Park, Thervoykandigai (from Red Hills) and TTRO water from Kodungaiyur TTRO plant are enclosed as Annexure-7.</p>

use of treated waste water along with water balance chart taking into account all forms of water use and management.	S.No	Water Usage	Fresh water (KLD)	TTRO Water (KLD)	Recycled water (KLD)	Total water(KLD)
	1	Domestic	405	0	0	405
	2	Process & Utilities	280	0	1541	1821
	3	Green belt development	0	3365	365	3730
		Total	685	3365	1906	5956

Details of Waste water generation and Management are given in Chapter-2 Section 2.8.2

2 1	Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rain water. Examine details.	Storm water will be collected in RWH pits through storm water drains along the road side and only excess storm water will be let into nearby water bodies after filtration. Around 785 numbers of Rain water Harvesting pits will be proposed for the project. Layout showing the storm water layout is enclosed as Annexure -11. Apart from this Individual industries will have their own rain water harvesting system.
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2 2	Examine soil characteristics and depth of ground	1) Soil Characteristics									
		S I. N	Paramet ers	Units	Proje ct Site	Nagarju nakandi gai	Ramacha ndrapura m	Mana li	Kann ankot tai	Madar pakka m	Ma nall ur

water table for rainwater harvesting.			S1	S2	S3	S4	S5	S6	S7	S8
1	Soil Texture	-	Sandy Loam	Sandy Caly	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
2	Sand	%	75.0	51.2	74.0	61.1	58.1	59.9	53.7	59.3
3	Silt	%	6.88	10.2	16.0	30.2	29.6	27.8	8.1	30.6
4	Clay	%	18.12	38.6	10.0	8.7	12.3	12.3	38.2	10.1
5	pH	-	7.11	7.02	6.98	7.21	6.87	7.04	6.79	7.06
6	Electrical conductivity	µmho/cm	218	114	164	14	166	175	21	240
7	Nitrogen as	µg/kg	244	114.	212.4	118.3	231.4	241.2	210.3	112.1
8	Phosphorus	mg/kg	16.64	21.23	11.1	29.9	24.46	34.41	24.2	31.11
9	Potassium	mg/kg	165.4	142.3	108.6	21.3	14.3	142.1	10.2	132.9
10	Boron	µg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)
11	Cadmium	mg/kg	BLQ(L OQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)	BLQ(L OQ 0.1)
12	Porosity	-	0.34	0.33	0.51	0.53	0.49	0.55	0.36	0.49
13	Water Holding Capacity	Inches per foot of water	1.53	2.01	1.61	1.71	1.81	1.69	2.21	1.98

2) The water level observed in the study area during May 2023 based on the piezometric analysis varies from 2.9 m (Madrapakkam) to 6.2 m (Manellore) .

		3) SIPCOT will provide around 785 Numbers of Rain water Harvesting pits within the site and Storm water layout is Enclosed as Annexure-11				
2 3	Examine details of solid waste generation treatment and its disposal.	S.No	Municipal Solid waste	Construction phase (kg/day)	Operation phase (kg/day)	Disposal Method
		1	Organic waste	27	2430	Individual industries will segregate the waste and organic waste will be composted and used as manure.
		2	Inorganic waste	18	1620	Sold to TNPCB authorized recyclers by individual industries
2 4	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption.	<p>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</p> <p>2) Apart from this, SIPCOT will instruct Individual Industries to provide Solar Panels on Roof Top area</p>				
2 5	In case DG sets are likely to be used during construction and operational	Details of utilities and DGs proposed for the project is given in Table 4-1. AERMOD software is used to estimate the GLCs from proposed air pollution Sources. Details are given in Section 4.3.				

	<p>phase of the project, emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.</p>																												
26	<p>Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic</p>	<p>1) Project site is well connected with Road and Rail 2) MDR 599 (Gummidipoondi -MadharpakkamRd) is passing within the site 3) Nearest Railway station is Elavur which is 8.21 km (E) Detailed Traffic Study is conducted and the details given Existing and proposed vehicular movement in SH 52 (Kavaraipettai – Sathyavedu Rd)</p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Type of Vehicles</th> <th>Existing vehicles</th> <th>Existing PCU</th> <th>Proposed vehicles</th> <th>Proposed PCU</th> <th>Total vehicles after project implementation</th> <th>PCU Factors IRC (SP 41)</th> <th>Total PCU after project implementation</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Motor Cycles or Scooters etc.</td> <td>135</td> <td>101.25</td> <td>25</td> <td>18.75</td> <td>160</td> <td>0.75</td> <td>120</td> </tr> <tr> <td>2.</td> <td>Three Wheelers/ Auto Rickshaw</td> <td>54</td> <td>108</td> <td>7</td> <td>8.4</td> <td>61</td> <td>2</td> <td>122</td> </tr> </tbody> </table>	S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation	1.	Motor Cycles or Scooters etc.	135	101.25	25	18.75	160	0.75	120	2.	Three Wheelers/ Auto Rickshaw	54	108	7	8.4	61	2	122
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2.	Three Wheelers/ Auto Rickshaw	54	108	7	8.4	61	2	122																					

congestion and providing faster trouble free system to reach different destinations in the city.

3.	Four Wheelers/ Cars	215	215	45	45	260	1	260
4.	Truck/Bus	51	188.7	5	11	56	3.7	207.2
5.	Agricultural Tractor	7	28	2	8	9	4	36
6.	Light Commercial Vehicle	41	82	10	20	51	2	102
	Total	503	722.95	94	111.15	597	13.45	847.2

Traffic volume after implementation of the project at SH 52 (Kavaraipettai – Sathyavedu Rd)

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	503	722.95	1500	0.48	C	Good
After implementation	597	847.2	1500	0.56	C	Good

Traffic study at MDR 599 (Gummidipoondi - MadharpakkamRd)

S. No	Type of Vehicles	Existing vehid	Existing PCU	Proposed vehid	Proposed PCU	Existing after project imple	Factor s IRC (SP	Existing after project imple
1	Motor Cycles or Scooters etc.	96	72	25	18.75	121	0.75	90.75

2	Three Wheelers/ Auto Rickshaw	26	31.2	7	8.4	33	1.2	39.6
3	Four Wheelers/ Cars	85	85	45	45	130	1	130
4	Truck/Bus	22	48.4	5	11	27	2.2	59.4
5	Agricultural Tractor	11	44	2	8	13	4	52
6	Light Commercial Vehicle	30	60	10	20	40	2	80
	Total	270	340.6	94	111.15	364	11.15	451.75

Traffic volume after implementation of the project at MDR 599 (Gummidipoondi - MadharpakkamRd)

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	270	340.6	1500	0.23	B	Very Good
After implementation	451.75	451.75	1500	0.3	B	Very Good

Due to propose Project, there will be increment in the vehicle movement and the level of service (LOS) anticipated is Good traffic flow for SH 52 (Kavaraipettai – Sathyavedu Rd) and Very good Traffic flow forMDR 599 (Gummidipoondi - MadharpakkamRd) . Traffic circulation plan for the proposed IP is attached as an **Annexure-8**.Details given in Chapter 4 section 4.5.2

2 7	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	Existing and proposed vehicular movement in SH 52 (Kavaraipettai – Sathyavedu Rd)								
		S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
		1.	Motor Cycles or Scooters etc.	135	101.25	25	18.75	160	0.75	120
		2.	Three Wheelers/ Auto Rickshaw	54	108	7	8.4	61	2	122
		3.	Four Wheelers/ Cars	215	215	45	45	260	1	260
		4.	Truck/Bus	51	188.7	5	11	56	3.7	207.2
		5.	Agricultural Tractor	7	28	2	8	9	4	36
6.	Light Commercial Vehicle	41	82	10	20	51	2	102		
	Total	503	722.95	94	111.15	597	13.45	847.2		
Traffic volume after implementation of the project at SH 52 (Kavaraipettai – Sathyavedu Rd)										
	For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification			
	Existing	503	722.95	1500	0.48	C	Good			
	After implementation	597	847.2	1500	0.56	C	Good			

Traffic study at MDR 599 (Gummidipoondi - MadharpakkamRd)

S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	vehicles after project implementation	Factors IRC (SP 41)	Total PCU after project implementation
1	Motor Cycles or Scooters etc.	96	72	25	18.75	121	0.75	90.75
2	Three Wheelers/ Auto Rickshaw	26	31.2	7	8.4	33	1.2	39.6
3	Four Wheelers/ Cars	85	85	45	45	130	1	130
4	Truck/Bus	22	48.4	5	11	27	2.2	59.4
5	Agricultural Tractor	11	44	2	8	13	4	52
6	Light Commercial Vehicle	30	60	10	20	40	2	80
	Total	270	340.6	94	111.15	364	11.15	451.75

Traffic volume after implementation of the project at MDR 599 (Gummidipoondi - MadharpakkamRd)

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	270	340.6	1500	0.23	B	Very Good

		After implementation	451.75	451.75	1500	0.3	B	Very Good			
		Traffic circulation plan for proposed Industrial Park is enclosed as Annexure-8									
28	Examine the details of transport of materials for construction which should include source and availability.	The construction materials will be sourced from nearby places for the proposed project. Nearest Town Gummidipoondi ~9.50 km,ESE									
29	Examine noise levels - present and future with noise abatement measures.	Noise monitoring was carried out in 8 location and the details given below									
		S. No	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)	
		1	Project Site	N1	Within Site		39.0	35.1	55	45	Industrial
		2	Nagarjunakandigai	N2	5.60	E	43.1	40.2	55	45	Residential
		3	Ramachandrapuram	N3	0.45	SE	43.3	39.4	55	45	Residential
		4	Manali	N4	8.79	SSE	38.1	35.0	55	45	Residential

		5	Kannankottai	N5	6.80	SSW	40.4	36.4	55	45	Residential
		6	Madarpakkam	N6	1.18	WSW	42.3	39.3	55	45	Residential
		7	Manallur	N7	0.49	NW	41.2	37.6	55	45	Residential
		8	Pondavakkam	N8	3.12	NW	42.5	35.5	55	45	Residential
		<p>Noise abatement measures</p> <ul style="list-style-type: none"> 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. 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. <p>Details of Noise Modelling is given in Annexure-17</p>									
30	Identify, predict and assess the environmental and sociological impacts on	<p>Environmental Impact:</p> <p>1) Air Pollution:</p> <p>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</p>									

account of the project. A detailed description with costs estimates of CSR should be incorporated in the EIA / EMP report.

due to movement of vehicles

2) Noise Environment:

The major Noise pollution sources 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.

Budget for Environmental Monitoring Plan

S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
1	Solid Waste Management Facility	800.00	64
2	Greenbelt development	325.00	32.50
3	Rain water harvesting	100.00	8
	Total EMP Cost	1225.00	104.50

3 1	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	<p>EMP During Construction Phase</p> <p>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.</p> <p>In order to mitigate such impacts and restrict them within tolerable levels, the following measures shall be adopted:</p> <ul style="list-style-type: none"> • 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
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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 muffers 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 given in Chapter 10.5

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 in different places	Half yearly	500	3,000
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 the site	Half yearly	3,500	21,000
Total				11,500	71,000

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	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 in different places	Half yearly	500	3,000
3	Water	Two number of surface and ground water samples near	Half yearly	3,000	24,000

			the site.				
		4	Solid waste / Hazardous waste	Storage areas of solid and hazardous waste	Half yearly	1,000	2,000
		5	Soil	Three locations within the site	Half yearly	3,500	21,000
		Total				11,500	71,000
3 2	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Emergency Evacuation plan and Disaster Management Plan is given in chapter 7 section 7.4. Detailed DMP is enclosed as Annexure –10					
3 3	Details of litigation pending against the project, if any, with direction/order passed by any	There is no litigation in the lands proposed for the project. There are no court cases.					

Court of Law against the Project should be given.

The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

Project Cost

S.No	Components	Total Cost (Rs. in crores)
1	Land alienation cost	119.28
2	Site Development	0.56
3	Development of Roads (including storm water drains, rainwater harvesting, approach road, Solid waste management)	102.55
4	Water Supply scheme	52.79
5	Common Facilities	13.6
6	Street light	5.52
7	Greenbelt Development	3.25
8	Contingency	42.59
9	Preliminary and Preoperative expenses	13.14
Total cost of project		353.28 crores

EMP Cost

S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
1	Solid Waste Management Facility	800.00	64
2	Greenbelt development	325.00	32.50

		3	Rain water harvesting	100.00	8
			Total EMP Cost	1225.00	104.50
3 5	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 website http://moef.nic.in/Manual/IndustrialEstate .	Noted and Complied			

2 PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

SIPCOT propose to develop an Industrial Park over an extent of 279.995 Hectares (691.587Acres) at Manallur and Soorapoondi villages, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu. The Industrial Park is planned with only 10% Industrial plot area for non-pharma 5(f) category industries like Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc. and balance 90% Industrial plot area for non-EC category industries like E vehicle and its components manufacturing, Automobile and automobile accessories manufacturing, Engineering and fabrication, etc., falling under 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 A, irrespective of the area). Besides TN – AP interstate boundary is ~3.13 Km (towards NNW) from the project boundary and Pulicat lake bird Sanctuary is ~5.77 Km (towards NE). Therefore, General Condition is applicable.

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 organisations to private lands in view of lower cost and litigation free lands.

Considering the vicinity of site from Chennai, SIPCOT propose to develop an Industrial Park over an extent of 279.995Ha.(691.587Acres) at Manallur and Soorapoondi villages, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu. The Industrial Park is planned with only 10% Industrial plot area for non- pharma 5(f) category industries like Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc. and balance 90% Industrial plot area for non-EC category industries like E vehicle and its components manufacturing, Automobile and automobile accessories manufacturing, Engineering and fabrication, etc., falling under Red, Orange, Green and White category industries

Automobile:

- 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. In FY22, total automobile exports from India stood at 5,617,246.
- India is the fifth-largest auto market and world's fifth largest manufacturer of cars and enjoys a strong position in the global heavy vehicles market as it is the largest tractor producer, second-largest bus manufacturer, and third largest heavy trucks manufacturer in the world. India's annual production of automobiles in FY22 was 22.93 million vehicles.

E-vehicle and its component manufacturing:

- The electric vehicle (EV) market is estimated to reach Rs. 50,000 crore (US\$ 7.09 billion) in India by 2025. A study by CEEW Centre for Energy Finance recognised a US\$ 266 billion opportunity for electric vehicles in India by 2030. This will necessitate a US\$ 180 billion investment in vehicle manufacturing and charging infrastructure.

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 US\$ 92 billion in 2019 and is forecast to reach US\$ 115.17 billion by 2025. Growth in the power industry is expected to drive growth in the electrical equipment industry. Electrical equipment market is forecasted to grow at 12% CAGR to reach US\$ 72 billion by 2025 from US\$ 48-50 billion in 2021. Electrical equipment export market is forecasted to reach US\$ 13 billion by 2025, from US\$ 8.62 billion in 2021

Synthetic Organic Chemicals (Non Pharma 5(f) industries):

- 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.

2.3 Project Location

The Industrial Park is proposed to be located at Manallur and Soorapoondivillages Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu.

The site is located at survey Nos. - 203/1, 204/2, 207/2, 208, 209/1, 209/3,210/1, 210/3, 211, 212/1, 212/3,213, 214, 215, 216/1, 216/3, 217/1, 217/3,218/1, 218/3, 219/1, 220/1, 223/4, 224, 225/1,226/1, 227/1, 227/3, 228, 229,230, 231, 232, 233/1, 234/1, 234/3, 235/3, 236, 237/1, 237/3, 238, 239, 240,241, 242, 243, 244, 245, 248, 249, 250, 252, 253, 270/1, 270/8, 274/1, 274/29 at Manallur village and 1, 2, 3, 4, 5, 6/2, 9/1, 9/3, 9/5, 9/6, 9/11, 10/4, 10/9,12/2,12/3, 12/4, 12/5, 12/6, 12/7, 12/8, 12/9, 12/10, 12/11, 12/12, 12/13,12/14, 12/15, 12/16, 12/17, 13/1, 13/2, 13/3, 13/4, 13/5, 13/6, 13/7, 13/8,13/9,15, 16/1, 37/1, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49 of Soorapoondi villages in Gummidipoondi Taluk, Thiruvallur District.

The proposed site is located approximately 2.99 km (S) from SH-52 (Kavaraipettai – Sathyavedu).The Project location map is given in **Figure 2-1**. Satellite image of project

sites given in **Figure 2-2** and the coordinates of project site are given in **Table 2-1**. Google image of the 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**. Combined FMB for the proposed site is enclosed as **Annexure-4**. Layout of the Industrial Park is given in **Figure 2-7** and **Annexure -5**.

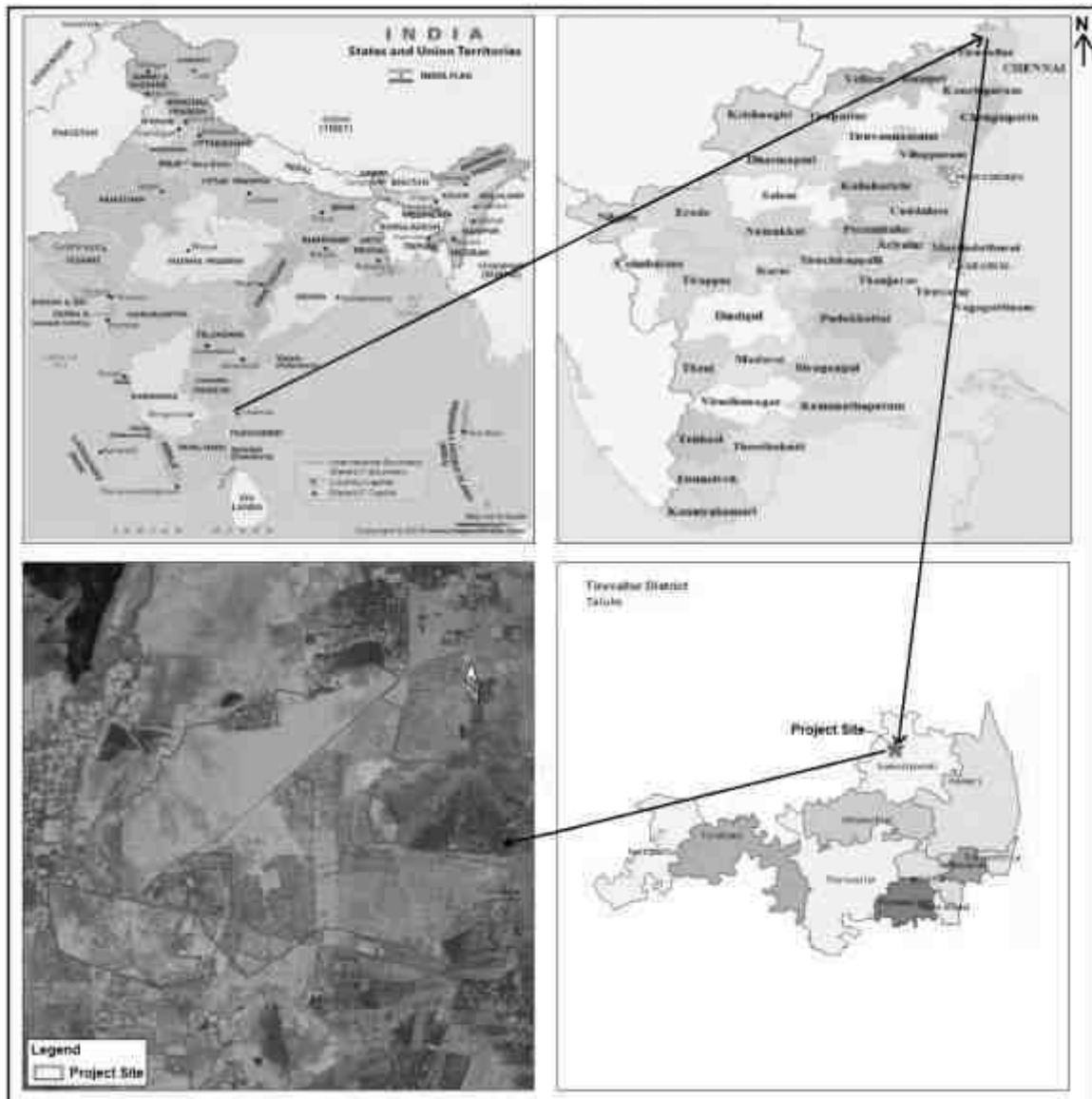


Figure 2-1 Location Map of the project



Figure 2-2 Google map of project Site

Table 2-1 Coordinates of the project site

S.No	Latitude	Longitude	S.No	Latitude	Longitude
1	13° 26' 46.794"	80° 0' 46.323"	25	13° 27' 27.052"	80° 1' 57.189"
2	13° 26' 33.259"	80° 0' 48.471"	26	13° 27' 23.755"	80° 1' 53.623"
3	13° 26' 26.123"	80° 1' 9.166"	27	13° 27' 20.722"	80° 1' 58.049"
4	13° 26' 27.321"	80° 1' 15.532"	28	13° 27' 10.744"	80° 1' 55.445"
5	13° 26' 32.189"	80° 1' 17.287"	29	13° 27' 10.893"	80° 2' 23.29"
6	13° 26' 32.161"	80° 1' 12.43"	30	13° 27' 7.946"	80° 2' 22.771"
7	13° 26' 40.86"	80° 1' 14.307"	31	13° 27' 7.835"	80° 2' 9.915"
8	13° 26' 43.843"	80° 1' 0.805"	32	13° 27' 4.007"	80° 2' 10.054"
9	13° 26' 49.612"	80° 0' 57.989"	33	13° 27' 0.478"	80° 2' 6.721"
10	13° 26' 50.432"	80° 1' 1.677"	34	13° 27' 1.48"	80° 2' 1.089"
11	13° 27' 1.828"	80° 0' 59.971"	35	13° 27' 6.094"	80° 2' 0.857"

12	13° 27' 4.209"	80° 1' 3.822"	36	13° 27' 2.638"	80° 1' 54.837"
13	13° 27' 6.596"	80° 1' 6.914"	37	13° 27' 4.414"	80° 1' 51.7"
14	13° 27' 11.858"	80° 1' 9.287"	38	13° 26' 54.695"	80° 1' 52.345"
15	13° 27' 11.227"	80° 1' 11.012"	39	13° 26' 49.76"	80° 2' 20.248"
16	13° 27' 17.236"	80° 1' 14.234"	40	13° 26' 43.385"	80° 2' 19.354"
17	13° 27' 18.533"	80° 1' 22.608"	41	13° 26' 37.787"	80° 2' 16.303"
18	13° 27' 17.119"	80° 1' 22.462"	42	13° 26' 36.034"	80° 2' 10.355"
19	13° 27' 17.668"	80° 1' 33.049"	43	13° 26' 29.553"	80° 2' 8.782"
20	13° 27' 21.263"	80° 1' 31.443"	44	13° 26' 37.709"	80° 1' 41.664"
21	13° 27' 24.765"	80° 1' 32.415"	45	13° 26' 28.098"	80° 1' 26.576"
22	13° 27' 22.869"	80° 1' 38.697"	46	13° 26' 40.309"	80° 1' 16.695"
23	13° 27' 26.164"	80° 1' 40.02"	47	13° 26' 49.206"	80° 1' 22.915"
24	13° 27' 29.367"	80° 1' 51.952"	48	13° 26' 50.917"	80° 1' 13.131"



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



Figure 2-4 Google map of project site in 5 Km radius



Figure2-5Google mapof project site in10 Km radius

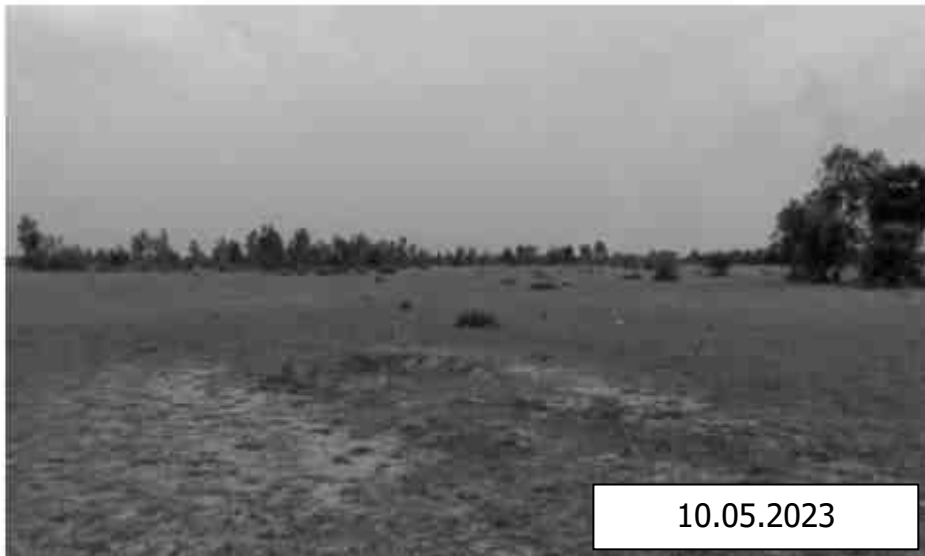
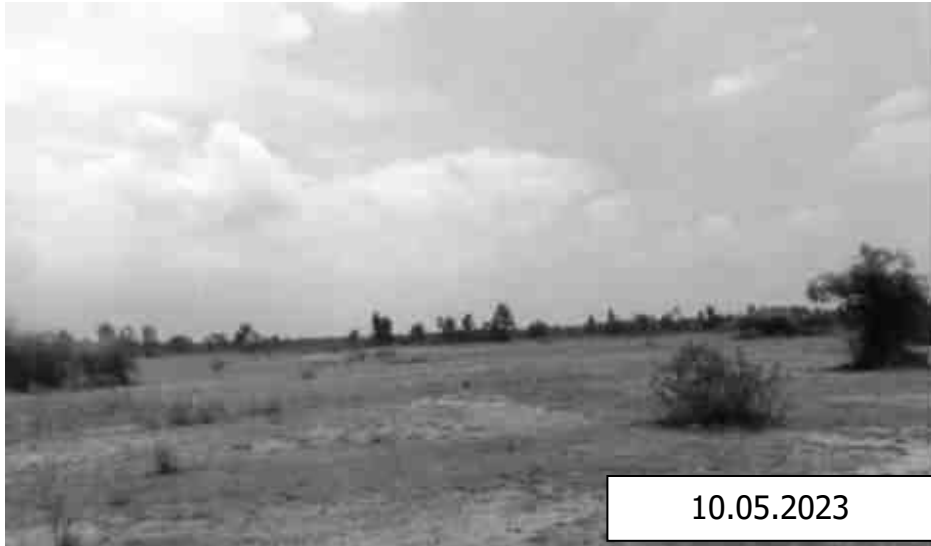


Figure 2-6 Latest Photographs of the Project Site

Table 2-2 Salient features of project and surroundings

S. No.	Particulars	Details
1	site Latitude	13° 26' 26.123"N-13° 27' 29.367"N
2	site Longitude	80° 0' 46.323" E-80° 2' 23.29"N

3	Elevation of Project site	~11-29mAMSL (Nature of land :Predominantly Flat terrain with few undulation)																										
4	Present land use	<p>As per Bhuvan 2015-2016, the proposed site is predominantly classified as Barren -Scrub land (85%) with Agriculture- crop and fallow land (15%) .</p> <p>Government of Tamil Nadu has issued Administrative sanction vide GO No 285 dated 03/08/2018 for alienation of 283.08 Ha of poramboke land to SIPCOT for development of Industrial Park (enclosed as Annexure-1b) and later 3.085 Ha of poramboke land has been excluded vide Thiruvallur District Collector letter no. 14888/2018 dated 10.06.2019, (enclosed as Annexure-1c)</p> <p>As per the revenue records, the entire land (279.995 Ha) is government Poramboke land and classified as under:</p> <table border="1"> <thead> <tr> <th>Land use Classification</th> <th>Extent (Ha)</th> <th colspan="2">% of area</th> </tr> </thead> <tbody> <tr> <td>Kallaankuthu</td> <td>227.095</td> <td colspan="2">81</td> </tr> <tr> <td>Unassessed waste</td> <td>35.055</td> <td colspan="2">12</td> </tr> <tr> <td>Punjai Anadeenam</td> <td>13.32</td> <td colspan="2">5</td> </tr> <tr> <td>Nanjai Anadeenam</td> <td>4.525</td> <td colspan="2">2</td> </tr> <tr> <td>Total</td> <td>279.995</td> <td colspan="2">100</td> </tr> </tbody> </table>			Land use Classification	Extent (Ha)	% of area		Kallaankuthu	227.095	81		Unassessed waste	35.055	12		Punjai Anadeenam	13.32	5		Nanjai Anadeenam	4.525	2		Total	279.995	100	
Land use Classification	Extent (Ha)	% of area																										
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Punjai Anadeenam	13.32	5																										
Nanjai Anadeenam	4.525	2																										
Total	279.995	100																										
5	Nearest Highway	SH-52(Kavaraipettai – Sathyavedu Rd) at a distance of ~2.99 km towards SSW.																										
6	Nearest railway Station	Elavur Railway station, ~ 8.21 km, E																										
7	Nearest Airport	Chennai International Airport, ~ 49.71km, SSE																										
8	Nearest Port	Ennore Port ~35.75km, ESE Chennai Port ~45.43km, SE																										
9	Defence Installation	Nil																										
9	Nearest Villages	<table border="1"> <thead> <tr> <th colspan="3">Villages</th> <th>Pop</th> </tr> </thead> <tbody> <tr> <td>Hamlet(Kunthanimeedu)</td> <td>Adjacent to Site</td> <td>N</td> <td>200</td> </tr> <tr> <td>Madarpakkam</td> <td>Adjacent to Site</td> <td>W</td> <td>4,737</td> </tr> <tr> <td>Manallur</td> <td>0.01km</td> <td>W</td> <td>4,534</td> </tr> <tr> <td>Ramachandrapuram</td> <td>0.08km</td> <td>S</td> <td>300</td> </tr> </tbody> </table>		Villages			Pop	Hamlet(Kunthanimeedu)	Adjacent to Site	N	200	Madarpakkam	Adjacent to Site	W	4,737	Manallur	0.01km	W	4,534	Ramachandrapuram	0.08km	S	300					
Villages			Pop																									
Hamlet(Kunthanimeedu)	Adjacent to Site	N	200																									
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Manallur	0.01km	W	4,534																									
Ramachandrapuram	0.08km	S	300																									

		Sankaranarayanapuram	0.35km	N	350
		Surapundi	0.52km	E	1,480
		Pannur	0.58km	S	400
9	Nearest Town	Gummidipoondi ≈ 9.50 km(ESE)			
10	Water bodies	Water Bodies	Distance (~km)	Direction.	
		Pond	Adjacent to Site	E	
		Pond	Adjacent to Site	S	
		Lake near Manallur	0.04	W	
		Lake near Pannur	0.19	S	
		Lake near Madarpakkam	0.30k	SW	
		Lake near Surapundi	0.39km	E	
		Pallavae	0.61m	NW	
		Lake near Ramachandrapuram	0.68km	SE	
		Lake near Sanaputtur	0.80km	E	
		Stream near Iguvarpalaiyam	1.60km	ESE	
		Lake near Rshanagaram	1.89km	W	
		Lake near Nemalur	2.15km	SW	
		Lake near Sitturnattam	2.46km	SE	
		Lake near Vaniamalli	2.48km	S	
		Lake near Kannambakkam	3.93km	N	
		Puvalambedu Lake	4.14km	S	
		Telugu Ganga/Satya Sai Ganga (TG) Canal	5.52km	W	
		KannankottaiThervoykandigaiReservoir(KKTK)	7.11km	SSW	
		Egumadurai Lake	7.11km	N	
		Canal near Reservoir	8.86km	SW	
		Pulicat Lake	8.92km	NE	
		Arani R	10.99km	SSE	
		Sulamani Eri	12.35km	SSW	
		Rakkampalayam Lake	12.53km	E	
Chinnambedu Lake	13.88km	SSE			
RallaEru	14.04km	NW			
Uttukkottai Eri	14.74km	SW			
Note:*As per TN Revenue records, there is no water bodies located inside the					

		site. However, as per survey of India Topo map, there are two pond located within the site		
12	Reserve Forests and Protected Forests	Reserve Forests	≈ Distance	Direction
		Nemalur RF	1.13km	WSW
		Irukulam RF	3km	NNW
		Sirurvedu RF	3.96km	SSW
		Panchali RF	4.04km	SSW
		Satyavedu RF	5.87km	W
		Palavakkam RF	7.31km	S
		Manali RF	7.69km	S
		Vanallur RF	8.09km	WNW
		Arudur R	9.00k	N
		Rajugunta F	9.54km	WSW
		Ambalam RF	11.21km	WSW
		Kaduru RF	11.37km	NNW
		Senjiyagaram RF	13.95km	SW
13	Notified Wildlife Sanctuary/ National Parks	Sanctuary	≈Distance	Direction
		Pulicat Bird Sanctuary	5.77km	NNE
14	Inter State Boundary	Inter state boundary	≈Distance	Direction
		TN-AP State Boundary as per SOI	3.13km	NNW

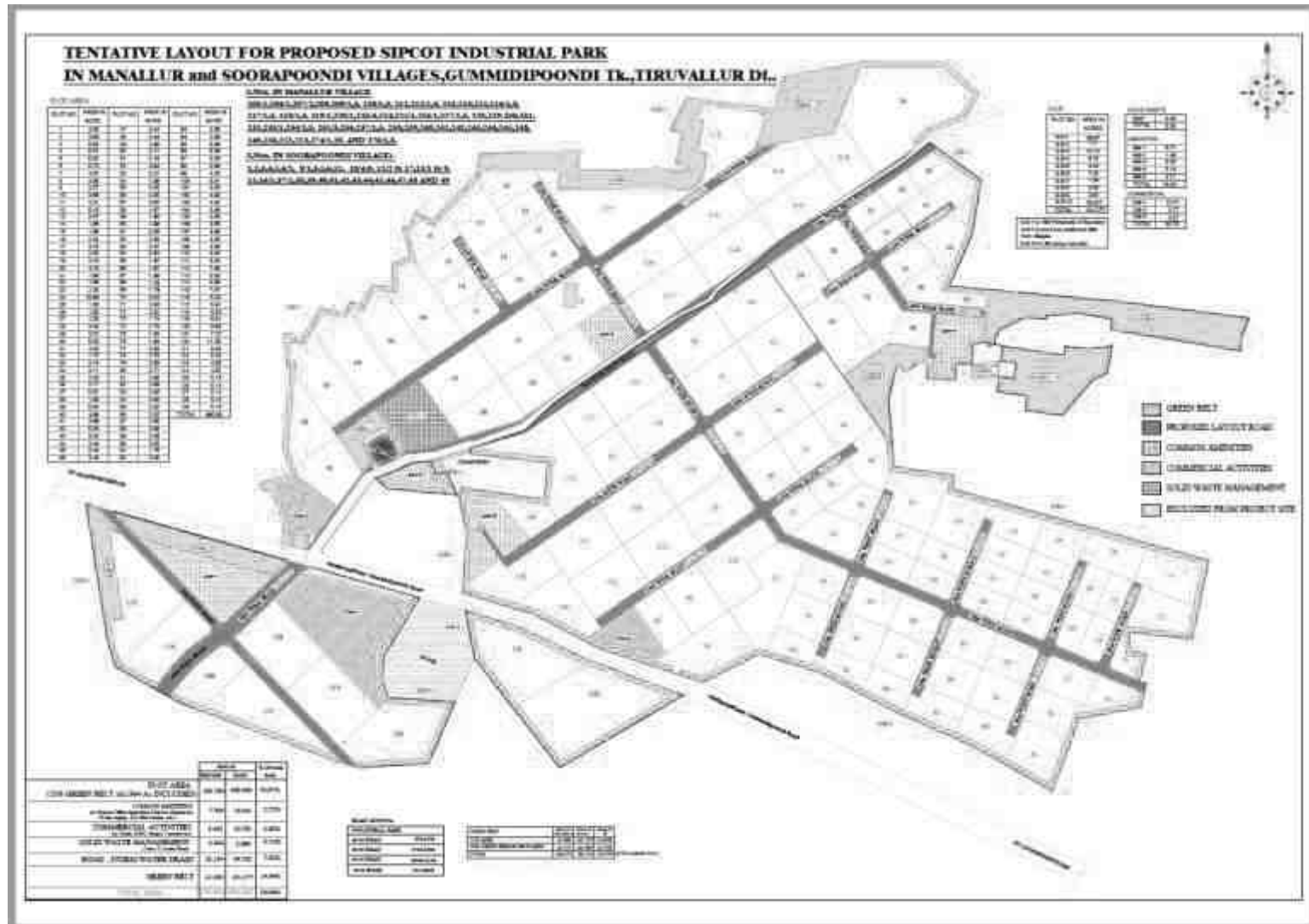


Figure 2-7 Layout of Industrial Park

2.4 Size or Magnitude of operation

Total area of Industrial Park is 279.995 Ha (691.587 Acres). Land area breakup for the Industrial Park is given in **Table 2-3** below. Total number of industrial plots proposed is 131 .

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

Area break up	During 316th EAC Meeting- ToR PPT			Revised for EIA		
	Acres	Ha	Percentage of developable area (%)	Acres	Ha	Percentage of developable area (%)
Industrial plot area (Including 33% green belt)	514.540	208.316	74.40%	490.800	198.704	70.97%
Common amenities	11.390	4.611	1.65%	19.040	7.709	2.75%
Commercial activities	20.750	8.401	3.00%	20.750	8.401	3.00%
Solid waste management	5.000	2.024	0.72%	5.000	2.024	0.72%
Road, storm water drains	52.300	21.174	7.56%	54.720	22.154	7.91%
Green belt	87.607	35.469	12.67%	101.277	41.003	14.65%
Developable area	691.587	279.995	100.00%	691.587	279.995	100.00%

*Industries will be mandated to provide 33 % of green belt within their premises. Total green belt proposed for Industrial Park is 38.07 % (106.575 Ha) of Developable area of 279.995Ha. Layout of the Industrial Park is enclosed as **Annexure-5** and **Figure 2-7**.

2.5 Proposed schedule for approval & implementation

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

Table 2-4 Project Schedule

S. No	Description	Time Frame
1	Environmental Clearance	September / October 2023
2	CTE	November 2023
3	Construction activities	November 2023to October 2025

2.6 Technology and Process Description

The project proposal is development of Industrial Park. Different type 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 Park in a total area of 279.995 Ha (691.587 Acres) for accommodating 10% - 5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc and 90%- Non EC Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc.

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.

The following type / category of industries are proposed in the industrial park:

- 10% - 5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc., .
- 90%- Non EC Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc.,

2.7.1 Project zoning

The proposed project is an Industrial Park with infrastructure to promote industries in cluster. As submitted in our proposal, the Industrial Park is envisaged to accommodate 10% - 5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc and 90%- Non EC

Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc. Zonation details of the Industrial Park is given in **Table 2-5**. Zonation Map of the Industrial Park is given in **Figure 2-8** and enclosed as **Annexure-6**.

Table 2-5 Zonation of Industrial Park

S.No	Type Industries	Approximate % of Industrial plot area	Industrial plot area in Ha	Industrial plot area in Acres
1	5(f) Non pharma industries such as Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc.,	10	19.838	49.00
2	Non EC Category industries such as E vehicle and its components manufacturing, Automobile and accessories manufacturing, Engineering and fabrication, Plastics manufacturing etc.,	90	178.866	441.80
	Total	100	198.704	490.80

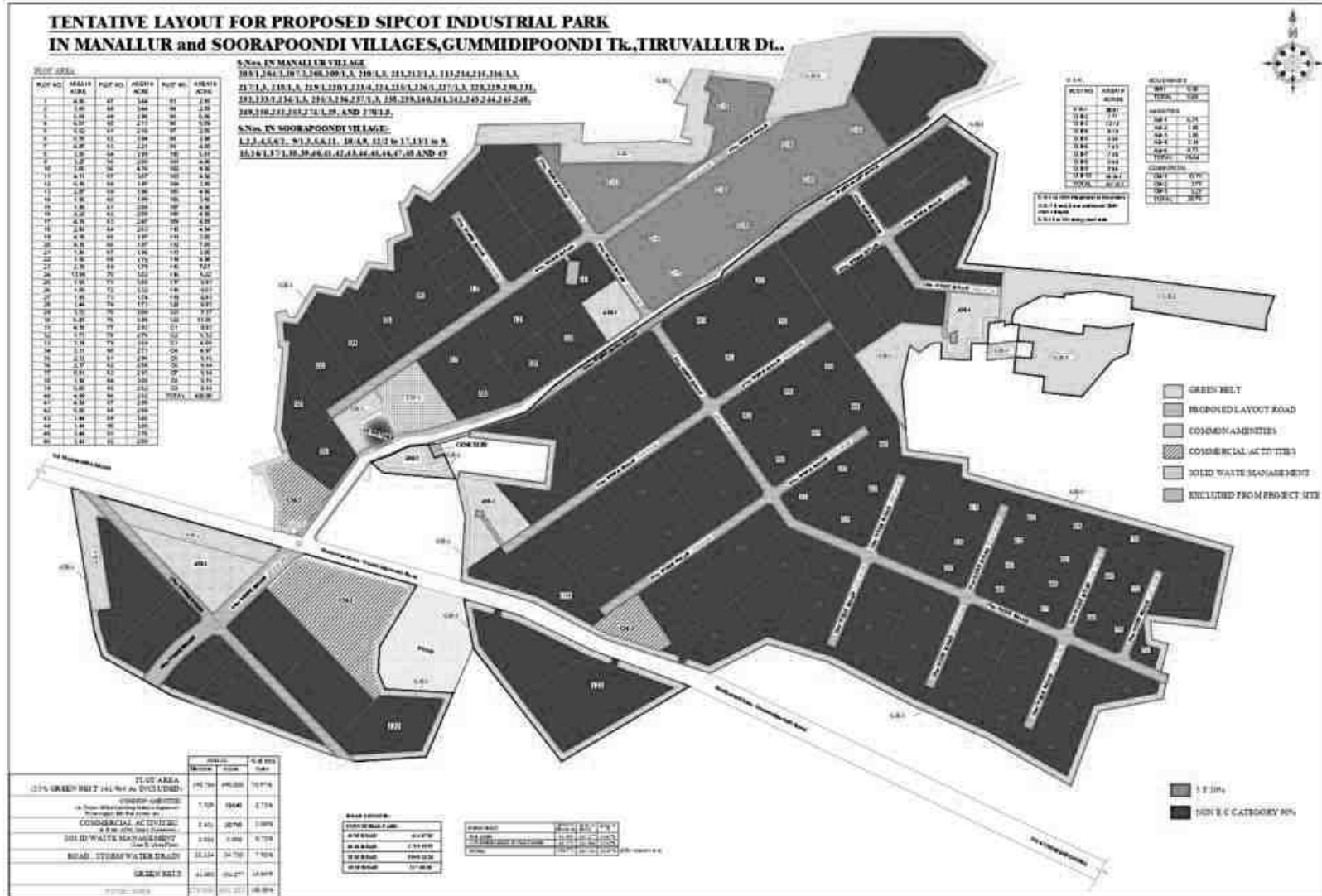


Figure 2-8 Zonation map for the Industrial Park

2.7.2 Project components

2.7.2.1 Industrial plot area

Total industrial plot area is 198.704 Ha (490.800 Acres). Total number of plots proposed for the Industrial Park is 131 nos. Industrial plot area break up for the Industrial Park is given in **Table 2-6**.

Table 2-6 Industrial plot area breakup

Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)
1	4.06	30	5.00	59	1.96	88	2.88	117	5.91
2	3.60	31	4.30	60	1.99	89	3.45	118	6.53
3	5.58	32	1.73	61	2.00	90	3.00	119	6.81
4	6.01	33	3.19	62	2.00	91	1.76	120	6.93
5	5.52	34	3.11	63	2.47	92	2.00	121	7.37
6	5.70	35	2.33	64	2.63	93	2.95	122	11.58
7	4.87	36	2.17	65	1.97	94	2.88	C1	8.93
8	3.95	37	0.81	66	1.97	95	6.66	C2	5.32
9	3.27	38	1.90	67	1.96	96	5.09	C3	4.05
10	3.66	39	5.00	68	1.79	97	2.05	C4	4.97
11	4.31	40	4.99	69	1.79	98	2.98	C5	5.15
12	5.15	41	4.99	70	3.02	99	4.00	C6	5.14
13	2.07	42	5.00	71	3.85	100	5.81	C7	5.14
14	1.96	43	3.44	72	3.32	101	4.85	C8	5.15
15	1.96	44	3.44	73	1.74	102	4.92	C9	5.15
16	2.22	45	3.44	74	1.73	103	4.92		
17	4.15	46	3.43	75	1.00	104	3.80		

Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)	Plot no	Area (acre)
18	2.00	47	3.44	76	1.94	105	4.56		
19	4.18	48	3.44	77	2.93	106	3.55		
20	4.18	49	2.96	78	2.75	107	4.96		
21	1.96	50	2.11	79	3.59	108	4.92		
22	1.96	51	2.10	80	2.71	109	4.88		
23	2.38	52	3.94	81	2.95	110	4.94		
24	13.98	53	2.21	82	2.88	111	3.00		
25	1.58	54	1.99	83	2.93	112	7.60		
26	1.58	55	2.00	84	3.00	113	3.00		
27	1.58	56	4.35	85	2.52	114	4.98		
28	3.44	57	3.67	86	2.02	115	7.67		
29	3.72	58	1.97	87	2.95	116	5.22		

2.7.2.2 Common facilities

7.709 Ha (19.040 Acres) of land is proposed for common amenities. The amenities/ facilities proposed within project site are Administrative Office, Medical dispensary, water supply, Fire station, EB, etc.

2.7.2.3 Commercial area

8.401 Ha (20.75 Acres) is proposed for commercial facilities like bank, ATM, Restaurant/Food Court, canteen, petty shops, general stores, etc. will be proposed in commercial area.

2.7.2.4 Green belt

Total green belt area proposed in the Industrial Park works out to be 106.575 Ha (263.241 Acres) which accounts to 38.07% of Developable area of 279.995 Ha (691.587 Acres). Green belt area break up is given in **Table 2-7**.

Table 2-7 Green belt area break up

Green belt	Area (Acres)	Area (Ha)	Percentage of developable area
Green belt in plot area(33% by industries)	161.964	65.572	23.42
Green belt by SIPCOT	101.277	41.003	14.65
Total	263.241	106.575	38.07

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

2.7.2.5 Roads

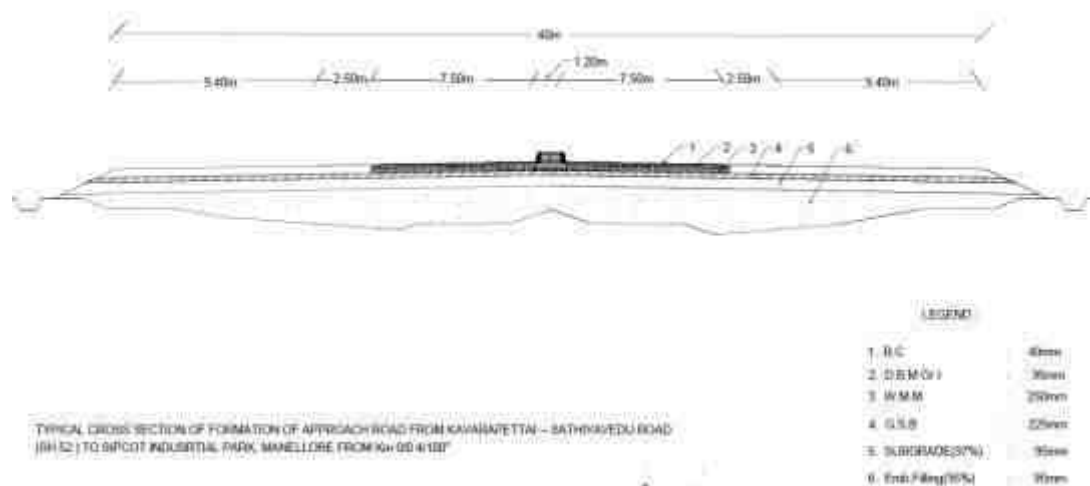
22.154 Ha (54.720 Acres) is proposed for roads and storm water drains. 40m, 30m and 20m RoW Internal roads will be provided by SIPCOT. The length of roads is given in **Table 2-8**.

Table 2-8 Length of internal roads

Width of the road	Road Length(km)
40	0.454
30	1733.53
20	8949.23
10	0.227

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 are given in **Figure 2-9**.

TYPICAL CROSS SECTION OF 40.00M WIDE ROAD

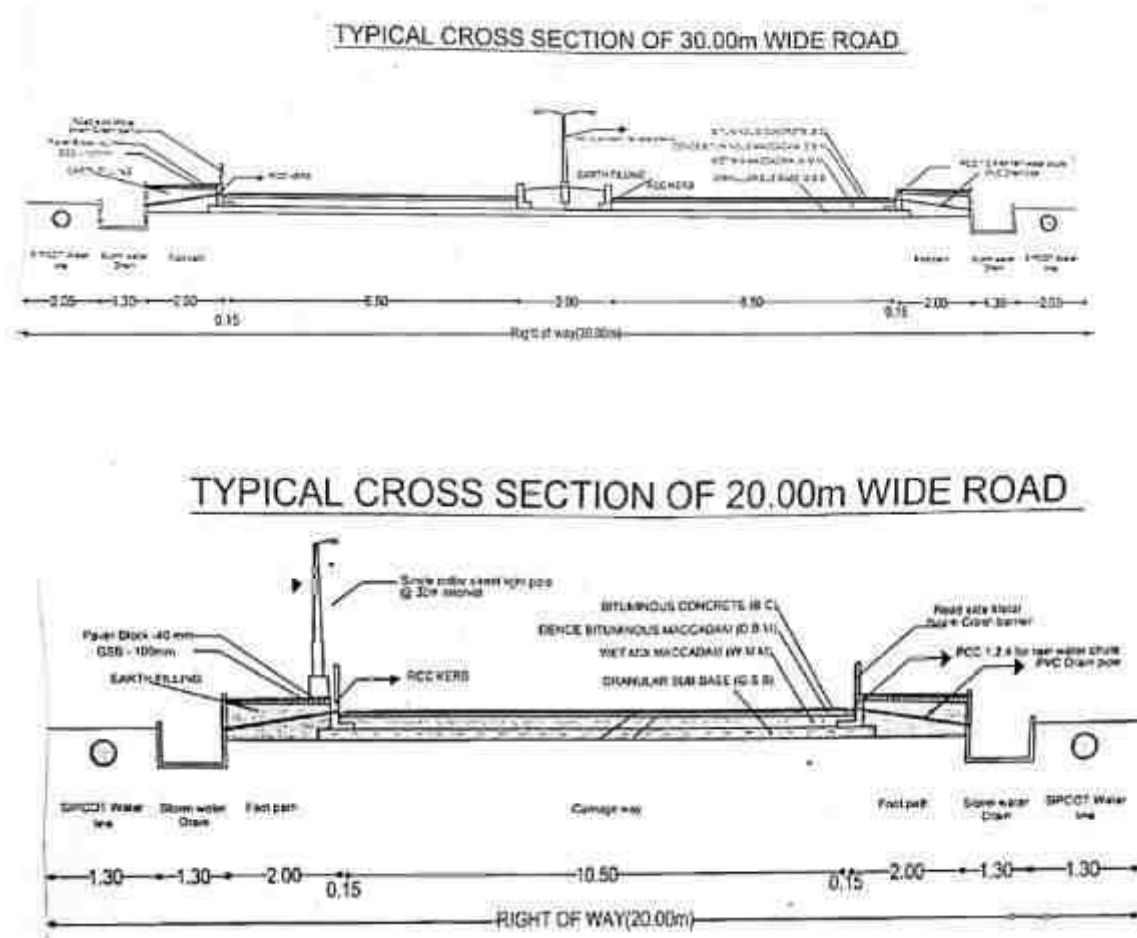


Figure 2-9 Typical Road Cross-section of 30 m & 20 m ROW

2.7.3 Infrastructure requirements for the project

2.7.3.1 Water Requirement

Construction Phase: During the construction phase, the water requirement for the project is calculated as 63 KLD and same will be sourced from Private water suppliers. Approximate people working will be around 100 Nos. Only infrastructure development like provision of storm water drain, laying of roads, water supply line, providing substation, green belt in common area, common facilities are under the scope of SIPCOT. The construction period for infrastructure facilities is estimated to be 24 months.

Operation Phase:

Total water requirement for the project during operation phase is 5956 KLD. Fresh water requirement of 685 KLD and TRO water requirement of 3365 KLD will be sourced from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). The balance water of 1906 KLD will be met from recycling of treated wastewater. Letters from CMWSSB for the supply of raw water from SIPCOT

Industrial Park, Thervoykandigai (from Red Hills) and TTRO water from Kodungaiyur TTRO plant are enclosed as 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 2-9 Water Requirement during operation phase

S.No	Water Usage	Fresh water (KLD)	TTRO Water (KLD)	Recycled water (KLD)	Total water(KLD)
1	Domestic	405	0	0	405
2	Process & Utilities	280	0	1541	1821
3	Green belt development	0	3365	365	3730
	Total	685	3365	1906	5956

(*)

- Industrial plot area 328.84 ac x 5KL/Acre=1645KLD
- Common amenities 19.04 ac x 3KL/Acre=57KLD
- Commercial activities 20.75 acx 5KL/Acre=104 KLD
- Solid waste Management 5acx3KL/Acre=15 KLD
- Green Belt 106.575 Ha x 35 KL/Hectare=3730 KLD
- Domestic 9000person x45 L/Person=405 KLD

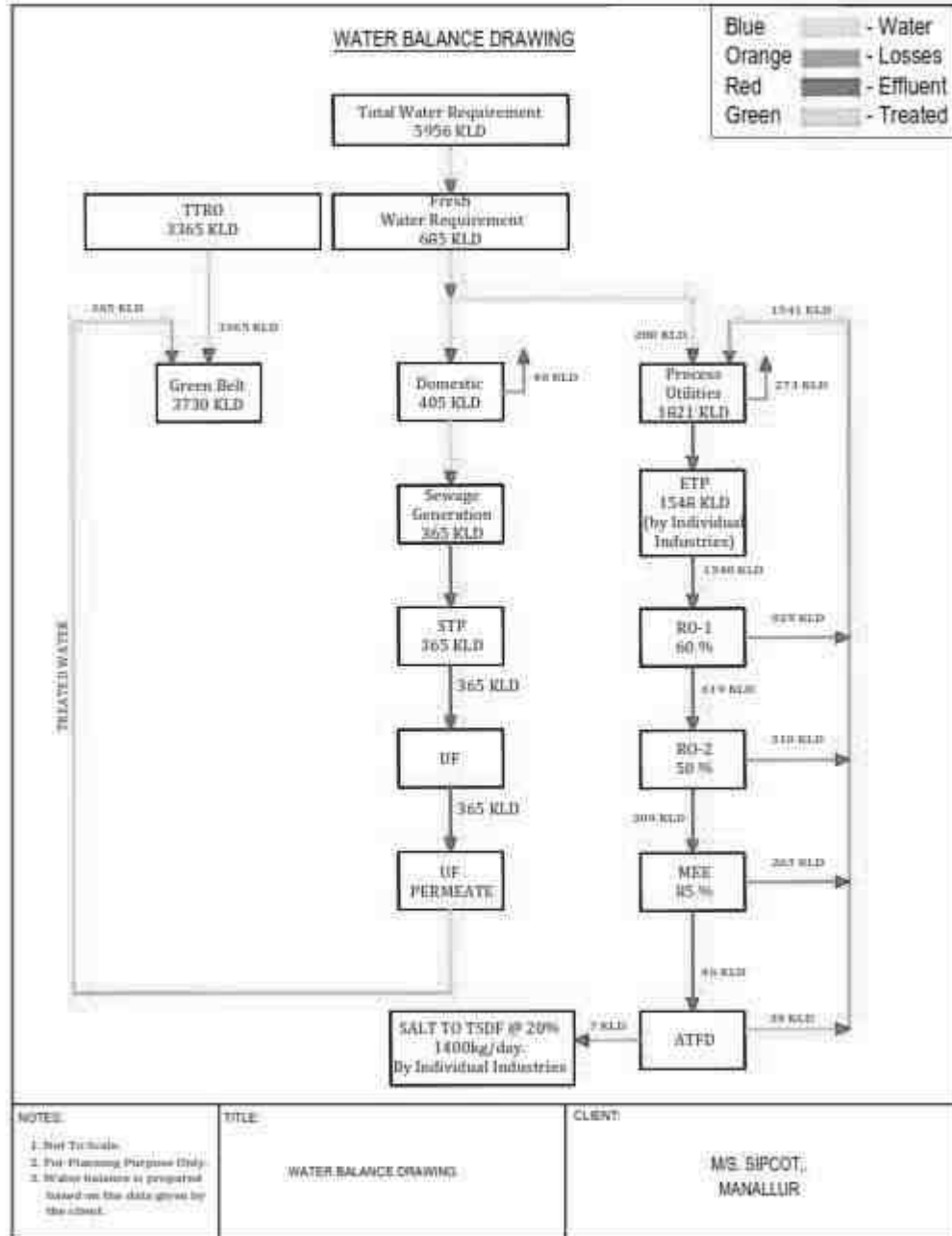


Figure 2-10 Water Balance Chart for Industrial park

2.7.3.2 Power Requirements

Power requirement for the Industrial Park is estimated to be 28 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.

2.7.3.3 Man Power

Approximately 100 employees will be required for the construction Period, inclusive of Workmen, Supervisors, Engineers, Architects and Managers. During operation phase, the estimated population will be 9,000 people.

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 and boilers will be provided with acoustic enclosures and sufficient stack height for dispersion 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 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 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 2-10 Wastewater generation and treatment

S.No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			
1	Sewage	4	Will be treated in 5 KLD Packaged STP
Operation Phase			
2	Sewage from industries	365	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.
3	Effluent from individual industries	1548	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 is detailed in **Table 2-11.**

Table 2-11 Municipal Solid Waste generation and Management

S.No	Municipal Solid waste	Construction phase (kg/day)	Operation phase (kg/day)	Disposal Method
1	Organic waste	27	2430	Individual industries will segregate the waste and organic waste will be composted and used as manure.
2	Inorganic waste	18	1620	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 – 9000 nos.

MSW Management

As a provision to have in house and independent Solid Waste Management facility, 5 Acres (Sheds for recovery and recycling facility) 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 their premises and disposed as per Hazardous waste (Management and Transboundary) Rules 2016.

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

The industries proposed in the Industrial Park are 10% EC category industries and 90% Non EC Category industries. The industries to be proposed will be using only tested technology and there will be no risk for technological failure. Details of manufacturing process and technology will be given by the individual industries while applying for CTE/CTO.

2.10 Project Cost

Tentative Project cost for the proposed project is estimated at INR.353.28 crores. The details are given below in **Table 2-12**.

Table 2-12 Project cost for Industrial Park

S.No	Components	Total Cost (Rs. in crores)
1	Land alienation cost	119.28
2	Site Development	0.56
3	Development of Roads (including storm water drains, rainwater harvesting, approach road, Solid waste management)	102.55
4	Water Supply scheme	52.79
5	Common Facilities	13.6
6	Street light	5.52
7	Greenbelt Development	3.25
8	Contingency	42.59
9	Preliminary and Preoperative expenses	13.14
Total cost of project		353.28 crores

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 M/s. State Industries Promotion Corporation Of TamilNadu, **Development of an Industrial Park over an extent of 279.995Ha.(691.587Acres) at Manallur and Soorapoondi villages, Gummidipoondi Taluk, Tiruvallur District, TamilNadu.** The primary baseline data monitored covered three (3) months i.e., from **mid of January 2023 to mid of April 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.

3.1 STUDY AREA AND PERIOD

A 10 Km radial distance with the proposed project site as the epicentre 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 Gummidipoondi Taluk, Tiruvallur district of Tamil Nadu State. The primary baseline data monitored covered three (3) months i.e., from **mid of January 2023 to mid of April 2023.**

3.2 DESCRIPTION OF THE STUDY AREA, COMPONENTS & METHODOLOGIES

As described in Chapter 1, the proposed project is M/s. State Industries Promotion Corporation Of TamilNadu, **Development of an Industrial Park over an extent of 279.995 Hectares (691.587Acres) at Manallur and Soorapoondi villages, Gummidipoondi Taluk, Tiruvallur District, TamilNadu.** Chennai International Airport is located 49.71km South East from the site. Chennai Port is at a distance of 45.43km South East to the site. Ennore Port is found 35.75km from the site. Elavur Railway station is the nearest which runs 8.21km from the site. 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 **Error! Reference source not found.** and Topo Map of the study area

is given in Error! Reference source not found..

- **Meteorology:** Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section- 3.5**
- **Ambient Air Quality:** Particulate matter <10-micron size (PM₁₀), Particulate matter <2.5-micron size (PM_{2.5}), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), Lead (Pb), Ozone (O₃), Benzene (C₆H₆), Benzo (a) pyrene (C₂₀H₁₂), Arsenic (As), Nickel (Ni), Ammonia (NH₃) **Refer Section- 3.6.**
- **Ambient Noise Levels:** Day equivalent noise levels, Night. equivalent noise levels - **Refer Section- 3.8**
- **Water Quality:** Ground Water Quality, Surface Water Quality- **Refer Section- 3.9**
- **Soil Quality- Refer Section- 3.10**
- **Biological Environment - Refer Section- 3.11**
- **Socio Economic Status- Refer Section- 3.12**

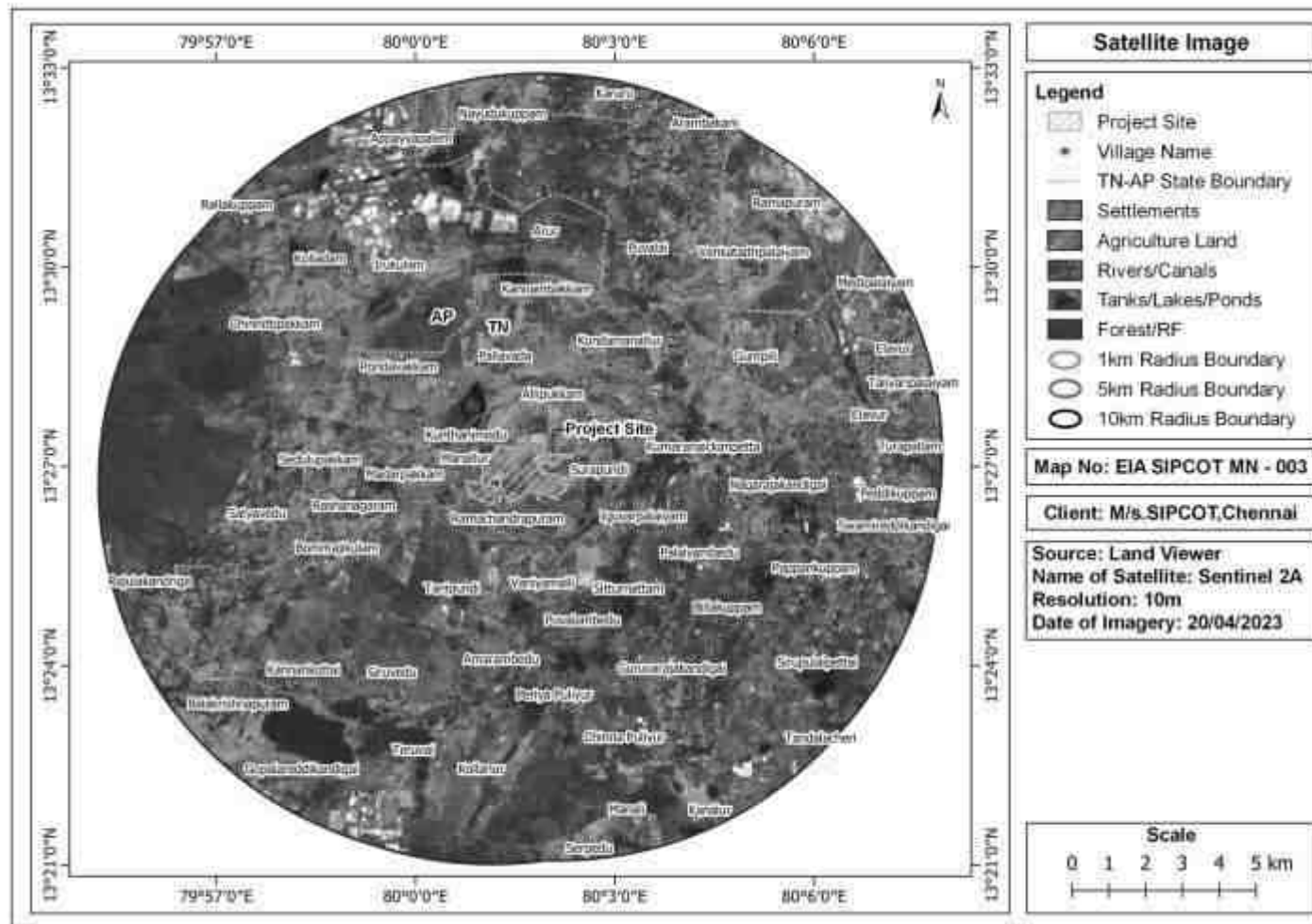


Figure 3-1Map showing the Satellite Image of the study area of Project

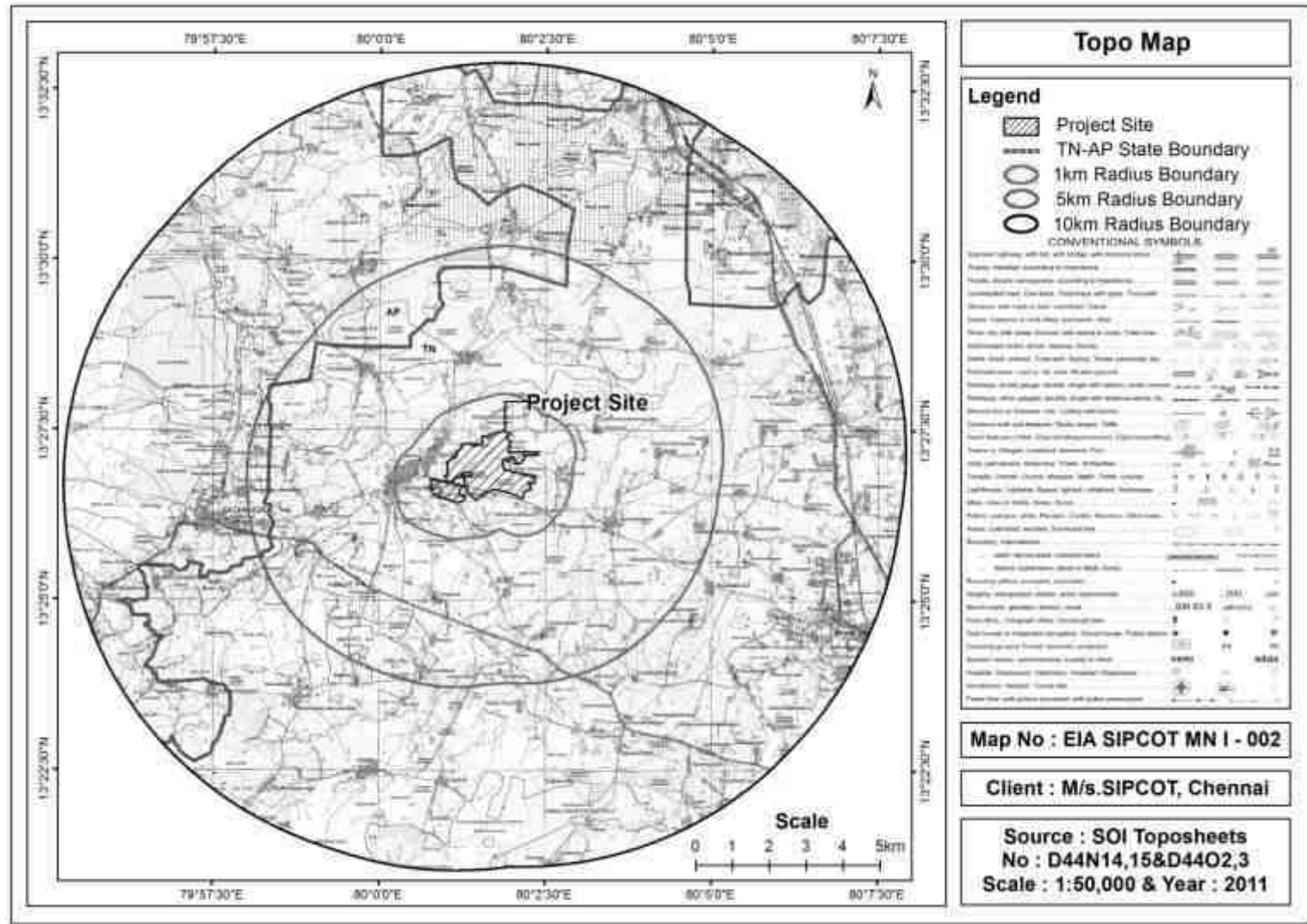


Figure 3-2Topo Map of Study area

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

S.No.	Areas	Distance & Direction from project boundary			
		S.No	Monuments	Distance (~km)	Direction
1	Monuments	1.	Megalithic cists and cairns with bounding stone circles Vaniyamalli	2.32km	S
		2.	Megalithic cists and cairns Pondavakkam	3.55km	NNW
		3.	Megalithic cists and cairns Panchali	4.70km	S
		4.	Megalithic cists Chinnittipakkam	5.54km	WNW
		5.	Megalithic cists and cairns Siruvedu	5.64km	SSW
		6.	Megalithic cists and cairns Amirdamangalam	5.73km	SSE
		7.	Cairn site Sengarai	12.37km	SSW
		8.	Urn burials Palavakkam	14.06km	SSW
		2	Waterbodies ,Reserve Forest and sancturies	Water Bodies	Dist. (~km)
Pond	Adjacent to Site			E	
Pond	Adjacent to Site			S	
Lake near Manallur	0.04km			W	
Lake near Pannur	0.19km			S	
Lake near Madarpakkam	0.30km			SW	
Lake near Surapundi	0.39km			E	
Pallavada Lake	0.65km			NW	
Lake near Ramachandrapuram	0.68km			SE	
Lake near Sanaputtur	0.80km			E	
Stream near Iguvarpalaiyam	1.60km			ESE	
Lake near Rshanagaram	1.89km			W	
Lake near Nemalur	2.15km			SW	

		Lake near Sitturnattam	2.46km	SE	
		Lake near Vaniamalli	2.48km	S	
		Lake near Kannambakkam	3.93km	N	
		Puvalambedu Lake	4.14km	S	
		Telugu Ganga/Satya Sai Ganga (TG) Canal	5.52km	W	
		KannankottaiThervoykandigai Reservoir(KKTK)	7.11km	SSW	
		Egumadurai Lake	7.11km	N	
		Canal near Reservoir	8.86km	SW	
		Pulicat Lake	8.92km	NE	
		Arani R	10.99km	SSE	
		Sulameni Eri	12.35km	SSW	
		Rakkampalayam Lake	12.53km	E	
		Chinnambedu Lake	13.88km	SSE	
		RallaEru	14.04km	NW	
		Uttukkottai Eri	14.74km	SW	
		Note:*As per TN Revenue records, there is no water bodies located inside the site. However, as per survey of India Topo map, there are two pond located within the site			
		Reserve Forest	Dis. (~km)	Direc.	
		Nemalur RF	1.13	WSW	
		Irukulam RF	3	NNW	
		Sirivedu RF	3.96	SSW	
		Panchali RF	4.04	SSW	
		Satyavedu RF	5.87	W	
		Palavakkam RF	7.31	S	
		Manali RF	7.69	S	
		Vanallur RF	8.09	WNW	
		Arudur RF	9.10	NNW	
		Rajugunta RF	9.54	WSW	
		Ambakkam RF	11.21	WSW	
		Kaduru RF	11.37	NNW	
		Senjiyagaram RF	13.95	SW	
		Wildlife Sanctuary	Dis. (~km)	Direc.	
		Pulicat Bird Sanctuary	5.77	NE	
3	State, National boundaries	Description	Dis. (~km)	Direc.	
		TN-AP State Boundary (As per SOI)	3.13	NNW	

4	Nearest Highway	SH-52(Kavaraipettai – Sathyavedu Rd) at a distance of ~2.99 km towards SSW.				
5	Defence installations	NIL				
6	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)					
		S. No	Manmade sensitive features	Distance (~km)	Direction	
		Schools				
		1.	RMT Matriculation School	0.01	N	
		2.	Govt Girls Higher Sec School Padhirivedu	0.24	W	
		3.	Govt Higher Sec School Padhirivedu	0.27	W	
		4.	Don Bosco Matriculation School	1.70	ENE	
		5.	Govt High School Poovalambedu	3.80	S	
		6.	Panchayat Union Middle School Kannambakkam	3.80	N	
		7.	ZPH School Irugulam	5.67	NNW	
		8.	Govt Middle School Poovalai	5.81	NNE	
		9.	Govt Higher Sec School Achamana Naidu Kandigai	6.52	SW	
		10.	Govt ADW High School ThervoyKandigai	7.80	SSW	
		11.	Govt High School N.M.Kandigai	7.96	WSW	
		12.	Govt Higher Sec School PuduGummidipoond	9.47	SE	
		13.	Government High School Arambakkam	9.89	NNE	
		14.	Government Higher Secondary School Sunnambukulam	12.20	ENE	
		15.	Mangavaram Govt School	13.01	E	
		16.	M.K.V Govt Higher Sec School Arani	13.44	SSE	
			Colleges			
		1.	Satyavedu Govt Junior College	5.62	W	
		2.	Govt Polytechnic Satyavedu	5.82	W	
		3.	Dhos Degree College	6.48	WSW	
		4.	Govt Degree College Satyavedu	7.71	WSW	
		5.	KREA University	10.48	N	
		6.	Sri Jayaram Institute of Engineering & Technology	10.80	E	
		7.	Indian Institute of Information Technology Sri City	10.59	N	
		8.	Great Lakes International University	11.24	N	
		9.	R.M.D. Engineering college	14.36	SE	
		10.	Chennai Academy Of Architecture And Design College	14.48	S	
		Hospitals				
	1.	PHC Madaharpakkam	1.11	W		
	2.	Upgraded PHC Eguvarapalayam	2.53	ESE		
	3.	Billa kuppam Hospital	5.54	SE		
	4.	Govt. Hospital Sathyavedu	6.24	W		
	5.	Govt PHC Kannankottai	6.57	SW		

6.	Government PHC Arambakkam	8.58	NNE
7.	ESI Dispensary Gummudipoondi	9.58	ESE
8.	Government Hospital Gummidipoondi	10.34	ESE
9.	Govt PHC Sunnambukulam	11.85	ENE
10.	Arani Govt PHC	12.89	SSE
11.	Govt Hospital Periyapalayam	14.31	S
12.	Kavaraipettai Govt PHC	14.73	SE
Government Buildings			
1.	Manellore Post Office	0.55	W
2.	Madharpakkam Police Station	1.20	W
3.	Irugulam Post Office	5.38	NNW
4.	Grama Sachivalayam Aroor	5.45	N
5.	MPDO Office Sathyavedu	5.68	W
6.	Mandal Revenue Office Sathyavedu	6.37	W
7.	Junior Civil Court Sathyavedu	6.37	W
8.	Fire Station Thervoykandigai	7.92	SSW
9.	Gummidipoondi Sub Registrar Office	8.45	ESE
10.	Gummidipoondi Taluk Office	8.46	ESE
11.	Sri City Sub Post Office	8.73	NNW
12.	TNPCB Gummidipoondi	9.00	ESE
13.	Grama Sachivalayam AM Puram	10.65	W
14.	VAO office Athuppakkam	11.70	E
15.	Sub Register Office Aarani	13.24	SSE
Religious Buildings			
1.	Church of Christ	Adjacent to Site	E
2.	Om Sakthi Temple	0.02	W
3.	Veerabhadraswami Temple Manellore	0.51	W
4.	Venugopala swamy Temple	0.52	SE
5.	Chamundeeshwari Temple	0.62	WNW
6.	Sri Arakathamman Temple	1.23	W
7.	Sri Lakshimi Narayana Perumal Thirukovil	2.13	ESE
8.	Pallavada Dharmaraja Temple	2.24	N
9.	RCF Church	2.73	ESE
10.	Pallavada Shiva Temple	3.05	NW
11.	ArulmiguVekkaiamman Temple	3.15	E
12.	Satyavedu Masjid E Sathariya	6.28	W
13.	Satyavedu Old Siva Temple	6.95	WSW

14.	Shri Ponni Amman Temple	7.30	SSW
15.	Sri EllaiammanKovil	9.70	SE
16.	Lord Paleeswara Siva Temple	10.22	ESE
17.	CSI Church Vanelloor	10.63	NW
18.	Shri Kalatheeswarar Temple	12.32	ENE
19.	Sri Varamoortheeswarar Temple	13.71	SE
20.	ArulmiguPeriyapalaiyam Bhavani Amman Koil	14.48	S

S.n o	Industries	Dist (km)	Dire c
1	Subbarow Apparels	Adjac ent	S
2	Kevin Steel Pvt Ltd	0.08	S
3	South India Polypro	0.12	S
4	S.L.Packaging Industries	0.65	S
5	Veanus Corn Products Ltd	0.91	S
6	Callidai Motor Works	1.31	S
7	Ezhil Jothi Safety Enterprises	1.46	SE
8	Sri Varalakshmi Agro Tech Industries	2.86	E
9	Balsara Engineering Products Ltd	3.05	S
10	Tulsyan NEC Ltd power plant	3.06	SSE
11	Chetna Steel Tubes Ltd	3.06	S
12	Sri Venkatachalapathy Alloys Pvt Ltd	3.29	S
13	Shree Sai Hanuman Smelters Pvt Ltd	3.46	SE
14	Akshara Industries Ltd	3.53	ESE
15	ARS Power Plant	3.75	SE
16	Agrawire Industries	4.01	SE
17	Kamlesh Greencrete Pvt Ltd	4.19	ESE
18	Prakash Ferrous Industries Pvt Ltd	4.21	SW
19	Tinna Rubber And Infrastructure Ltd	4.29	SE
20	Agra Coal Impex	4.32	SE
21	ADS Pro-Shield	4.35	SE
22	Vamshadhara Paper Mills	4.5	SE
23	Sindiya Aqua Mineral Pvt. Ltd	4.52	E
24	Pashupati Metalics	4.61	S
25	Malpani Alloy And Extrusions Pvt Ltd	4.72	E
26	Apollo Distilleries Pvt Ltd	5.09	SE
27	Cauvery Power Plant	5.28	SE
28	Caplin Point Laboratories Unit-IV	5.48	SSE
29	J.R.Metals	5.51	S
30	Kamachi Industries Ltd	5.51	ESE
31	Capricon Juice factory	5.52	NW

32	Suryaans Paper Mill	5.64	S
33	THK India Pvt Ltd	5.7	N
34	OPG Power Generation Pvt Ltd	5.79	E
35	Toray Industries	5.92	NNW
36	Daiki Aluminum India Pvt Ltd	5.93	NNW
37	TATA Smartfoodz Ltd	6.12	N
38	Kalimark Bovonto	6.13	NNW
39	Jain Metals And Rolling Mills Pvt. Ltd	6.24	ESE
40	Heaven Blanc Energy Pvt Ltd	6.31	ESE
41	Mico Plast Industries Pvt. Ltd	6.33	SSE
42	Chemfab Alkalis Ltd OPVC	6.35	NNW
43	Oren Hydrocarbons Pvt Ltd	6.42	SE
44	International Flavors & Fragrances	6.45	NNW
45	Jindal Stainless Steelway Ltd	6.46	SSE
46	Dalmia Laminators Ltd Unit 2	6.51	ESE
47	Bhatia Coke & Energy Limited	6.6	SE
48	Frontier Mediville	6.83	ENE
49	Siddhartha Logistics Co. Pvt. Ltd	6.85	NNW
50	SRF Limited	6.86	ESE
51	Green Signal Bio Pharma Pvt Ltd	6.9	ESE
52	Zen Linen International Pvt Ltd	6.92	NNW
53	Bharath Oxygen Licensee	6.95	SE
54	BFG International	6.98	NNW
55	Rockworth Systems Furniture India Pvt Ltd	6.99	NNW
56	Vermeiren India Rehab Pvt. Ltd.	7.01	NNW
57	Hi-Tech Carbon	7.03	ESE
58	McWane India Pvt Ltd	7.07	NNW
59	Sivanesan Company	7.13	SSE
60	Kemin Industries Manufacture	7.18	ESE
61	Vanta Bioscience Ltd	7.2	ESE
62	Tulsyan Nec Ltd	7.25	ESE
63	Enrique Keller India	7.27	ESE
64	Precision Hydraulics Pvt Ltd	7.28	ESE
65	Madras Door Company	7.28	ESE
66	Fumitec Minerals Pvt Ltd	7.29	ESE
67	Emerald Resilient Tyre Manufacturers Pvt. Ltd	7.31	ESE
68	Surana Industries Plant	7.32	ESE
69	Chennai United Metals Ltd	7.33	SSE
70	RBA Exports Pvt Ltd	7.39	ESE
71	Anjan Drug Pvt Ltd	7.42	ESE
72	J Ferro Tech Ltd	7.49	ESE
73	Tamilnadu Air Products Pvt Ltd	7.52	ESE
74	Astrotech Steels	7.52	NNW
75	Gea-Bgr Energy System India Ltd	7.57	NE

76	Jain Rubbers Pvt Ltd	7.58	ESE
77	Mil Industries Ltd	7.59	ESE
78	Sree Sumangala Metals & Industries Pvt Ltd	7.6	ESE
79	Codina Metalic Pvt Ltd	7.61	ESE
80	West Pharma	7.61	NNW
81	Polyhose Industrial Park	7.64	E
82	Monsoon Bounty Foods Pvt Ltd	7.67	ESE
83	Doosan Bobcat Pvt Ltd	7.68	E
84	Qute Extrusions (P) Ltd	7.71	ESE
85	Mabel Engineers Pvt Ltd	7.71	ESE
86	Bharatgas BPCL Chennai LPG Territory	7.71	SE
87	Altius Automotive Pvt.Ltd	7.72	ESE
88	Manchu Toughend Glass (P) Ltd	7.73	ESE
89	Jana Engineering Industries	7.74	SE
90	Ars Steels & Alloys International Pvt Ltd	7.78	ESE
91	Nova Air Technologies Pvt. Ltd	7.86	NNW
92	Panvo Organics Ltd	7.96	E
93	Ashok Mineral Enterprises	8.01	ESE
94	Abref Pvt Ltd	8.05	ESE
95	P A Footwear P Ltd.	8.08	ESE
96	SAC Engine Components Pvt Ltd	8.09	ESE
97	Sak Industries Pvt Ltd	8.12	ESE
98	Leo Prime	8.16	E
99	SharonPly	8.17	E
100	PepsiCo India Holdings Pvt Ltd	8.2	NW
101	Ball Beverage Packaging India	8.24	NNW
102	Greaves Cotton Ltd	8.25	ESE
103	NGC Transmission Chennai Pvt Ltd	8.27	NNW
104	Western Thomson India Ltd	8.28	ESE
105	Aachi Masala Foods	8.31	ESE
106	Baron Minerals Pvt Ltd	8.32	ESE
107	Adani Agri Logistics Ltd	8.39	E
108	TIL Healthcare Pvt Ltd	8.43	NNW
109	Arnpurna Re-Steel Company Pvt Ltd	8.44	ESE
110	Jayaam Galvanizers Pvt. Ltd	8.47	ESE
111	Triune Technofab Pvt Ltd	8.47	NNW
112	Sovereign Agro Tech Pvt Ltd	8.47	SSW
113	Leitwind Shriram Manufacturing Ltd	8.49	ESE
114	Madras Hydraulic Hose Pvt Ltd	8.5	ESE
115	Bharat Petroleum Ltd	8.5	SE
116	Artura Pharmaceuticals	8.51	NNW
117	Bharthia Pulverisers	8.54	SSW
118	Arun Vyapar Udyog Ltd	8.57	ESE
119	Super Gas	8.62	SSW

		120	Hindusthan Resins&Terpenes	8.63	SSW
		121	IMI CCI	8.66	NNW
		122	Mitsuba Sical India Pvt Ltd	8.7	ESE
		123	Harsha éxito Engineering Pvt Ltd	8.71	SSW
		124	TVS Sundram Fasteners Ltd	8.72	ESE
		125	Feed Mill - Sheng Long Bio-Tech (India) Pvt Ltd	8.72	SSW
		126	Esthell Rubbers Factory	8.81	SSW
		127	The Metal Powder	8.86	SSW
		128	VIKI Steels	8.88	ESE
		129	Baettr India	8.92	SSW
		130	Xmold Polymers Pvt Ltd	8.95	ESE
		131	Pure Chemical	8.97	SSW
		132	Acciona Windpower India Pvt Ltd	9	SE
		133	Alstom Transport India Ltd	9.04	NNW
		134	KTV Health and Food Products Ltd	9.05	ESE
		135	ALF Engineering Pvt Ltd	9.05	NNW
		136	Sai Supreme Chemicals	9.08	ESE
		137	TVS Sundram Fasteners Ltd Foundry	9.1	ESE
		138	SAC Engine Components Camshafts Unit I	9.11	ESE
		139	Sfl Autolec Pvt Ltd	9.16	ESE
		140	Daniel India Ltd	9.17	NNW
		141	Michelin India Private Ltd	9.19	SSW
		142	Sundram Fasteners Ltd.	9.32	ESE
		143	CETC Renewable Energy (India) Pvt. Ltd	9.38	NNW
		144	TVM Edible Oil Refineries	9.41	ESE
		145	Kellogg's India Pvt Ltd	9.48	NNW
		146	Shinsung Petrochemical Pvt Ltd	9.51	ESE
		147	Suryadev Alloy And Power Pvt Ltd	9.62	SE
		148	Tamil Naadu Edible Oils Pvt. Ltd	9.66	ESE
		149	Magnatherm Alloys Pvt. Ltd	9.67	ESE
		150	Laulagun Bearing India Pvt Ltd	9.68	SSW
		151	Kikuwa India Pvt Ltd	9.71	NNW
		152	Suryadev Thermal Power Plant Pvt Ltd	9.77	SE
		153	Wheels India Ltd	9.81	SSW
		154	Paques Environmental Technology India Pvt. Ltd.	9.92	NNW
7	Nearest Village, Town, City	Villages			Pop
		Hamlet(Kunthanimedu)	Adjacent to Site	N	200
		Madarpakkam	Adjacent to Site	W	4,737
		Manallur	0.01km	W	4,534
		Ramachandrapuram	0.08km	S	300
		Sankaranarayanapuram	0.35km	N	350

		Surapundi	0.52km	E	1,480	
		Pannur	0.58km	S	400	
8	Nearest public transportation services	Elavur Railway station, ~ 8.21 km, E				

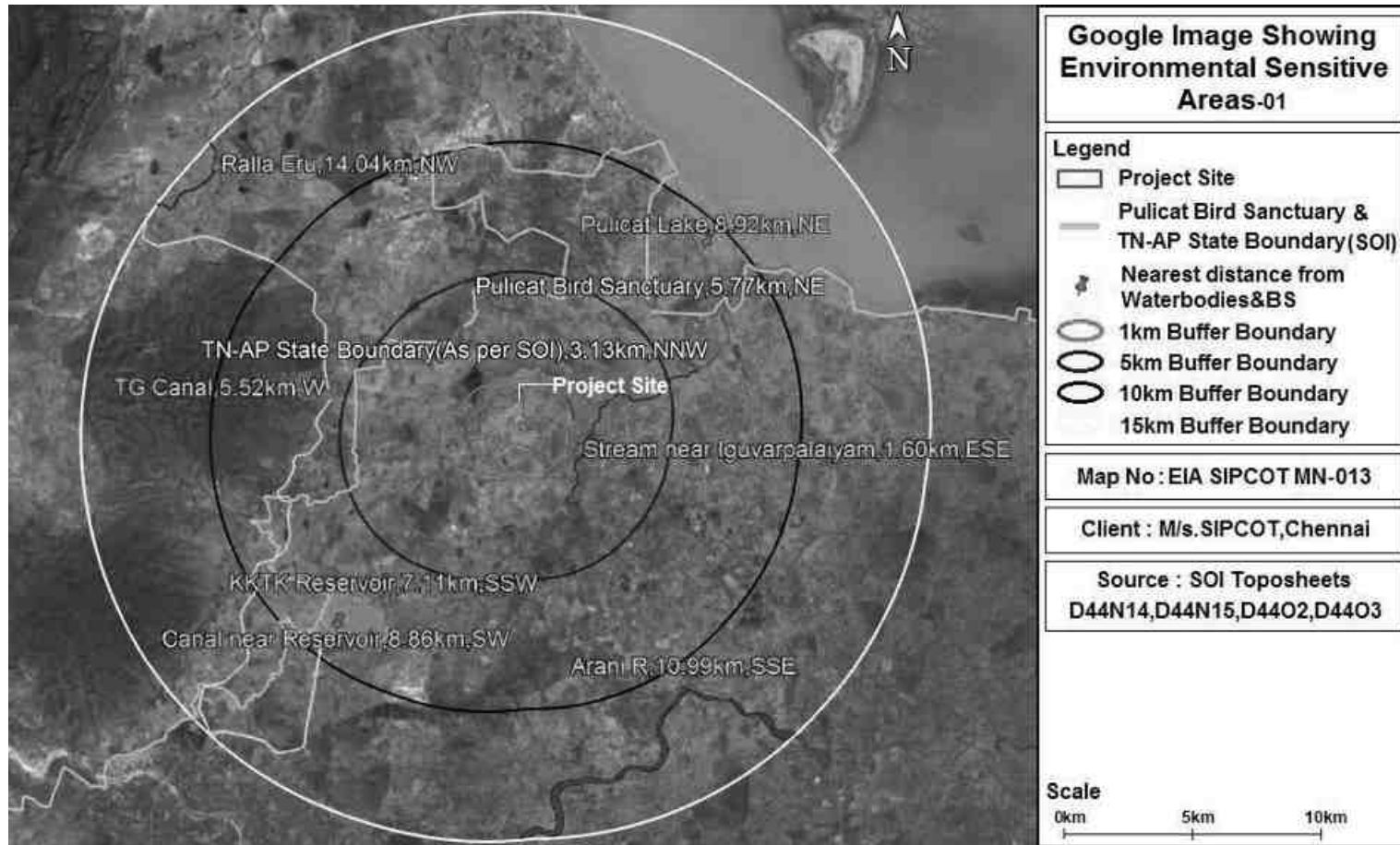


Figure 3-3 Environmental sensitive areas (Water bodies) covering within 15 km from project boundary

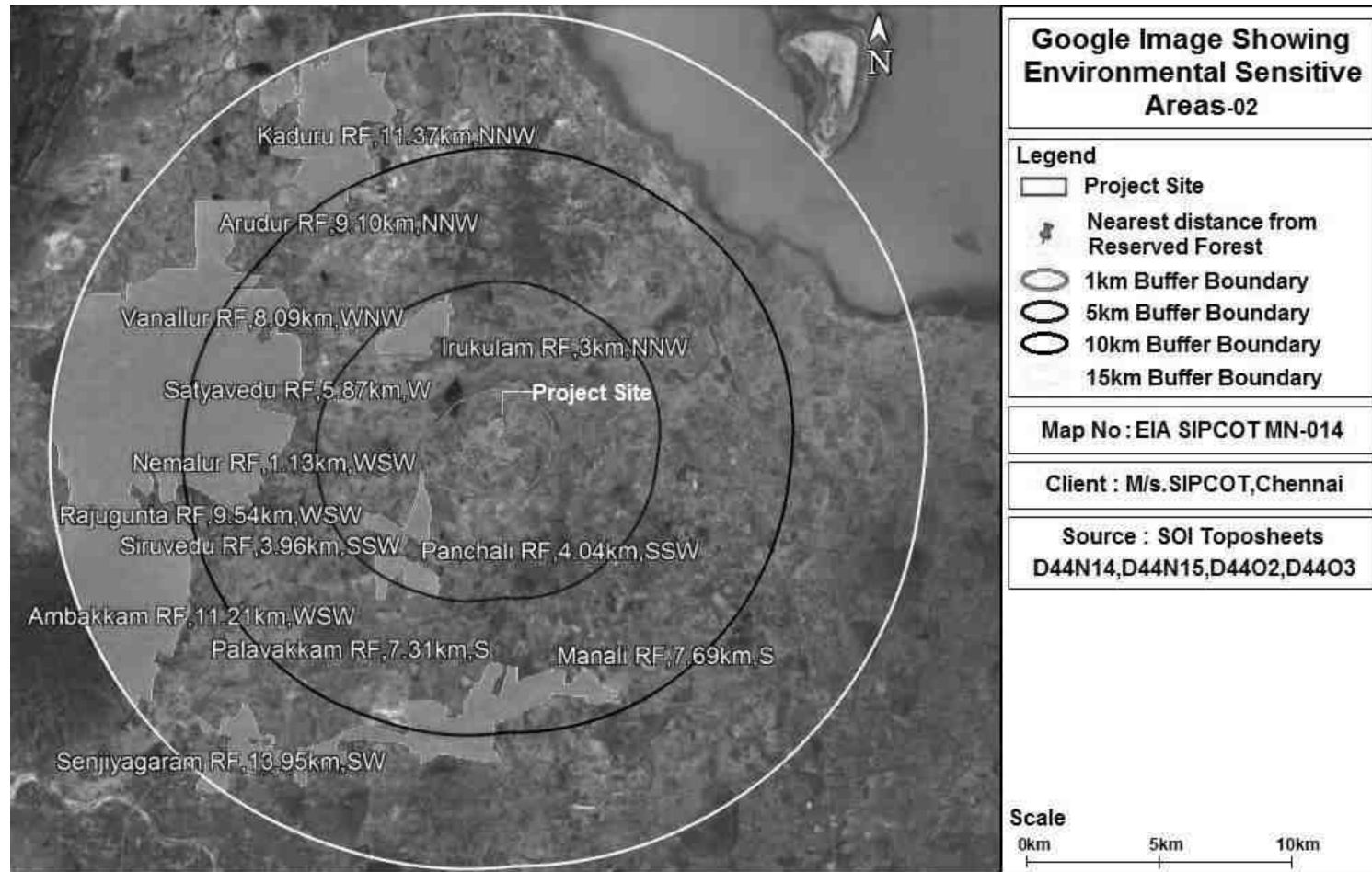


Figure 3-4 Environmental sensitive areas(Reserved forest) covering within 15 km from project boundary

3.5 PHYSICAL CONDITIONS OF PIA DISTRICT

In this section, the physical conditions of PIA district 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

3.5.1 PIA District Profile

Thiruvallur is a coastal district lies between 12°10' and 13°15' Northern latitude and between 79°15' and 80°20' Eastern longitude and spreads over an area of 3394 sq.kms. The district has Chennai and Bay of Bengal as its boundary on the east flanked to the north and west by Andhra Pradesh and to the south by Vellore and Kancheepuram districts. The land area is flat while some parts of the district are undulated and some of them are even hilly. The taluks of Ponneri, Gummidipoondi and Tiruvallur do not have any landscape worth to mention while a number of hillocks are seen scattered in and around Tiruttani taluk. The sandy strip of the coast is replete with casuarina plantations.

Source: https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_330_1_PART_A_DCHB_THIRUVALLUR.pdf

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

3.5.2 Climatic Conditions

The district receives the rain under the influence of both southwest and northeast monsoons. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal chiefly during Northeast monsoon period. The southwest monsoon rainfall is highly erratic and summer rains are negligible. Rainfall data analysis shows that the normal annual rainfall varies from 950 mm to 1150 mm.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

3.5.3 Natural Resources OfPIA District

3.5.3.1 Flora & Fauna

Thiruvallur coast has a very vast coastal plain, which extends from North of ToppalaPalayam to South of Sattangadu. There are three strand lines, with intervening broad tidal flats occurring in the coastal plains. Lagoons, mangrove swamps, salt marshes, estuaries, creeks, sand dunes, and beach terraces represent the marine landforms. The Pulicate brackish water lake of Bay of Bengal in Ponneri block is a potential hot spot along the coast. It was the site of Old Dutch settlement. Migratory birds from various countries flock here every year between December and February. Pulicate Lake was identified as a site of international importance by the International Union for the Conservation of Nature (IUCN) and is rich in mangroves. Flora and fauna of PIA are discussed in **Section 3.11**.

Source: <http://tnenvvis.nic.in/files/THIRUVALLUR%20%20.pdf>

3.5.3.2 Forest Resources

Forest occupies 5.8 % of the total area. The total extent of Reserved Forests and Reserve lands are 19791 ha, about 1800 ha of Reserve lands, notified under section 26 of Tamil Nadu Forest Act is also under active consideration for declaration as Reserve forest. These lands are in bits and pieces spread over the district are tropical in nature and they fall under dry thorn and dry evergreen types. Much of the natural forests have been converted into man-made forests since the late 1950s. However, chunks of natural forests still exist.

Source: <http://tnenvvis.nic.in/files/THIRUVALLUR%20%20.pdf>

3.5.3.3 Irrigation

Apart from seasonal rivers like Kosasthalaiyar, Araniar, Nandi, Kallar, Coovum and Buckingham canal, there is no perennial river in the district. The agricultural operations in the district depend mainly on tanks and lakes. They get water mainly during two monsoon periods viz., South-West monsoon (June to September) and North-East monsoon (October to December). The North-East monsoon brings more water compared to the others.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.5.3.4 Agricultural Resources

The main occupation of the district is agriculture and allied activities. Nearly 47% of the total work force is engaged in the agricultural sector. Around 86% of the total population is in rural areas engaged in agriculture and allied activities. The major crops grown in the district are rice, cumbu - ragi, green gram, black gram, sugar cane and groundnut. Apart from this, certain horticultural crops like mango, guava and vegetables have also been cultivated successfully. Total cultivated Area is 184198 ha, Net Area Sown is 136648 ha, Area Sown more than once is 50550 ha and Cropping Intensity is 134.8%.

Source: <http://tnenvis.nic.in/files/THIRUVALLUR%20%20.pdf>

3.5.3.5 Mineral Resources

The district does not contain any precious mineral. However it has a few varieties of major and minor minerals.

Minor Minerals

Lime Shell: Pulicut Lake, Sunnambukulam, Annamalaicherry

Silica Sand: Elavoor, Eravanoor, Ennore, Gummidipoondi and Ponneri.

Stoneware Clay: Adhigathur, Odhapal, GudapakkamKandigai

Major Minerals

River Sand: Kosasthalaiyar, Araniar, Kallar, Nandi, Coovam

Blue Metal: Pallipattu and Tiruttani Taluks

Gravel: Ponneri and Gummidipoondi Taluks

Brick Clay: Tiruvallur and Ponneri Taluks.

Mineral map of India is given in **Figure 3-5**.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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



(Source: Maps of India)

Figure 3-5 Mineral Map of Tamil Nadu

3.5.9 Land Use & Land Cover

Total geographic area of Tiruvallur district is 3423 Sq.Km. Urban Builtup area is 295.16 Sq.Km and Rural Builtup area is 272.76 Sq.Km. Details of land use/land cover statistics for Tiruvallur district were given in **Table 3-2** and Land Use map of Tiruvallur district is given in **Figure 3-7**. Land Use pattern of Tiruvallur is given in **Figure 3-6**.

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

S. No	Division of Land Use/Land Cover	Area in Sq.Km	Area in Acres	Area in Ha	Total Area %
1	Agriculture,Crop land	1834.25	453252.35	183425	53.59
2	Agriculture,Plantation	87.77	21688.41	8777	2.56
3	Agriculture,Fallow	115.92	28644.41	11592	3.39
4	Barren/unculturable/ Wastelands, Salt Affected land	7.42	1833.52	742	0.22
5	Barren/unculturable/ Wastelands, Scrub land	190.58	47093.27	19058	5.57
6	Barren/unculturable/ Wastelands, Sandy area	12.83	3170.36	1283	0.37
7	Barren/unculturable/Wastelands, Gullied/Ravinous Land	0.11	27.18	11	0.00
8	Barren/unculturable/ Wastelands, Barren rocky	2.39	590.58	239	0.07
9	Builtup,Urban	295.16	72935.51	29516	8.62
10	Builtup,Rural	272.76	67400.36	27276	7.97
11	Builtup,Mining	7.54	1863.17	754	0.22
12	Forest,Evergreen/ Semi evergreen	18.22	4502.25	1822	0.53
13	Forest,Deciduous	68.13	16835.26	6813	1.99
14	Forest,Forest Plantation	10.57	2611.90	1057	0.31
15	Forest,Swamp/ Mangroves	3.03	748.73	303	0.09
16	Forest,Scrub Forest	0.03	7.41	3	0.00
17	Wetlands/Water Bodies, Inland Wetland	0.65	160.62	65	0.02
18	Wetlands/ Water Bodies, Reservoir/Lakes/Ponds	341.57	84403.65	34157	9.98
19	Wetlands/Water Bodies, River/Stream/canals	67.33	16637.58	6733	1.97
20	Wetlands/Water Bodies,Coastal Wetland	86.74	21433.89	8674	2.53
Total		3423	845840.42	342300	100

Source: <https://bhuvan-app1.nrsr.gov.in/thematic/thematic/index.php>

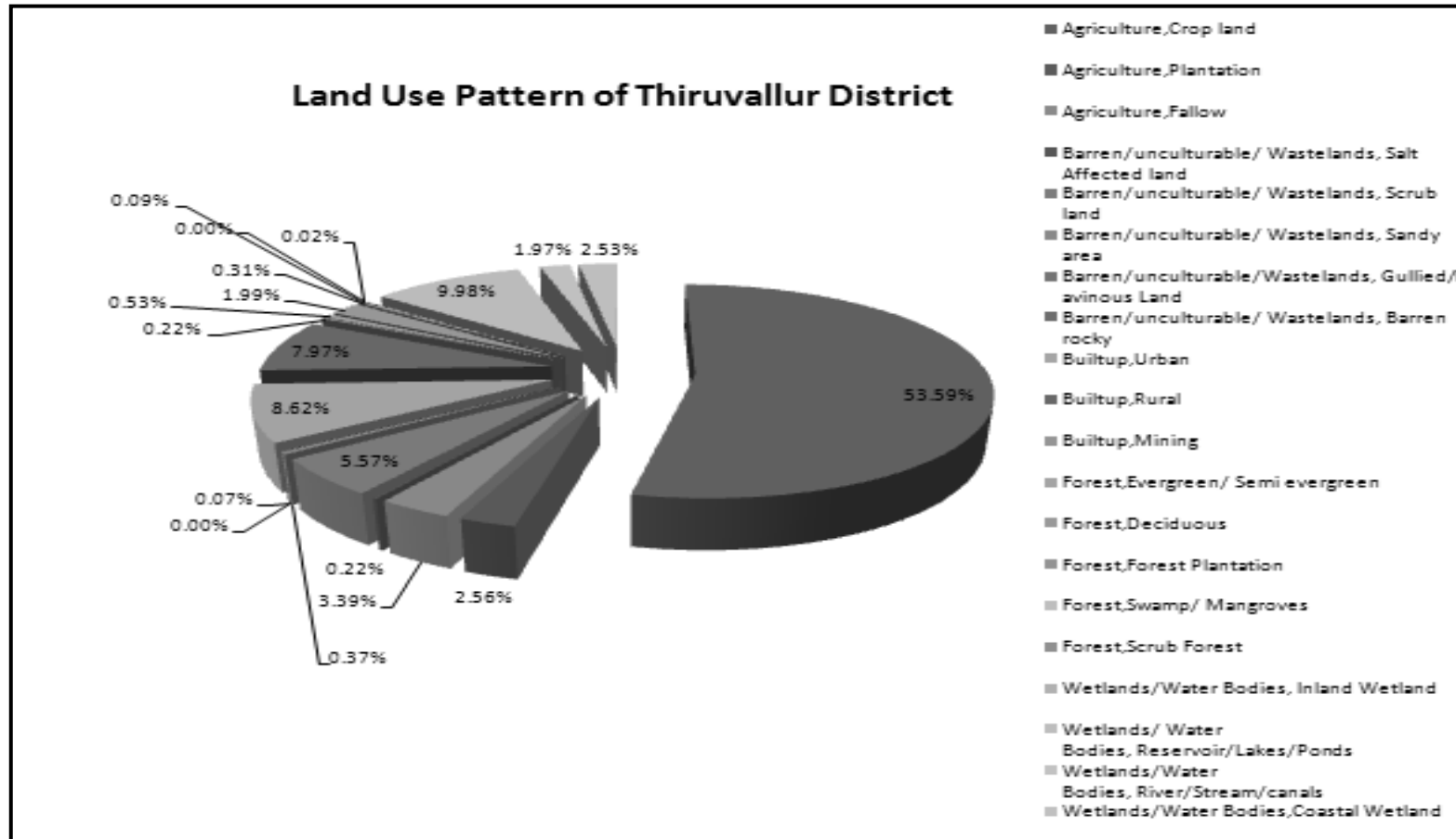


Figure 3-6 Land use pattern of the Thiruvallur District

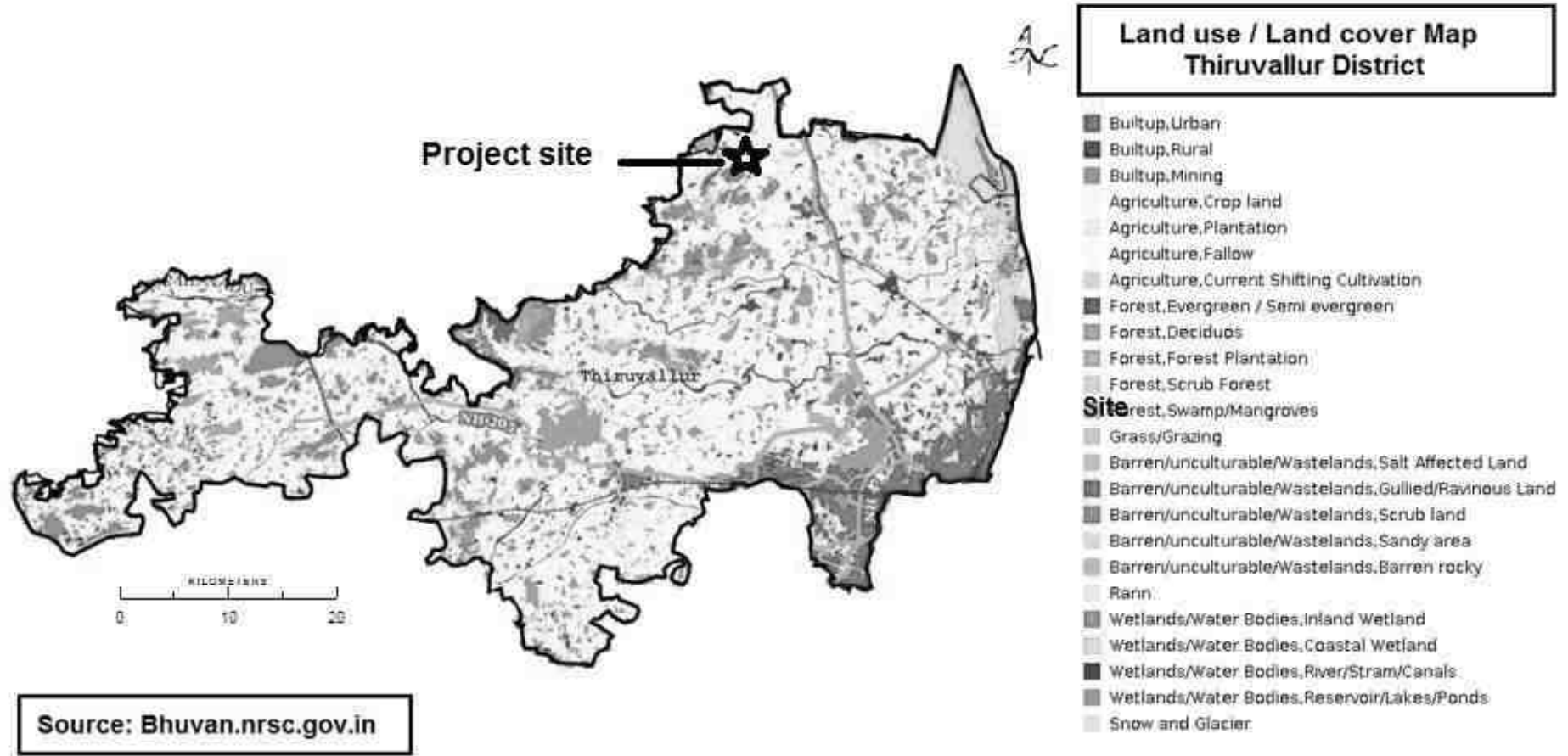


Figure 3-7 Land use / Land cover Map of Thiruvallur district

3.5.4.1 Land Use and Land Cover of the Study Area

Total Project Study area is **397.88** 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 3-8** and **Figure 3-9** respectively.

Table 3-3 Land Use Pattern of the Study Area

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Area (%)
1	Crop land	45.65	181.63	44881.68	18163
2	Fallow	10.75	42.78	10571.15	4278
3	Plantation	8.01	31.86	7872.77	3186
4	Rural	6.80	27.06	6686.66	2706
5	Scrub land	5.85	23.26	5747.66	2326
6	Tanks / Lakes / Ponds	5.82	23.16	5722.95	2316
7	Deciduous	5.53	22	5436.31	2200
8	Urban	4.07	16.19	4000.63	1619
9	Forest Plantation	3.94	15.68	3874.61	1568
10	Coastal wetland	2.33	9.28	2293.13	928
11	Scrub Forest	0.61	2.42	597.99	242
12	River / Stream / Canals	0.39	1.56	385.48	156
13	Sandy area	0.10	0.41	101.31	41
14	Gullied / Ravinous	0.09	0.34	84.02	34
15	Evergreen / Semi Evergreen	0.04	0.14	34.59	14
16	Mining	0.03	0.11	27.18	11
	Total	100.00	397.88	98318.14	39788

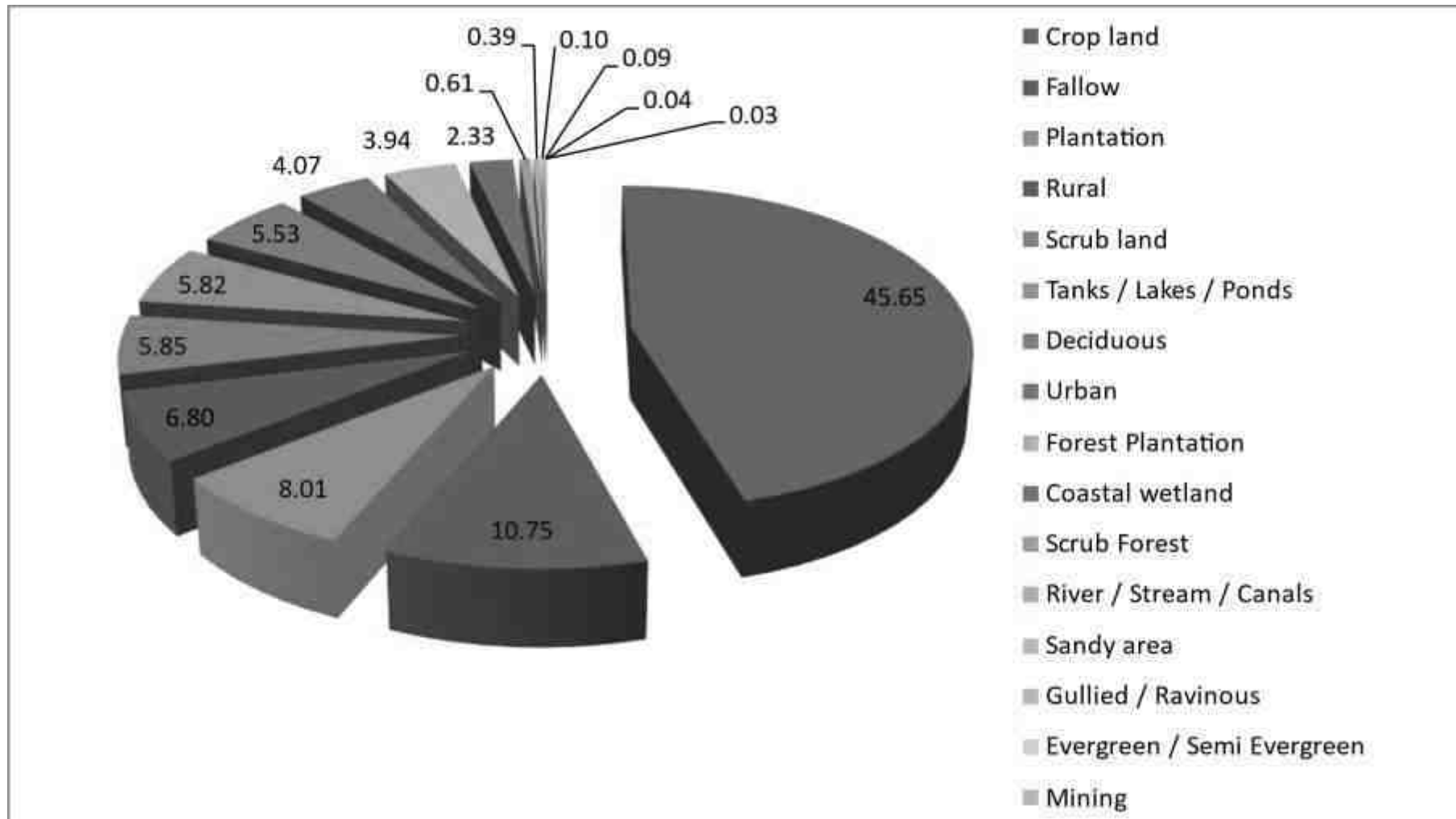


Figure 3-8 Land Use Pattern of the Study Area

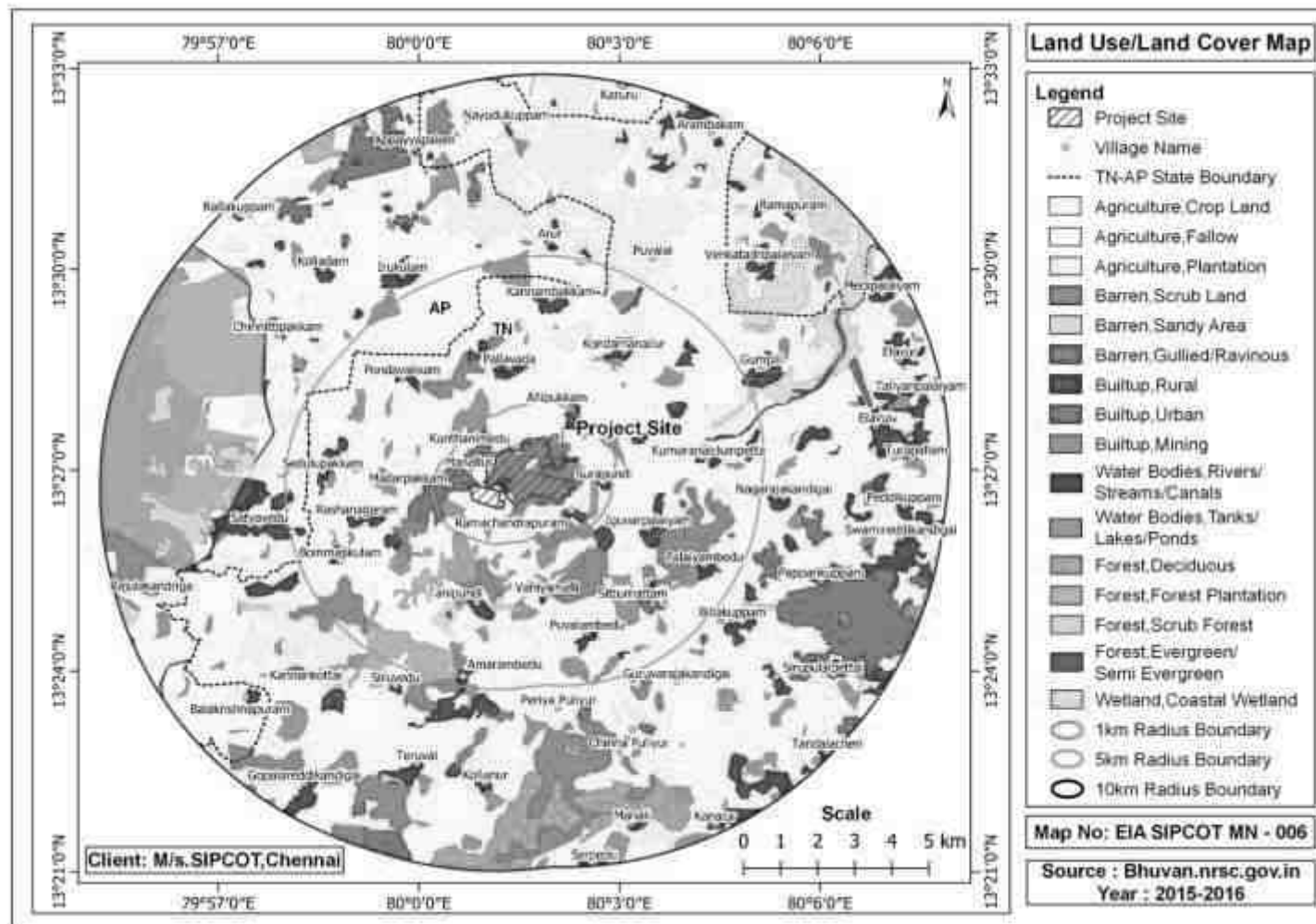


Figure 3-9 Land Use Map of the Study Area

3.5.9 Topography

The coastal region is mostly flat while certain areas in Tiruttani and Pallipet taluks are undulated and even hilly. However, there are not many hills of any considerable height in this district. There are a few conical hills or ridges of small elevation, like the St. Thomas Mount. Most of the hills and hillocks are rocky and no verdant vegetation is seen in the slopes of these hills. The area under forests, all of 19,736 sq. km., is only 5.8 % of the total geographical area of the district. Physical map of Tamilnadu is given as **Figure 3-9** and Topo map of study area is given as **Figure 3-2** and contour map of the study area is given as **Figure 3-10**.

Source: http://www.spc.tn.gov.in/Exe_Summary_DHDR/Thiruvallur.pdf

(Reference: State planning Commission –Tamil Nadu, "District Human Development Report-2017, Thiruvallur District")

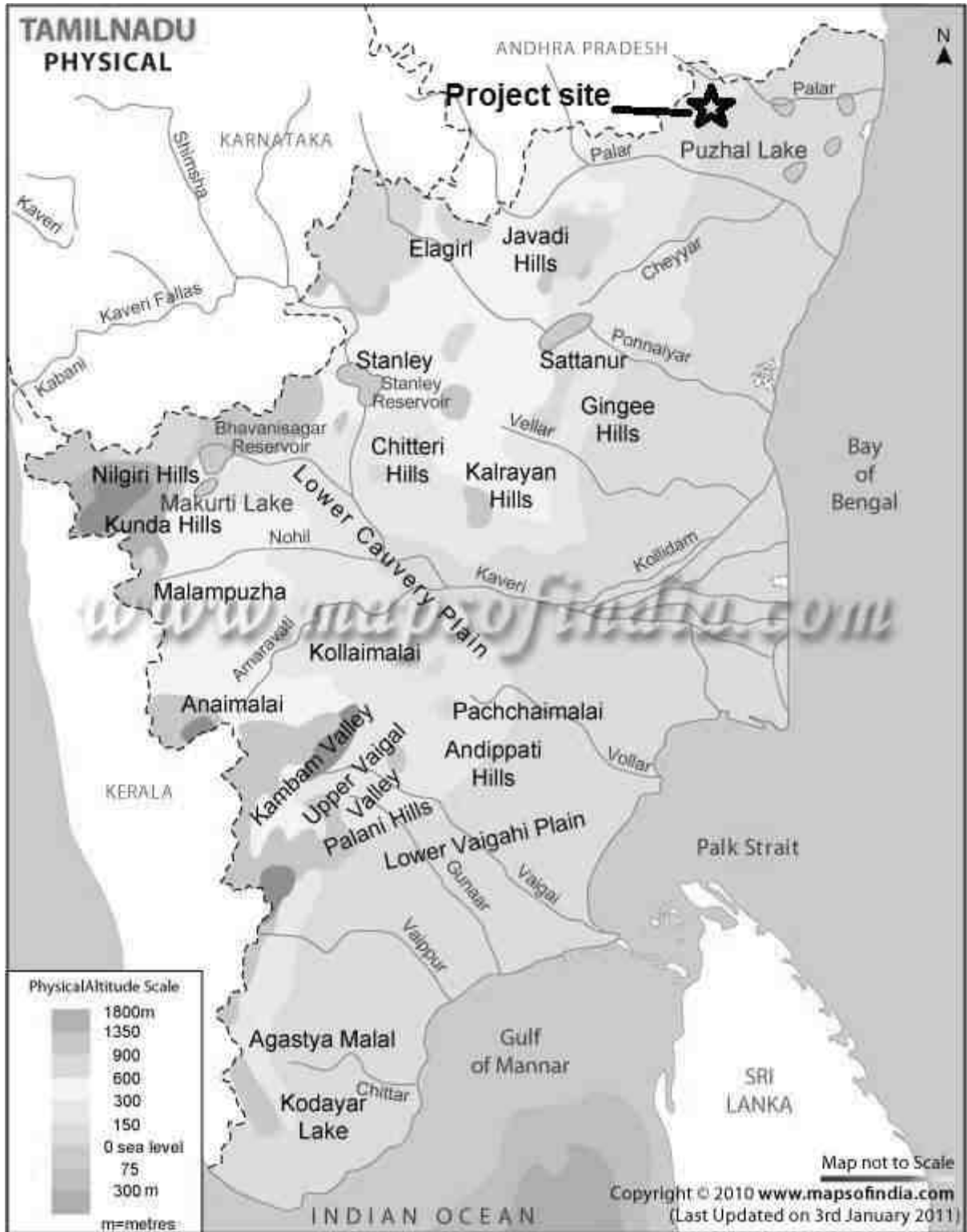


Figure 3-10 Physical Map of Tamilnadu

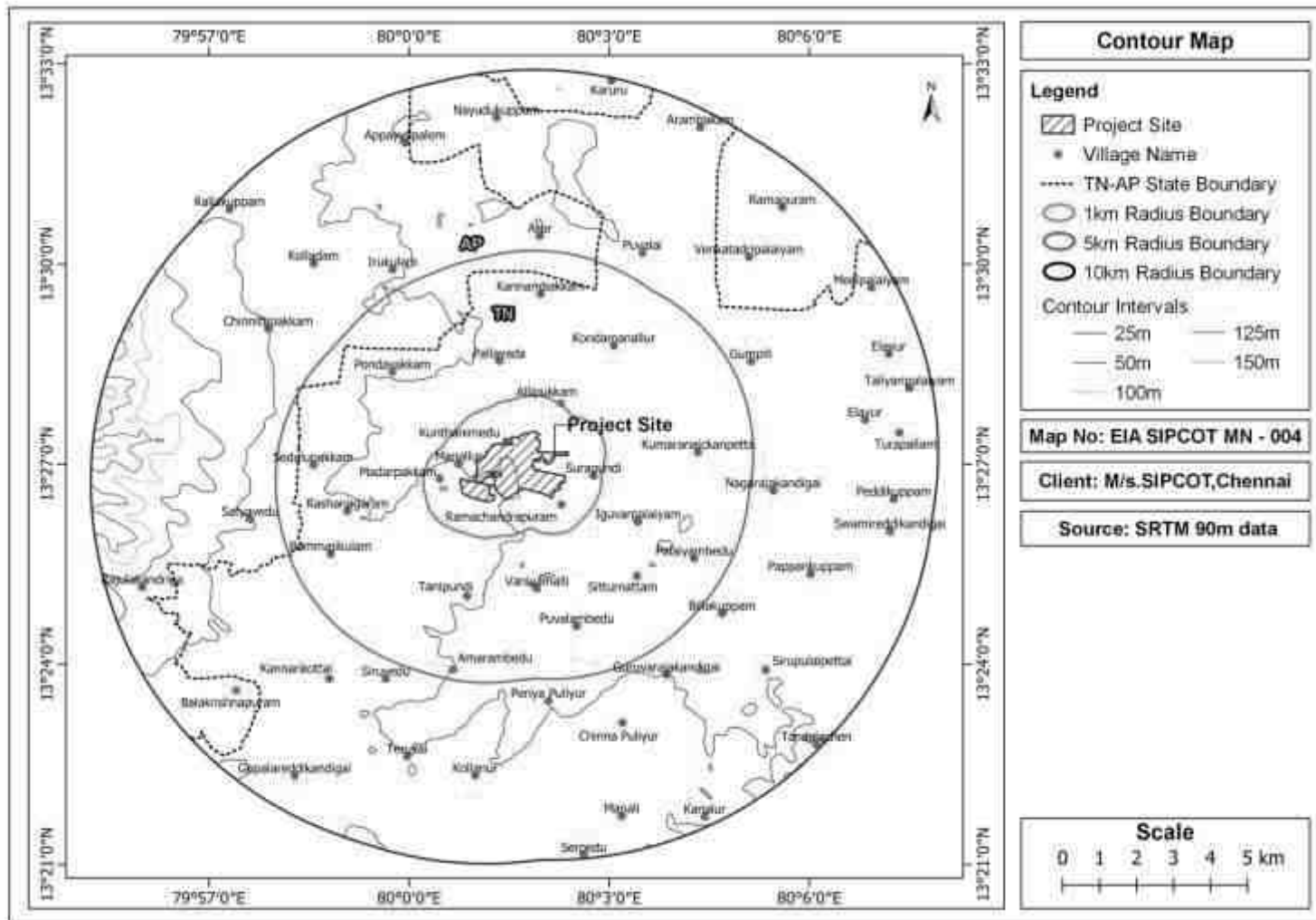


Figure 3-11 Contour Map of Study Area

3.5.6 Geomorphology of PIA district

The prominent geomorphic units identified in the district through interpretation of Satellite imagery are Alluvial Plain, Old River Courses, Coastal plains, Shallow & deep buried Pediments, Pediments and Structural Hills. The elevation of the area ranges from 183 m amsl in the west to sea level in the east. Four cycles of erosion gave rise to a complex assemblage of fluvial, estuarine and marine deposits. The major part of the area is characterised by an undulating topography with innumerable depressions which are used as irrigation tanks. The coastal tract is marked by three beach terraces with broad inter-terrace depressions. The coastal plains display a fairly lower level or gently rolling surface and only slightly elevated above the local water surfaces or rivers. The straight trend of the coastal tract is resultant of development of vast alluvial plains. There are a number of dunes in the coastal tract. The Geomorphology Map of the Thiruvallur District is shown as **Figure 3-12**.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

3.5.6.1 Geomorphology of the study area

Total geographical area of the study area is **397.88**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 3-13**.

Table 3-4 Geomorphology pattern of the study area

watS. No	Description	Sq.Km	Acr	Hec	%
1	Denudational Origin-Pediment-PediPlain Complex	339.92	83995.93	33992	85.43
2	Coastal Origin-Younger Coastal Plain	26.55	6560.64	2655	6.67
3	Waterbodies	22.36	5525.27	2236	5.62
4	Structural Origin-Moderately Dissected Hills and Valleys	8.75	2162.17	875	2.20
5	Denudational Origin-Low Dissected	0.17	42.01	17	0.04

	Hills and Valleys				
6	Fluvial Origin-Active Flood Plain	0.13	32.12	13	0.03
	Total	397.88	98318.14	39788	100.00

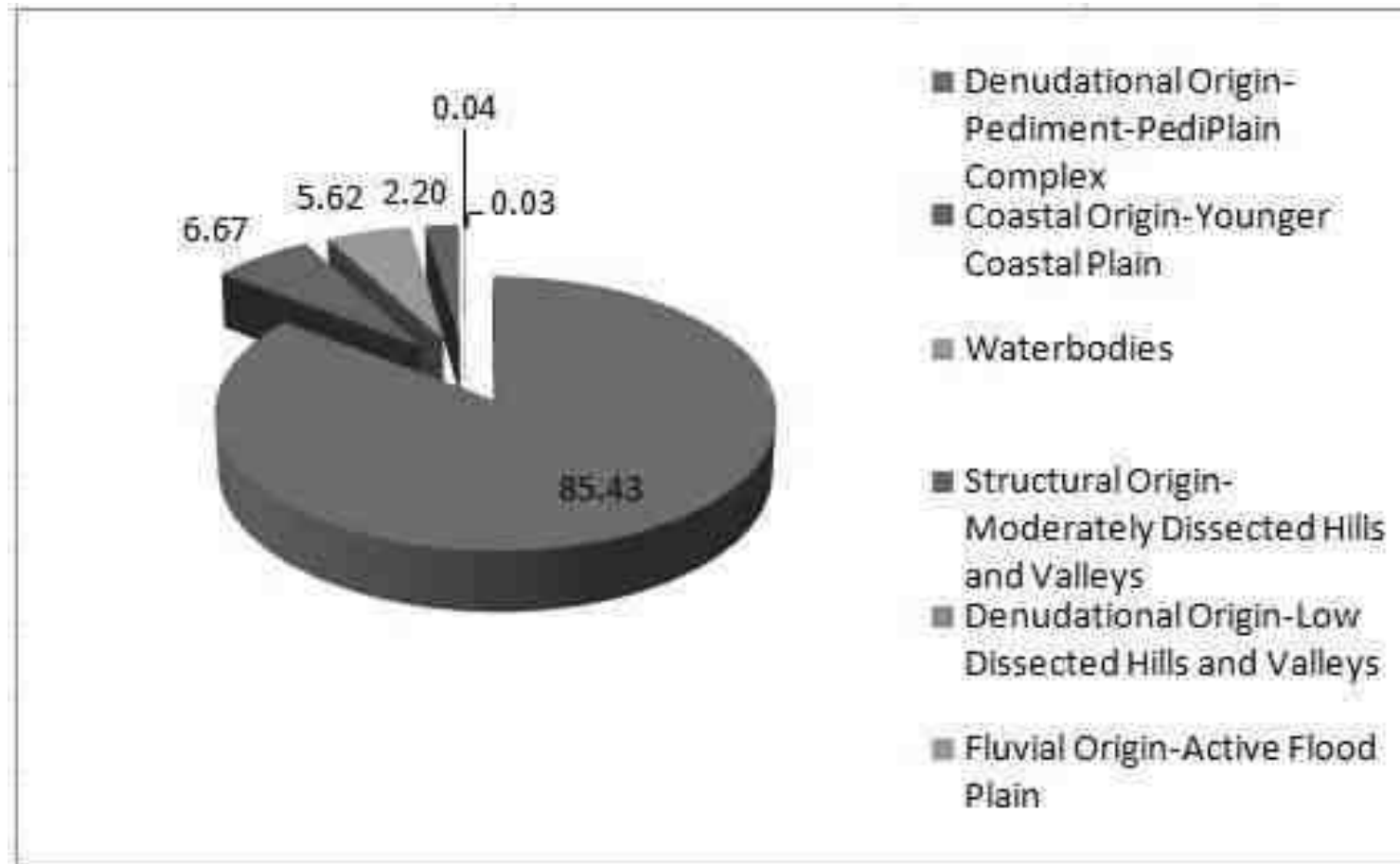


Figure 3-12 Geomorphology pattern of the study area

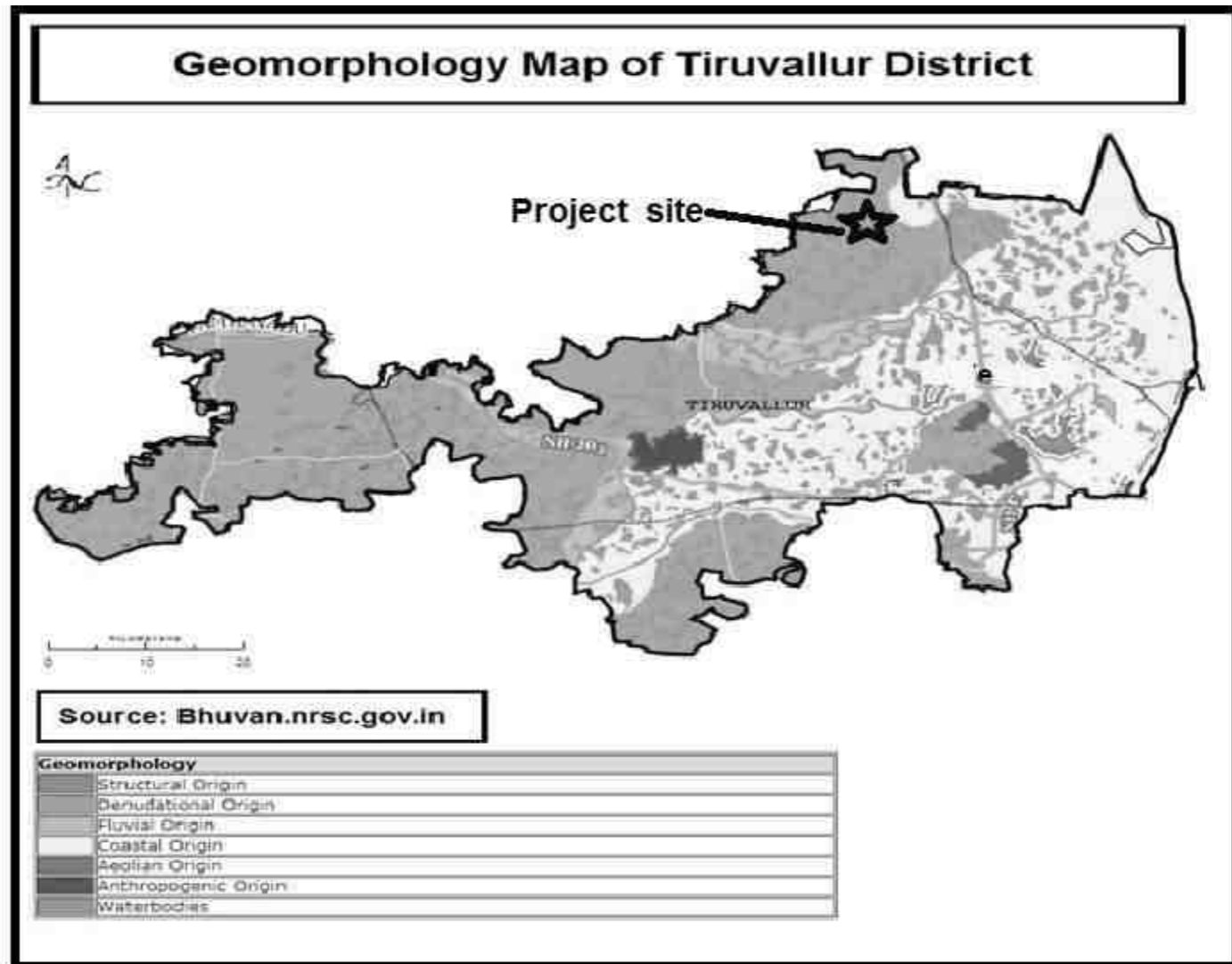


Figure 3-13Geomorphology Map of Thiruvallur District

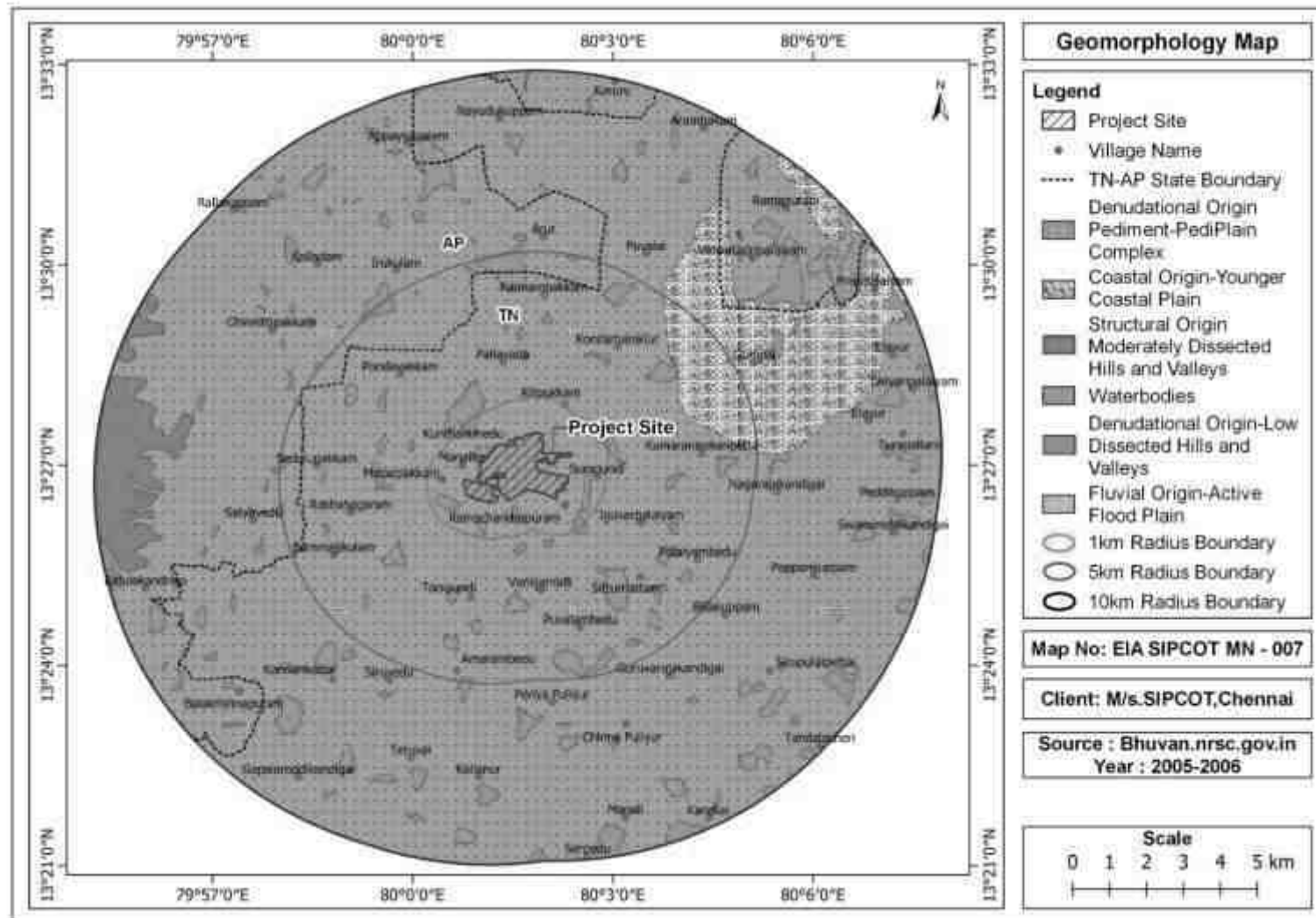


Figure 3-14 Geomorphology Map of Study Area

3.5.9 Hydrogeology of PIA district

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are considered by Unconsolidated & semi-consolidated formations and Weathered, fissured and fractured crystalline rocks. The porous formations in the district include sandstones and clays of Jurassic age (Upper Gondwana), marine sediments of Cretaceous age, sandstones of Tertiary age and recent alluvial formations. As the Gondwana formations are well-compacted and poorly jointed, the movement of ground water in these formations is mostly restricted to shallow levels. Ground water occurs under phreatic to semi-confined conditions in the intergranular pore spaces in sands and sandstones and the bedding planes and thin fractures in shales. In the area underlain by Cretaceous sediments, ground water development is rather poor due to the rugged nature of the terrain and the poor quality of the formation water. Quaternary formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district. The maximum thickness of alluvium is 30.0 m. whereas the average thickness is about 15.0m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Alluvium which forms a good aquifer system along Araniyar and Korattalaiyar river bed which is one of the major sources of water supply to urban areas of Chennai city and also to the industrial units. Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fissured and fractured zones at deeper levels. The thickness of weathered zone in the district is in the range of 2 to 12 m. The depth of the wells ranged from 8.00 to 15.00 mbgl. The yield of large diameter wells tapping the weathered mantle of crystalline rocks ranges from 100 to 500 lpm and are able to sustain pumping for 2 to 6 hours per day. The yield of bore wells drilled down to a depth of 50 to 60 m ranges from 20 to 400 lpm. The yield of successful bore wells drilled down to a depth of 150 m bgl during the ground water exploration programme of Central Ground Water Board ranged from 1.2 to 7.6 lpm. The depth to water level in the district varied between 2.38 – 7.36 m bgl during pre-monsoon (May 2006) and 0.79 – 5.30 m bgl during post monsoon (Jan 2007). The seasonal fluctuation shows a rise between 0.28 and 4.80 mbgl. The piezometric head varied between 2.20 to 10.30 m bgl (May 2006) during premonsoon and 2.72 to 8.55 m bgl during post monsoon. The hydrogeology map of Thiruvallur District is given in **Figure 3-14**

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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



Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

Figure 3-15 Hydrogeology Map of Tiruvallur District

3.5.9 Drainage Pattern in PIA district

Araniyar, Korattalayar, Cooum, Nagari and Nandhi are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. Korattaliar river water is supplied to Cholavaram and Red Hill tanks by constructing an Anicut at Vellore Tambarambakkam. After filling a number of tanks on its further course, the river empties into the Ennore creek a few kilometres north of Chennai. The Cooum River, flowing across the southern part of the district, has its origin in the surplus waters of the Cooum tank in Tiruvallur taluk and also receives the surplus waters of a number of tanks. It feeds the Chembarambakkam tank through a channel. It finally drains into the Bay of Bengal. The drainage map of the Study Area is given as **Figure 3-15**.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

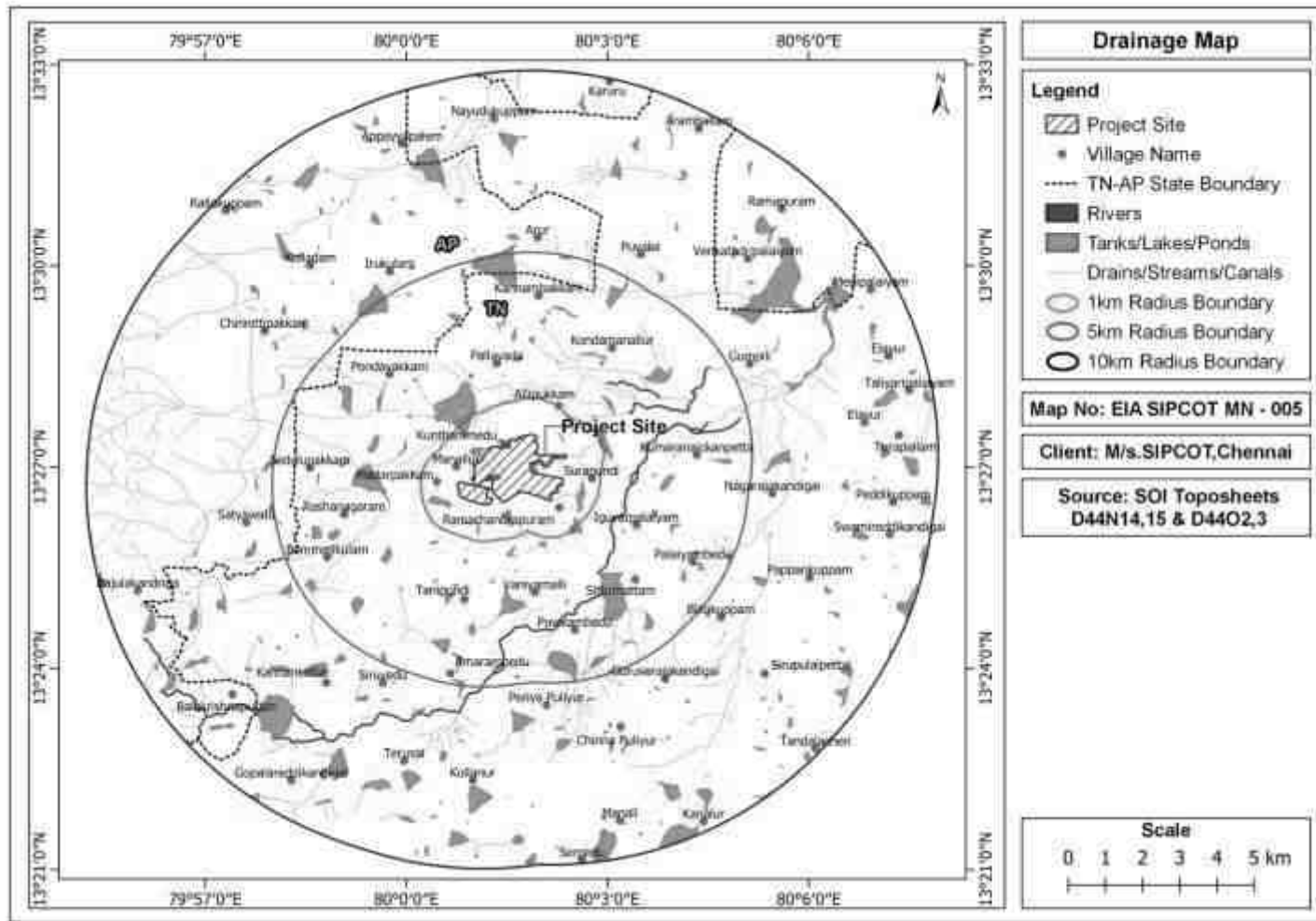


Figure 3-16 Drainage map of the study area

3.5.9 Geology

The Thiruvallur district can be geologically classified into hard rock and sedimentary (alluvial) formation. This district is principally made up of Archaean, upper Gondwana and the tertiary formations. These are overlaid by laterites and alluvium. The oldest of the crystalline rocks of Archaean age are of Biotite and Hornblende Gneiss, Charnockite and granite. These are intruded by Amphibole dykes, and occasionally with veins of quartz and pegmatites. Granites and gneisses of Archaean age are mainly seen in Tiruthani taluk. Geological map of Tamilnadu is given as **Figure 3-16**.

Source: <http://nwm.gov.in/sites/default/files/Notes%20on%20Thiruvallur%20District.pdf>

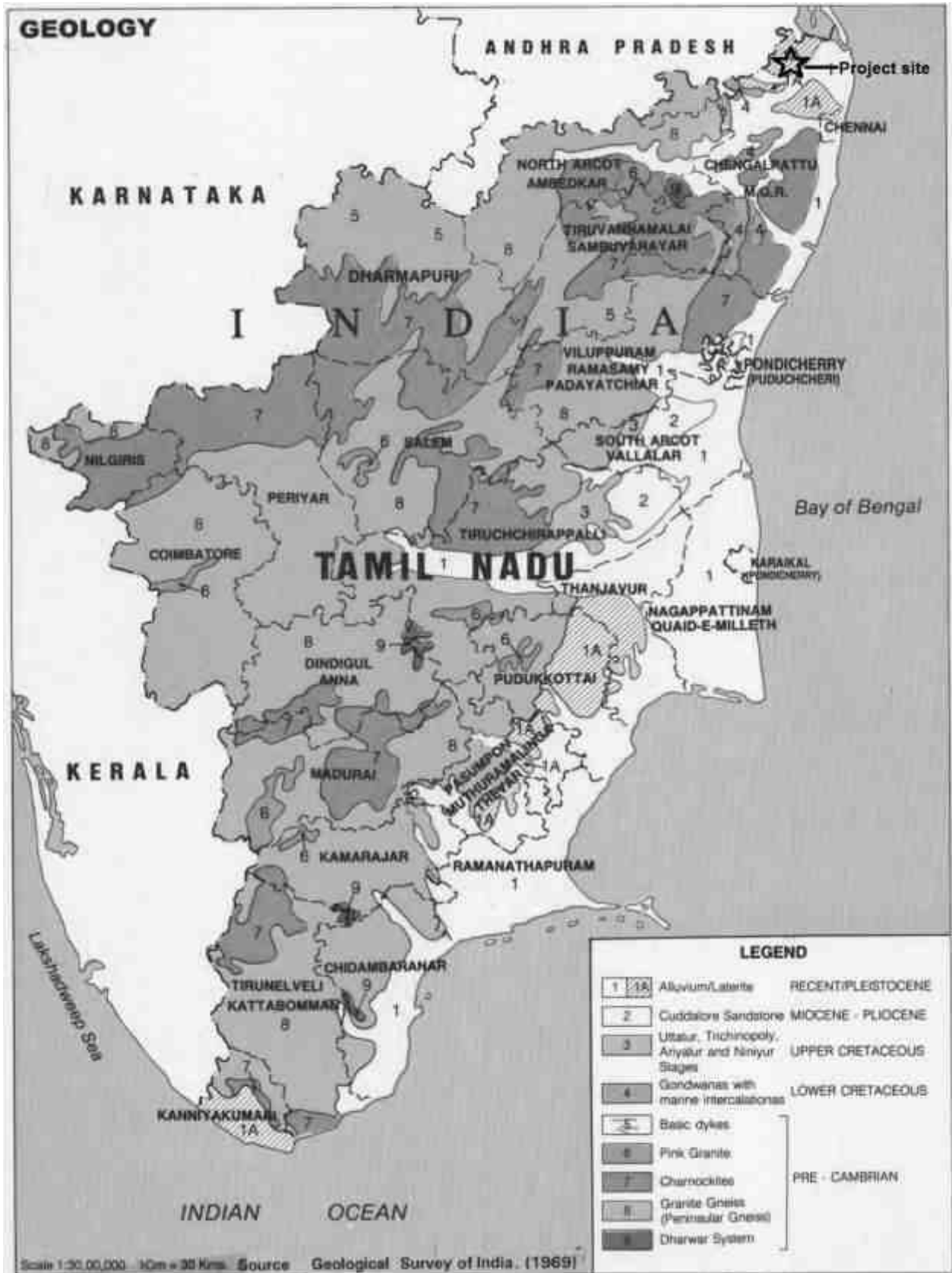


Figure 3-17 Geology Map of Tamilnadu

3.5.11 Soils in PIA District

Soils in the area have been classified into Red soil, Black soil, Alluvial soil and colluvial soil. The major part is covered by Red soil of red sandy/clay loam type. Ferruginous red soils are also seen at places. Black soils are deep to very deep and generally occur in the depressions adjacent to hilly areas, in the western part. Alluvial soils occur along the river courses and eastern part of the coastal areas. Sandy coastal alluvium (arenaceous soil) are seen all along the sea coast as a narrow belt. Soil map of India is given in **Figure 3-18**.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

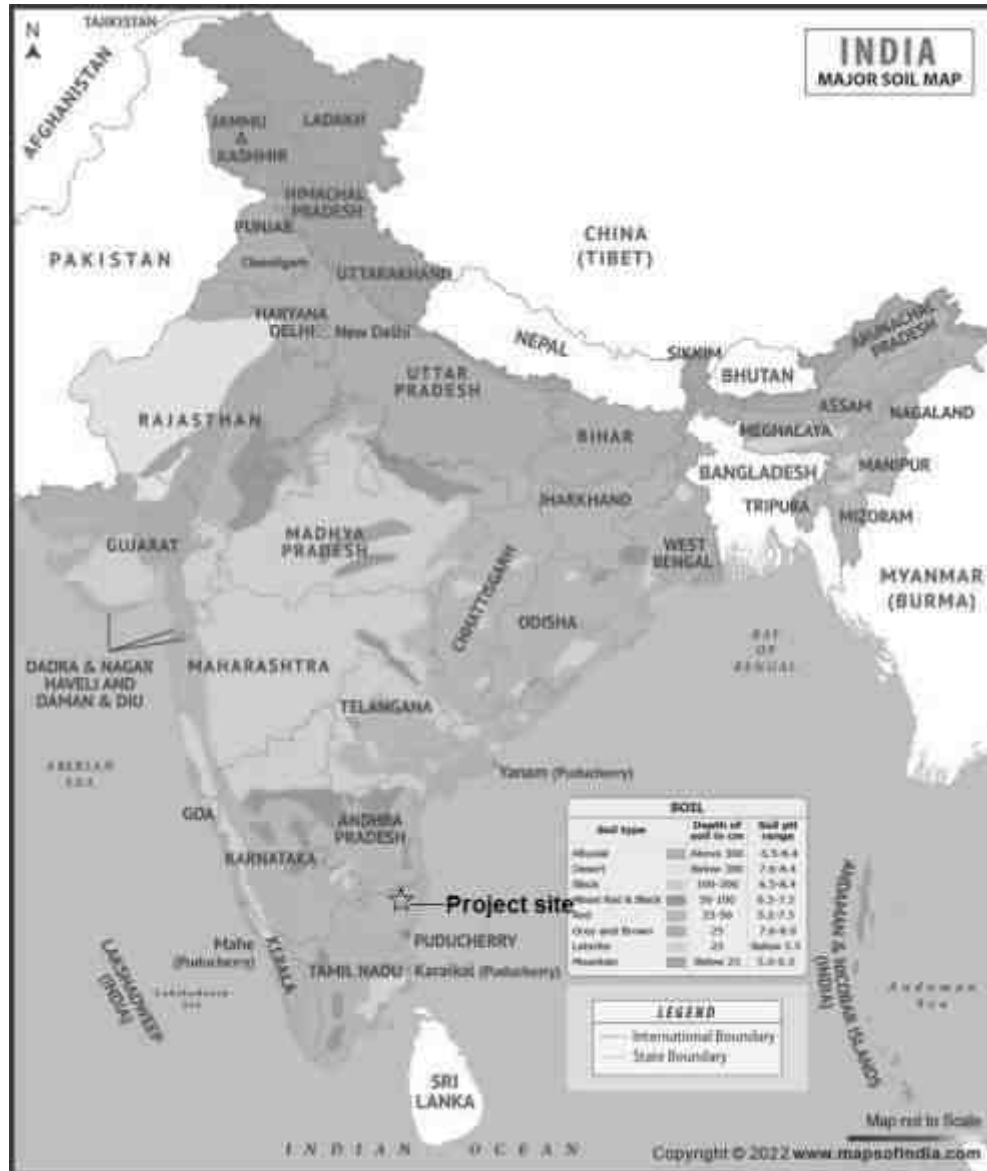


Figure 3-19 Soil map of India

3.5.12 Natural Hazards in PIA District

The coastline is mainly accreting with noticeable erosional effects particularly near Ennore. Development of offshore bars and shoals are observed near Ennore and Pulicat. Madras Thermal Power Station (MTPS) has been located near the Pulicat Lake. Boulders and Groynes were laid along a continuous stretch in this area. The strip of land between the Bay of Bengal and Pulicat Lake faces sea erosion. Generally floods occur during north east monsoon when there is heavy rainfall coupled with cyclonic storm in Bay of Bengal. Floods often occur in the basins of Kosasthalaiyar, Araniar, Coovum and Adyar and its tributaries. The entire coastal length of the district is prone to tsunami. Wind Hazard Map of India is given in **Figure 3-19**.

Source: <http://tnenvs.nic.in/files/THIRUVALLUR%20%20.pdf>

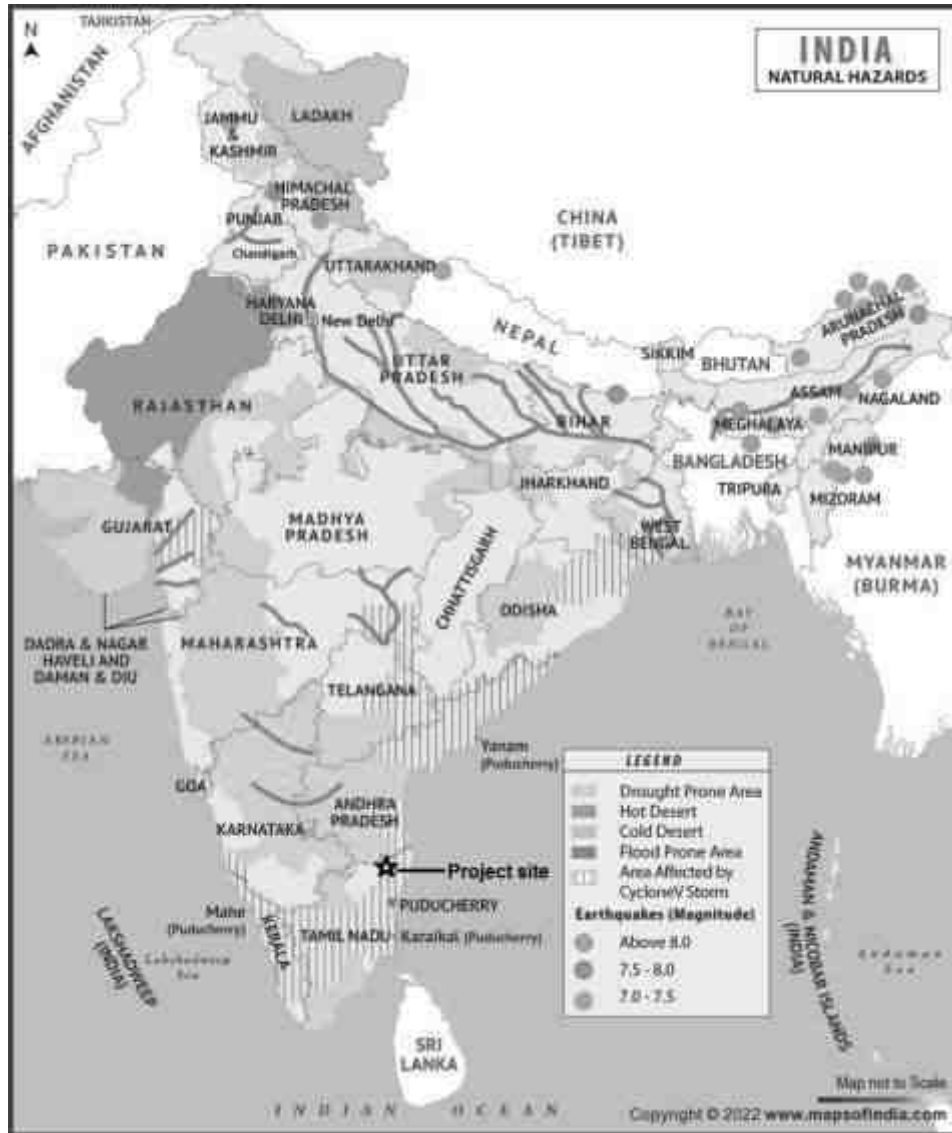


Figure 3-20 Natural Hazard Map of India

3.6 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

3.6.1 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.

3.6.2 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 **mid of January 2023 to mid of April 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 Indian Meteorological Department (IMD).

3.6.3 General Meteorological Scenario based on IMD Data

The nearest Indian Meteorological Department (IMD) station located to project site is Chennai (Minambakkam). The Climatological data of Chennai (Minambakkam) (13°00'00" N and 80°11'00"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 3-5 Climatological Summary– Chennai (Minambakkam (A) (1991-2020)

	Temp (°C)		Rainfall (mm)		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Km/hr)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
	Jan	29.9	20.9	20.0	1.4	83	64	24.6		22.8	4.8
Feb	31.7	21.8	4.7	0.6	80	62	25.6	23.8	5.7	NW	E
Mar	34.0	23.8	3.4	0.2	76	62	25.4	26.7	7.2	S	SE
Apr	35.9	26.2	17.5	1.0	73	66	31.4	30.5	8.7	S	SE
May	38.3	27.7	49.7	1.8	65	62	30.1	31.2	9.2	SW	SE
Jun	37.5	27.4	75.4	4.5	61	58	27.4	28.9	9.1	W	SE
Jul	35.8	26.4	113.1	6.7	67	59	27.5	28.4	8.1	W	SE
Aug	34.9	25.7	141.4	8.8	71	64	28.1	29.4	7.5	W	SE
Sep	34.4	25.4	143.9	7.4	75	68	29.3	29.8	6.4	W	SE
Oct	32.6	24.6	278.3	10.6	81	74	30.1	29.7	4.9	W	E

Nov	30.4	23.2	377.3	11.5	83	75	28.5	27.4	4.6	N	NE
Dec	29.4	21.7	183.7	5.7	83	69	25.7	24.1	5.0	N	NE
Max.	38.3	27.7	377.3	11.5	83	75	31.4	31.2	9.2	Annual predominant wind pattern is South East	
Min.	29.4	20.9	3.4	0.2	61	58	24.6	22.8	4.6		
Avg/Total	33.7	24.6	1408.4	60.2	75	65	28.1	27.7	6.8		

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

- Daily maximum temperature is 38.3°C and the daily minimum temperature is 29.4°C were recorded in the months of May and December respectively.
- Maximum and minimum relative humidity of 83% and 58% were recorded in the months of January, November, December and June respectively.
- Maximum and minimum rainfall of 377.3mm and 3.4mm was recorded in the months of November and March respectively.
- Maximum and minimum Mean wind speed is 9.2 Km/hr and 4.6 Km/hr was recorded in the months of May and November respectively. According to the above IMD data, Annual predominant wind pattern is from **South East**.

3.6.4 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 (Mid of January to Mid of April 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 (Mid of January to Mid of April 2023)

S. No	Parameter	Observation
1.	Temperature	MaxTemperature:38 ⁰ C MinTemperature:21 ⁰ C AvgTemperature:28.06 ⁰ C
2.	AverageRelativeHumidity	74.46%
3.	AverageWindSpeed	2.97 m/s
4.	PredominantWindDirection	East

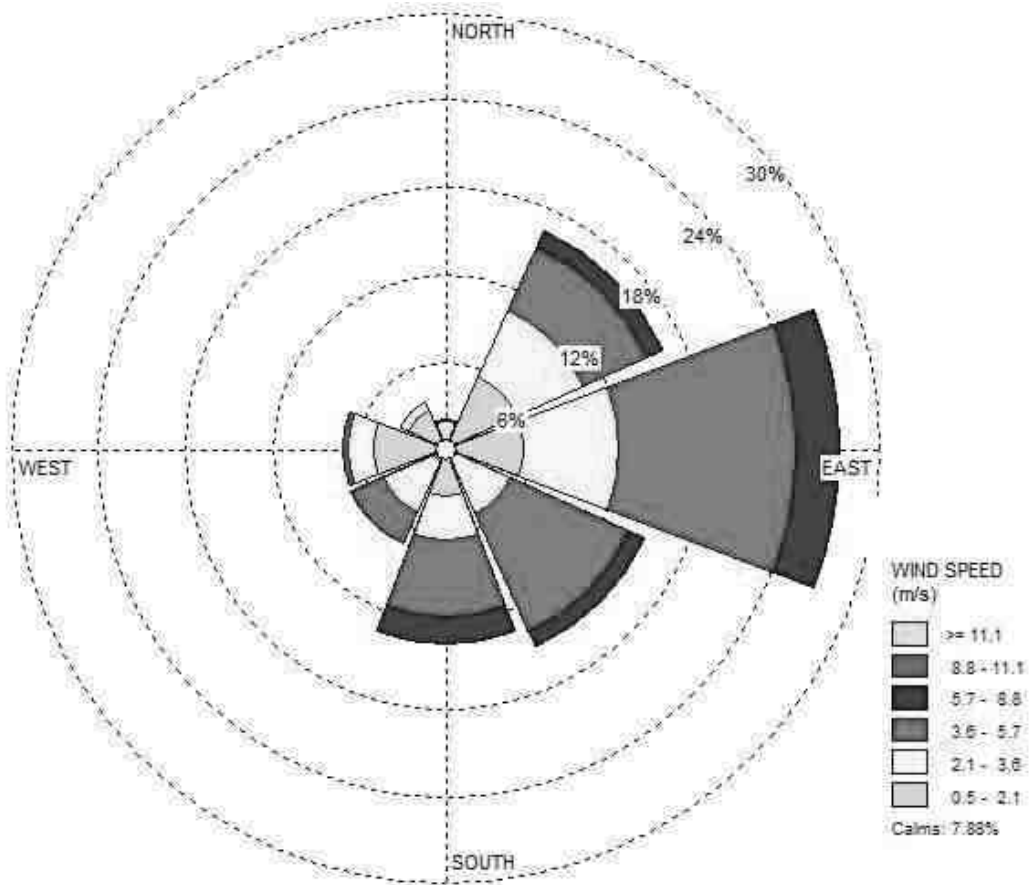


Figure 3-21 Wind rose during study period (Mid of January to Mid of April 2023)

3.6.5 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: 28.06°C
- Average Relative humidity: 74.46 %
- Average Wind speed: 2.97 m/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 3109 m during 6 AM to 5 PM, the maximum recorded at 4 PM, April 2023. This is shown in **Figure 3-15**.

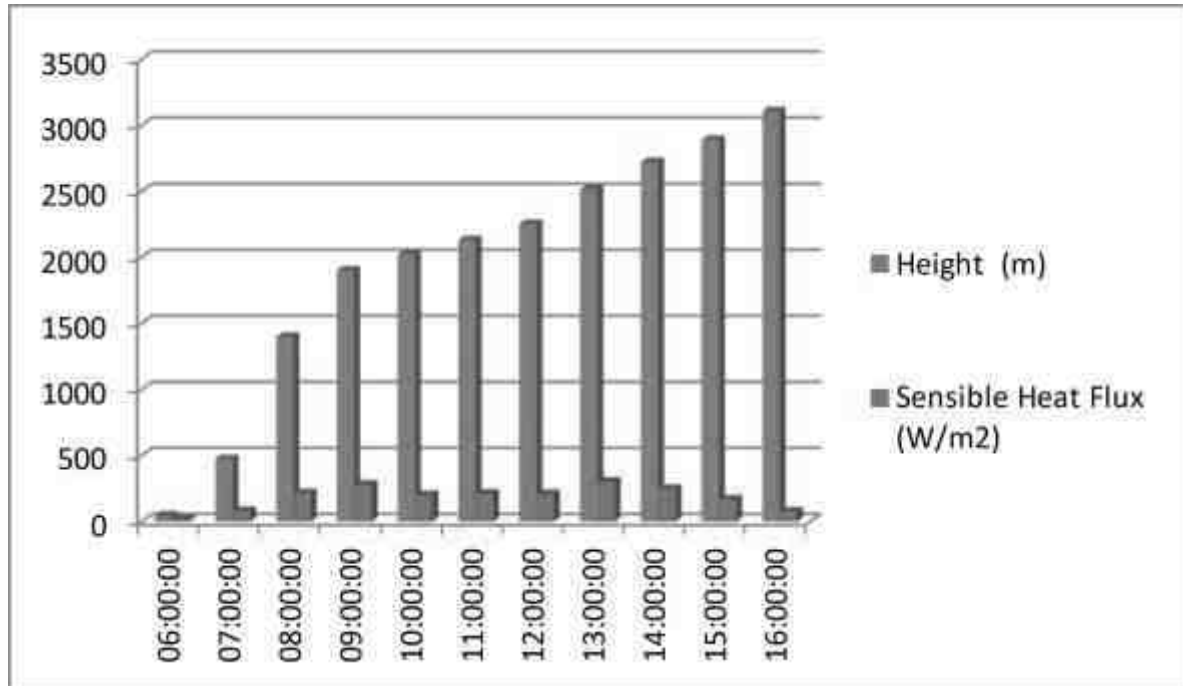


Figure 3-22 Atmospheric inversion level at the project site

3.7 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

3.7.1 Ambient Air Quality Monitoring Stations

To evaluate the baseline air quality of the study area, Eight (08) monitoring locations have been identified as per Meteorological data during the study period (Mid of January to Mid of April 2023). The wind predominance during study period is East. AAQ monitoring locations are selected based on IMD data for the study period wind predominance, map showing the air 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	Nagarjunakandigai	c/w	5.60	E
A3	Ramachandrapuram	u/w	0.45	SE
A4	Manali	c/w	8.79	SSE
A5	Kannankottai	c/w	6.80	SSW
A6	Madarpakkam	c/w	1.18	WSW
A7	Manallur	d/w	0.49	NW
A8	Pondavakkam	d/w	3.12	NW

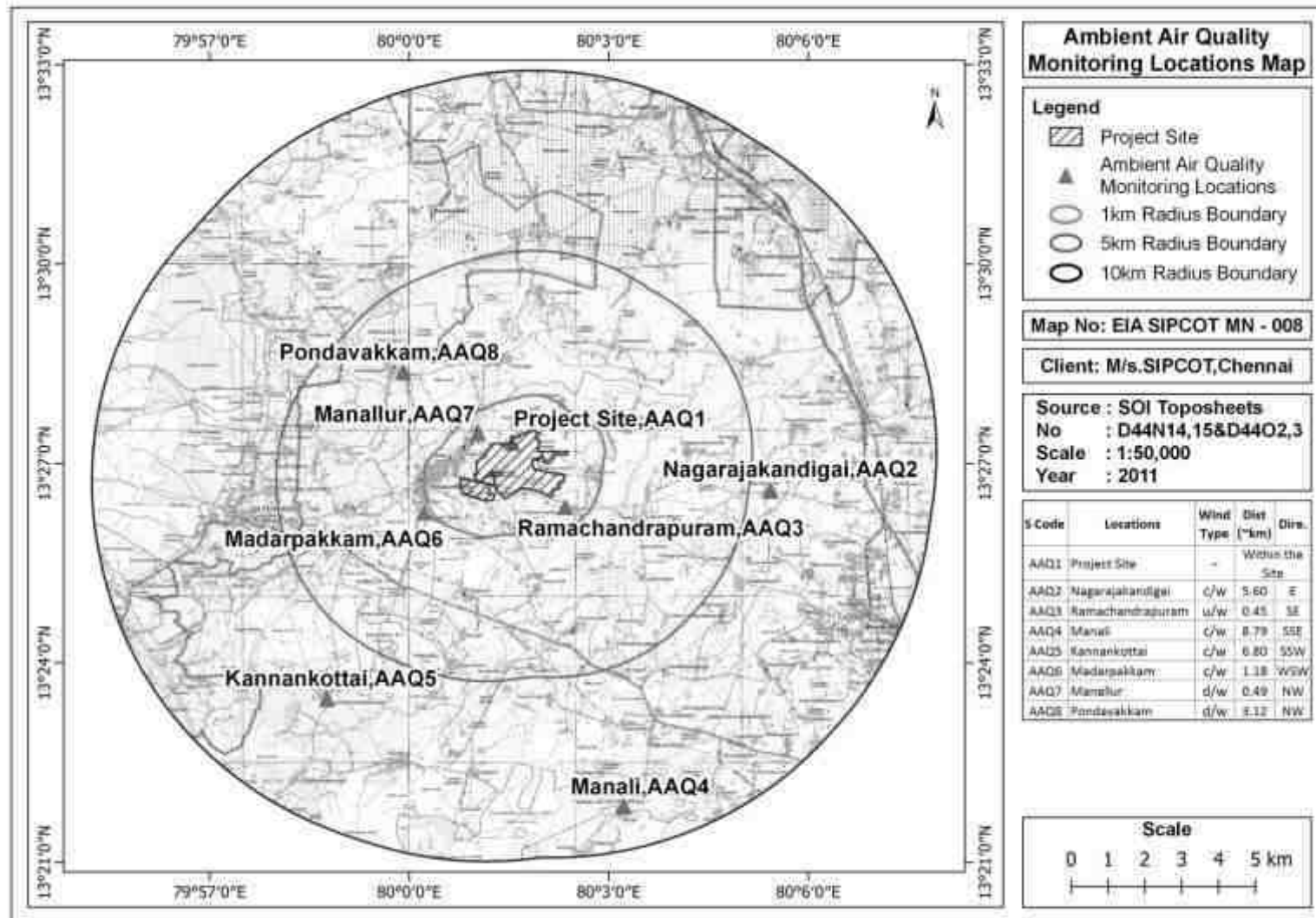


Figure 3-23Map showing the Air monitoring locations

3.7.2 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. 3 months (Mid of January to Mid of April 2023). PM₁₀, PM_{2.5}, SO₂, NO_x, Pb, NH₃, C₆H₆, C₂₀H₁₂, As and Ni 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 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters

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 - 24): 2019	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	Pbµg/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: 2016	6 (Annual)	6 (Annual)	24 Hours
12	Nickel ng/ m ³	HECS/AA/SOP/009 : 2016	20(Annual)	20(Annual)	24 Hours

3.7.3 Results and Discussions

The variations of the pollutants Particulate matter <10 micron size (PM₁₀), Particulate matter <2.5 micron size (PM_{2.5}), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), Lead (Pb), Ozone (O₃), Benzene (C₆H₆), Benzo (a) pyrene (C₂₀H₁₂), Arsenic (As), Nickel (Ni), Ammonia (NH₃) are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November 2009. Ambient Air Quality Monitoring Data (**mid of January 2023 to mid of April**

2023) for the study area is given in **Error! Reference source not found.**and trends of measured ambient concentration in the study area were graphically represented in **Error! Reference source not found.**

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

Parameter s	Conc.	NAAQ Standards	Locations							
			Project Site	Nagarj unakan digai	Ramach andrapu ram	Manali	Kannankotta i	Madarpakka m	Manallur	Pondava kkam
			A1	A2	A3	A4	A5	A6	A7	A8
PM ₁₀ Conc. (µg/m ³)	Min.	100 (24 Hours)	39.25	46.26	42.33	37.74	47.68	41.67	51.10	43.59
	Max.		55.93	65.93	60.33	53.79	67.95	59.38	72.83	62.12
	Avg.		47.06	55.47	50.77	45.26	57.18	49.97	61.28	52.27
	98th %tile		55.61	65.54	59.98	53.48	67.56	59.04	72.41	61.76
PM _{2.5} Conc. (µg/m ³)	Min.	60 (24 Hours)	21.21	28.56	25.55	18.62	30.64	23.71	34.32	27.64
	Max.		30.23	40.70	36.41	26.54	43.67	33.80	48.91	39.39
	Avg.		25.44	34.25	30.64	22.33	36.75	28.44	41.16	33.15
	98th %tile		30.05	40.46	36.20	26.38	43.42	33.60	48.63	39.16
SO ₂ Conc. (µg/m ³)	Min.	80 (24 Hours)	6.01	7.01	6.60	5.43	7.43	6.26	7.68	6.76
	Max.		8.57	10.00	9.40	7.74	10.59	8.93	10.95	9.64
	Avg.		7.21	8.42	7.92	6.51	8.92	7.51	9.22	8.12
	98th %tile		8.52	9.94	9.35	7.69	10.53	8.87	10.88	9.58
NO ₂ Conc. (µg/m ³)	Min.	80 (24 Hours)	10.96	15.22	11.29	10.12	16.81	10.80	19.31	13.54
	Max.		15.61	21.69	16.09	14.42	23.95	15.40	27.51	19.30
	Avg.,		13.14	18.26	13.54	12.14	20.16	12.96	23.15	16.25
	98th %tile		15.52	21.57	16.00	14.34	23.82	15.31	27.35	19.19
Lead (Pb) (µg/m ³)	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)
Carbon monoxide (CO) (mg/m ³)	Avg.	4 (1hour)	0.23	0.27	0.19	0.11	0.30	0.16	0.33	0.21

Parameter s	Conc.	NAAQ Standards	Locations							
			Project Site	Nagarj unakan digai	Ramach andrapu ram	Manali	Kannankotta i	Madarpakka m	Manallur	Pondava kkam
			A1	A2	A3	A4	A5	A6	A7	A8
Ozone O ₃ (µg/m ³)	Avg.	180 (1hour)	9.89	11.04	10.56	9.77	11.41	10.02	12.01	10.91
Benzene (C ₆ H ₆) (µg/m ³)	Avg.	5(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)
Benzo (a) Pyrene (C ₂₀ H ₁₂ (a)), (ng/m ³)	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)
Arsenic (As) (ng/ m ³)	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)
Nickel as Ni (ng/m ³)	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)
Ammonia (NH ₃) (µg/m ³)	Avg.	400 (24 hour)	8.21	10.11	8.87	7.9	12.82	8.52	13.28	9.94

Note: BDL (Below detectable limit), DL (Detectable limit), BLQ (Below Detectable Limit), LOQ (Limit of Quantification)

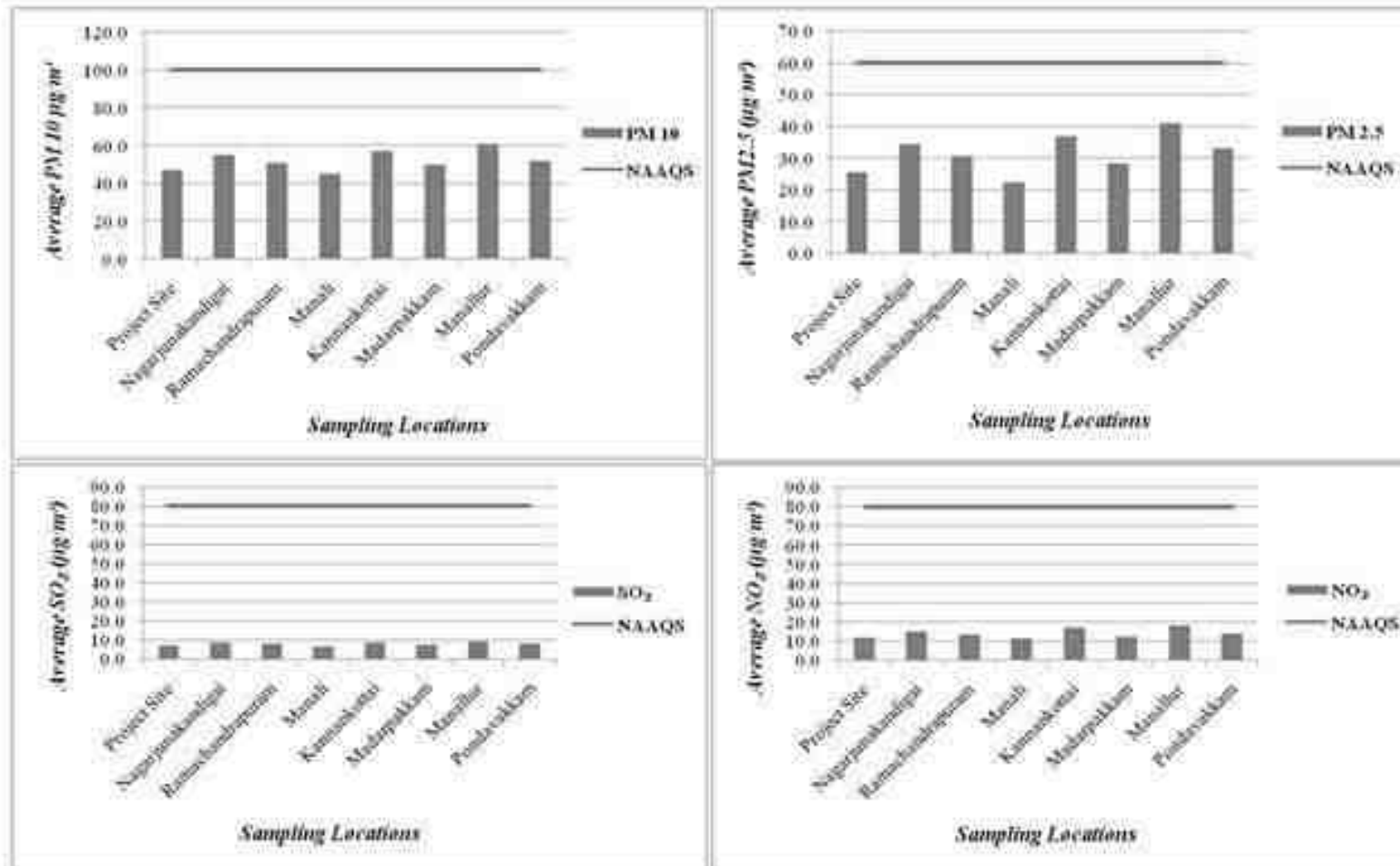


Figure 3-24: Trends of Measured Ambient Concentrations in the Study Area

3.7.3.1 Observations

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 45.26 to 61.28 µg/m³.
- The average baseline levels of PM_{2.5} vary from 22.33 µg/m³ to 41.16 µg/m³.
- The average baseline levels of SO₂ vary from 6.51 µg/m³ to 9.22 µg/m³.
- The average baseline levels of NO₂ vary from 12.14 µg/m³ to 23.15 µg/m³

All the parameters are well within NAAQ standards

3.8 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**.

3.8.1 Results and Discussions

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

- 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 comparison of day equivalent noise levels (Ld) and night equivalent noise levels (Ln) with the respective CPCB stipulated noise standards for various land use categories are shown in the **Table3-10**.

Table 3-10 Day and Night Equivalent Noise Levels

S. No	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)	
1	Project Site	N1	Within Site		39.0	35.1	75	65	Industrial
2	Nagarjunakandigai	N2	5.60	E	43.1	40.2	55	45	Residential
3	Ramachandrapuram	N3	0.45	SE	43.3	39.4	55	45	Residential
4	Manali	N4	8.79	SSE	38.1	35.0	55	45	Residential
5	Kannankottai	N5	6.80	SSW	40.4	36.4	55	45	Residential
6	Madarpakkam	N6	1.18	WSW	42.3	39.3	55	45	Residential
7	Manallur	N7	0.49	NW	41.2	37.6	55	45	Residential
8	Pondavakkam	N8	3.12	NW	42.5	35.5	55	45	Residential

3.8.1.1 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 level is 39 dB (A) and night time noise level is 35.1 dB(A) , which are within the prescribed limit by CPCB for Industrial areas. In Residential areas day time noise levels varied from 38.1 dB (A) to 43.3 dB (A) and night time noise levels varied from 35.0 dB(A) to 40.2 dB(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)

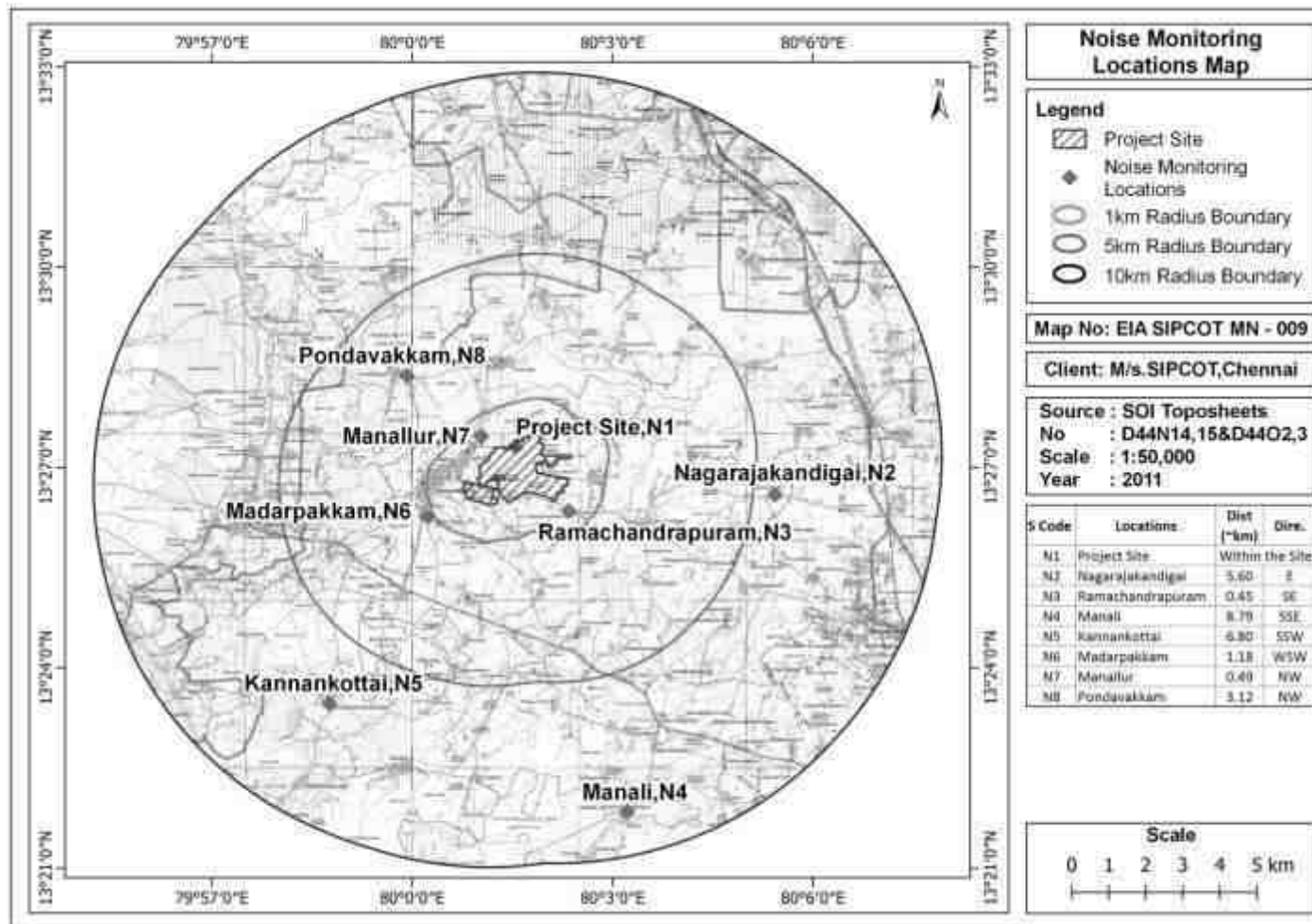


Figure 3-25Map showing the Noise Monitoring location

3.9 Water Environment

3.9.1 Surface Water Resources

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

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

3.9.2 Surface Water Quality Assessment

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 3-11 Test 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
3	Conductivity	IS:3025 (Part - 14): 1983
4	Total Dissolved Solids	IS:3025:(Part - 16) 1984
5	Total Suspended Solids	IS 3025 (Part - 17) 1984
6	Alkalinity as CaCO ₃	IS:3025 (Part - 23) 1986
7	Total Hardness as CaCo ₃	IS:3025 (Part - 21):1983
8	Sodium	IS:3025(Part - 45): 1993
9	Potassium	IS:3025 (Part - 45) 1993
10	Calcium as Ca	IS 3025 (Part - 40):1991
11	Magnesium as Mg	IS 3025 (Part - 46): 1994
12	Chloride	APHA4500 Cl-B 23 rd Edition:2017

Sl. No	Parameter Measured	Test Method
13	Sulphate SO ₄	IS 3025 (Part – 24):2021
14	Nitrate as NO ₃	IS 3025(Part - 34): 2022
15	Fluorides as F	IS 3025 (Part - 60):2022
16	Cyanide	IS 3025 (Part-27):2021
17	Arsenic	USEPA 200.8 Revision 5.4: 1994
18	Boron	IS 3025 Part 57: 2021
19	Cadmium	USEPA Method 200.8:1994
20	Chromium, Total	USEPA Method 200.8:1994
21	Copper	USEPA Method 200.8:2016
22	Iron	IS 3025 (Part - 53):2003
23	Lead	USEPA Method 200.8:1994
24	Manganese	USEPA Method 200.8:1994
25	Mercury	USEPA Method 200.8:1994
26	Nickel	USEPA Method 200.8:1994
27	Selenium	USEPA Method 200.8:1994
28	Dissolved Oxygen	IS:3025 (Part - 38): 1989
29	BOD	IS 3025 (Part-44): 1993
30	COD	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 3-12 Details of Surface water sampling locations

S.No	Location	Location Code	Distance in Km	Direction
1	Pulicat Lake	SW1	9.29	NE
2.	Pond near Site	SW2	0.03	E
3	Lake near Surapundi	SW3	0.46	E
4	Stream near Iguvarpalayam	SW4	1.61	ESE
5	Puvalambedu Lake	SW5	4.14	S
6	KannankottaiThervoykandigai(KKTK) Reservoir	SW6	8.74	SW

S.No	Location	Location Code	Distance in Km	Direction
7	TG Canal	SW7	5.74	W
8	Pallavada Lake	SW8	0.69	WNW

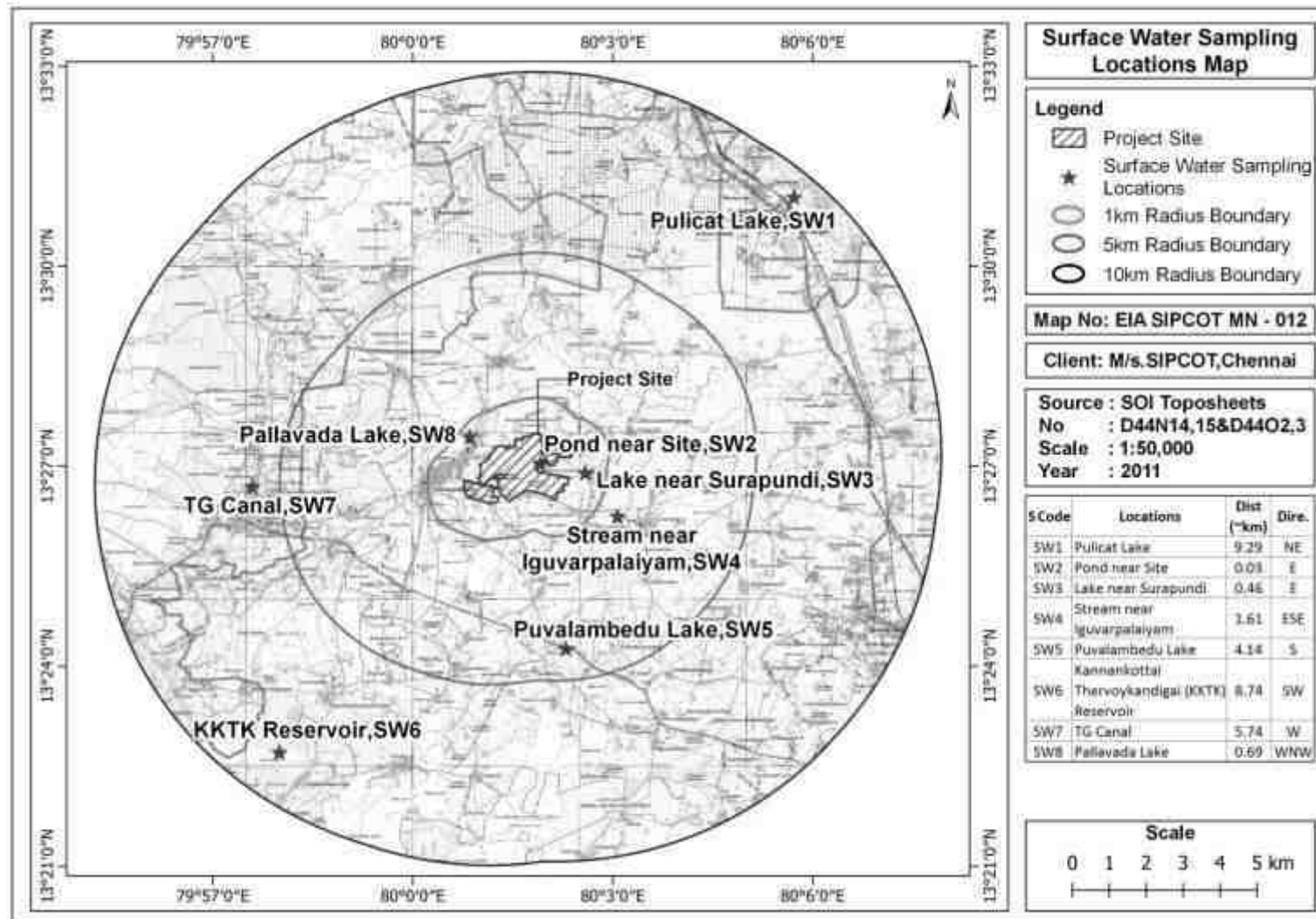


Figure 3-26 Map showing the surface water monitoring locations

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

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	Pulicat Lake	Pond near Site	Lake near Surapundi	Stream near Iguvarpalayam	Puvalambedu Lake	KannankottaiT hervoykandigai(KKTK) Reservoir	TG Canal	Pallavada Canal
				SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
1.	pH (at 25°C)	--	6.5-8.5	7.61	8.38	7.51	8.26	8.03	8.39	8.21	8.47
2.	Fluorides as F	mg/l	1.5	0.52	0.24	BLQ(LOQ 0.2)	0.32	BLQ(LOQ 0.2)	0.23	0.35	0.28
3.	Total Dissolved Solids	mg/l	500	20198.1	463	66	202	138	273	428	436
4.	Total Alkalinity as CaCO ₃	mg/l	-	260	230	26	69	50	125	200	200
5.	Electrical Conductivity	µS/cm	-	31115	809	116	798	254	506	812	805
6.	Colour	Hazen		BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)

7.	Turbidity	NTU	1	6.2	1.6	14.6	8.2	13.5	35.3	0.8	3.2
8.	Total Hardness as CaCO ₃	mg/l	300	4122.1	210	30	160	65	100	200	230
9.	Calcium as Ca	mg/l	-	102	48.09	6.81	36.07	16.03	26.05	48.09	52.1
10.	Cyanide	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)
11.	Magnesium as Mg	mg/l	-	411	21.87	3.16	17.01	6.07	8.5	19.44	24.3
12.	Sulphate as SO ₄	mg/l	400	1973	60.77	8.72	41.15	43.15	40.25	72.5	80.81
13.	Nitrate as NO ₃	mg/l	20	2.4	10.30	2.36	5.94	1.2	3.71	9.94	9.72
14.	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)
15.	Zinc	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)
16.	Copper as Cu	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)
17.	Manganese as Mn	mg/l	0.5	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)
18.	Cadmium as Cd	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)

19.	Lead as Pb	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)
20.	Selenium as Se	mg/l	0.01	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)
21.	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)
22.	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)
23.	Sodium as Na	mg/l	-	608	51	6	76	10	31	45	44
24.	Potassium as K	mg/l	-	48	3	BLQ(LOQ 1)	7	1	2	3	2
25.	Phosphate	Mg/l		0.7	0.09	BLQ(LOQ 0.02)	0.12	BLQ(LOQ 0.02)	0.34	0.046	0.12
26.	Total Suspended Solids	mg/l	-	31	4	33	18	27	78	2	8
27.	BOD, 3 days @ 27°C as O ₂	mg/l	2	51.1	BLQ(LOQ 1)	2	2	2	4	BLQ(LOQ 1)	BLQ(LOQ 1)
28.	Chemical Oxygen Demand as O ₂	mg/l	-	301.1	BLQ(LOQ 4)	16	20	16	24	11	8

29.	Nickel as Ni	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)
30.	Dissolved Oxygen	mg/l	6	2.4	6.4	6.3	6.3	6.5	6.7	6.2	6.6
31.	Carbonate	mg/l		55	60	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	40	BLQ(LOQ 1)	50
32.	Bi-Carbonate	mg/l		315	170	26	100	50	85	200	250
33.	Chromium, Total	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)
34.	Iron	mg/l		2.1	BLQ(LOQ 0.01)	0.24	0.13	0.28	0.38	0.097	0.17
35.	Chloride as Cl	mg/l	250	11995	108.87	13.36	148.46	19.79	66.81	91.55	84.14

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

3.9.2.1 Results and Discussions

Surface water sample results are discussed below:

- Surface Water sample results are compared with Surface water standards IS 2296:1992.
- pH in the collected surface water samples varies between 7.51 – 8.47.
- The Total Dissolved Solids range from 66 mg/l to 20198.1 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- The chloride content in the surface water for study area ranges from 13.36 mg/l to 11995 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- The sulphate content in the surface water of the study area varies between 8.72 mg/l – 1973 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- The Total hardness ranges between 30 mg/l – 4122.1 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- BOD value of the collected surface water sample ranges upto 51.1 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- COD value of collected surface water varies from 21.3 to 93.5 mg/l. Higher values are seen in Pulicat Lake due to the mixing of sea water at the estuary.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se are within the limits of IS 2296:1992.
- Surface water standards (IS 2296:1992) given in **Table 3-14**

Table 3-14 Surface 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	80.10	---	---	---	---
8	Magnesium as Mg.	mg/l	24.28	---	---	---	---
9	Sodium Na	mg/l	---	---	---	---	---
10	Potassium	mg/l	---	---	---	---	---

S.No	Parameters	Unit	A	B	C	D	E
11	Chloride as Cl	mg/l	250	---	600	---	600
12	Sulphate as SO ₄	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

3.9.3 Ground Water Resources

Ground water in phreatic aquifers in Tiruvallur district, in general, is colourless, odourless and slightly alkaline in nature. The estimation of groundwater resources for the district has shown that 6 blocks are over exploited and 2 blocks are under "critical" category. The shallow alluvial aquifers along Korattalaiyar and Araniyar rivers serve as an important source of drinking water for Chennai Metropolitan area and 5 well fields have been constructed in Tiruvallur district for the purpose. The well fields have a combined yield of 36.50 MCM/year. Dug wells are the most common ground water abstraction structures used for irrigation in the district. The yield of dug wells range from 50 to 200 m³/day in weathered crystalline rocks, 20 to 100 m³/day in Gondwana formations and up to 400 m³/day in Recent alluvial formations along major drainage

courses. Depth to water level during Pre Monsoon & Post Monsoon for Thiruvallur District, Tamil Nadu, is given in **Figure 3-25**.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.pdf

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

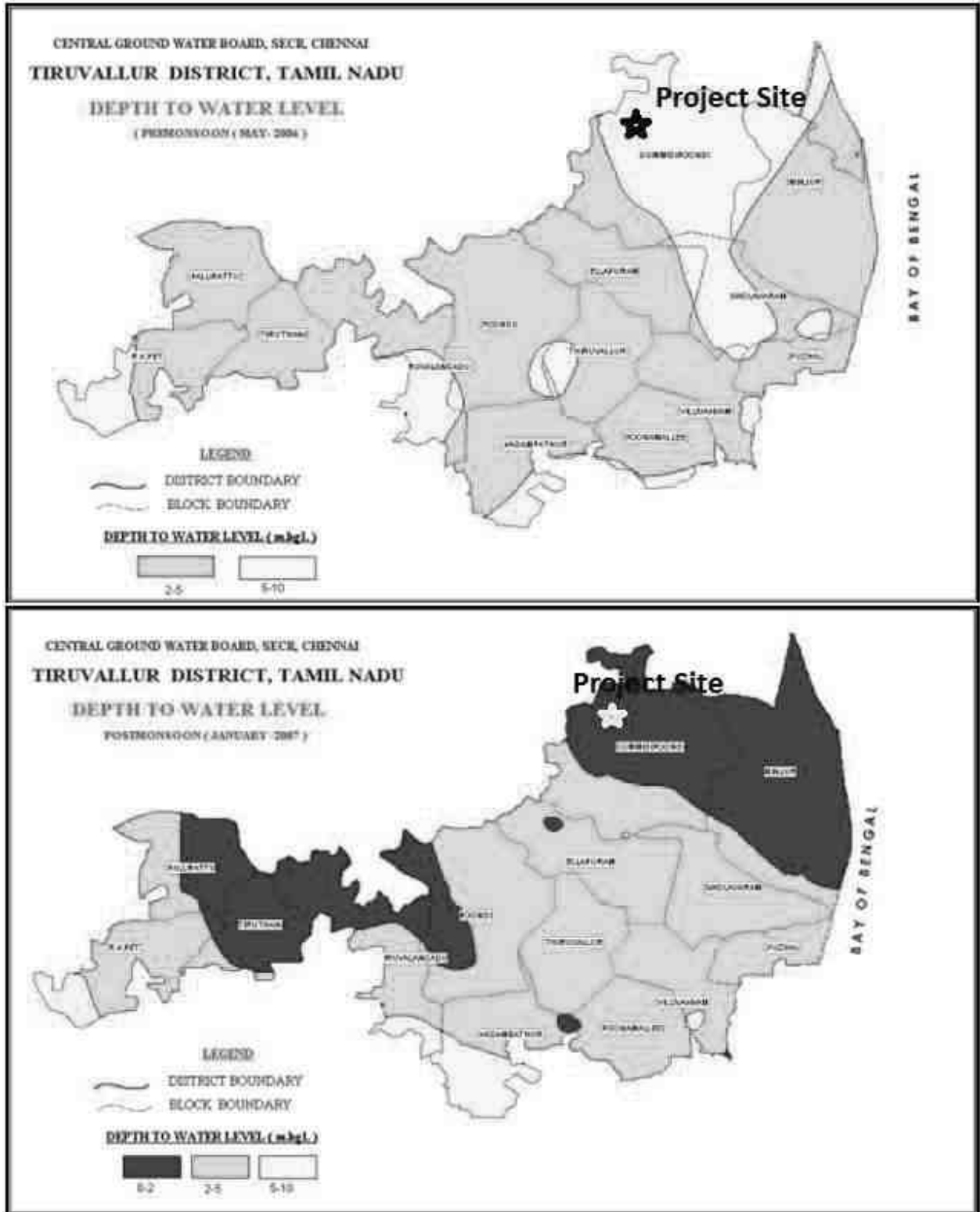


Figure 3-27 Depth to water level during Pre Monsoon & Post Monsoon – Tiruvallur District

3.9.3.1 Ground Water Quality

Groundwater is the principal source for domestic and drinking purposes in almost all villages near the study area. The quality of the groundwater received is influenced by pollution of soil and air, industrial and domestic waste disposal, organic components, pathogenic microorganisms, application of fertilizers and pesticides in agriculture, etc. Total Eight (08) ground water monitoring locations were identified for assessment in different villages around the project site based on the usage of sub surface water by the settlements/ villages in the study area. The groundwater results are compared with the desirable and permissible water quality standards as per IS 10500 (2012) for drinking water. Groundwater quality monitoring locations and results are given in Error! Reference source not found.and Error! Reference source not found.. Map showing the groundwater monitoring locations are given in Error! Reference source not found.

Table 3-15Details of Groundwater Quality Monitoring Locations

S.No	Location	Location Code	Distance in Km	Direction
1	Project Site	GW1	Within site	
2	Nagarjunakandigai	GW2	5.60	E
3	Ramachandrapuram	GW3	0.45	SE
4	Manali	GW4	8.79	SSE
5	Kannankottai	GW5	6.80	SSW
6	Madarpakkam	GW6	1.18	WSW
7	Manallur	GW7	0.49	NW
8	Pondavakkam	GW8	3.12	NW

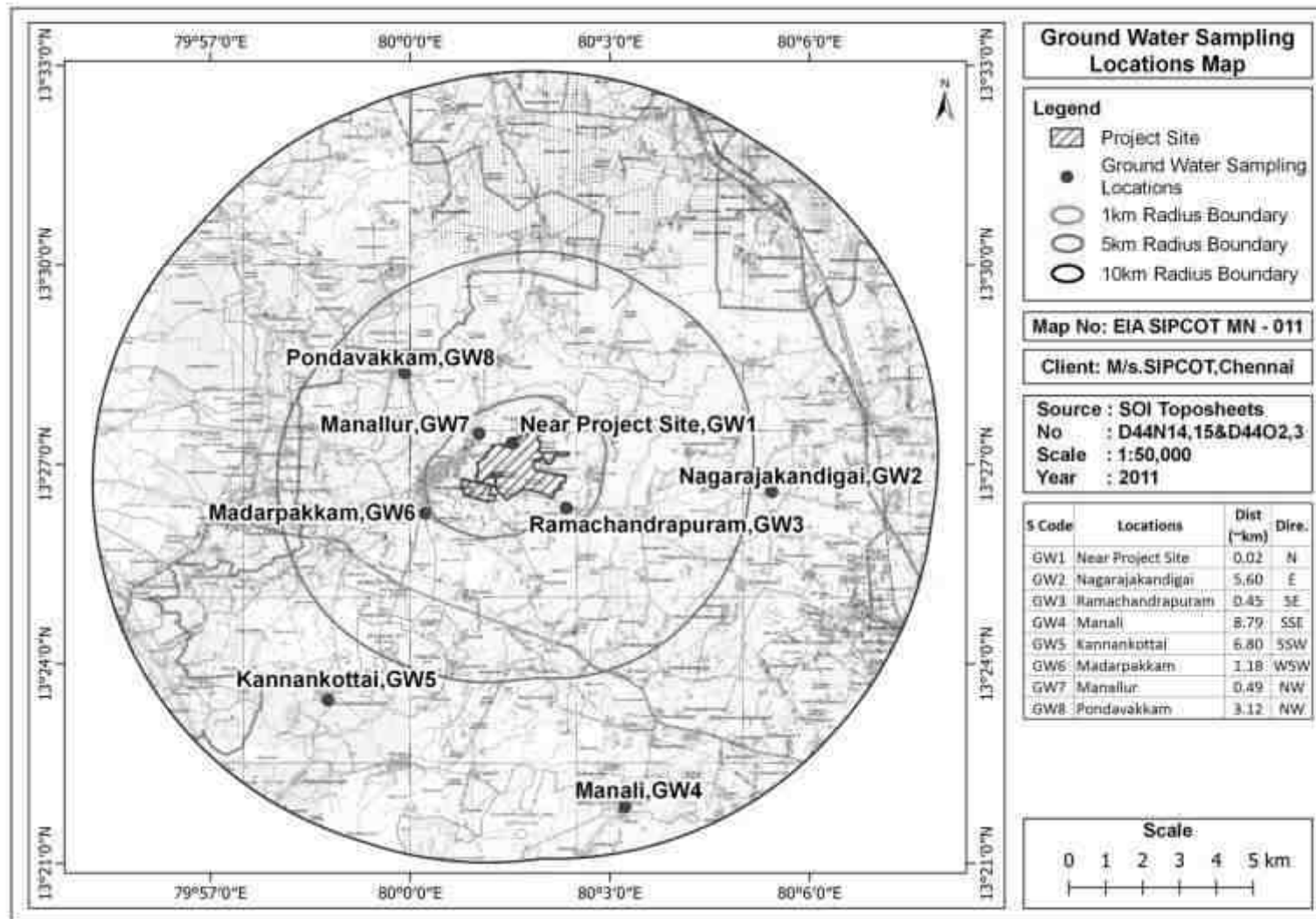


Figure 3-28 Map showing the groundwater monitoring locations

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

SL NO	Parameters	Unit	Drinking water Standard (IS 10500: 2012)		Project Site	Nagarju nakandigai	Ramach andrapuram	Manali	Kannan kottai	Madarp akkam	Manallu r	Pondav akkam
			Permissible Limit	Acceptable Limit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	Colour	Hazen	15	5	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)
2	Turbidity	NTU	5	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)	BLQ(LOQ 0.1)
3	pH	-	NR	6.5-8.5	6.69	7.01	6.59	7.11	7.23	7.26	7.14	7.36
4	Electrical Conductivity	µS/cm	-	-	1161	805	843	1014	842	974	901	889
5	Total Dissolve Solids	mg/l	2000	500	454	429	347	278	493	393	469	486
6	Total Suspended Solids		-	-	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)
7	Total Alkalinity as CaCO ₃	mg/l	600	200	114	121	113	102	98	105	131	142
8	Total Hardness as CaCO ₃	mg/l	600	200	332	294	194	264	275	301	287	214
9	Sodium as Na	mg/l	-	-	98	86	94	101	81	98	115	95
10	Potassium as	mg/l	-	-	11	9	8	12	13	9	5	7

SL NO	Parameters	Unit	Drinking water Standard (IS 10500: 2012)		Project Site	Nagarjunakondai	Ramachandrapuram	Manali	Kannakottai	Madurakkam	Manallur	Pondavakkam
			Permissible Limit	Acceptable Limit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
	K											
11	Calcium as Ca	mg/l	200	75	44.5	64.5	37.4	48.8	34.4	64.5	50.2	41.2
12	Magnesium as Mg	mg/l	100	30	28.9	18.4	16.3	21.1	15.6	27.2	16.4	19.7
13	Chloride	mg/l	1000	250	112	106	171	184	198	211	201	154
14	Sulphate SO ₄	mg/l	400	200	61.1	75	61	68	51	46	58	63
15	Nitrate as NO ₃	mg/l	NR	45	3.1	4.9	3.5	4.4	3.0	4.2	4.7	5.9
17	Fluorides as F	mg/l	1.5	1	0.39	0.42	0.33	0.26	0.38	0.44	0.52	0.49
18	Cyanide	mg/l	NR	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)
19	Arsenic as As	mg/l	0.05	0.01	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	Boron as B	mg/l	1.0	0.5	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)
21	Cadmium as Cd	mg/l	NR	0.003	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)
22	Chromium as Cr	mg/l	NR	0.05	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)
23	Copper as Cu	mg/l	1.5	0.05	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)	BLQ(LOQ)

SL NO	Parameters	Unit	Drinking water Standard (IS 10500: 2012)		Project Site	Nagarjunakondai	Ramachandrapuram	Manali	Kannakottai	Madurakkam	Manallur	Pondavakkam
			Permissible Limit	Acceptable Limit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
					Q 0.01)	Q 0.01)	0.01)	Q 0.01)	Q 0.01)	Q 0.01)	Q 0.01)	Q 0.01)
24	Lead as Pb	mg/l	NR	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LOQ 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
25	Manganese as Mn	mg/l	0.3	0.1	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LOQ 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)
26	Mercury	mg/l	NR	0.001	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LOQ 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)
27	Nickel as Ni	mg/l	NR	0.02	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LOQ 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
28	Selenium as Se	mg/l	NR	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LOQ 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)

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

3.9.3.2 Results and Discussions

A summary of analytical results are presented below:

- The pH of the collected ground water sample ranges from 6.59 to 7.36.
- The concentrations of Chloride in the collected ground water sample ranges from 106 to 211 mg/l.
- Total Dissolved Solids (TDS) value of the collected ground water sample varies from 278 mg/l to 493 mg/l.
- Total hardness of the collected ground water sample ranges from 194 mg/l to 332 mg/l.
- The concentrations of Sulphate in the collected ground water sample ranges from 51 to 75mg/l.

All the Parameters are well within the limit as per (IS 10500: 2012) standards

3.10 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 3-27**.

Table 3-17 Soil & Sediment Quality Monitoring Locations

S.No	Location	Location Code	Distance in Km	Direction
1	Project Site	S1	-	-
2	Nagarjunakandigai	S2	5.60	E
3	Ramachandrapuram	S3	0.45	SE
4	Manali	S4	8.79	SSE
5	Kannankottai	S5	6.80	SSW
6	Madarpakkam	S6	1.18	WSW
7	Manallur	S7	0.49	NW
8	Pondavakkam	S8	3.12	NW

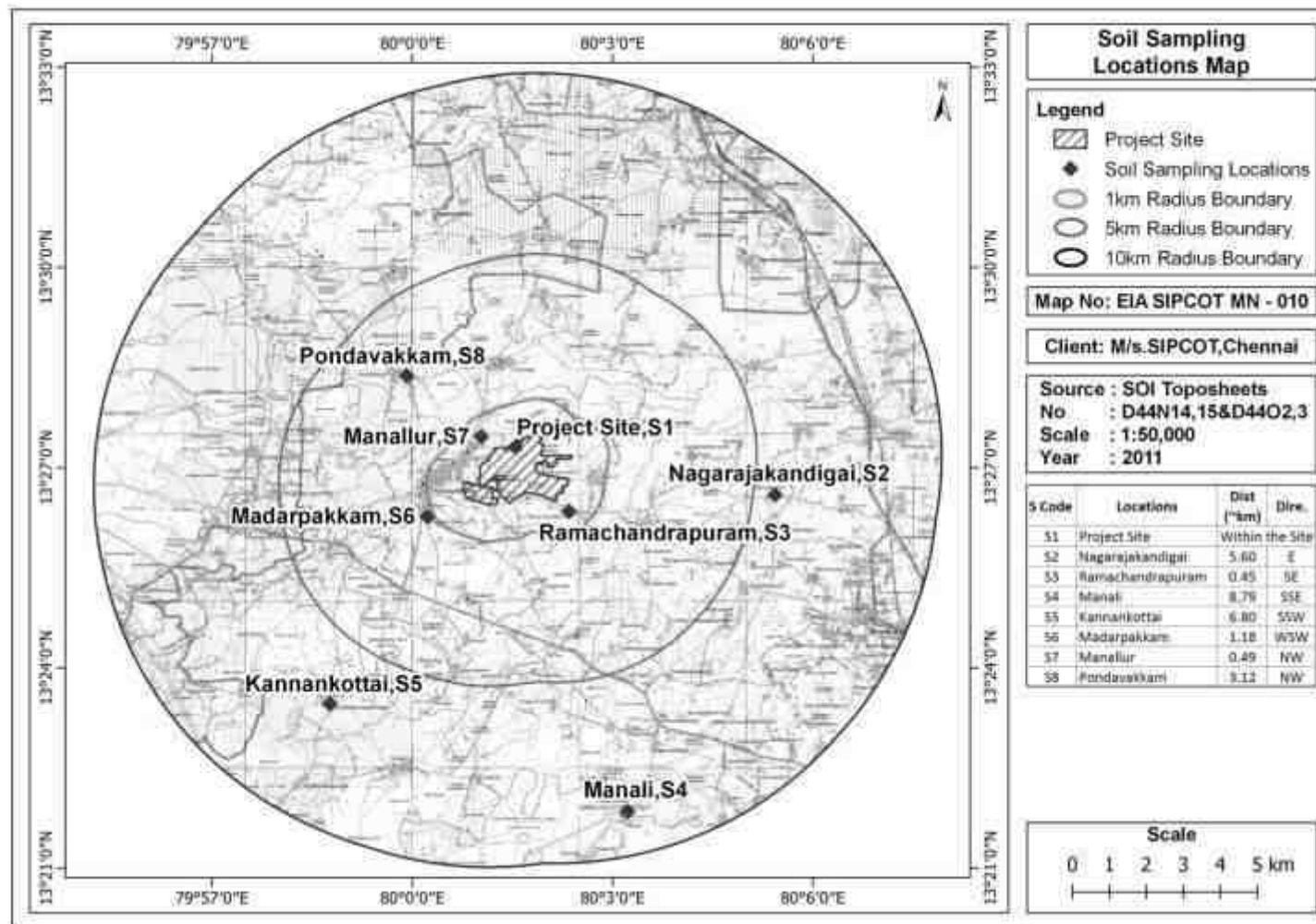


Figure 3-29 Map showing the soil monitoring locations

Table 3-18 Soil & Sediment Quality Monitoring Results

Sl. No	Parameters	Units	Project Site	Nagarju nakandigai	Ramachandrapuram	Manali	Kannankottai	Madarpakkam	Manallur	Pondavakkam
			S1	S2	S3	S4	S5	S6	S7	S8
1	Soil Texture	-	Sandy Loam	Sandy Caly	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Clay	Sandy Loam
2	Sand	%	75.0	51.2	74.0	61.1	58.1	59.9	53.7	59.3
3	Silt	%	6.88	10.2	16.0	30.2	29.6	27.8	8.1	30.6
4	Clay	%	18.12	38.6	10.0	8.7	12.3	12.3	38.2	10.1
5	pH	-	7.11	7.02	6.98	7.21	6.87	7.04	6.79	7.06
6	Electrical conductivity	µmho/cm	218	184	164	146	166	175	213	240
7	Nitrogen as N	mg/kg	244.3	114.3	212.4	118.3	231.4	241.2	210.3	312.1
8	Phosphorus	mg/kg	19.64	21.23	43.61	29.9	24.46	34.41	24.42	31.11
9	Potassium	mg/kg	165.4	142.3	108.6	214.3	194.3	142.1	101.2	132.9
10	Boron	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)
11	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)
12	Porosity	-	0.34	0.33	0.51	0.53	0.49	0.55	0.36	0.49
13	Water Holding Capacity	Inches per foot of water	1.53	2.01	1.61	1.71	1.81	1.69	2.21	1.98

Note: BDL: Below Detectable Limit; DL: Detectable Limit; BLQ: Below Limit of Quantification; LOQ: Limit Of Quantification

3.10.1 Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 6.87 to 7.21.
- Conductivity of the soil samples ranged from 146 to 240 $\mu\text{mho/cm}$.
- Nitrogen content ranged from 114.3 mg/kg to 312.1 mg/kg.
- Phosphorous ranged from 19.64 mg/kg to 43.61 mg/kg.
- Potassium content ranges from 101.2 mg/kg to 214.3 mg/kg.

3.11 BIOLOGICAL ENVIRONMENT

As per the ToR condition, Green Work Trust (GWT) was engaged for conducting bio diversity study within 10 kilometre range of the project site. Within 10 Km radius of the project site, there are water bodies, reserved forests and Pulicat Lake Bird Sanctuary.

Green Work Trust (GWT) is an NGO established in 2016. In 2017-18, GWT conducted a year-long comparative biodiversity survey at two sites at Lamkani, Dhule district, Maharashtra. Currently, GWT is conducting a long-term bird monitoring programme at 2 protected areas- Karnala Bird Sanctuary and Phansad Wildlife Sanctuary in Maharashtra organized by Maharashtra Forest Department. GWT has a team of biodiversity experts who bring a vast collective experience to the organisation. Bio Diversity Report of GWT is enclosed as **Annexure-14** and the conservation plan for Schedule I species is enclosed as **Annexure-17**.

3.11.1 Pulicat Lake

a) Introduction

Pulicat is a vast coastal shallow, brackish water lagoon along the coast of Bay of Bengal in to which streams drain. Its length is about 70 kms and width varies from 1 km to 20 kms. The lake has 16 island villages and 30 villages adjoining the lake. The people depend on the lake for their livelihood. The lake supports a colossal number of flora and fauna adapted to this brackish water ecosystem.

b) About Pulicat Lake

The Pulicat lake ($13^{\circ}24'-13^{\circ}47'N$; $80^{\circ}03'-80^{\circ}18'E$) extends over Ponneri town and Gummidipundi taluk of Thiruvallur district in Tamil Nadu, and Sulpurpet and Tada Mandals of Nellore district in Andhra Pradesh. It is connected to the Bay of Bengal about 1.6 kms north of

the Pulicat light house. The area of Pulicat Lake in Tamil Nadu is 154 km². The Tamil Nadu part of Pulicat Lake has 13 villages; Pazhaverkadu, Knavanthurai, Avurivakkam, Pakkam, Sirulapakkam, Annamalaicheri, Kallur, Mangodu, Sunnampu kulam, Methipalayam, Pungulam etc. Eighty-four percent of the Lake falls in Andhra Pradesh while remaining 16% falls in Tamil Nadu. Pulicat Lagoon is said to be the second, largest lagoon in India. Pulicat Lake covers an area of 720 km² (Kannan & Pandiyan 2012). The lake has a number of islands. The mean annual rainfall ranges from 10 mm to 467 mm and temperature ranges from 28.2°C to 40.3°C (Kannan & Pandiyan 2012). Once this lagoon occupied nearly 55 km stretch north to south but presently it has shrunk to only 35 km stretch, with a maximum width of about 18 to 19 km. The average depth of the lake is 1–3 m which favours larval development of fishes and shrimps. This is extremely important for waders and seabirds during spring and autumn migrations (Hussain 1987). Pulicat lagoon is shallow with large areas of mudflats and sandflats. In general, the seawater enters the lagoon through the northern end near Sriharikota Island and flows back into the Bay of Bengal through the southern end. The salinity is greatly affected by rainfall. The inflow of seawater has led to the formation of bar mouth in the northern portion of the lagoon, however over time decreased rainfall has resulted in the depletion of fish stock (Saraswathy & Pandian 2016). The estuarine ecosystems in Pulicat Lake offer a substantial diversity of habitats, food resources and nursery areas for many species. Macroalgae are important primary producers along these coasts, serving as habitat or functioning as ecological engineering species. Seaweeds and seagrasses form small patches or larger vegetation beds which support epiphytic algae, as well as a variety of associated species and fish

c) Uniqueness

The second largest brackish water eco-system in the Country supporting the largest congregation of Flamingoes is Andhra Pradesh. Greater Flamingoes come to Pulicat from Great Rann of Kutch (their breeding place), in the month of October and return back in April.

d) Forest Type

Southern tropical dry evergreen forests, interspersed with Mangrove forests and littoral vegetation and cane brakes on Sri Harikota Island.

e) Flora

The green kingdom is represented with about 132 plant species like *Walsura piscida*; *Manilkara elengi*, *Excoecaria agallocha*, *Spinifex littoreus*, *Calamus viminalis*, etc.

f) Fauna

The Sanctuary is rich in invertebrate life including planktons, molluscs, insects, coelenterates and crustaceans. Prawns and fishes are also abundant here. The fish fauna is incredible with over 60 species like Pomfret, Sable fish, Sargin fish, etc. Monitor lizard, Common Krait, etc; constitute the reptilian realm. The avian dominion is epitomized by 200 bird species like Greater and Lesser flamingo, Garganey, Spot billed duck, Besra sparrow hawk, Pied Avocet, Painted snipe, Grey plover, Marsh harrier, Rufous turtle dove, Brown headed gull, Indian Great reed warbler, Blue chat, Yellow throated sparrow, etc. Jackal, Jungle cat, Black napped hare; are a few of the mammalian species inhabiting the Sanctuary.

Impact of the Project and its Mitigation measures

❖ Impact on Flora and Fauna:

SIPCOT Project area is Government Poramboakke land Classified as Kallanguthu and Anatheenam. There is no reserve forest at the immediate vicinity / within 1 Km from the project site. Hence no direct impact is anticipated due to the project. A few globally threatened and 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. To minimize the impact, adequate pollution control measures such as provision of 38.07% of developable area i.e 106.575 Ha under Greenbelt Development (including 50m GB near habitat areas), mandating individual industries to adopt Zero Liquid Discharge (ZLD), proper stack height for DG sets & boilers 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-17**.

❖ Impact on Pulicat Lake Bird Sanctuary:

Project site situated in open habitat landscape and surrounded by agriculture fields, industries, etc. Pulicat Lake Bird Sanctuary is located at a distance of 5.77 Km from the project site and 8.92 Km from the tail end portion of Pulicat Lake. As a wetland ecosystem, the Pulicat lake area is important for the breeding and roosting birds and several other fauna and flora, but only edge portion is covered in project buffer area. Therefore no direct impact is envisaged on the wetland.

3.12 SOCIO ECONOMIC PROFILE

As per Census of India 2011, Thiruvallur District with a total population of 3,728,104 constitutes 1,876,062 males and 1,852,042 females; ranks 3rd highest population size in Tamil Nadu. Of the total population of Thiruvallur district 65.14 per cent were enumerated from urban areas and the rest 34.86 per cent were counted from rural areas. The density of population of the district is 1098 persons per Square Kilometre.

The district has recorded higher literacy rate (84.03%) as compared with State literacy rate of 80.1%. The literacy rate of Male is higher than that of females in the district. Male literacy rate is recorded as 89.69 while that of female is 78.32 per cent in the district.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1 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.

Table 3-19 shows some important Social Indicators of Thiruvallur District in Tamilnadu.

Table 3-19 Social Indicators of Thiruvallur District

S.No	Social Indicators	Thiruvallur District
------	-------------------	----------------------

1	Decadal growth rate %	35.3
2	Urban population %	65.1
3	Sex ratio	987
4	0-6 age group %	11.06
5	Population density (Persons per square Km)	400
6	Scheduled caste population %	22.03
7	Scheduled tribe population %	1.26
8	Literacy rate %	84.03
9	Work Participation rate %	41.3
10	Main Workers %	81.1
11	Marginal Workers %	18.86
12	Cultivators %	4.78
13	Agricultural labourers %	17.59
14	Workers in household industries %	3.79
15	Other workers %	73.84

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.1 Population and Household Size

Out of total population of Thiruvallur, 65.14% people live in urban regions. The total figure of population living in urban areas is 1,299,709 of which 650,462 are males and while remaining 649,247 are females. The rural population constitutes 34.86 percent, ie.,2,428,395 of which 1,225,600 are males and 1,202,795 are females.

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.2 Sex Ratio

Sex Ratio in urban regions of Thiruvallur was 987 females per 1000 males. Urban sex ratio is 998 while rural sex ratio is 981.

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.3 Scheduled Castes and Scheduled Tribes

Thiruvallur has a population of 821646 persons belonging to Scheduled Castes which represents 22% of the total population of the district. Of these, 451999 reside in rural areas and that 34.8% of the Scheduled Caste population..

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.4 Education & Literacy

As per 2011 census, the literacy rate in the District of Thiruvallur was 84.03% as against the State average of 80.09 per cent. The literacy rate of Male is higher than that of females in the district. Male literacy rate is recorded as 89.69 while that of female is 78.32 per cent in the district. Total numbers of male literates are 1,495,711 and female literates are 1,296,010.

Table 3-20 shows the educational infrastructures in PIA district.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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

Table 3-20 Education Infrastructures in Thiruvallur district

Type of school	Total schools		Rural Schools	
	Government	Private	Government	Private
Primary	941	487	815	252
Primary + Upper Primary	289	60	225	35
P + UP+ Secondary + Higher Secondary	33	192	12	55
UP only	2	1	2	0
UP + Secondary + Higher Secondary	100	36	69	13
P + UP + Secondary	22	126	11	53
UP + Secondary	147	18	117	7

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

3.12.1.5 Health Facility

Primary Health Centers (PHCs) and Health Sub-centers (HSCs) 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 **Table 3-21**.

Table 3-21 **Medical Facilities available in Thiruvallur District**

Name of the District	Type of Facility	Facilities									
		Total Facility					Active Facilities				
		Total [(A+B) or (C+D)]	Public [A]	Private [B]	Urban [C]	Rural [D]	Total [(A+B) or (C+D)]	Public [A]	Private [B]	Urban [C]	Rural [D]
Thiruvallur	SC	303	303	0	0	303	303	303	0	0	303
	PHC	58	58	0	11	47	54	54	0	11	43
	CHC	16	15	1	1	15	15	14	1	1	14
	SDH	12	12	0	10	2	11	11	0	10	1
	DH	1	1	0	0	1	1	1	0	0	1
	Total	390	389	1	22	368	384	383	1	22	362

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

(Source: National Health Mission, as on February 1st, 2021)

3.12.1.6 Employment And Livelihood

In Thiruvallur district Out of 1,538,054 total workers 1,247,918 (33.47%) are main workers and 290,136 (7.78%) are marginal workers. 2,190,050 persons (58.74%) population belong to the category of Non Workers. As per Census 2011, the broad categories of workers namely Cultivators, Agricultural Labourers, Household Industry Workers and Other Workers have accounted for 4.78 per cent, 17.59 per cent, 3.79 per cent and 73.85 per cent respectively in Thiruvallur District.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.7 Industrial Scenario

The significance of industrial development cannot be over stated. From a developmental perspective, the case for industrialization is very strong. The district has 16 Industrial Estates; 11 developed by the Government and 5 by Private Organizations. As the latest, during 2009, a new industrial complex with 1127 acres of Government fallow land alienated in favour of SIPCOT has been established at ThervoyKandigai, Gummidipoondi taluk. M/s Michelin India Tamil Nadu tyresPvt.ltd and Harsha group respectively are allotted lands for setting up their projects in this complex as per the MoU entered between the Companies and the Government of Tamil Nadu. One more industrial complex has been established in Thiruvallur district at Mappedu with 125.17 acres of Government fallow land and the entire extent has been allotted to Chennai Port Trust for setting up an Integrated Dry Port and Multi Model Logistics Hub with an investment of Rs. 260.5 crores and with an employment potential to 700 persons.

Thiruvallur district is one of the fastest developing districts in Tamil Nadu in terms of Industrial Development. The district has many leading industries like Madras Refineries, Madras Fertilizers, Manali Petro Chemicals, MRF, Ashok Leyland, TI Cycles, Britannia India Ltd, Parry India Ltd and Hindustan Motors. It also boasts of the Ennore Thermal Power Station and the Avadi Tank Factory. There are 178 Large and 21 Medium scale enterprises and there are 27319 Micro and Small enterprises engaged in the manufacturing of various products like Leather/Textiles/Chemical/engineering. Some of the economic activities undertaken by the rural artisans are manufacturing of jute, coconut shell and palm leaf based products, paper cups, leather, rexine works etc. Auto components, engineering products, leather, garments, rubber products, cycle, electronic goods, marine products, cosmetic items, textiles etc., are the major items exported from the district.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1094/download/3390/DH_2011_3301_PART_A_DCHB_THIRUVALLUR.pdf

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

3.12.1.8 Social Economic Profile Of The Study Area

The project area comes under the Thiruvallur District of Tamilnadu. **Table 3-22** provides the details on population profile within study area.

Table 3-22 Population profile within study area

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0-5 Km								
Gummidipoondi Taluk- Thiruvallur District								
1.	Pallavada	512	1709	833	876	161	785	103
2.	Sanaputhur	750	2891	1473	1418	340	1794	166
3.	Thurapallam	877	3371	1658	1713	410	72	7
4.	Peria obulapuram	733	2810	1406	1404	347	587	4
5.	Soorapundi	403	1480	740	740	171	746	117
6.	Madaharpakkam (Part)	1171	4737	2391	2346	502	1145	209
7.	Manellore	1203	4534	2174	2360	483	1568	381
8.	Pondavakkam	401	1556	749	807	172	1009	165
9.	Chedilpakkam	329	1369	671	698	163	724	2
10.	Nemalur	1106	4251	2086	2165	416	1724	476
11.	Madaharpakkam (CT) WARD NO.-0001	1109	4250	2082	2168	479	359	377
5-10 Km								
Gummidipoondi Taluk- Thiruvallur District								
12.	Amirthamangalam	169	627	301	326	75	321	25
13.	Arambakkam	2798	11363	5609	5754	1309	1288	233

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
14.	Chinnaobulapuram	915	3412	1812	1600	354	1000	0
15.	Chinnapuliyur	76	291	143	148	34	16	0
16.	Chithoornatham	176	668	325	343	91	191	25
17.	Edur	760	2939	1480	1459	294	1169	30
18.	Egumadurai	227	831	421	410	84	514	34
19.	Elavur	1452	5390	2788	2602	658	661	116
20.	Getnamallee	383	1465	712	753	151	3	0
21.	Kanlur	208	858	430	428	135	193	87
22.	Kannambakkam	317	1161	586	575	106	786	82
23.	Kannankottai	538	2008	987	1021	227	1256	75
24.	Karadipudur	500	1926	963	963	220	718	28
25.	Karumbukuppam	387	1457	718	739	182	596	28
26.	Kollanur	164	525	262	263	52	0	0
27.	Manali	88	311	166	145	35	118	0
28.	Medhipalayam	283	1052	503	549	142	0	0
29.	Naidukuppam	203	706	354	352	79	594	0

SI. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
30.	Narasingapuram	264	893	439	454	109	258	0
31.	Paleswarankandigai	1360	5039	2815	2224	596	387	18
32.	Panchalai	417	1505	738	767	161	540	4
33.	Pappankuppam	1113	4209	2099	2110	500	979	226
34.	Peria obulapuram	733	2810	1406	1404	347	587	4
35.	Periapuliyur	195	683	345	338	50	405	0
36.	Poovalai	235	1033	523	510	158	447	93
37.	Poovalambedu	268	1056	547	509	110	692	0
38.	Pudugummidipundi	1406	5491	2785	2706	620	281	139
39.	Sepedu	61	231	113	118	23	205	0
40.	Siruvada	196	795	393	402	82	524	0
41.	Thandalacheri	417	1574	794	780	169	555	0
42.	Theruali	1640	6216	3118	3098	686	362	123
43.	Thervoy	792	3122	1558	1564	359	2433	4
44.	Thurapallam	877	3371	1658	1713	410	72	7
Satiyavedu Mandal- Chittoor District								

SI. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
45.	Rallakuppam	102	389	199	190	31	92	12
46.	Cherivi	472	1634	819	815	212	540	133
47.	Gollavaripalem	81	283	139	144	41	181	0
48.	Appaiahpalem	45	207	99	108	29	178	17
49.	Mallavaripalem	345	1277	660	617	157	658	211
50.	Aroor	268	1061	527	534	156	442	61
51.	Irugulam	567	1999	987	1012	201	991	133
52.	Kolladam	201	705	356	349	80	290	143
53.	Pedda Eetivakam	447	1852	937	915	200	824	113
54.	Chinna Eetivakam	225	813	413	400	85	300	79
55.	Kothamarikuppam	694	3230	1316	1914	262	1277	416
56.	Narasaraju Agraharam	259	977	485	492	95	7	59
57.	Dalavai Agraharam	508	2245	1024	1221	214	1164	23
58.	Satyavedu	2897	11474	5799	5675	1145	2756	888
59.	Venkataraju Khandriga	199	766	379	387	95	210	20
Tada Mandal- Sri Potti Sriramulu Nellore District								
60.	Andagundala	659	2560	1282	1278	292	1285	317

SI. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
61.	Tada	1068	4220	2206	2014	425	999	127
62.	Karur	1147	4410	2183	2227	525	212	48
63.	Periavattu	449	1773	890	883	248	232	117
64.	Ramapuram	1035	3849	1910	1939	383	570	0
65.	Pannamgadu	155	528	266	262	51	0	0
	Total	26928	103930	52030	51900	11611	28061	3689

(Source:Census2011)

3.12.1.9 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 3-23**

Table 3-23 Classification 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												
Gummidipoondi Taluk- Thiruvallur District												
1)	Pallavada	1038	940	98	95	3	696	67	3	0	146	55
2)	Sanaputhur	1608	1249	359	215	2	852	282	7	0	175	75
3)	Thurapallam	1390	804	586	50	28	178	312	22	24	554	222
4)	Peria obulapuram	1213	1101	112	286	8	380	67	6	3	429	34
5)	Soorapundi	811	182	629	25	3	57	594	5	5	95	27
6)	Madaharpakkam (Part)	1953	1725	228	55	6	232	85	186	15	1252	122
7)	Manellore	1916	971	945	26	43	185	612	101	62	659	228
8)	Pondavakkam	639	322	317	36	47	188	234	1	2	97	34
9)	Chedilpakkam	771	765	6	16	3	664	2	6	0	79	1
10)	Nemalur	2222	2077	145	183	10	1293	42	47	3	554	90
11)	Madaharpakkam (CT) WARD NO.-0001	1692	1549	143	25	2	262	62	113	12	1149	67
5-10 Km												
Gummidipoondi Taluk- Thiruvallur District												

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				
12)	Amirthamangalam	291	67	224	1	10	2	136	0	0	64	78
13)	Arambakkam	4820	4425	395	162	11	1410	222	46	6	2807	156
14)	Chinnaobulapuram	1647	1308	339	263	119	179	145	7	0	859	75
15)	Chinnapuliur	125	123	2	1	0	67	1	1	0	54	1
16)	Chithoornatham	341	48	293	10	17	5	151	2	13	31	112
17)	Edur	1258	1218	40	363	3	671	25	21	3	163	9
18)	Egumadurai	508	455	53	228	23	147	8	50	7	30	15
19)	Elavur	2599	2110	489	556	21	808	405	16	6	730	57
20)	Getnamallee	813	533	280	198	10	277	147	2	66	56	57
21)	Kanlur	411	345	66	116	4	164	54	2	1	63	7
22)	Kannambakkam	576	563	13	39	2	402	4	13	0	109	7
23)	Kannankottai	1049	1000	49	393	7	479	31	16	4	112	7
24)	Karadipudur	769	391	378	168	6	123	346	8	5	92	21
25)	Karumbukuppam	694	278	416	8	9	51	190	35	4	184	213

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				
26)	Kollanur	294	256	38	22	12	163	12	9	3	62	11
27)	Manali	107	107	0	19	0	56	0	0	0	32	0
28)	Medhipalayam	430	393	37	2	0	222	0	0	1	169	36
29)	Naidukuppam	342	14	328	0	15	3	304	0	2	11	7
30)	Narasingapuram	389	371	18	23	1	115	5	3	0	230	12
31)	Paleswarankandigai	2344	1884	460	15	19	48	99	51	12	1770	330
32)	Panchalai	817	426	391	67	15	259	321	1	8	99	47
33)	Pappankuppam	1859	1238	621	145	146	163	106	23	27	907	342
34)	Peria obulapuram	1213	1101	112	286	8	380	67	6	3	429	34
35)	Periapuliyur	289	281	8	25	1	156	4	2	0	98	3
36)	Poovalai	579	574	5	12	1	500	0	7	0	55	4
37)	Poovalambedu	381	306	75	18	2	150	3	18	5	120	65
38)	Pudugummidipundi	2043	1925	118	102	20	300	6	42	0	1481	92
39)	Sepedu	76	76	0	3	0	60	0	0	0	13	0

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				
40)	Siruvada	442	310	132	11	0	258	130	0	0	41	2
41)	Thandalacheri	720	701	19	7	2	594	14	0	0	100	3
42)	Theruali	2336	1795	541	392	68	229	260	38	21	1136	192
43)	Thervoy	1638	499	1139	14	47	206	984	2	5	277	103
44)	Thurapallam	1390	804	586	50	28	178	312	22	24	554	222
Satiyavedu Mandal- Chittoor District												
45)	Rallakuppam	213	196	17	94	3	89	10	0	2	13	2
46)	Cherivi	881	702	179	106	8	447	23	3	3	146	145
47)	Gollavaripalem	144	45	99	0	2	17	41	0	0	28	56
48)	Appaiahpalem	84	32	52	0	2	26	28	0	0	6	22
49)	Mallavaripalem	564	539	25	57	0	395	22	0	0	87	3
50)	Aroor	460	402	58	31	3	274	52	0	0	97	3
51)	Irugulam	855	763	92	76	4	524	80	26	1	137	7
52)	Kolladam	367	358	9	35	4	265	3	4	1	54	1
53)	Pedda Eetivakam	919	897	22	25	2	808	11	0	3	64	6

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				
54)	Chinna Eetivakam	378	372	6	87	1	190	4	10	0	85	1
55)	Kothamarikuppam	1078	986	92	35	3	688	17	72	34	191	38
56)	Narasaraju Agraharam	504	487	17	29	2	243	11	64	0	151	4
57)	Dalavai Agraharam	913	789	124	30	10	426	30	28	19	305	65
58)	Satyavedu	4271	3752	519	139	17	1471	191	107	13	2035	298
59)	Venkataraaju Khandriga	268	106	162	51	15	9	112	1	3	45	32
Tada Mandal- Sri Potti Sriramulu Nellore District												
60)	Andagundala	1180	950	230	13	59	423	127	125	2	389	42
61)	Tada	1514	1286	228	29	6	174	72	42	1	1041	149
62)	Karur	2183	1733	450	246	4	394	275	10	6	1083	165
63)	Periavattu	684	452	232	27	1	27	165	5	3	393	63
64)	Ramapuram	1912	1436	476	236	20	430	324	12	4	758	128
65)	Pannamgadu	272	246	26	13	0	41	21	9	3	183	2
	Total	45489	36351	9138	4514	703	14697	5127	758	305	16382	3003

(Source: Census 2011)

3.12.1.10 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 3-24** shows the literates population.

Table 3-24 Details of Literacy population in the study area

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
0-5 Km								
Gummidipoondi Taluk- Thiruvallur District								
1.	Pallavada	1709	979	540	439	730	293	437
2.	Sanaputhur	2891	1589	900	689	1302	573	729
3.	Thurapallam	3371	2312	1275	1037	1059	383	676
4.	Periaobulapuram	2810	1693	994	699	1117	412	705
5.	Soorapundi	1480	964	531	433	516	209	307
6.	Madaharpakkam (Part)	4737	3353	1841	1512	1384	550	834
7.	Manellore	4534	3006	1616	1390	1528	558	970
8.	Pondavakkam	1556	822	450	372	734	299	435
9.	Chedilpakkam	1369	739	412	327	630	259	371

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
10.	Nemalur	4251	2568	1393	1175	1683	693	990
11.	Madaharpakkam (CT) WARD NO.-0001	4250	2776	1481	1295	1474	601	873
5-10 Km								
Gummidipoondi Taluk- Thiruvallur District								
12.	Amirthamangalam	627	373	201	172	254	100	154
13.	Arambakkam	11363	6625	3622	3003	4738	1987	2751
14.	Chinnaobulapuram	3412	2327	1392	935	1085	420	665
15.	Chinnapuliyur	291	178	104	74	113	39	74
16.	Chithoornatham	668	344	175	169	324	150	174
17.	Edur	2939	1724	997	727	1215	483	732
18.	Egumadurai	831	389	227	162	442	194	248
19.	Elavur	5390	2822	1716	1106	2568	1072	1496
20.	Getnamallee	1465	884	493	391	581	219	362
21.	Kanlur	858	480	265	215	378	165	213
22.	Kannambakkam	1161	634	366	268	527	220	307

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
23.	Kannankottai	2008	1179	630	549	829	357	472
24.	Karadipudur	1926	1100	649	451	826	314	512
25.	Karumbukuppam	1457	832	466	366	625	252	373
26.	Kollanur	525	369	203	166	156	59	97
27.	Manali	311	160	96	64	151	70	81
28.	Medhipalayam	1052	549	312	237	503	191	312
29.	Naidukuppam	706	327	187	140	379	167	212
30.	Narasingapuram	893	497	283	214	396	156	240
31.	Paleswarankandigai	5039	3639	2201	1438	1400	614	786
32.	Panchalai	1505	784	441	343	721	297	424
33.	Pappankuppam	4209	2734	1499	1235	1475	600	875
34.	Peria obulapuram	2810	1693	994	699	1117	412	705
35.	Periapuliyur	683	427	241	186	256	104	152
36.	Poovalai	1033	486	266	220	547	257	290
37.	Poovalambedu	1056	688	412	276	368	135	233

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
38.	Pudugummidipundi	5491	3802	2093	1709	1689	692	997
39.	Sepedu	231	101	52	49	130	61	69
40.	Siruvada	795	520	284	236	275	109	166
41.	Thandalacheri	1574	1108	616	492	466	178	288
42.	Theruali	6216	4438	2442	1996	1778	676	1102
43.	Thervoy	3122	1906	1060	846	1216	498	718
44.	Thurapallam	3371	2312	1275	1037	1059	383	676
Satiyavedu Mandal- Chittoor District								
45.	Rallakuppam	389	257	144	113	132	55	77
46.	Cherivi	1634	935	522	413	699	297	402
47.	Gollavaripalem	283	163	92	71	120	47	73
48.	Appaiahpalem	207	118	55	63	89	44	45
49.	Mallavaripalem	1277	542	310	232	735	350	385
50.	Aroor	1061	564	323	241	497	204	293
51.	Irugulam	1999	1290	721	569	709	266	443

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
52.	Kolladam	705	394	216	178	311	140	171
53.	PeddaEetivakam	1852	1115	636	479	737	301	436
54.	ChinnaEetivakam	813	472	285	187	341	128	213
55.	Kothamarikuppam	3230	2159	864	1295	1071	452	619
56.	Narasaraju Agraharam	977	613	349	264	364	136	228
57.	Dalavai Agraharam	2245	1600	790	810	645	234	411
58.	Satyavedu	11474	8040	4455	3585	3434	1344	2090
59.	VenkatarajuKhandriga	766	485	272	213	281	107	174
Tada Mandal- Sri Potti Sriramulu Nellore District								
60.	Andagundala	2560	1622	891	731	938	391	547
61.	Tada	4220	2916	1702	1214	1304	504	800
62.	Karur	4410	2250	1288	962	2160	895	1265
63.	Periavattu	1773	775	449	326	998	441	557
64.	Ramapuram	3849	1874	1104	770	1975	806	1169
65.	Pannamgadu	528	262	167	95	266	99	167

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
	Total	103930	65178	36294	28884	38752	15736	23016

(Source: Census 2011)

3.12.1.11 Dwelling Within Study Area

Due to industrialization in nearby area and various Government Schemes, the standard of dwelling place has improved.

3.12.1.12 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 emergency medical service facility "108" is very familiar and being used by the people in this area. 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. **Table 3-25** shows the health facilities available in the study area.

Table 3-25 Health facilities available in the study area

Sl.No	Type	Numbers
1	Community health centre	1
2	Primary health centre	5
3	Primary health sub-centre	22
4	Maternity and Child Welfare Centre	22
5	TB hospital/Clinic	13
6	Hospital Allopathic	3
7	Hospital Alternative Medicine	16
8	Dispensary Health Centre	17
9	Veterinary hospital	13
10	Mobile health clinic	0
11	Family Welfare Centre	13
12	Non-Government Medical facilities Out Patient	54

(Source: Census 2011)

3.12.1.13 Industrialization Within The Study Area

The people near to the site has mixed responses of industrialization in the area. The people of villages away from the site are welcoming the industrialization as it provides job opportunities and good infrastructure developments.

3.12.1.14 Summary

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. **Table 3-26** show the socio-economic indicator within the study area.

Table 3-26 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	11	Nos.
2	Total Households	8594	Nos.
3	Total Population	32958	Nos.
4	Children Population (<6 Years Old)	3644	Nos.
5	SC Population	10513	Nos.
6	ST Population	2007	Nos.
7	Total Working Population	15253	Nos.
8	Main Workers	11685	Nos.
9	Marginal Workers	3568	Nos.
10	Cultivators	1167	Nos.
11	Agricultural labours	7346	Nos.
12	Household Industries	623	Nos.
13	Other Workers	6144	Nos.
14	Literates	20801	Nos.
15	Illiterates	12157	Nos.
5-10 Km			
1	Number of villages in the Study Area	54	Nos.
2	Total Households	26928	Nos.
3	Total Population	103930	Nos.
4	Children Population (<6 Years Old)	11611	Nos.
5	SC Population	28061	Nos.
6	ST Population	3689	Nos.
7	Total Working Population	45489	Nos.
8	Main Workers	36351	Nos.
9	Marginal Workers	9138	Nos.
10	Cultivators	5217	Nos.
11	Agricultural labours	19824	Nos.
12	Household Industries	1063	Nos.
13	Other Workers	19385	Nos.
14	Literates	65178	Nos.
15	Illiterates	38752	Nos.

(Source:Census 2011)

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 determination of 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 of natural 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 reliability 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 the project 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 nonrenewable 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, backfilling and levelling
- 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, if not most, 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 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.

4.3.3 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.

4.3.4 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.

4.3.5 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 0-1** gives the emissions from various construction equipments.

Table 0-1 Construction Equipments Emission Factors

Type of Construction Equipment	VOC (g/hp-Hr)	CO (g/hp-Hr)	NO _x (g/hp-Hr)	PM ₁₀ (g/hp-Hr)	PM _{2.5} (g/hp-Hr)	SO ₂ (g/hp-Hr)	CO ₂ (g/hp-Hr)
Water Truck	0.440	2.070	50490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.000
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	75760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

(Source: USEPA 2005 Emission Factors)

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

4.3.6 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.

4.3.7 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.

4.3.8 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 PM₁₀, PM_{2.5}, NO_x, CO from vehicles may also cause respiration problem for the surrounding organisms. The extent of the pollution will be about 2km from the project area.

4.3.9 Possible accidents during construction phase

Possible accidents that are expected during construction phase are

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

4.3.10 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 100 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

During construction phase of the proposed project the employees are subject to Health and Safety Risks.

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.
- Vegetation in OSR and greenbelt area will be maintained as such and will not be disturbed.

- 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.
- Rainwater harvesting prevents the flooding of low-lying areas in the project premises. Rain Water Harvesting system is proposed throughout the Industrial park and the excess rain water will be diverted to the nearby water body within the site after proper treatment.
- If during excavation, if water accumulates in the excavated areas, it will be pumped out and disposed in recharge soak pits or 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 no inconvenience 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 done only 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 that there is no congestion of vehicles 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 by spraying 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 provided with earmuffs and 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 within the 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 for minimizing 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 burnt at 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 backupp power 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 PM₁₀, PM_{2.5}, SO₂, NO₂, 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, SO₂, NO_x and CO emissions.

4.5.1.1 Meteorological Data

The meteorological data for a month, i.e. from 16/01/2023 to 15/04/2023 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 modelling is shown below in **Figure 4-1**.

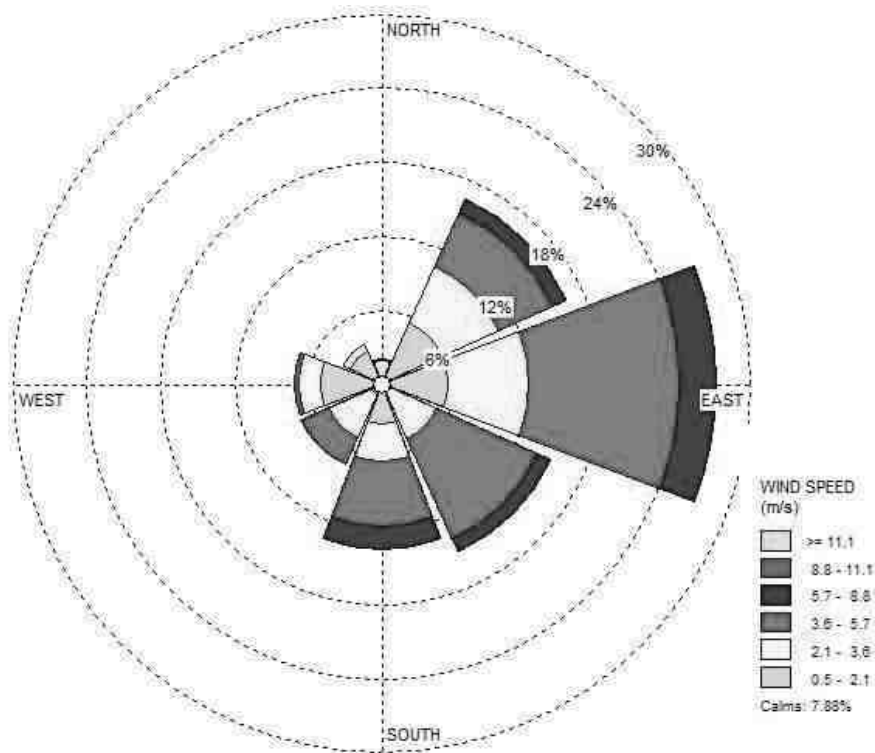


Figure 0-1 Windrose diagram considered for Modeling (Mid of January to Mid of April 2023)

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 modelling. The land use was characterized for in and around the site. The surface characteristics 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 modelling 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, SO₂, 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.

Table 0-2 Cumulative Stack & Transportations Emissions from proposed project

Plot No.	DG/Boiler	DG Capacity KVA	Fuel used	Stack Details				Emission(m/s)			
				Height(m)	Dia(m)	Temp (C)	Exit velocity(m/s)	PM	SO2	NOX	CO
1	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
2	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
3	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
4	DG	215	HSD	28	0.3	215	12	0.0026	0.0024	0.0374	0.0081
5	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
6	DG	205	HSD	28	0.3	215	11.3	0.0025	0.0023	0.0357	0.0077
7	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
8	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053
9	DG	115	HSD	28	0.3	214.2	12.5	0.0014	0.0013	0.0200	0.0043
10	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
11	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
12	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
13	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
14	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
15	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
16	DG	80	HSD	27	0.25	208	13	0.0010	0.0009	0.0139	0.0030
17	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
18	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
19	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
20	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
21	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
22	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
23	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
24	DG	500	HSD	30	0.5	195	9.7	0.0061	0.0057	0.0870	0.0188

25	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
26	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
27	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
28	DG	120	HSD	28	0.3	214.2	12.5	0.0015	0.0014	0.0209	0.0045
29	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
30	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
31	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
32	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
33	DG	115	HSD	28	0.3	214.2	12.5	0.0014	0.0013	0.0200	0.0043
34	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
35	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
36	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
37	DG	30	HSD	27	0.25	203	12	0.0004	0.0003	0.0052	0.0011
38	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
39	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
40	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
41	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
42	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
43	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
44	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
45	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
46	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
47	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
48	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
49	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
50	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
51	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
52	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053

53	DG	80	HSD	27	0.25	208	13	0.0010	0.0009	0.0139	0.0030
54	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
55	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
56	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
57	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
58	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
59	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
60	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
61	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
62	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
63	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
64	DG	95	HSD	27	0.25	212	13.5	0.0012	0.0011	0.0165	0.0036
65	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
66	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
67	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
68	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
69	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
70	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
71	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053
72	DG	120	HSD	28	0.3	214.2	12.5	0.0015	0.0014	0.0209	0.0045
73	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
74	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
75	DG	35	HSD	27	0.25	201	12.3	0.0004	0.0004	0.0061	0.0013
76	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
77	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
78	DG	100	HSD	27	0.3	211	13.3	0.0012	0.0011	0.0174	0.0038
79	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
80	DG	100	HSD	27	0.3	211	13.3	0.0012	0.0011	0.0174	0.0038

81	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
82	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
83	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
84	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
85	DG	90	HSD	27	0.25	211	13.3	0.0011	0.0010	0.0157	0.0034
86	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
87	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
88	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
89	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
90	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
91	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
92	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
93	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
94	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
95	DG	240	HSD	28	0.3	214	12	0.0029	0.0027	0.0418	0.0090
96	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
97	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
98	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
99	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
100	DG	210	HSD	28	0.3	215	11.8	0.0026	0.0024	0.0366	0.0079
101	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
102	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
103	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
104	DG	135	HSD	28	0.3	215.4	13.1	0.0017	0.0015	0.0235	0.0051
105	DG	165	HSD	28	0.3	216	14.2	0.0020	0.0019	0.0287	0.0062
106	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
107	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
108	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066

109	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
110	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
111	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
112	DG	275	HSD	29	0.3	218.7	12.8	0.0034	0.0031	0.0479	0.0103
113	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
114	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
115	DG	275	HSD	29	0.3	218.7	12.8	0.0034	0.0031	0.0479	0.0103
116	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
117	DG	210	HSD	28	0.3	215	11.8	0.0026	0.0024	0.0366	0.0079
118	DG	235	HSD	28	0.3	218	12	0.0029	0.0027	0.0409	0.0088
119	DG	245	HSD	29	0.3	216	12.4	0.0030	0.0028	0.0426	0.0092
120	DG	250	HSD	29	0.3	216	12.4	0.0031	0.0028	0.0435	0.0094
121	DG	265	HSD	29	0.3	218.7	12.8	0.0032	0.0030	0.0461	0.0100
122	DG	415	HSD	30	0.5	198	9.5	0.0051	0.0047	0.0722	0.0156
C1	DG	320	HSD	29	0.4	202	10.4	0.0039	0.0036	0.0557	0.0120
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C2	DG	190	HSD	28	0.3	213	12.5	0.0023	0.0022	0.0331	0.0071
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C3	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C4	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C5	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C6	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070

	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C7	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C8	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C9	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
Total(g/s)								0.221	0.210	3.366	0.731
								0	2	3	1

Note:

1. Boiler and DG are considered as sources for this project. Boiler capacity and DG capacity is assumed based on the plot size.
2. HSD is assumed as fuel for DG and Boilers.
3. DG height is calculated based on the formula:
Height of building is assumed as 15 m
i. DG Stack Height (H) = Height of the building (h) + 0.2 SQRT(DG set capacity in KVA)

Source:

1. AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1. (DG).

6.	396646	1496053	0.34263	9.21	NNE
7.	386646	1486053	0.32678	8.06	WSW
8.	384646	1484053	0.32663	10.44	WSW
9.	396646	1497053	0.31653	10.19	NNE
10.	396646	1494053	0.30118	7.28	NNE

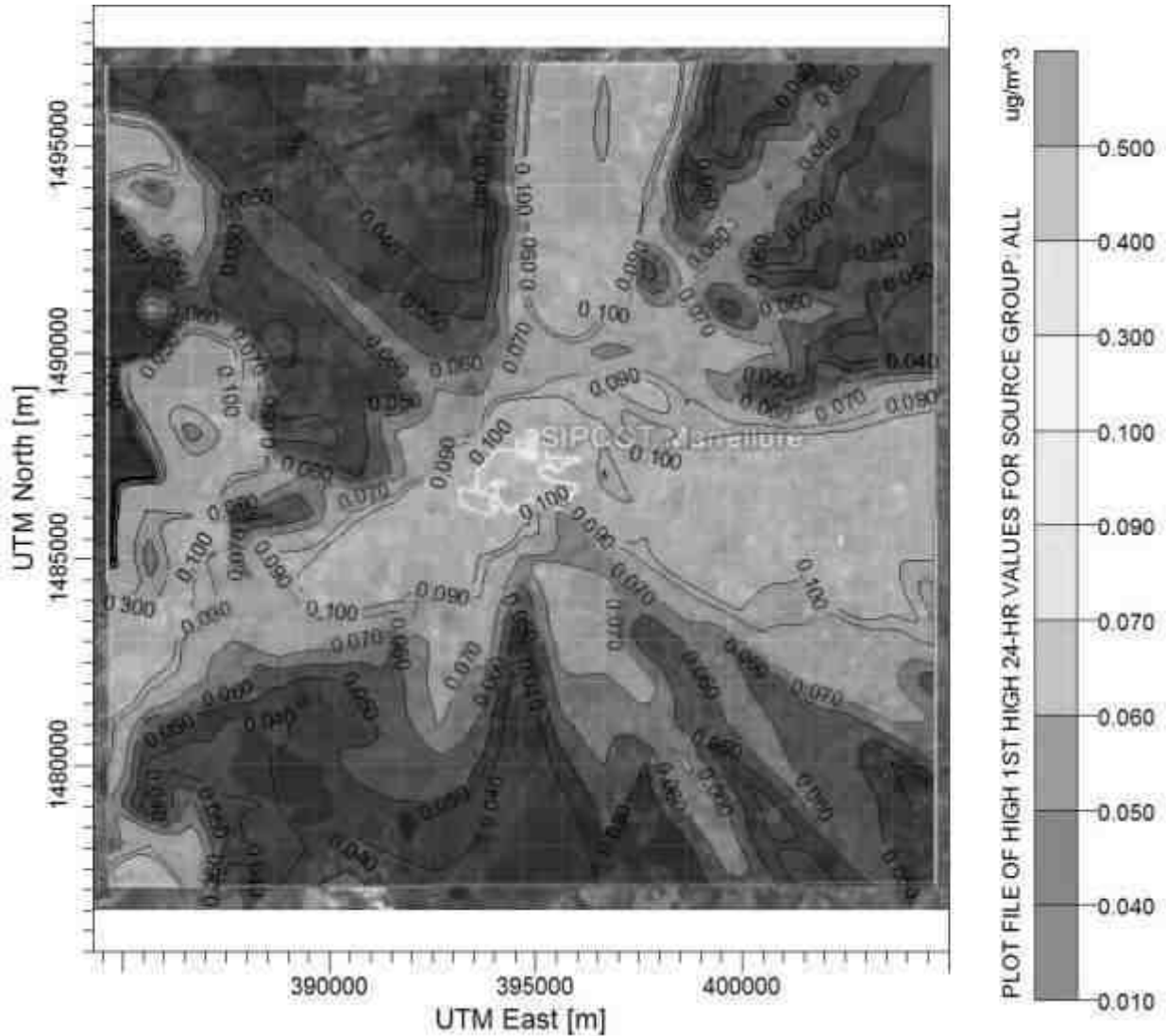


Figure 0-3 Predicted 24-Hrs GLC's of SO₂ within 10 km Radius of the Study Area

Table 0-4 Estimated Top 10 Highest Concentrations of SO₂ obtained through Modeling

S. No	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Project Site	Direction from Centre of Project
	E	N			
6.	396646	1496053	0.34263	9.21	NNE
7.	386646	1486053	0.32678	8.06	WSW
8.	384646	1484053	0.32663	10.44	WSW
9.	396646	1497053	0.31653	10.19	NNE
10.	396646	1494053	0.30118	7.28	NNE

				(~Km)	Site
1.	385646	1485053	0.46729	9.21	WSW
2.	386646	1488053	0.45841	8.06	WNW
3.	385646	1484053	0.34877	9.48	WSW
4.	385646	1486053	0.3363	9.05	WSW
5.	396646	1495053	0.3237	8.24	NNE
6.	396646	1496053	0.32014	9.21	NNE
7.	384646	1484053	0.30856	10.44	WSW
8.	386646	1486053	0.3053	8.06	WSW
9.	396646	1497053	0.29573	10.19	NNE
10.	396646	1494053	0.28104	7.28	NNE

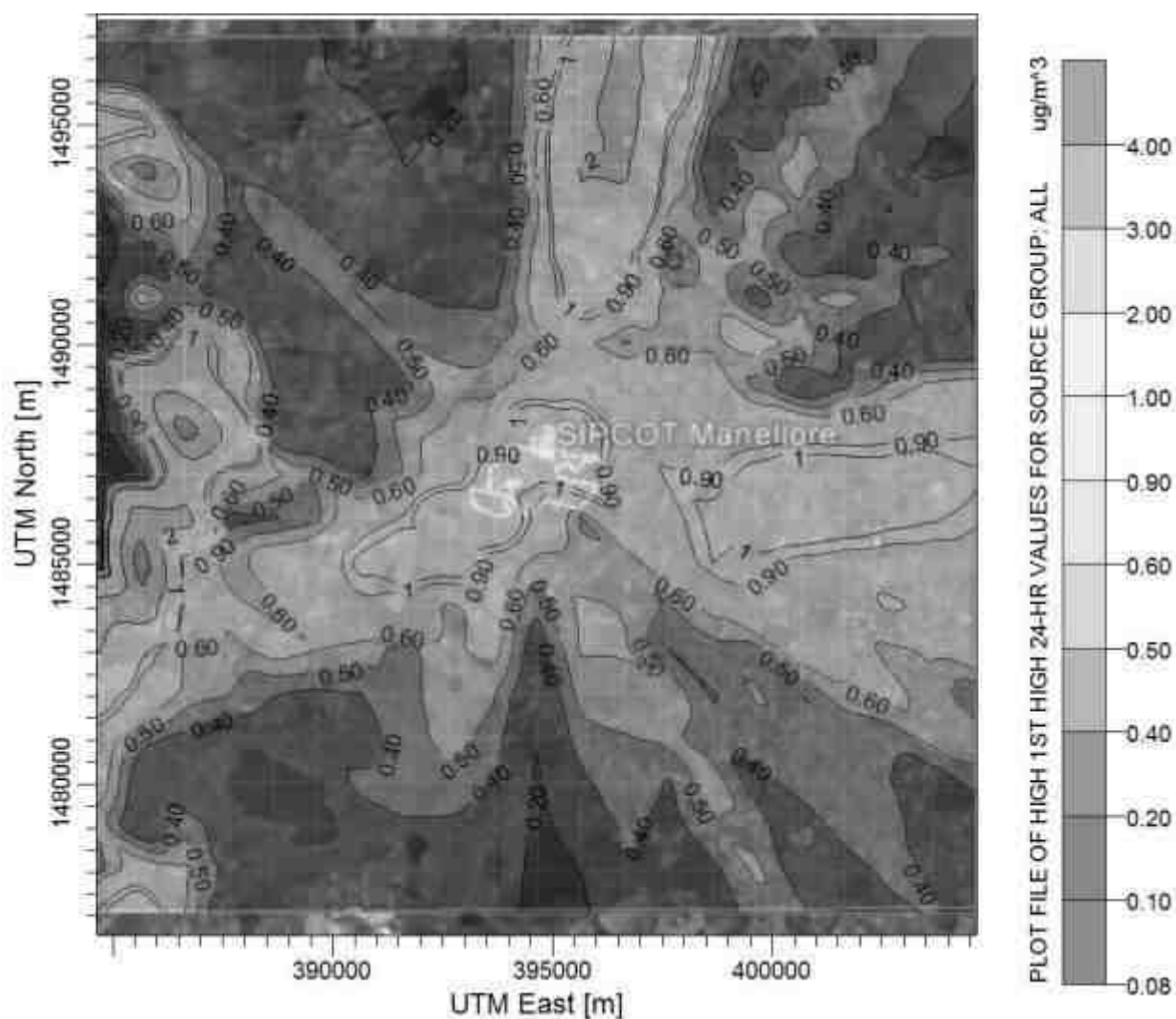


Figure 0-4 Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 0-5 Estimated Top 10 Highest Concentrations of NO_x obtained through Modeling

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	385646	1485053	3.60256	9.21	WSW
2.	386646	1488053	3.55107	8.06	WNW
3.	385646	1484053	2.69038	9.48	WSW
4.	385646	1486053	2.63121	9.05	WSW
5.	396646	1495053	2.48361	8.24	NNE
6.	396646	1496053	2.46236	9.21	NNE
7.	384646	1484053	2.43389	10.44	WSW
8.	386646	1486053	2.34765	8.06	WSW
9.	396646	1497053	2.27403	10.19	NNE
10.	396646	1494053	2.15495	7.28	NNE

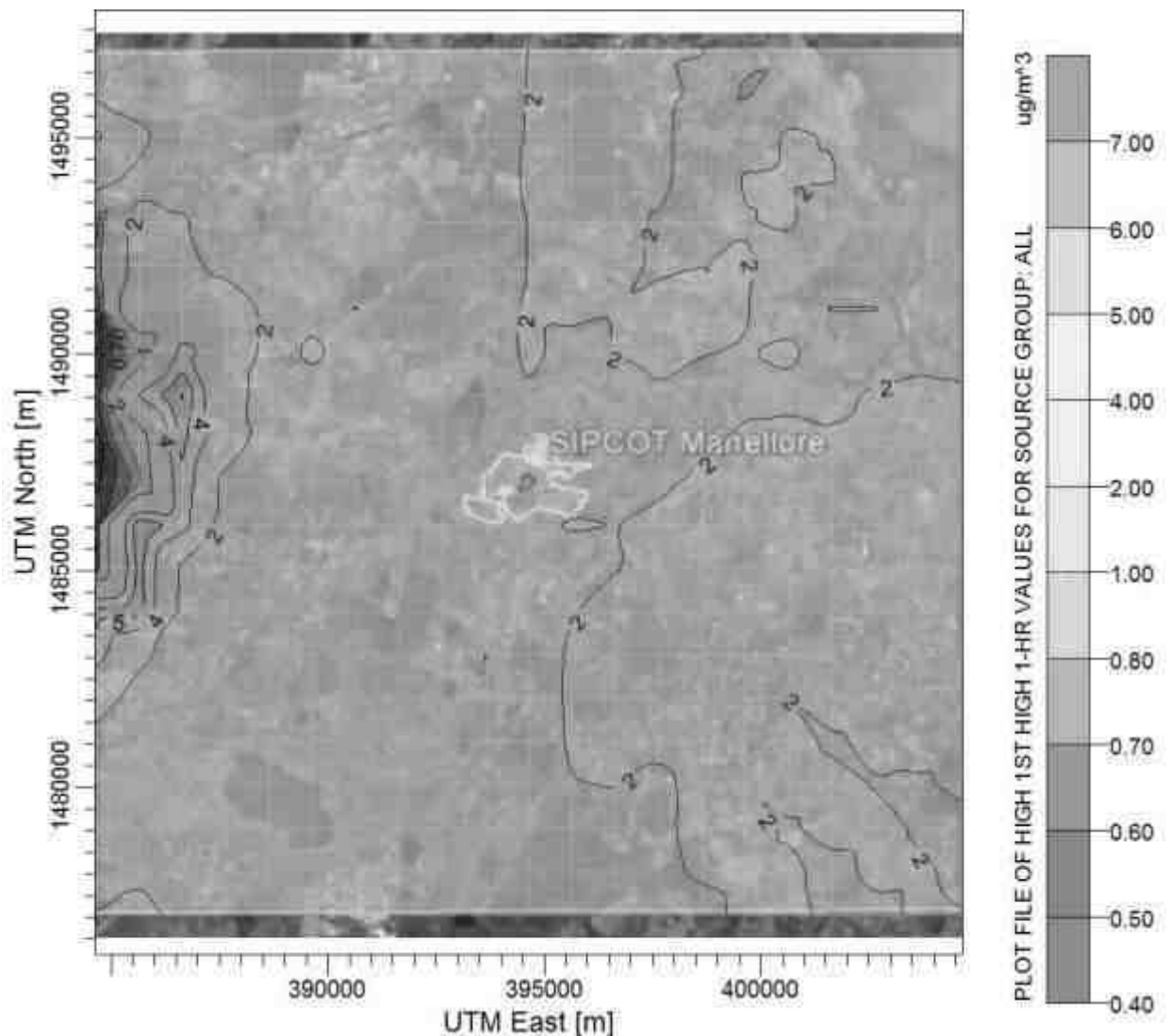


Figure 0-5 Predicted 1-Hr GLC's of CO within 10 km Radius of the Study Area**Table 0-6 Estimated Top 10 Highest Concentrations of CO obtained through Modeling**

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	386646	1489053	6.10362	8.24	WNW
2.	385646	1486053	5.81099	9.05	WSW
3.	385646	1484053	5.63507	9.48	WSW
4.	385646	1485053	5.33158	9.21	WSW
5.	384646	1484053	5.31122	10.44	WSW
6.	386646	1488053	5.29518	8.06	WNW
7.	386646	1487053	4.83102	10.19	NNE
8.	384646	1483053	4.6226	10.77	WSW
9.	386646	1486053	4.56957	9.21	NNE
10.	384646	1495053	4.34286	12.80	WNW

4.5.1.4 Conclusion

Maximum pollutant concentrations of PM, SO₂, NO_x observed due to proposed for an 24hr-average period have been studied and CO observed due to proposed for an 1hr-average period have been studied. All the parameters are well within the NAAQ Standards. The total increase in air pollutant concentrations above baseline status to estimate the percentage increase and summarized in **Table 4-7**.

Table 0-7 Total Maximum GLCs from the proposed Stack Emissions

Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard ($\mu\text{g}/\text{m}^3$)	% increase
PM10	72.83	0.49	73.32	100	0.67
SO2	10.95	0.46	11.41	80	4.2
NO _x	27.51	3.60	31.11	80	13.08
CO	330	6.10	336.1	4000	1.84

From the above table, it is evident that even from uncontrolled emissions from the proposed project, the total Concentration for PM, SO₂, 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 NO_x will be further reduced for the proposed project after establishment.

4.5.1.5 Line Source:

Table 0-8 Proposed project Transportations Emission

S.no	Type of Vehicle	No.of.Vehicle	Emission(g/s)		
			PM	NOX	CO
1	Bike	25	3.13E-04	6.25E-03	3.47E-02
2	Car	45	5.63E-04	1.56E-02	9.25E-02
3	3W	7	1.94E-07	3.11E-03	4.28E-03
4	HW	5	1.39E-04	6.39E-03	5.56E-02
Total(g/s)			1.01E-03	3.14E-02	1.87E-01

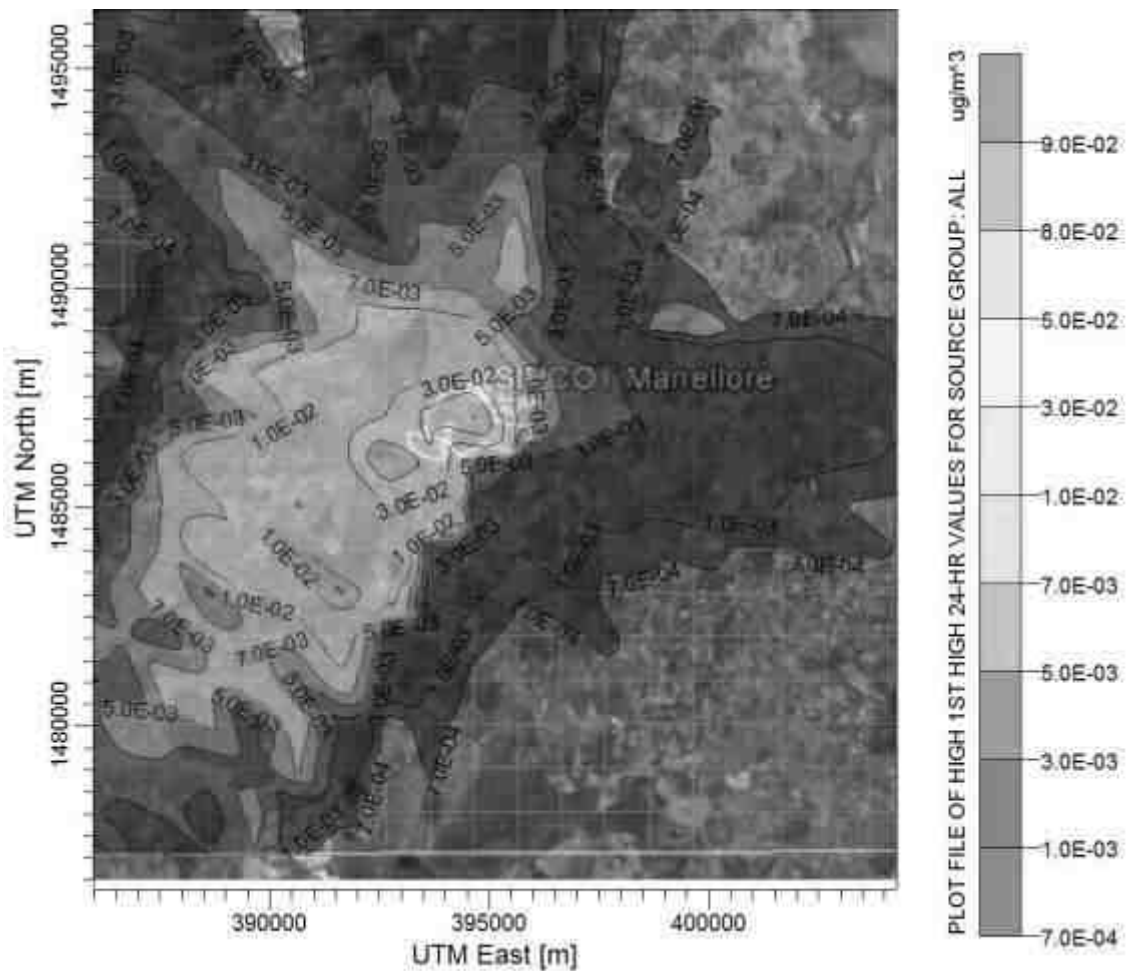


Figure 0-6 Predicted 1-Hr GLC's of CO within 10 km Radius of the Study Area

Table 0-9 Estimated Top 10 Highest Concentrations of Particulate Matter PM obtained through Modeling

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	394646	1487053	0.0808	Project Site	Project Site
2.	392646	1486053	0.0692	2.23	WSW
3.	393646	1487053	0.0573	1.00	W
4.	393646	1486053	0.04815	1.41	SW
5.	390646	1485053	0.03113	4.47	WSW
6.	392646	1487053	0.03033	2.00	W
7.	392646	1485053	0.03025	2.82	SW
8.	394646	1488053	0.02864	1.00	N
9.	391646	1486053	0.0271	3.16	WSW
10.	392646	1484053	0.02148	3.60	SSW

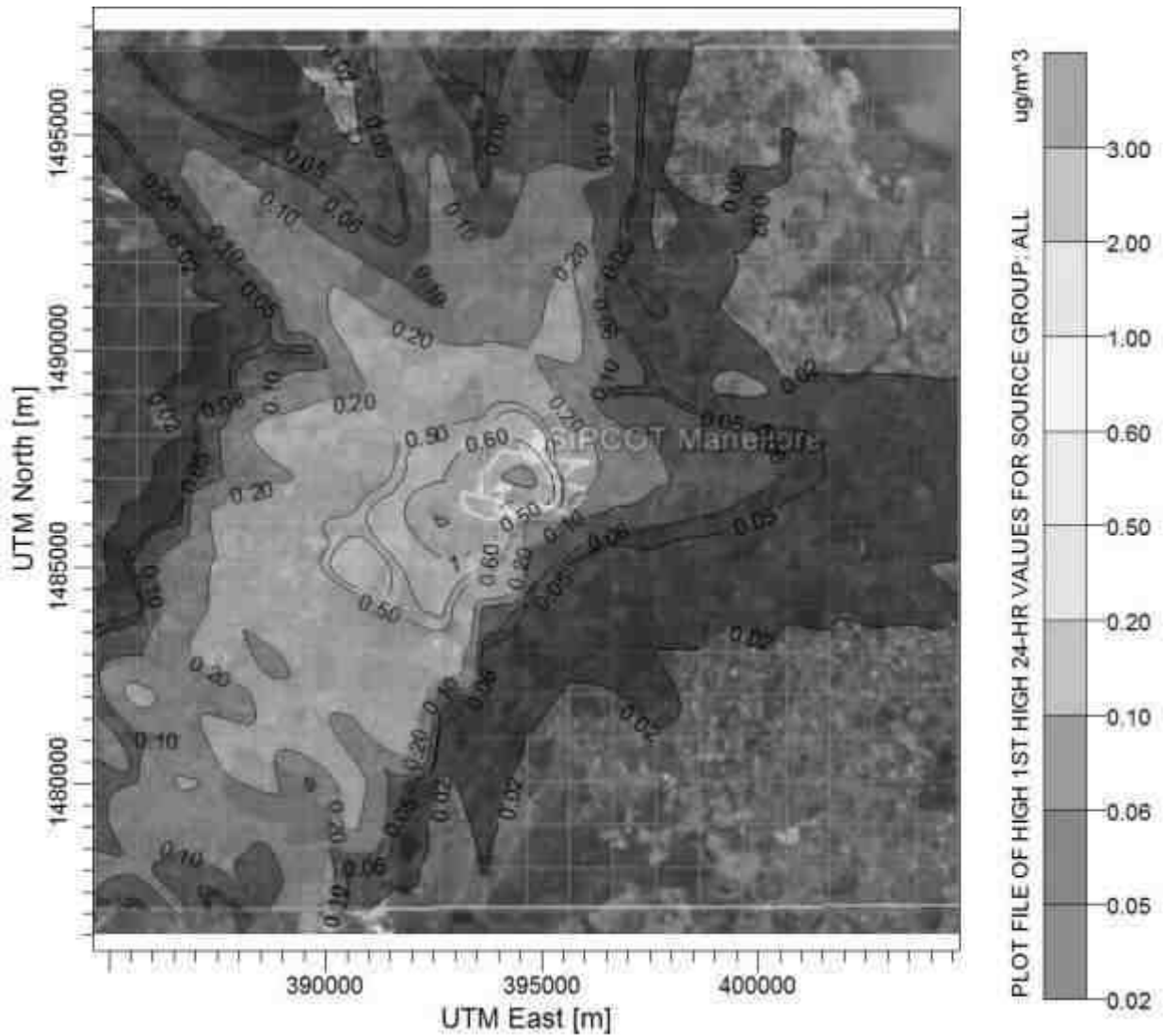


Figure 0-7 Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 0-10 Estimated Top 10 Highest Concentrations of oxide of Nitrogen Obtained through Modeling

S. No	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	394646	1487053	2.51205	Project Site	Project Site
2.	392646	1486053	2.15135	2.23	WSW
3.	393646	1487053	1.78152	1.00	W
4.	393646	1486053	1.49706	1.41	SW
5.	390646	1485053	0.96783	4.47	WSW
6.	392646	1487053	0.94293	2.00	W
7.	392646	1485053	0.94048	2.82	SW

8.	394646	1488053	0.89037	1.00	N
9.	391646	1486053	0.84248	3.16	WSW
10.	392646	1484053	0.66777	3.60	SSW

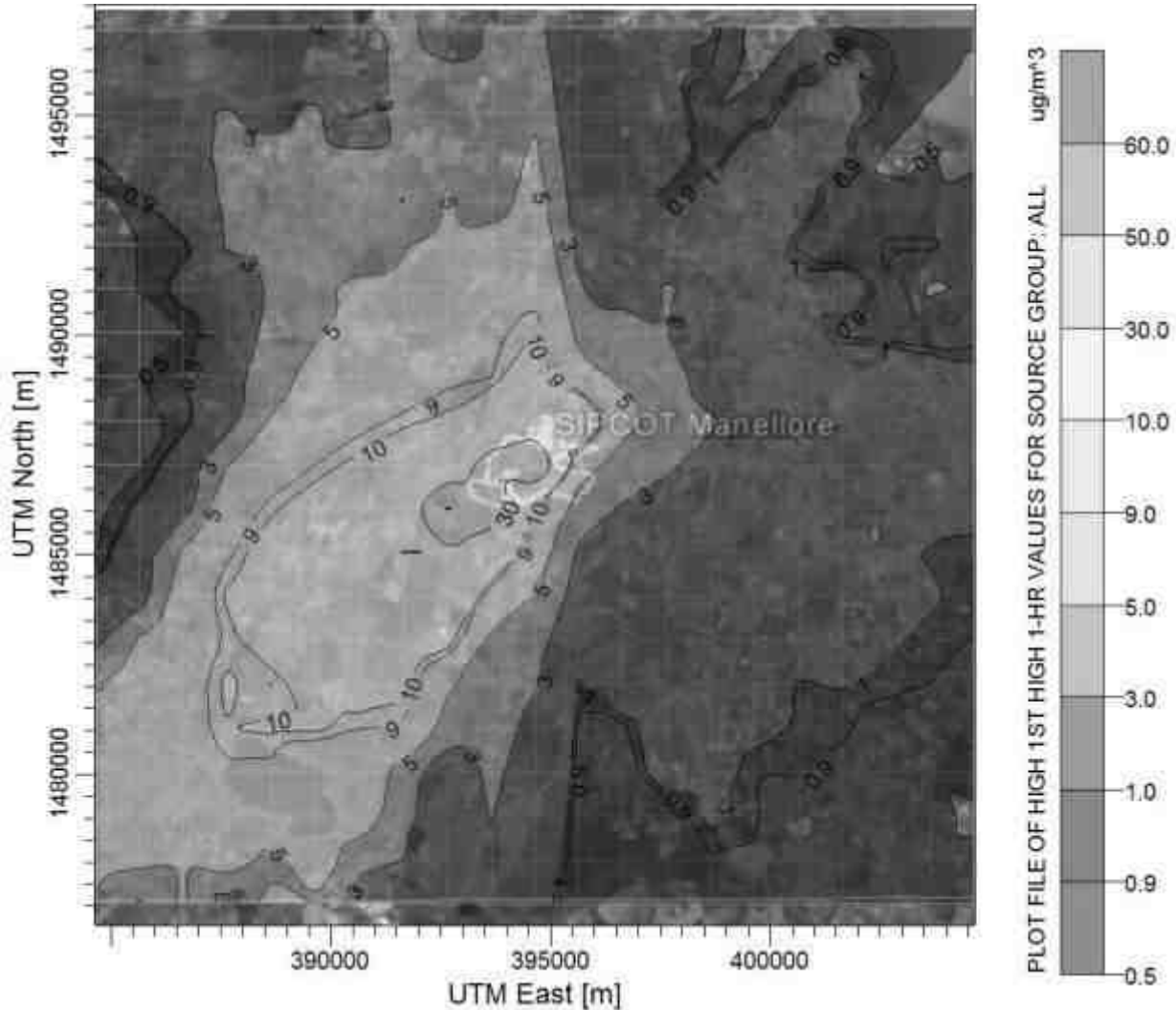


Figure 0-8 Predicted 1-Hrs' GLC's of CO within 10 km Radius of the Study Area

Table 0-11 Estimated Top 10 Highest Concentrations of Carbon Monoxide Obtained through Modeling

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	392646	1486053	50.81815	2.23	WSW
2.	394646	1487053	49.19755	Project Site	Project Site
3.	393646	1486053	44.07849	1.41	SW

4.	393646	1487053	37.51909	1.00	W
5.	391646	1485053	30.36692	3.60	WSW
6.	392646	1485053	29.69229	2.82	SW
7.	391646	1486053	23.15497	3.16	WSW
8.	391646	1484053	21.56187	4.24	SW
9.	394646	1488053	19.58277	1.00	N
10.	390646	1485053	19.53295	4.47	WSW

Conclusion

Table 0-12 Total Maximum GLCs from the Transportations Emissions

Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard ($\mu\text{g}/\text{m}^3$)	% increase
PM10	72.83	0.08	72.91	100	0.10
NO _x	27.51	2.51	30.02	80	9.12
CO	330	50.81	380.81	4000	15.39

4.5.1.6 Cumulative:**Table 0-13 Proposed project Stack & Transportations Emission (Cumulative)**

Plot No.	DG/Boiler	DG Capacity KVA	Fuel used	Stack Details				Emission(m/s)			
				Height(m)	Dia(m)	Temp (C)	Exit velocity(m/s)	PM	SO2	NOX	CO
1	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
2	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
3	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
4	DG	215	HSD	28	0.3	215	12	0.0026	0.0024	0.0374	0.0081
5	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
6	DG	205	HSD	28	0.3	215	11.3	0.0025	0.0023	0.0357	0.0077
7	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
8	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053
9	DG	115	HSD	28	0.3	214.2	12.5	0.0014	0.0013	0.0200	0.0043
10	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
11	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
12	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
13	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
14	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
15	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
16	DG	80	HSD	27	0.25	208	13	0.0010	0.0009	0.0139	0.0030
17	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
18	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
19	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
20	DG	150	HSD	28	0.3	215	14	0.0018	0.0017	0.0261	0.0056
21	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026

22	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
23	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
24	DG	500	HSD	30	0.5	195	9.7	0.0061	0.0057	0.0870	0.0188
25	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
26	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
27	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
28	DG	120	HSD	28	0.3	214.2	12.5	0.0015	0.0014	0.0209	0.0045
29	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
30	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
31	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
32	DG	60	HSD	27	0.25	204	11	0.0007	0.0007	0.0104	0.0023
33	DG	115	HSD	28	0.3	214.2	12.5	0.0014	0.0013	0.0200	0.0043
34	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
35	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
36	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
37	DG	30	HSD	27	0.25	203	12	0.0004	0.0003	0.0052	0.0011
38	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
39	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
40	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
41	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
42	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
43	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
44	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
45	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
46	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
47	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
48	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
49	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039

50	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
51	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
52	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053
53	DG	80	HSD	27	0.25	208	13	0.0010	0.0009	0.0139	0.0030
54	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
55	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
56	DG	155	HSD	28	0.3	216	14.2	0.0019	0.0018	0.0270	0.0058
57	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
58	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
59	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
60	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
61	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
62	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
63	DG	85	HSD	27	0.25	210	13.2	0.0010	0.0010	0.0148	0.0032
64	DG	95	HSD	27	0.25	212	13.5	0.0012	0.0011	0.0165	0.0036
65	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
66	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
67	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
68	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
69	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
70	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
71	DG	140	HSD	28	0.3	216	13.5	0.0017	0.0016	0.0244	0.0053
72	DG	120	HSD	28	0.3	214.2	12.5	0.0015	0.0014	0.0209	0.0045
73	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
74	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
75	DG	35	HSD	27	0.25	201	12.3	0.0004	0.0004	0.0061	0.0013
76	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
77	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039

78	DG	100	HSD	27	0.3	211	13.3	0.0012	0.0011	0.0174	0.0038
79	DG	130	HSD	28	0.3	215.4	13.1	0.0016	0.0015	0.0226	0.0049
80	DG	100	HSD	27	0.3	211	13.3	0.0012	0.0011	0.0174	0.0038
81	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
82	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
83	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
84	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
85	DG	90	HSD	27	0.25	211	13.3	0.0011	0.0010	0.0157	0.0034
86	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
87	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
88	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
89	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
90	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
91	DG	65	HSD	27	0.25	204.5	11.2	0.0008	0.0007	0.0113	0.0024
92	DG	70	HSD	27	0.25	203	11.4	0.0009	0.0008	0.0122	0.0026
93	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
94	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
95	DG	240	HSD	28	0.3	214	12	0.0029	0.0027	0.0418	0.0090
96	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
97	DG	75	HSD	27	0.25	202	11.4	0.0009	0.0009	0.0131	0.0028
98	DG	105	HSD	27	0.3	211.2	13.2	0.0013	0.0012	0.0183	0.0039
99	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
100	DG	210	HSD	28	0.3	215	11.8	0.0026	0.0024	0.0366	0.0079
101	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
102	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
103	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
104	DG	135	HSD	28	0.3	215.4	13.1	0.0017	0.0015	0.0235	0.0051
105	DG	165	HSD	28	0.3	216	14.2	0.0020	0.0019	0.0287	0.0062

106	DG	125	HSD	28	0.3	215	13.6	0.0015	0.0014	0.0218	0.0047
107	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
108	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
109	DG	175	HSD	28	0.3	215.7	14.5	0.0021	0.0020	0.0305	0.0066
110	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
111	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
112	DG	275	HSD	29	0.3	218.7	12.8	0.0034	0.0031	0.0479	0.0103
113	DG	110	HSD	28	0.3	214	12.4	0.0013	0.0013	0.0191	0.0041
114	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
115	DG	275	HSD	29	0.3	218.7	12.8	0.0034	0.0031	0.0479	0.0103
116	DG	200	HSD	28	0.3	215	11.6	0.0024	0.0023	0.0348	0.0075
117	DG	210	HSD	28	0.3	215	11.8	0.0026	0.0024	0.0366	0.0079
118	DG	235	HSD	28	0.3	218	12	0.0029	0.0027	0.0409	0.0088
119	DG	245	HSD	29	0.3	216	12.4	0.0030	0.0028	0.0426	0.0092
120	DG	250	HSD	29	0.3	216	12.4	0.0031	0.0028	0.0435	0.0094
121	DG	265	HSD	29	0.3	218.7	12.8	0.0032	0.0030	0.0461	0.0100
122	DG	415	HSD	30	0.5	198	9.5	0.0051	0.0047	0.0722	0.0156
C1	DG	320	HSD	29	0.4	202	10.4	0.0039	0.0036	0.0557	0.0120
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C2	DG	190	HSD	28	0.3	213	12.5	0.0023	0.0022	0.0331	0.0071
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C3	DG	145	HSD	28	0.3	216	13.5	0.0018	0.0017	0.0252	0.0055
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C4	DG	180	HSD	28	0.3	214	12.2	0.0022	0.0021	0.0313	0.0068
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C5	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C6	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070

	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C7	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C8	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
C9	DG	185	HSD	28	0.3	213	12.5	0.0023	0.0021	0.0322	0.0070
	Boiler Kg/hr	600	HSD	40	0.5	190	9	0.0006	0.0010	0.0328	0.0075
Transportations											
S.no	Type of Vehicle	No.of.Vehicle					PM	SO2	NOX	CO	
	Bike	25					3.13E-04		6.25E-03	3.47E-02	
	Car	45					5.63E-04		1.56E-02	9.25E-02	
	3W	7					1.94E-07		3.11E-03	4.28E-03	
	HW	5					1.39E-04		6.39E-03	5.56E-02	
Total(g/s)						0.2219 89	0.2101 72	3.3976 67	0.9181 49		

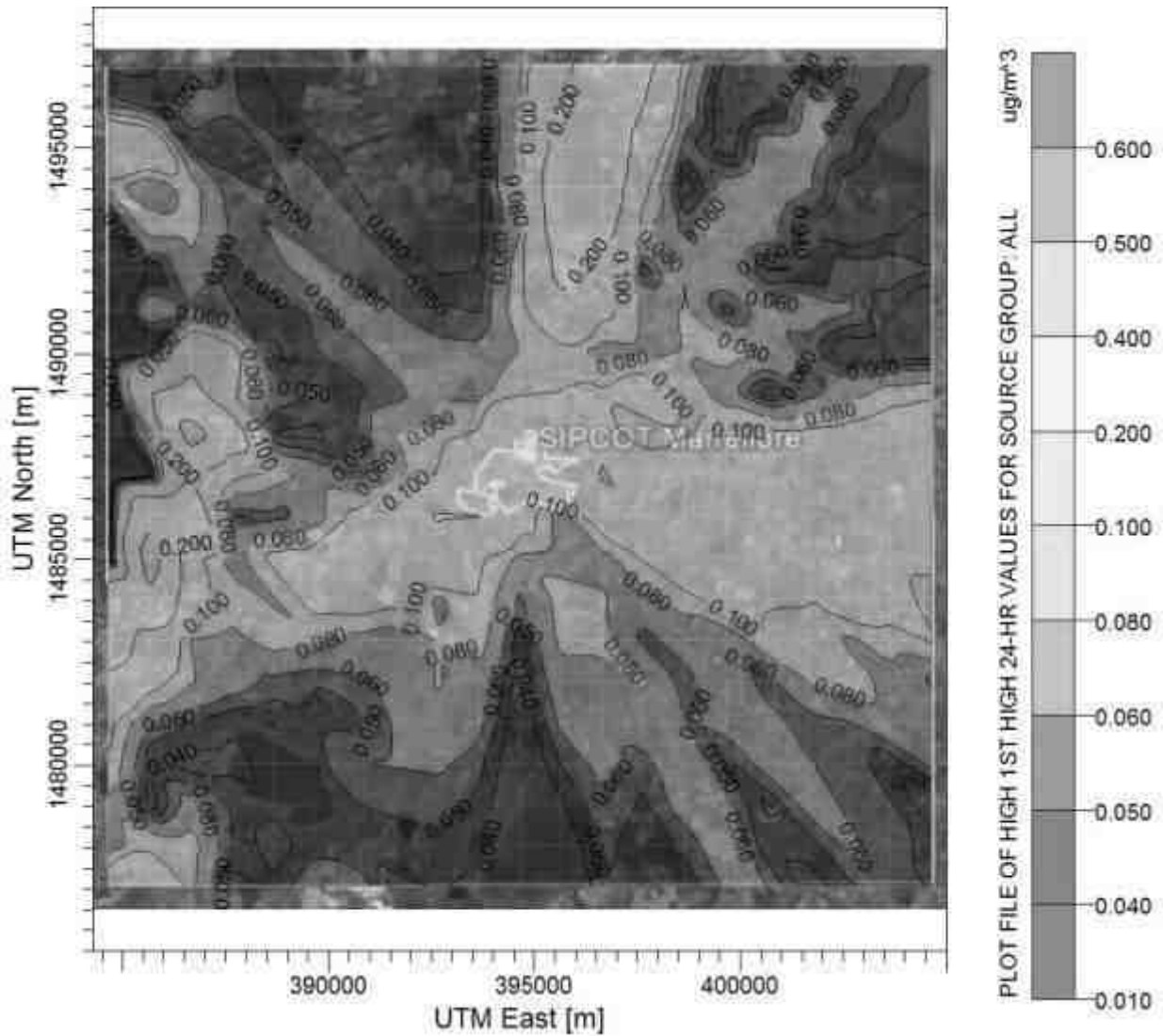


Figure 0-9 Predicted 24-Hrs GLC's of Particulate matter PM within 10 km Radius of the Study Area

Table 0-14 Estimated Top 10 Highest Concentrations of Particulate Matter PM obtained through Modeling

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	385646	1485053	0.50177	9.21	WSW
2.	386646	1488053	0.48972	8.06	WNW
3.	385646	1484053	0.37372	9.48	WSW
4.	385646	1486053	0.35823	9.05	WSW
5.	396646	1495053	0.35012	8.24	NNE

6.	396646	1496053	0.34597	9.21	NNE
7.	386646	1486053	0.32854	8.06	WSW
8.	384646	1484053	0.32766	10.44	WSW
9.	396646	1497053	0.31929	10.19	NNE
10.	396646	1494053	0.30442	7.28	NNE

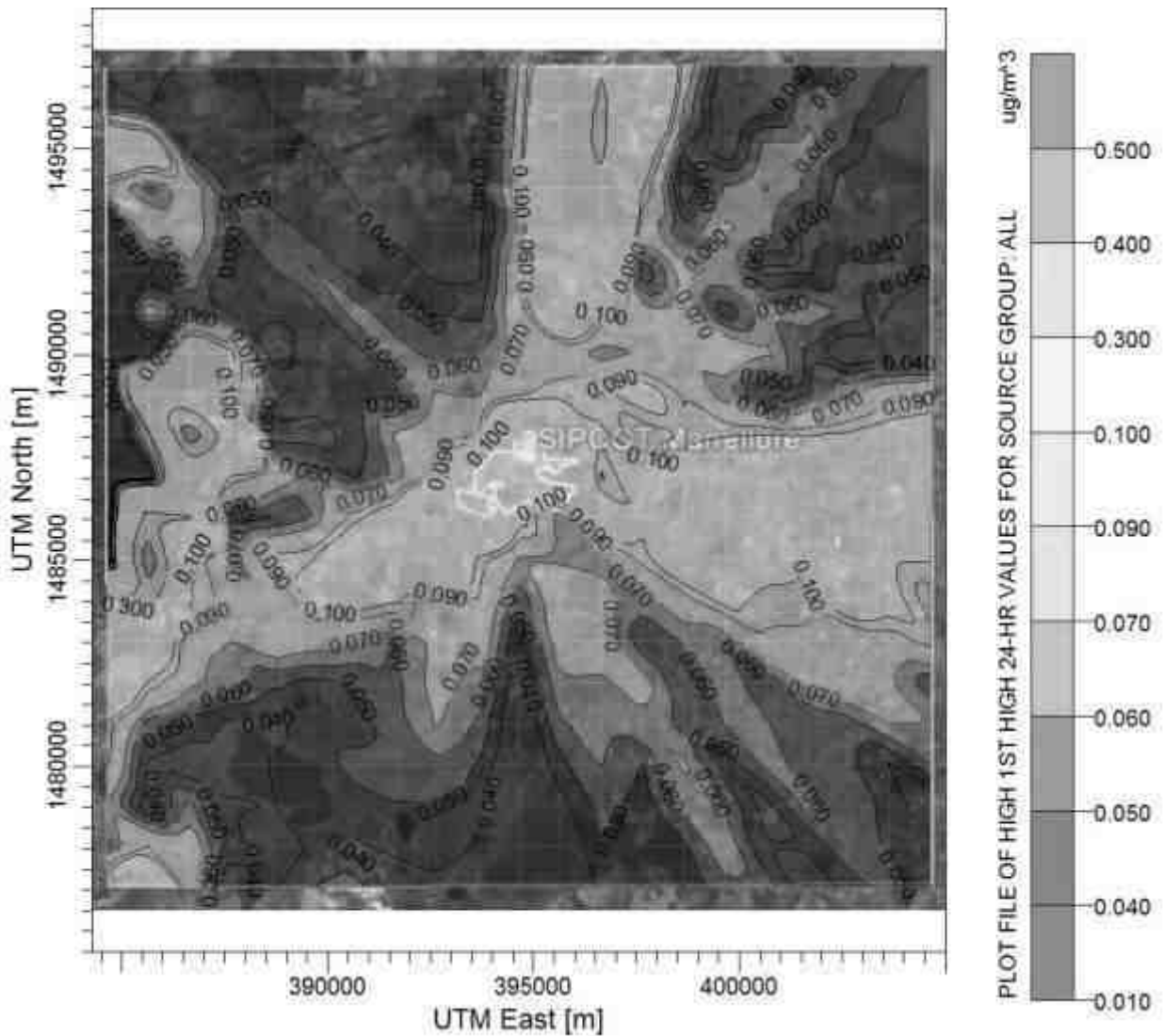


Figure 0-10 Predicted 24-Hrs' GLC's of SO₂ within 10 km Radius of the Study Area
Table 0-15 Estimated Top 10 Highest Concentrations of SO₂ Obtained through Modeling

S. No	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	385646	1485053	0.46729	9.21	WSW

2.	386646	1488053	0.45841	8.06	WNW
3.	385646	1484053	0.34877	9.48	WSW
4.	385646	1486053	0.3363	9.05	WSW
5.	396646	1495053	0.3237	8.24	NNE
6.	396646	1496053	0.32014	9.21	NNE
7.	384646	1484053	0.30856	10.44	WSW
8.	386646	1486053	0.3053	8.06	WSW
9.	396646	1497053	0.29573	10.19	NNE
10.	396646	1494053	0.28104	7.28	NNE

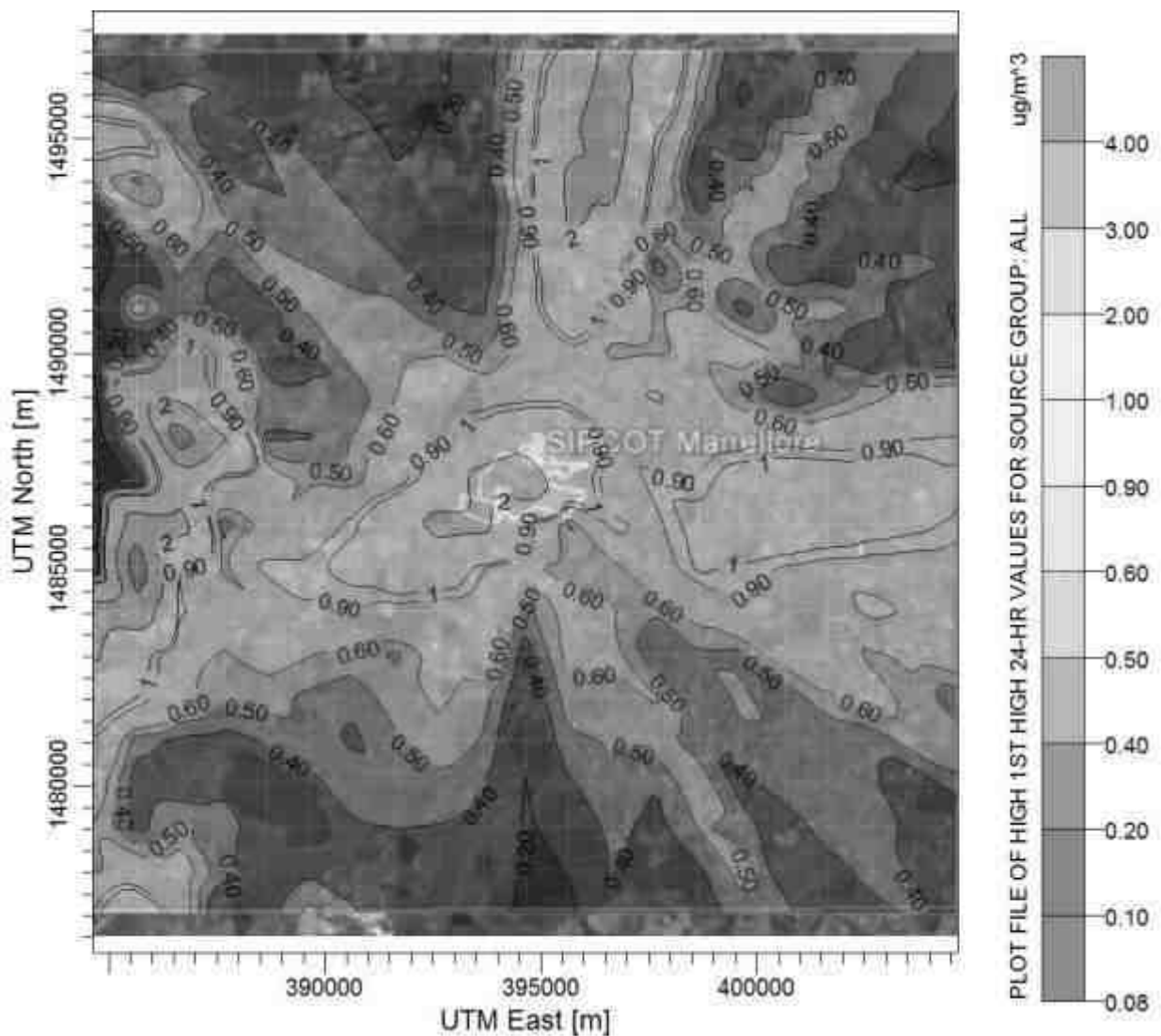


Figure 0-11 Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area
Table 0-16 Estimated Top 10 Highest Concentrations of oxide of Nitrogen Obtained through Modeling

S.	UTM coordinates (m)	Conc.	Distance	Direction
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No	E	N	($\mu\text{g}/\text{m}^3$)	from Centre of Project Site (~Km)	from Centre of Project Site
1.	385646	1485053	3.66954	9.21	WSW
2.	386646	1488053	3.57006	8.06	WNW
3.	394646	1487053	2.95419	Project site	Project site
4.	385646	1484053	2.71858	9.48	WSW
5.	385646	1486053	2.66099	9.05	WSW
6.	396646	1495053	2.58673	8.24	NNE
7.	396646	1496053	2.56605	9.21	NNE
8.	384646	1484053	2.46605	10.44	WSW
9.	393646	1487053	2.40984	1.00	W
10	386646	1486053	2.40236	8.06	WSW

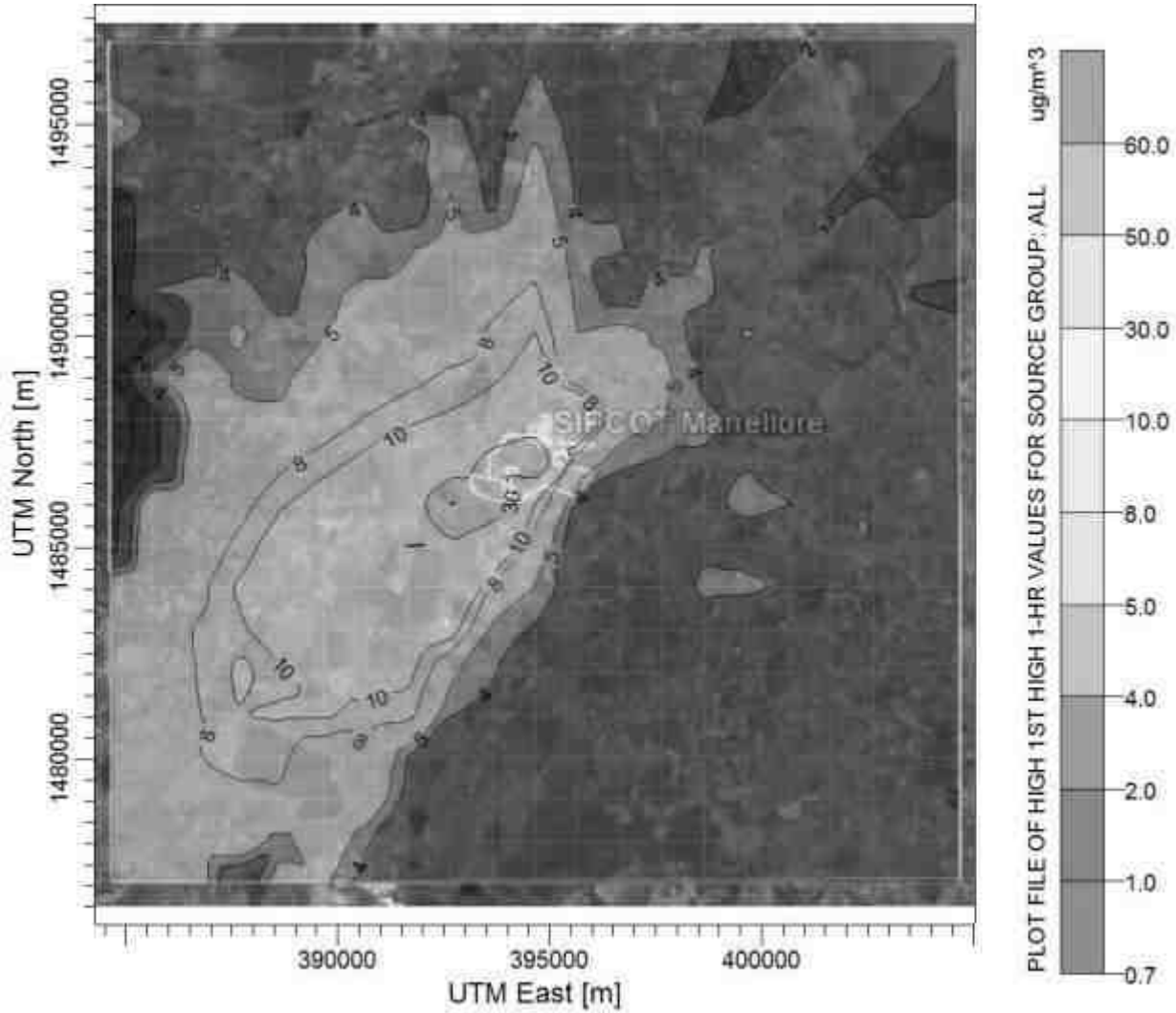


Figure 0-12 Predicted 1-Hrs' GLC's of CO within 10 km Radius of the Study Area

Table 0-17 Estimated Top 10 Highest Concentrations of Carbon Monoxide Obtained through Modeling

S. No	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Project Site (~Km)	Direction from Centre of Project Site
	E	N			
1.	392646	1486053	50.81815	.2.23	WSW
2.	394646	1487053	49.19755	Project site	Project site
3.	393646	1486053	44.07849	1.41	SW
4.	393646	1487053	37.51909	1.00	W
5.	391646	1485053	30.36694	3.60	WSW
6.	392646	1485053	29.69231	2.82	SW
7.	391646	1486053	23.15497	3.16	WSW

8.	391646	1484053	21.56232	4.24	SW
9.	394646	1488053	19.58277	1.00	N
10.	390646	1485053	19.53295	4.47	WSW

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 . All the parameters are well within the NAAQ Standards .The total increase in concentrations above baseline status to estimate the percentage increase and summarized in **Table 4-18**

Table 0-18 Total Maximum GLCs from the Stack & Transportations Emissions

Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard ($\mu\text{g}/\text{m}^3$)	% increase
PM10	72.83	0.50	73.33	100	0.68
SO ₂	10.95	0.46	11.41	80	4.2
NO _x	27.51	3.66	31.17	80	13.30
CO	330	50.81	380.81	4000	15.39

Cumulative Impact Assessment of the project along with Industries in 10 km radius is provided in Annexure-13

4.5.1.7 Mitigation Measures

- Individual industries will provide Air pollution control devices (such as Scrubers ,Bag filters etc) apart from this individual industries will be mandated to provide 33% greenbelt along the periphery.
- Individual industries will be instructed to provide proper stack height for DG sets, furnaces & boilers 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. 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, additional 35m near habitat areas (to maintain 50 m as per ToR condition), 33% area by individual industries , 3m along

road side and in other areas. Overall green belt area of the park will be 106.575 Ha i.e 38.07% of developable area.

4.5.2 Traffic and Transport

Approach road to the site is MDR 599(Gummidipoondi - Madharpakkam). Google image of road connectivity to the site is given in **Figure 4-13**. **Table 4-19 & 4-21** gives the existing and proposed vehicular movement due to the project at SH-52 and MDR 599(Gummidipoondi - Madharpakkam) respectively and **Table 4-20** and **Table 4-22** gives the traffic volume due to the proposed project at SH-52 and MDR 599 respectively. **Table 4-23** gives the traffic Categorisation.



Figure 0-13 Google image showing site connectivity

Table 0-19 Existing and proposed vehicular movement in SH 52 (Kavaraipettai – Sathyavedu Rd)

S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
7.	Motor Cycles or Scooters etc.	135	101.25	25	18.75	160	0.75	120

S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
8.	Three Wheelers/ Auto Rickshaw	54	108	7	8.4	61	2	122
9.	Four Wheelers/ Cars	215	215	45	45	260	1	260
10.	Truck/Bus	51	188.7	5	11	56	3.7	207.2
11.	Agricultural Tractor	7	28	2	8	9	4	36
12.	Light Commercial Vehicle	41	82	10	20	51	2	102
	Total	503	722.95	94	111.15	597	13.45	847.2

Table 0-20 Traffic volume after implementation of the project at SH 52 (Kavaraipettai – Sathyavedu Rd)

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	503	722.95	1500	0.48	C	Good
After implementation	597	847.2	1500	0.56	C	Good

Table 0-21 Traffic study at MDR 599 (Gummidipoondi - Madharpakkam Rd)

S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	Motor Cycles or Scooters etc.	96	72	25	18.75	121	0.75	90.75
2	Three Wheelers/ Auto Rickshaw	26	31.2	7	8.4	33	1.2	39.6
3	Four Wheelers/ Cars	85	85	45	45	130	1	130
4	Truck/Bus	22	48.4	5	11	27	2.2	59.4
5	Agricultural Tractor	11	44	2	8	13	4	52

S. No	Type of Vehicles	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
6	Light Commercial Vehicle	30	60	10	20	40	2	80
	Total	270	340.6	94	111.15	364	11.15	451.75

Table 0-22 Traffic study at MDR 599 (Gummidipoondi - Madharpakkam Rd).

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	270	340.6	1500	0.23	B	Very Good
After implementation	451.75	451.75	1500	0.3	B	Very Good

Table 0-23 Categorisation of traffic

V/C	LOS	Performance
0.00-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good
0.6-0.8	D	Fair/Average
0.8-1.0	E	Poor
1.0 & Above	F	Very Poor

Due to proposed Project, there will be increment in the vehicle movement and the level of service (LOS) anticipated is Good traffic flow for SH 52 (Kavaraipettai – Sathyavedu Rd) and Very good Traffic flow for MDR 599 (Gummidipoondi - Madharpakkam Rd). Traffic circulation plan for the proposed IP is attached as an **Annexure-8**.

4.5.3 Noise Environment

The impacts of the proposed project on the noise levels of the surrounding areas were assessed. All equipments 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 is 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 correspond 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.

4.5.3.2 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 requirement will be met from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). 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 developments 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. 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 4-24**

Table 0-24 Wastewater generation and treatment

S.No	wastewater	Quantity (KLD)	Method of Disposal
Construction Phase			
1	Sewage	4	Will be treated in 5 KLD Packaged STP
Operation Phase			
2	Sewage from industries	365	Will be treated by individual industries and treated sewage will be used for green belt development within the IP.
3	Effluent from individual industries	1548	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 4-25**.

Table 0-25 Characteristics 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 **Tables 4-26, 4-27, 4-28 and 4-29** respectively.

Table 0-26 Effluent 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 0-27 Automobile parts manufacturing industries

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 0-28 Effluent characteristics of Engineering & Fabrication Industries

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 0-29 Effluent characteristics of Synthetic organic Chemicals

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
7	COD(mg/l)	1250-1350

Individual industries will be mandated to provide ZLD system and recycle the treated effluent for process and utilities.

4.5.5 Land Environment

Originally, Administrative Sanction was given for acquisition of 303.75 Ha (300.765 Ha of poramboke land and 2.985 Ha of patta land) for the development of Industrial Park at Manallur vide G.O (Ms) No.119 dated 07.06.2013. The same is enclosed as **Annexure-2a**. Later, poramboke land extent was reduced to 283.08 Ha vide Government of Tamil Nadu land alienation G.O(Ms) No.285 dated 03/08/2018, enclosed as **Annexure -2b**. Further, 3.085 Ha of poramboke land has been excluded vide Thiruvallur District Collector vide letter no. 14888/2018 dated 10.06.2019, enclosed as **Annexure -2c** and 2.985 Ha of patta land is also excluded from land acquisition and the total area of the Industrial Park is reduced to 279.99.5 Ha. Land Delivery Receipt in

proof of taking over possession of 279.99.5 Ha of poramboke land from Zonal Deputy Tahsildar along with survey number wise land extent and classification is enclosed as **Annexure-2d.**

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.
- 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 facility) 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 industries as 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 their premises 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 2016.

4.5.8 Biological Environment

As per the ToR condition, Green Work Trust (GWT) has conducted the Biodiversity study within 10 kilometre range from the project site. Within 10 Km radius of the project site, there are water bodies, reserved forests and Pulicat Lake Bird Sanctuary. Bio Diversity Report is enclosed as **Annexure-14**.

4.5.8.1 Impacts

The impact on terrestrial ecology will be due to emission of gaseous pollutants like PM, NO_x, SO₂. 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 Poramboakke land Classified as Kallanguthu and Anatheenam. There is no reserve forest at the immediate vicinity / within 1 Km from the project site. Hence no direct impact is anticipated due to the project. A few globally threatened and 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 on Pulicat Lake Bird Sanctuary:**

Project site situated in open habitat landscape and surrounded by agriculture fields, industries, etc. Pulicat Lake Bird Sanctuary is located at a distance of 5.77 Km from the project site and 8.92 Km from the tail end portion of Pulicat Lake. As a wetland ecosystem, the Pulicat lake area is important for the breeding and roosting birds and several other fauna and flora, but only edge portion is covered in project buffer area.

As per IMD data predominant wind direction is South East and the pulicat bird sanctuary is ~5.77 Km (towards NE), hence there will not be any direct impact on pulicat bird sanctuary and Reserved Forest near the proposed project.

4.5.8.2 Mitigation measures

- Adequate Green belt area will be provided in the park viz 15m peripheral green belt along the boundary, additional 35m near habitat areas (to maintain 50 m as per ToR condition), 33% area by individual industries, 3m along road side and in other areas. Overall green belt area of the park will be 106.575 Ha i.e 38.07% 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.
- 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.
- Conservation plan for Schedule I species is enclosed as **Annexure-17**.

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

- 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 38.07% will be proposed (106.575 Ha) including 50m Greenbelt towards habitation, apart from this Individual industries will provide acoustic enclosures for their D.G.sets.
- 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.

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 38.07 % will be proposed in the Industrial Park. Green belt area breakup is given in **Table 4-30**.

Table 0-30 Green belt area breakup

Green belt	Area (Acres)	Area (Ha)	Percentage of developable area
Green belt in plot area(33% by industries)	161.964	65.572	23.42
Green belt by SIPCOT	101.277	41.003	14.65
Total	263.241	106.575	38.07

S.NO	TYPE OF TREE	NO. OF PLANTS	NO. OF PLANTS to be Removed
1	Mango Tree	1294	103
2	Coconut	471	38
3	Guava	89	7
4	Sapota	24	2
5	Eucalyptus	38	3
6	Amla	95	8
7	Cashew	16	1
8	Banyan	2	-
9	Neem	50	4
10	Papaya	19	1
11	Palm	1	-
12	Naga	6	-
13	Teak	48	3
Total		2153	170

Total No. of trees within the site are 2153. Out of which 170 trees will felled down due to proposed project .To Compensate that trees 1700 trees will be planted in green belt area.

Around 1,99,828 numbers of trees will be planted (for 106.575 ha @ 1500 trees / Ha by considering 80% survival rate).

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 4-31**.

Table 0-31 Proposed green belt Species

SNo	Plant species proposed	Nos
1	Neem	16,652
2	<i>Seasam</i>	16,652
3	<i>Teak wood</i>	16,652
4	<i>Cassia fistula</i>	16,652
5	<i>Commelina benghalensis</i>	16,652
6	<i>Cheno qodium album</i>	16,652
7	<i>Acacia auriculiformis</i>	16,652
8	<i>Acacia ferruginea</i>	16,652
9	<i>Borringtonio racemose Roxb</i>	16,652
10	Adinacordifolio Roxb	16,652
11	Buteo monos perma Lamk	16,652
12	<i>Colophyllum inophyllum Linn</i>	16,656
	Total	1,99,828

(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 4-8** and Green belt layout with coordinates is attached as **Annexure-9**

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 4-32**

Table 0-32 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

S.No	Project impact scale	Magnitude of impact
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 method described 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 components likely to be affected with the values for importance are tabulated in **Table 4-33**.

Table 0-33 Project scenario without 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	-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 quality	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 -36.75 which 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 components likely to be affected with the values for importance are tabulated in **Table 4-34**.

Table 0-34 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	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	-8	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 quality	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.
- 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.
- Noise: Individual industries will be mandated to provide 33% (65.572 Ha) green belt in their area. Apart from this SIPCOT is providing 14.65 % green belt area in the project site and its periphery. Total green belt proposed for the project is 106.575 Ha (38.07% of developable area) Individual industries will provide acoustic enclosures for their D.G.sets.

5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 Introduction

SIPCOT propose to develop an Industrial Park over an extent of 279.995Ha.(691.587Acres) at Manallur and Soorapoondi villages, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu. The Industrial Park is planned with only 10% Industrial plot area for non-pharma 5(f) category industries like Synthetic Acrylic polymers and resins, water proofing compounds synthetic adhesives etc. and balance 90% Industrial plot area for non-EC category industries like E vehicle and its components manufacturing, Automobile and automobile accessories manufacturing, Engineering and fabrication, etc., falling under 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 A, irrespective of the area). Besides TN – AP interstate boundary is ~3.13 Km (towards NNW) from the project boundary and Pulicat lake bird Sanctuary is ~5.77 Km (towards NE). Therefore, General Condition is applicable.

5.2 Choice of Each Alternatives

SIPCOT considered three alternative sites based on the need for promoting an Industrial Park in the proposed project location. Industrial growth, precisely, 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: Arur (Kannambakkam)
- Site II: Sanaputhur, Iguvarpalaiyam & Lakshminarasimapuram
- Site III: Manallur and Surapundi (hereinafter referred as Manallur and Soorapoondi villages as per land alienation GO Ms No 285).

5.3 Site Matrix

The choice among the alternative sites in Thiruvallur 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 three locations;

- Area

- Access
- Soil Conditions
- Ecological Index
- R& R Requirements

5.4 Evaluation of selected sites

The Site Matrix evaluated for the above said deciding criteria as per IL&FS – Technical EIA Guidance Manual is presented in **Table 5-1**.

Table 5-1 Environmental analysis for alternate sites for Proposed Industrial Park

Criteria	Good(10)	Moderate(7)	Poor(3)
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S.No	Environmental Attributes	Site-I	Site-II	Site-III
1	Location	Arur	Sanaputhur, Iguvarpalaiyam & Lakshminarasi mapuram	Manallur & Soorapondi
2	Habitable Villages	Human Settlement Within the site	Human Settlement Within the site	Human Settlement adjacent to the site
3	Land availability	To be purchased	Government Lands	Government Land. Alienated to SIPCOT for Industrial Development.
4	Road Connectivity	Access Road (Village Road) available	Access Road (Village Road) available	Access Road (MDR) available
5	Rail Connectivity (Nearest Rly Station)	5.4 KM	5.2 KM	8.2 KM
6	Water Sources (Thervoykandigai IP)	43.5 km	39.4 km	40.3 km
7	Nearest Wild Life Sanctuary	Pulicat Bird Sanctuary is at a distance of 3.47km.	Pulicat Bird Sanctuary is at a distance of 3.33km	Pulicat Bird Sanctuary is at a distance of 5.77km
8	Nearest RF	2.1 KM	5.8KM	1.1 KM
9	Nearest Water Body	Within the site	Within the Site	Adjacent to the site
10	Interstate	Interstate adjacent to the site.	Interstate boundary is at a	Interstate boundary is at a

			distance of 3.76km	distance of 3.13km
11	Socio Economic	Disturbance to local farming	Disturbance to local farming	No Activity; Barren
12	RR Plan	Applicable	Applicable	Not applicable
13	Project Costing Budgetary Estimate	More	Comparatively less	Less since land is already alienated to SIPCOT.
	Total Score	52/130 = 40%	64/130 = 49%	95/130 = 73%

The maximum score of 95 out of 130 is seen for Manallur&Soorapoondi site. Hence the land available at Manallur&Soorapoondi Villages is selected for development of this Industrial Park.

The project site is well connected to state highways and all the required infrastructure will be made available for the development of Industrial Park by SIPCOT. So, alternate sites were not considered. The connectivity to the project site is summarized in **Table 5-2**.

Table 0-1 Connectivity to the Project Site

S No.	Description	Name of Connectivity	Distance (~km)	Direction
1.	Nearest Highway	SH-52 (Kavaraipettai – Sathyavedu Rd)	2.99	SSW
2.	Nearest Railway Station	Elavur	8.21	ENE
3	Nearest Airport	Chennai International Airport	49.71	SSW
4.	Nearest seaport	Ennore Port	35.75	ESE
5.	Nearest major Town	Gummidipoondi	9.50	ESE

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 different places	Half yearly	Ambient Equivalent continuous 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
4	Solid waste / Hazardous waste	Storage areas of solid and hazardous waste	Half yearly	Quantity
5	Soil	Three locations within/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 12 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.

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
3.	Water	Two surface and three ground water within the study area	Half yearly	All the parameters as per IS 10500:2012
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 and 1st 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 in different places	Half yearly	500	3,000
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

7 ADDITIONAL STUDIES

7.1 Public Consultation

As per issued ToR vide File No. 21-59/2015-IA.III, 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 or commitment by the proponent will be submitted to MoEF&CC for further appraisal of the project and obtaining Environment Clearance.

7.2 Rehabilitation and Resettlement

There is no R & R for the proposed Originally, Administrative Sanction was given for acquisition of 303.75 Ha (300.765 Ha of poramboke land and 2.985 Ha of patta land) for the development of Industrial Park at Manallur vide G.O (Ms) No.119 dated 07.06.2013. The same is enclosed as **Annexure-2a**. Later, poramboke land extent was reduced to 283.08 Ha vide Government of Tamil Nadu land alienation G.O(Ms)No.285 dated 03/08/2018, enclosed as **Annexure -2b**. Further, 3.085Ha of poramboke land has been excluded vide Thiruvallur District Collector vide letter no. 14888/2018 dated 10.06.2019, enclosed as **Annexure -2c** and 2.985Ha of patta land is also excluded from land acquisition and the total area of the Industrial Park is reduced to 279.99.5 Ha. Land Delivery Receipt in proof of taking over possession of 279.99.5 Ha of poramboke land from Zonal Deputy Tahsildar along with survey number wise land extent and classification is enclosed as **Annexure-2d**.

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.
- Electrocutation 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 to working 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 knowledge on 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 Handling of Hazardous chemical is inevitable, they carry inherent characteristic risk to the employees due to the properties of chemicals 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 with their 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 industries 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 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 flammable mixtures 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 chemicals produce deep ulceration. Others have a debilitating 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 devices (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 lead to sparks, if there is no proper grounding and bonding system, the electrical sparks will act as an ignition source for flammable chemicals.

- **Other Hazards**

Other toxic hazards due to acids/other toxic spillages (mainly limited to spillage area). The spillage if it comes in contact with metal parts will produce hydrogen which is highly flammable gas. Any person moving in the area and getting a splash will be injured. In addition, the spillage will cause a 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's Fire and Explosion Index is a step-by-step objective evaluation of the realistic fire, explosion and reactivity potential of process 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 result in 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 natural calamity 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 will be 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 to check 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, CO₂, water CO₂ 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.

7.4 Disaster Management Plan

The Disaster Management Plan (DMP) is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in

this same order of priorities. For effective implementation of 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-10**. 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 Centre is proposed for the Industrial Park inside 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.

8 PROJECT BENEFITS

- The proposed project site is located in Thiruvallur District. Its nearness to Gummidipoondi is ≈ 9.50 km (ESE) and direct access to other parts of state through SH-52 (Kavaraipettai – Sathyavedu Rd) ≈ 2.99 km towards SSW from site and nearness to Chennai International Airport ≈ 49.71 km (SSE) 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 IP will 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 9000 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.

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.

9 ENVIRONMENTAL COST BENEFIT ANALYSIS

(Not Recommended for scoping stage)

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.

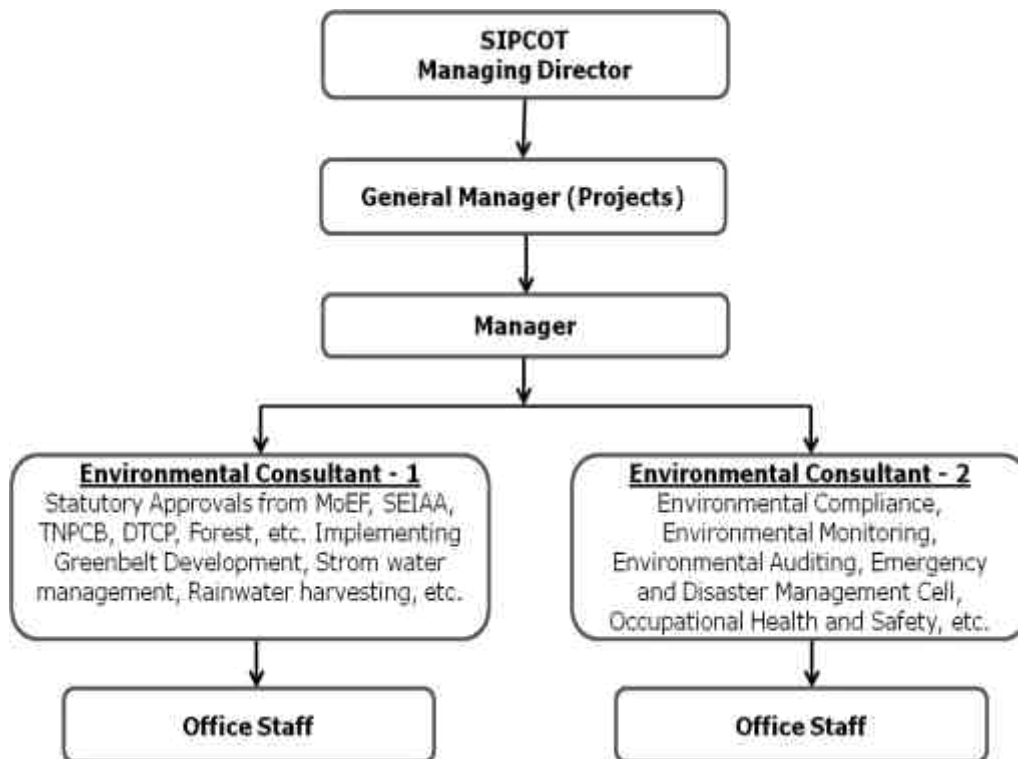


Figure 10-1 Organogram for Environmental Management Cell

10.3.2 Responsibilities of Environmental Management Cell

Environmental Management Cell (EMC) shall obtain all applicable statutory clearances and approvals as mandated by the regulatory authorities and maintain the Industrial Park in compliance with all applicable rules and regulations.

Other responsibilities of the cell will include:

- Review the progress of regulatory compliance of SIPCOT and initiate necessary 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 safeguard measures.
- Keeping the Board updated on regular basis about the activities carried out under environmental measures and suggests measures to improve environment 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 and transportation of goods and encourages energy recovery for self-sustainability 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	<ul style="list-style-type: none"> ➤ 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.
2	GM – Projects	<ul style="list-style-type: none"> ➤ Keep aware about all the activities performed under EMC in the industrial parks. ➤ Issuing direction to Project officers for implementing Greenbelt

S.No.	Designation	Responsibilities
		<p>development, Storm water management, rainwater harvesting, etc.</p> <ul style="list-style-type: none"> ➤ To deal with legal entity pertaining to environmental issues.
3	Manager	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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.

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 location 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. Overall 38.07% 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.

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 10-2 Rainwater 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	22.154	221540	0.7	0.041	6358.20
Common amenities	7.709	77090	0.7	0.041	2212.48

Green belt	41.003	410030	0.15	0.041	2521.68
Total	70.866	708660			11092.36

Design parameters:

Intensity of Rain fall Considered =2462.2mm(Average of IMD Data 20 Yrs is60.2)

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 = 11092.36m³/day

Storm water is designed for the 11092.36m³/day and the excess flow will be diverted to the nearby water bodies after filtration

RWH pits of 1 m Dia and 1.5 m depth (Volume of 1.18 m³/hr) (Assuming 50% percolation rate).

Total runoff load per hour = $11092.36/24 = 462.18$ m³/Hr.

Considering the percolation rate as 50%, total harvesting capacity of each pit per hour = $1.18 * 0.5 = 0.59$ m³

No of Rainwater harvesting pits proposed = $462.18 / 0.59 = 783.35 \sim 785$ nos.

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.

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
- 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 Medical Centre

Within the Industrial park, Individual Industries will have their own Occupational Health Centre as per norms.

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 12.25 Crores 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 10-4.**

Table 10-3 Budget for Environmental Monitoring Plan

S.No	Project Components	Capital Cost (INR Lakhs)	Recurring Cost (INR.Lakhs)
1	Solid Waste Management Facility	800.00	64
2	Greenbelt development	325.00	32.50
3	Rain water harvesting	100.00	8
	Total EMP Cost	1225.00	104.50

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 Manallur and Soorapoondi, 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.

Following mitigation measures are proposed for the project.

- Water environment - Fresh water and TTRRO water will be met from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). There is no extraction of ground water and the local community will not be affected.
- 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.
- 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 pits through storm water drains and only excess storm water will be let into nearby water bodies after filtration.
- 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 facility) has been earmarked for Solid Waste Management Facility. Hazardous waste will be disposed to TNPCB authorized TSDF/recyclers as applicable by individual industries.
- Noise: 38.07 % green belt is proposed for the Industrial Area. Individual industries will provide acoustic enclosures for their D.G.sets.
- 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.

12 DISCLOSURE OF CONSULTANTS ENGAGED

In order to assess the potential environmental impacts due to the development of SIPCOT Industrial Parkover an extent of 279.995 Ha. (691.587 Acres) at Manallur and Soorapoondi villages of Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu State, SIPCOT through ITCOT Limited, Chennai (Project Consultant) has engaged Hubert Enviro care System Pvt. Ltd., (NABET Accredited EIA Consultant) Chennai to undertake EIA study. The nature of consultancy service rendered covers terrestrial environmental assessment.

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 43 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.

ITCOT as a Project Consultant, provide technical services to SIPCOT in verification of land documents, preparation of layout, suggestion on prospective industries to be accommodated based on market scenario, estimation of tentative project cost, etc., and

also assist SIPCOT in arranging/preparing/analyzing the documents required/submitted for obtaining EC and NBWL Clearance.

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.

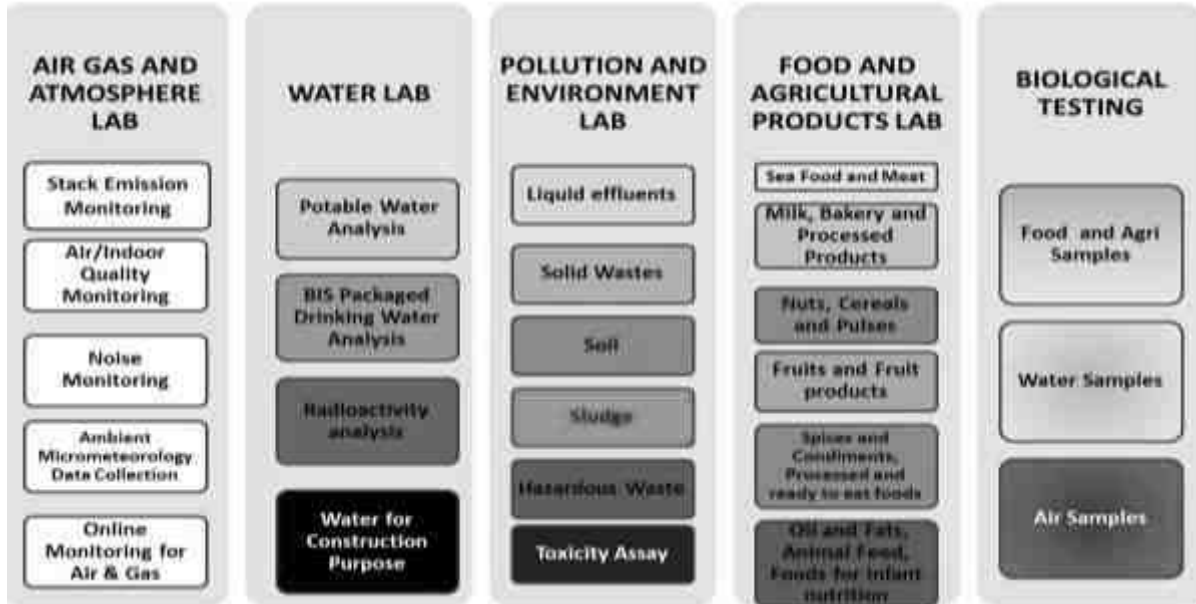
This EIA/EMP Study has been carried out by Hubert Enviro Care systems (P) Ltd. accredited by QCI-NABET for 7(c) – 'A' Category.

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 Certificate 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**
Creating an Ecosystem for Quality



**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)		Cat.
		NABET	MoEFCC	
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.

