**ENVIRONMENTAL IMPACT ASSESSMENT REPORT** 

For

# ENHANCEMENT OF CAMPHOR AND ITS DERIVATIVES PRODUCTION & INCREASE IN TOTAL LAND AREA

By

## **M/s KANCHI KARPOORAM LIMITED**

At

Sy.No. 669, 672, 670/2, 676/1 &674/1,667/1,668/1,668/2A, 667/2,668/2,667/2A, 668/2A&670/1 VILLAGE: ENADUR TEHSIL: KANCHEEPURAM DISTRICT: KANCHEEPURAM STATE: TAMILNADU

**EIA Consultant** 

HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI

**AUGUST 2019** 

## ACKNOWLEDGEMENT

The following personnel are gratefully acknowledged for their fullest support in collection, compilation of needful data regarding the project and kind cooperation in fulfilling the report on Environmental Impact Assessment (EIA) report of "Enhancement of Camphor and Its Derivatives production &Increase in total land area" at Sy.No.669, 672, 670/2, 676/1 & 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Kancheepuram Tehsil, Kancheepuram District, Tamil Nadu State.

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## **Declaration by the Project Proponent**

I, Dipesh S Jain Executive Director (works) of M/s Kanchi Karpooram Ltd, declaration/ undertaking that owing the contents(information and data) of the EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) for the "Enhancement of Camphor and Its Derivatives production &Increase in total land area"at Sy.No. 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A &670/1, Enadur Village, Kancheepuram Tehsil, Kancheepuram District, Tamil Nadu State." and the information and content provided in the report are factually correct.

For M/s Kanchi Karpooram Limited For KANCHI KARPOORAM LTD Authorite Weterv Exectflye Director (Works)

## Declaration by the Head of the Accredited Consultant Organization

I, Dr. J.R. Moses, hereby, confirm that the below mentioned experts prepared the EIA/EMP report for "Enhancement of Camphor and Its Derivatives production &Increase in total land area" at Sy.No. 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Kancheepuram Tehsil, Kancheepuram District, Tamil Nadu State". I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

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LU - Land Use

AP - Air Pollution monitoring, prevention and control

AQ - Meteorology, air quality modeling and prediction

WP - Water pollution monitoring, prevention and control

- EB Ecology and biodiversity
- NV Noise& Vibration
- SE Socio-economics
- HG Hydrology, ground water and water conservation
- GEO Geology
- RH Risk assessment and hazards management
- SHW Solid and hazardous waste management

SC - Soil Conservation

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## LIST OF ABBREVIATIONS

AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
AGL	Above Ground Level
ARL	Above Roof Level
BGL	Below Ground Level
СРСВ	Central Pollution Control Board
CSR	Corporate Social Responsibility
DMP	Disaster Management Plan
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
ETP	Effluent Treatment Plant
GLC	Ground Level Concentration
ISO	International Organization for Standardization
kWh	Kilowatt Hour
KKL	Kanchi Karpooram Ltd
MSDS	Material Safety Data Sheet
NAAQ	National Ambient Air Quality
PCU	Passenger Car Unit
R & D	Research & Development
RA	Risk Assessment
STP	Sewage Treatment Plant
TDS	Total Dissolved Solids
TFH	Thermic Fluid Heater
TNPCB	Tamil Nadu Pollution Control Board
TOR	Terms of Reference
TSDF	Treatment, Storage and Disposal Facility
TNPCB	Tamil Nadu Pollution Control Board
kVA	kilovolt-ampere

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#### S. No **Annexure No** Name of the Annexure Page Nos Existing Land ownership documents 1A Proposed Land ownership documents Land Conversion GOs First Consent Orders(1992) First Expansion Consent Orders (1997) Second Expansion Consent Orders (2007) Product's MSDS Raw Materials's MSDS **Existing Water Balance Proposed Water Balance TNEB** Agreement Hazardous Waste Disposal Agreement from TSDF **Existing Project Site Layout** 12A Existing & Proposed Project Site Layout Topo map of the Project Site Soil Investigation Report Manufacturing Process flow chart Photographs of the Canal Existing Consent Orders (valid up to 2020) **Environmental Test Reports** Existing Wastewater test reports from TNPCB Ground Water NOC from GCW-Tamil Nadu **PESO Explosive License** List of Fire Extinguishers & Location details Certification of incorporation Approval from Factories department Raw data of AAQ Measurements **Proposed STP Layout Existing ETP Layout Existing OHS Policy Existing Environment Policy Existing employee Health Test Reports Onsite Emergency Plan Risk Assessment Report** Public Hearing advertisement Minutes of Public Hearing and Compliance Project chronology Fee receipt Proposed TFH and dust collector specifications

## LIST OF ANNEXURE

Note: Annexure are given as Separate Book

# CHAPTER – 1 PROJECT INTRODUCTION

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# **1** INTRODUCTION

## 1.1 Project Background

M/s KanchiKarpooram Limited (KKL) a Public Limited Company is engaged in the manufacture of Camphor and Derivative Products & Incorporated in the year 1992. Unit is located at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu - 631552. KKL is in this arena for more than two decades with a proven track record for quality products, competitive price and timely supply of its products. The main product is Camphor which has been well accepted in the market. Besides Camphor and its Derivatives, KKL's other products such as Gum rosin and Rosin Derivatives also enjoy an enviable share in the market including Corporate Clientele.

Kanchi Karpooram Limited was originally conceived by Suresh shah, one of the largest consumers in the country and a leading tableteer of AMBICA brand. He was encouraged in this vision by some of the directors of M/s Twin city Organics Ltd which was one of two major manufacturers of Camphor in the country at that time.

Thus, Kanchi Karpooram Ltd was incorporated with Suresh shah, his associates and some of the directors of M/s Twincity Organics Pvt Ltd and their associates being the initial subscribers to the memorandum and Articles of Association of the Company. However, with effect from 31.03.1993 the directors of Twincity Organics Pvt Ltd disassociated themselves from the project because of non-receipt of term finance assistance from IDBI and preoccupation with their own business. Thereupon, Shri.Suresh shah who is the main customer of the products which are proposed to be manufactured by the company, decided to go ahead with the project by flushing in the required finance himself and by taking into confidence his other businessassociated//friends who area convinced about the company's potential.

KKL's (ISO 9001:2015 Certified Company) unit is situated very near to Kancheepuram & just 70 Km from Chennai, on Chennai–Bangalore National Highway (NH-4), thus geographically well connected. KKL's turnover is around 600 Million INR and well planned to augment the sales in a phased manner in the years to come. Existing and proposed expansion production details are given in **Table 1-1**.

S. No	Units	Existing Capacity (MT/Month)	Proposed Expansion (MT/Month)	After Expansion (MTT/Month)
I. F	I. Product			
1	Camphor	110	440	550
Sub Total         110         440         550				
II. By Products				
1	Terpeneolene / Dipentene	49.6	300	349.6
2	Rosin Oil	5.05	4.95	10
3	Spent Caustic lye	36.11	0	36.11
4	Sodium Acetate Tri Hydrate	115.5	460	575.5
5	Sodium Acetate as liquor/	193	0	193

## Table 1-1Existing and proposed expansion production details

	Alternate to Solid tri hydrate)			
6	Gum Rosin	295.62	0	295.62
7	Camphor Oil	2	0	2
	Sub Total	696.88	764.95	1461.83
III. I	ntermediates			
1	Turpentine oil(Turpentine KATEL)	98.475	-	98.475
2	Camphene	110	440	550
3	Iso Bornyl Acetate	170	340	510
4	Esters	15	0	15
5	Maleics	15	0	15
6	Phenolics	20	0	20
7	Rosin Size	100	0	100
8	Other Rosin Derivatives	20	0	20
9	Terpenic Oil	20	0	20
10	Pine Oil (Terpenol)	40	60	100
11	Longifoluences	10	0	10
12	Double Distilled Turpentine	10	20	30
13	Pine Tar	15	45	60
14	Pine Pitch	6.5	30	36.5
15	Iso Bornyl Crude	110	440	550
	Sub Total	759.975	1375	2134.975
	Grand Total (I+II+III)	1566.855	2579.95	4146.805

## 1.2 Overview of M/s Kanchi Karpooram Ltd

M/s KanchiKarpooram Ltd is engaged with manufacturing of Camphor and its Derivatives. Since, it is an Expansion Project for increase in production capacity from 110MT/Month to 550 MT/Month and increase in total land area situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu – 631552.

Camphor is a white flaky/crystalline powder having high sublimation properties with a melting point approximately 170°C. It is extensively used for Pooja purposes and also finds usage in Pharmaceuticals, Pesticides as a plasticizer for cellulose nitrates, and in cosmetics. It is also used in pain reliving balms, inhalers and Ayurvedic medicines and anti-moth in American, western, European countries. Camphor power is converted into Camphor tablets/slabs/lumps by more than 400 SSI & cottage units in unorganized sector in south India. Market survey reveals that camphor powder is usually in short supply especially during season period (from August to January). Camphor is used mainly for Aarti purposes by Hindus. The Hindu festivals generally fall during the period of August to January i.e from Ganesh Chaturthi toSabarimala season. There exist heavy demands to the tune of 2-3 times compared to its normal consumption during the period from February to July,

The total land area is 10.23 Acres. The existing project site land is converted for industrial use; land conversion GOs are obtained from Govt. of Tamil Nadu is enclosed as **Annexure-2.** Newly acquired land for proposed expansion is categorized as a patta land & applied for conversion of land use to industrial land from concerned department. Existing & Proposed Land's ownership document are enclosed as **Annexure-1 & Annexure-1A** respectively.

## **1.3 Categorization of the Project**

The Proposed Project termed under Schedule 5(f), Category A, Synthetic Organic Chemicals as per the EIA Notification 2006 and its subsequent Amendments. Since, KKL have gone for enhancement of Camphor production and its Derivatives and increase in total land area at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu – 631552. Project located area is classified as "Non notified Industrial area".

The Environmental Clearance application submitted to MoEF&CC on 19<sup>th</sup> May 2018 vide proposal number IA/TN/IND2/74991/2018. Based on the information furnished in Form-I, PFR MoEF&CC had issued the Desktop Terms of Reference (TOR) for preparing Environmental Impact Assessment (EIA) Report vide No. IA-J-11011/172/2018–IA-II (I) dated 21<sup>st</sup> June 2018. Base line Studies are carried out during the period of July 2018-Sep 2018 as per obtained ToR.

Later, Project Proponent applied for ToR amendment on 15.11.2018. Proposal appraised in 4<sup>th</sup> EAC Meeing 26.02.2019. During Presentation EAC Committee has recommended to submitting the ToR application with revised details.

The Environmental Clearance application submitted to MoEF&CC on 9<sup>th</sup> April 2019 vides proposal number IA/TN/IND2/101471/2019. Based on the information furnished in Form-I, PFR MoEF&CC had issued the Desktop Terms of Reference (TOR) for preparing Environmental Impact Assessment (EIA) Report vide No. IA-J-11011/143/2019–IA-II (I) dated 10<sup>th</sup> May 2019.

## 1.4 Project Summary

The proposed Expansion project envisages increasing the Camphor Production capacity from 110 MT/Month to 550 MT/Month, overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and increase in total land area. The project site is coming under the schedule 5(f) Synthetic Organic Chemicals, category 'A' as per EIA Notification 2006 and it Amendments.

The company is assigning prime importance for environmental protection. The company has implemented Zero Liquid Discharge concepts and comply the environmental laws. The industry has maintained well developed greenbelt. Project summary is provided in **Table 1-2**.

S. No	Particulars	Existing	Proposed	After Expansion
1	Category of products	Camphor and its Derivatives	Camphor and its Derivatives	Camphor and its Derivatives
2	Product	1	No change	1
3	By Products	7	No change	7
4	Intermediates:	15	No change	15
5	Total	23	No change	23

Table 1-2 Project Summary

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6	Product (TPA)	110	440	550
7	By Products (TPA)	696.88	764.95	1461.83
8	Intermediates (TPA)	759.975	1375	2134.975
9	Total (TPA)	1566.855	2579.95	4146.805
10	Total Land area(acres)	6.95	3.28	10.23
11	Total Built up area (sq .m)	6664.1	3387.3	10051.4
12	Total Water Requirement(KLD)	28.1	67.9	96
13	Recycled (KLD)	6.9	11.6	18.5
14	Fresh water(KLD)	21.2	56.3	77.5
15	Source of Water	Bore well	Bore well	Bore Well
16	Effluent Generation in KLD	8.2	3.3	11.5
17	Sewage Generation in KLD	7.0	1.0	8.0
18	Wastewater Treatment System & capacity	20 KLD ETP	20 KLD ETP(ZLD Concept)	20 KLD ETP(ZLD Concept)
19	Domestic Wastewater treatment system &Capacity	Septic tank followed by Soak pit	10 KLD STP	10 KLD STP
20	Power (kVA) Source: TNEB	260	100	360
21	Power Backup-DGs (kVA)	1 x 250 1 x 180	1 x 380	1 x 380 1 x 180 1 x 250 (will be removed during expansion)
22	Thermo Pack Heater (Nos)	3	0	3
23	TFH (Wood Fire heater(MW/hr)	1 x 1.74	1 x 4.65	1 x 1.74 1 x 4.65
24	Diesel requirement (liters/Month)	300	-	300
25	Furnace oil (KL/Month)	13.8	-	13.8
26	Fire wood (MT/Month)	300	500	800
27	Man-Power (Nos)	100	40	140
28	Municipal Solid Waste (kg/day)	45	9	54
29	Ash from Fire wood (kg/day)	8	8	16
30	STP Sludge (kg/day)	-	1.0	1.0
31	ETP Sludge (MTPA)	0.551	0.544	1.095
32	Project Cost (Crores)	1.0	13.0	14.0

## **1.5** Purpose and Status of the Report and its importance

M/s KanchiKarpooram Ltd is engaged with manufacturing of Camphor and its Derivatives. Since it is an expansion project for increase Camphor Production capacity from 110 MT/Month to 550 MT/Month, overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and increase in total land area at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu – 631552.

Camphor is a white flaky/crystalline powder having high sublimation properties with a melting point approximately 170°C. It is extensively used for pooja purposes and also finds usage in Pharmaceuticals, Pesticides as a plasticizer for cellulose nitrates, and in cosmetics. It is also used in pain releaving balms, inhalers and Ayurvedic medicines and anti-moth in American, western, European countries. Camphor powder is converted into Camphor tablets/slabs/lumps by more than 400 SSI & cottage units in unorganized sector in south India. Market survey reveals that camphor powder is usually in short supply especially during season period i.e. From August to January. Camphor is used mainly for Aarti purposes by Hindus. The Hindu festivals generally fall during the period of August to January i.e. from Ganesh Chaturthi to Sabarimala season. There exists a heavy demand to the tune of 2-3 times compared to its normal consumption during the period from February to July.

The Proposed Project termed under Schedule 5(f), Category'A' (project located in "Non notified Industrial area"), Synthetic Organic Chemicals as per the EIA Notification 2006 and its Amendments. Since, KKL have gone for enhancement of Camphor production and its Derivatives and increase in total land area at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu – 631552. Project located area is classified as "Non notified Industrial area".

The Environmental Clearance application submitted to MoEF&CC on 19<sup>th</sup> May 2018 vide proposal number IA/TN/IND2/74991/2018. Based on the information furnished in Form-I, PFR MoEF&CC had issued the Desk topTerms of Reference (TOR) for preparing Environmental Impact Assessment (EIA) Report vide No. IA-J-11011/172/2018–IA-II (I) dated 21<sup>st</sup> June 2018. Base line Studies are carried out during the period of July 2018-Sep 2018 as per obtained ToR.

Later, Project Proponent applied for ToR amendment on 15.11.2018. Proposal appraised in 4<sup>th</sup> EAC Meeing 26.02.2019. During Presentation EAC Committee has recommended to submitting the ToR application with revised details.

The revised Environmental Clearance application submitted to MoEF&CC on 9<sup>th</sup>April 2019 vides proposal number IA/TN/IND2/101471/2019. Based on the information furnished in Form-I& PFR, MoEF&CC had issued the Desk top Terms of Reference (TOR) vide No.IA-J-11011/143/2019–IA-II (I) dated 10<sup>th</sup> May 2019 to preparing the Environmental Impact Assessment (EIA) Report.

The EIA report submitted for Public Hearing to TNPCB, Public Hearing advertisement was published in Dinamani and new Indian Express on 08.06.2019. Public hearing was conducted on 16.07.2019, 3pm at Sri Lakshmi Narayane Mahal & Party Hall, Bagalore Highway, Hotel Saravana Bavan Complex, Enathur Village, Kanchipuram Taluk, Kancheepuram District and Tamil Nadu 631502 in the presence of the District Environmental Engineer Tamil Nadu Pollution Control Board, sriperumdudur and District Collector Kancheepuram.

Public Hearing advertisement details are enclosed as **Annexure-33**. Minutes of Public Hearing and compliance is enclosed as **Annexure-34**. Final EIA will be submitted to MoEF&CC for further appraisal of the project and obtaining Environment Clearance. Public Hearing Photographs are shown in **Figure 7-1**.

## 1.6 Brief Description of Nature, Size, Location of the Project & Its Importance to the Country, Region

## 1.6.1 Nature, Size & Location of the Project

The total land area is 10.23 Acres. The existing project site land is for industrial use. GOs related to existing land obtained from Govt. of Tamil Nadu are enclosed as Annexure-2. Land use classification of newly acquired land for proposed expansion is categorized as a patta land & applied for land use conversion to industrial use from concern departments. Existing & Proposed Land's ownership document are enclosed as Annexure-1&Annexure-**1A** respectively. The site is situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu – 631552. The site is located near (~2.18km) Kancheepuram (District Headquarters) & about 70 km away from Chennai. The center Coordinates of Plant area: 12°52'38.59"N; 79°42'37.27"E, Green belt and Firewood area: 12°52'43.41"N; 79°42'38.41"E & proposed land for expansion: 12°52'34.79"N 79°42'35.81"E. The Project location index map is shown in Figure 1-1 and Satellite Image of the project location is appeared in Figure 1-2. Photo graphs of the TamaraiTangal lake and Canal Passing between Plant area boundary and Green belt boundary is shown in Figure 1-3, Administrative Map of Project Study area is given in Figure 1-4, Map showing the Satellite Image of the study area Figure 1-5 and Geographical Coordinates of the project site is given inTable 1-3.



Figure 1-1Project Location Index map



Figure 1-2Satellite Imagery of the Project Site



Figure 1-3 Photographs of the TamaraiTangal lake and Canal Passing between Plant area boundary and Green belt boundary

Geographical Coordinates				
Site Point				
	Latitude	Longitude		
C1	12°52'47.03"N	79°42'37.85"E		
C2	12°52'46.69"N	79°42'39.46"E		
C3	12°52'47.37"N	79°42'39.43"E		
C4	12°52'47.12"N	79°42'39.95"E		
C5	12°52'43.14"N	79°42'39.82"E		
C6	12°52'42.49"N	79°42'40.12"E		
C7	12°52'42.08"N	79°42'39.81"E		
C8	12°52'40.89"N	79°42'39.39"E		
C9	12°52'40.54"N	79°42'39.27"E		
C 10	12°52'35.99"N	79°42'38.10"E		
C 11	12°52'32.51"N	79°42'37.09"E		
C 12	12°52'33.17"N	79°42'34.89"E		
C 13	12°52'32.45"N	79°42'34.62"E		
C 14	12°52'32.92"N	79°42'33.40"E		
C 15	12°52'36.93"N	79°42'34.95"E		
C 16	12°52'40.96"N	79°42'36.20"E		
C 17	12°52'40.83"N	79°42'37.13"E		
C 18	12°52'40.89"N	79°42'38.19"E		
C 19	12°52'41.32"N	79°42'38.02"E		
C 20	12°52'41.56"N	79°42'36.17"E		

## Table 1-3 Geographical Coordinates of the Project Site



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The Salient features of the project site are represented in Table 1-4.

Table 1-4 Salient Features of the Project	
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S. No.	Particulars	Details					
1.	Site Co-ordinates of	1)Plant area: 12°52'38.59"N; 79°42'37.27"E					
	the project site	2)Green	2) Green belt and Firewood storage area: 12°52'43.41"N; 79°42'38.41"E				
		3) Propo	3) Proposed land for expansion : 12°52'34.79"N; 79°42'35.81"E				
2.	Elevation	82 m M3	SL				
3.	Present land use	Existing	<b>y land</b> (669/672,670/2,676/1	& 674/1) :			
		Industrial use as per GO No.526 & 704					
		Proposed land (Sy.No.667/1,668/1,668/2A,667/2,668/2,667/2A,					
	NI	668/2A&670/1): Applied for land use conversion to industrial use					
4.	Nearest Highway	NH4 <u>~</u> 0.61 Km (SSW)					
5.	Nearest railway Station	New Kancheepuram railway station $\sim 3.09$ -SSW					
6.	Nearest Airport	Chennai International Airport ~ 49.63 km (ENE)					
7.	Nearest village	Karapettai~ 0.793 km (SSE)					
8.	Nearest major city	Kancheepuram District head quarter $_{\sim}$ 2.18 km (S)					
9.	Nearest seaport	Chennai(CPT)~ 65.87Km (NE)					
10.	Detense Installations	Nil within 15 km radius					
11.	Nearest Town	Kancheepuram District head quarter $\sim 2.18$ km (S)					
12.	Nearest River/	Iver/ S. No Name of the Location Distance(~km)					
	Lakes/Dams			0.07	CO.V.		
		2		5.27	5500		
			veyavali nvei	5.59	300		
		Lancs	Tamarai Tangal	0.02	۱۸/		
		1.	Tamara Tanya Tannari Tank	12.06	F VV		
		2.	Kavorinak Nalla	12.00	L \\\/\$\\/		
		J.	Pamba Kalvai	/ 07			
			Nathanettai lake	4.07	SE		
		6	Mamandur Tank	12.62	SSW		
13	Hills & vallevs	Nil within 15 Km radius of the project					
14.	Routes or facilities						
	used by the public	Monuments:					
	for access to	S. No	Name of the Monuments	Distance (~km)	Direction		
	recreation or other	1.	Kailasanathar Temple	4.25	SW		
	tourist, pilgrim areas	2.	Vaikuntaperumal Temple	4.28	SSE		
	& Archeologically	3.	Piravathanesvara Temple	3.37	S		
	Important Places/	4.	Iravathanesvara Temple	3.39	S		
	Tourist/Religious	5.	Muktesvara Temple	4.15	SSW		
	importance	6.	Iviatnangesvara Temple	4.41	S COE		
		<u> </u>		C.0	SOE		

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S. No.	Particulars	Details				
1.	Areas occupied by	Places of worships :				
	sensitive man-made	S. No	Places of worships	Distance (~km)	Direction	
	schools places of	1.	Sri Manikandeswara Swamy Temple	9.95	NW	
	worship community	2.	Najma – Masjid	10.12	W	
	facilities)	3.	Sri Vijaya Raghava Perumal temple	9.98	W	
		4.	Ekambareswarar Temple	3.18	SSW	
		5.	Sri Pachai Vanna Perumal Temple	3.49	S	
		6.	Sri Pavala Vanna Perumal Temple	3.53	S	
		7.	Kailasanathar Temple	4.25	SW	
		8.	Pandavar Perumal Temple	3.87	SSW	
		9.	Jurahareswar Temple	3.87	SSW	
		10.	Kamachi Amman Temple	3.84	S	
		11.	Ulagalantha Perumal Temple	4.05	S	
		12.	Kachabeswarar Temple	4.21	S	
		13.	TMN Temple	4.89	SSW	
		14.	Perinba Prayer House	5.55	SW	
		15.	Bodhidharma Temple	4.42	SSE	
		16.	Sathyanateswarar Temple	5.21	SSE	
		17.	Perumal Temple	5.63	S	
		18.	Jerusalem Workship	6.31	SSW	
		19.	Panadudeeswarar Temple	5.97	S	
		20.	Thiruvelakai Temple	5.91	S	
		21.	Manikandeswar Temple	5.95	SSE	
		22.	Narashima Temple	7.85	SSW	
		23.	Sri Varadharaja Perumal Temple	6.37	SSE	
		24.	Punniyakodeswarar Temple	6.57	SSE	
		25.	Mosque	10.74	SSW	
		26.	Thalapureeswarar Temple	13.31	SW	
		27.	Rani Amman Temple	10.35	SE	
		28.	Sri Ashtabujangaram Temple	5.85	S	
		29.	Punadudeeswarar Temple	5.95	SSW	
		30.	Govimthavadi Temple	8.67	NW	
		31.	Vaikuntaperumal Temple	4.28	SSE	
		32.	Iravathanesvara Temple	3.39	S	
		33.	Mathangesvara Temple	4.41	S	
		34.	Muktesvara Temple	4.15	SSW	
		Hospitals:				
		S. No	Hospitals	Distance (~km)	Direction	
		1.	Upgraded PHC	10.35	W	
		2.	Meenakchi Medical College &			
			Research Centre	1.58	SE	
		3.	Aringer Anna Cancer Institute	0.96	SE	
		4.	ABCD Hospital	4.07	S	
		5.	Lakshmi Hospital	4.19	S	
		6.	Narbhavi Hospital	4.24	SW	
		7.	Govt Hospital	5.34	SW	
		8.	Surya Clinic	4.36	S	
		9.	CSI Hospital	4.47	S	
		10.	Manohar Hospital	4.45	SSE	

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S. No.	Particulars	Details				
		11.	DKK Hospital	4.69	S	
		12.	Life Care Hospital	4.66	S	
		13.	Govt Dist HQ Hospital	4.73	S	
		14.	Vasan Eye Care Hospital	5.02	S	
		15.	Vengudi Hospital	5.01	S	
		16.	K.H. Hospital	6.24	SSW	
		17.	PH Center GH	5.25	SSE	
		18.	PH Centre	14.37	SSW	
		Schools	s and colleges:			
		S.No	S.No			
			Schools and collages	( <u>~</u> km)	Direction	
		1.	Park Global School	8.2	NNW	
		2.	P.T.Lee College of Engg & Tech	5.95	NNW	
		3.	Jai Mathaajee College of Engg	3.44	NW	
		4.	L&T Safety School	10.31	ENE	
		5.	Narasimma Pallavan Polytechnic			
			College	1.96	W	
		6.	Pallavan College of Engg	1.87	W	
		7.	University College of Engg	0.79	WSW	
		8.	Janus CBSC School	7.21	W	
		9.	Govt School	9.88	W	
		10.	Sri Krishna College of Arts &	614		
		11		0.14	VVSVV	
		11.	Illumaiai Engg College	5.67		
		12.	Neenakoni Neoloai College	1.43	ESE	
		13.	Bakinavachalam Polytechnic Collogo	0.72	<u>SE</u>	
		14		0.73		
		14.	Subvivi University Sti CSV Mehaviduelave	2.00		
		10.	Sil CSV IValiaviuyalaya	2.01		
		10.	Cast Primary School	2.99		
		17.	Codoo MUSS	3.40	SSW	
		10.	Duprkesh Vidhusshrom	3.32 3.70		
		20		3.70	<u> </u>	
		20.		4.00	S COE	
		21.		4.50		
		22.	Kanchi Global School	4.00		
		20.	Govt School	6.06	SG/V	
		24.	Sanskrit College	6.00		
		20.	Aadura Sol School	672	<u> </u>	
		20.	Pachajannas Womens College	613	<u>ح</u>	
		21.	Rharathidasan MHSS	7 68		
		20.	Covt MS	7.00		
		20.	Pachajannas College for Men	7.07	<u>SE</u>	
		21	Gove HSS	8.00	SE SE	
		37	USN School of Management	10.04	<u> </u>	
		33	Dusi Polytechnic College	10.75	S	
		34	Kanchi Pallavan Enon College	11 64	SSW	
		35	AMA College of Enga	13.38	SW	
		.36	Govt HS	14 29	SSW	
				1.40		
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S. No.	Particulars		De	tails			
		Commo	Common places				
		S. No	Common places		Distance (~km)	Direction	
		1.	AJS Kalyana Mahal		6.32	WSW	
		2.	2. Railway Station, Kanchipuram			S	
		3.	East Railwaystation, Kanch	ipuram	3.78	SSE	
		4.	Police Station		3.44	S	
		5.	Sringeri Saradha Peetam K	alyana	0.70		
		0	Mandapam		3.73	SSW	
		6. 7	SUD POSt Office		4.22	5500	
		7. 8	District Sports Stadium		4.00		
		0. Q	Head Post Office		4.70	S	
			Taluk Office		-4.00 5.53	<u> </u>	
		11	District Collector Office		5.87	S	
		12	S.P. Office		6.1	S	
		13.	DIG Office		6.46	SSW	
		14.	Walajabad Railway Station		14.57	SE	
		15.	Anna Memorial House	6.5	SSE		
1.	Ecologically sensitive areas	S. No	Name of the Location	Dis (~	tance -km)	Direction	
	(National Parks/Wild	Rivers		-			
	Life sanctuaries/Bio	1	1 Palar river 8			SSW	
	Sphere reserves)	2	Vegavati river	5	5.39	SW	
	. ,	Lakes	Ŭ			]	
		1.	Tamarai Tancal	C	).02	W	
		2.	Tonneri Tank	1	2.06	E	
		3.	Kaveripak Nalla	14	4.47	WSW	
		4.	Pamba Kalvai	4	1.07	NNW	
		5	Nathapettai lake	4	1.92	SF	
		6	Mamandur Tank	1	262	SSW	
2.	Reserved/Protected Forests within 15Km radius	Nil within	n 15 km of the project site				
3.	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	The are suscepti flooding Note : Seismic Seismic Seismic	a comes under seismic Zo ble to natural hazards liil or extreme or adverse dim Zone-III : Low risk Zone-III : Moderate Risk Zone-IV : High Risk Zone-V Very high Risk	one-III (IV ke subsid atic cond	Ioderate Ris dence, lanc itions.	sk). There is no Islides, erosion,	

#### **1.7** Importance to the Country and Region

#### 1.7.1 Demand-Supply Gap

As the demand for camphor is in the search and Kanchi Karpooram Limited is having its unit in Southern part of India where there are major consumers of camphor is envisaged. It is obvious that increase in the product quantity of Karpooram is not only economically viable but also subscribe to employment opportunities and also additional revenue to the government.

#### 1.7.2 Import Possibility

The company is successfully exporting one of its bye products namely Sodium Acetate Trihydrate to European countries. The recent visit by our senior management official to Europe has resulted in encouraging the market for the product. Therefore, the export of the product is potential and yield foreign exchange to the country.

The company is also exploring the areas of exporting the main product and the company is successful in exporting to the neighboring countries. The company is looking forward for the increase in the exports in the years to come. As regards to import of raw materials, the company exercises a minimum street in imports and exports.

#### **1.8 Domestic/Export Markets**

The manufacturing unit of the company is located in an area accessible for ports and surface transport. The company is well identified with a proven market record of quality product on competitive price. The company has edge over the competitors because of the proximity in the location of the unit which results a better competitive price. Therefore, the company can take a lion share for the increased demand. As regards to the other products of the company vis-à-vis dipentene, pine tar, the company has experienced the demand because of consumers of these products are very high either in Tamil Nadu or in the proximity closures of Tamil Nadu. Thus, the market strength of the company is increased thereby the demand has increased in the production regularly.

# 1.9 EIA Study

M/s Kanchi Karpooram Ltd, as a part of compliance to the regulatory requirement i.e., to obtain Environmental Clearance from MoEF&CC, has appointed Environmental Consultants accredited by National Accreditation Board for Education and Training (NABET)-Quality Council of India (QCI), New Delhi.

The work of undertaking field studies and preparation of Form-1, PFR, EIA/EMP report under A category, was assigned to M/s Hubert Enviro Care Systems (P) Ltd., (HECS) Chennai by the project proponent. HECS is accredited by NABET, for Synthetic Organic Chemicals Industry (Dyes & dye Intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates).

# 1.10 EIA Cost

EIA study was undertaken by HECS for an amount of Rs.6.0 Lakhs. The base line monitoring at an additional cost of Rs. 2, 00,000 was done by HECS lab, Chennai, an NABL and MoEF&CC Accredited Laboratory

#### 1.11 Scope of the Study

The scope of the work mentioned includes an assessment study of proposed Camphor and its derivatives manufacturing unit and their impact on the region. This study puts forward the most effective ways to protect the environment from increasing pollution caused by the burgeoning industrial development and recommendations for environmental-friendly development initiatives in the region.

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social and economic aspects, i.e. aiming at "Sustainable Development" due to the project activities.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may rise during the operational phases of the project only. This report also highlights the Environmental Monitoring Program during the operation phases of the project and the post project monitoring program. The generic structure of the EIA document will be as per the EIA Notification of the MoEF&CC dated 14<sup>th</sup> September 2006 and subsequent amendments. The basic structure of report will be as under:

#### Chapter 1: Introduction

Introductory information is presented in this Chapter. The introduction chapter provides background to the project, project proponent and describes the objective of this document. The purpose and organization of the report is also presented in this chapter.

#### **Chapter 2: Project Description**

This Chapter includes Project Description and Infrastructure Facilities delineating all the industrial and environmental aspect of the industry of M/s. Kanchi Karpooram Limited operation phase activities as well as process details of proposed products.

#### **Chapter 3: Description of the Environment**

This Chapter provides baseline environmental status of Environmental Components (Primary data) delineating meteorological details of the project site and surrounding area.

#### Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This Chapter presents the analysis of impacts on the environmental and social aspects of the project as a result of establishment of plan and thereby suggesting the mitigation measures.

#### Chapter 5: Analysis of Alternatives (Technology and Sites)

This chapter includes the justification for the selection of the project site from Environmental point of view as well as from economic point of view so that the technology will be affordable to the member units of the industrial area.

#### Chapter 6: Environmental Monitoring Program

This chapter will include the technical aspects of monitoring, the effectiveness of mitigation measures which will include the measurement methodologies, frequency, location, data analysis, reporting schedules etc.,

#### Chapter 7: Additional Studies

This chapter will detail about the Public Consultation sought regarding the project. It will also identify the risks of the Project in relation to the general public and the surrounding environment during operation phases of the plant and thereby presents Disaster Management Plan. Social impact assessment and R&R action plans.

#### Chapter 8: Project Benefits

This chapter deals with improvement in physical and social infrastructures, employment potential and other tangible benefits.

#### Chapter 9: Environmental Cost Benefits Analysis

Not recommended during scoping

# Chapter 10: Environmental Management Plan

This is the key Chapter of the report and presents the mitigation plan, covers the institutional and monitoring requirements to implement environmental mitigation measures and to assess their adequacy during project implementation.

#### **Chapter 11: Summary and Conclusion**

This chapter summarizes the information given in Chapters in this EIA/EMP report and the conclusion based on the environmental study, impact identification, mitigation measures and the environmental management plan.

#### Chapter 12: Disclosure of the Consultant

Names of consultants engaged in the preparation of the EIA/EMP report along with their brief resume and nature of Consultancy rendered are included in this Chapter.

# 1.12 Objectives of the Study

- To ensure environmental considerations are explicitly addressed and incorporated into the development 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 ToR and comply with the same.
- The major objective of this study is to prepare a detailed Environmental Impact Assessment Study within the study area i.e 10 km radius from the project.

## 1.13 Methodology adopted for the Study

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social and economic aspects, i.e., aiming at "Sustainable Development" due to the project activities.

#### **1.14 Applicable Regulatory Framework**

The EIA process followed for this EIA report is composed of the following stages:

- 1. Study of project information.
- 2. Screening & Scoping.
- 3. Environmental pre-feasibility study & application for approval of TOR.
- 4. Collection of detailed project management plan/report.
- 5. Baseline data collection.
- 6. Impact identification, Prediction & Evaluation.
- 7. Mitigation measures & delineation of EMP.
- 8. Risk assessment and safety & disaster management plan.
- 9. Review & finalization of EIA Report based on the TOR requirements.
- 10. Conducting Public hearing and obtaining minutes.
- 11. Submission of Final EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

#### The following Acts and Rules are applicable to the proposed project:

The details of Acts and Rules with applicability to the proposed project are given in Table 1-

5.

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	Table 1-5 Applicable Acts and Rules						
S.No	Act and Rules applicable	Purpose	Objective	Applicability			
1	EIA Notification 2006 and its amendments.	New projects, Expansion modernization, change in product mix of the existing project	Protection and Improvement of the Environment	As the proposal is for new project scheduled under category 5(f), Environmental clearance from Ministry of Environment, Forest & Climate Change is applicable			
2	The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and its amendments	Handling of Hazardous Chemicals	Regulate the manufacture, storage and import of Hazardous Chemicals	Preparation/ update of On-site Emergency Preparedness Plan and submission to Factory inspectorate. Preparation/ update of Safety Report and submit to Factory inspectorate. Preparation of Material Safety Data Sheet.			
3	The Water (Prevention and Control of Pollution) Act, 1974 and its amendments.	New projects, Expansion modernization, change of product mix of the existing project, Existing plants	Prevention, control and abatement of water pollution	Consent to Establish and Consent to Operate from State Pollution Control Board to be obtained for new product			
4	The Air (Prevention and Control of Pollution) Act, 1981 and its amendments.	New projects, Expansion /modernization, change of product mix of the existing project, Existing industries	Prevention, control and abatement of air pollution	Consent to Establish and Consent to Operate from State Pollution Control Board to be obtained for new product			
5	The Hazardous and other waste (Management, Handling and Transboundary Movement Rules) 2016 and its amendments.	Management, Handling and Transboundary Movement of Hazardous waste	Prevention, Control and abatement of pollution	Hazardous waste Authorization from State Pollution Control Board to be obtained			
6	The solid Waste Management Rules, 2016	Management of solid (non-hazardous) waste as per the provisions of the Rule	Prevention control and resource conservation	Proper collection, segregation and disposal as per Rules			

Table 1-5 Applicable Acts and Rules

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S.No	Act and Rules applicable	Purpose	Objective	Applicability
7	The Environmental (Protection)Act,198 6 and its Amendments	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	Protection and Improvement of the Environment	Environmental Standards as specified are to be complied. Submission of Environment Statement on yearly basis to TNPCB
8	The Noise Pollution (Regulation and Control) Rules, 2000	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	To protect the workers and public from noise related problems	Noise control measure. Comply with Noise standards and submission of monthly report to TNPCB
9	The Factories Act 1948 and its amendments.	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	Control of workplace environment, and providing for good health and safety of workers	Factory License from Factory inspectorate.
10	The Explosive Act, 1884	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	Production, Storage and import of explosive substance in and around the project and provides the regulations for the safety and environmental measures	Safety measures are compiled for the storage of chemicals in the plant as per PESO guidelines.
11	The Indian Boiler Act, 1923	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	Boiler act contain the law related to registration and inspection is steam boiler	The Act is applicable to all Boiler (Water tube and fire tube boilers)
12	The Central Motor Vehicle Act, 1988	New projects, Expansion/moderniz ation change of product mix of the existing project, Existing industries	Check the pollution load of vehicles inside the plant	Adequate environmental measures are put in place to check the vehicular emissions.

# CHAPTER – 2 PROJECT DISCRIPTION

HCSHubert Enviro Care Systems (P) Ltd

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# 2 PROJECT DISCRIPTION

# 2.1 Type of Project

M/s KanchiKarpooram Limited (KKL) a Public Limited Company is engaged in the manufacture of Camphor and its Derivative& Incorporated in the year 1992. Project Situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu - 631552. KKL is in this arena for more than two decades with a proven track record for quality, competitive price and timely supply of its products. The main product is Camphor which has been well accepted in the market. Besides Camphor and its Derivatives, KKL's other products such as Gum rosin and Rosin Derivatives also enjoy an enviable share in the market including Corporate Clientele.

To cater the needs of the market, KKL proposes increasing the Camphor Production capacity from 110 MT/Month to 550 MT/Month and overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and its derivatives and increase in total land area. The proposed project falls under Category 'A', Schedule 5(f), Synthetic Organic Chemicals Industry as per the EIA notification dated September 14<sup>th</sup>, 2006 and its subsequent amendments due to project located in Non notified industrial area. There are no interlinked projects.

# 2.2 Need for the Project and its Importance to the Country and/Region

As the demand for camphor is in the search and Kanchi Karpooram Limited is having its unit in Southern part of India where there are major consumers of camphor is envisaged. It is obvious that increase in the product quantity of Karpooram is not only economically viable but also subscribe to employment opportunities and also additional revenue to the government.

# 2.3 Site Location

The project site is located in industrial area which land was converted to industrial purpose by Govt, of Tamil Nadu vide G.O.No.526 dated 17.08.1992, 704 dated; 13.11.1992 are enclosed as Annexure-2 & Newly acquired land (3.23 acres) for proposed expansion is categorized as a patta land & applied for land use conversion from concern departments. The site is situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu- 631552. The site is located near (~2.18km) Kancheepuram (District Headquarters) about 70 km away from Chennai. The center Coordinates of Plant area: 12°52'38.59"N; 79°42'37.27"E, Green belt and Firewood area: 12°52'43.41"N; 79°42'38.41"E & proposed land for expansion: 12°52'34.79"N 79°42'35.81"E. The Project location index map is shown in Figure 2-1 and Satellite Image of the project location is appeared in Figure 1-2. Environmental Sensitive areas demarcated on Google image within 15 Km of the Project Site is given in Figure 2-2. Satellite Imagery (10 km radius) of the project site is shown in Figure 2-3, Satellite Imagery (5.0 km radius) of the project site is given in Figure 2-4, Satellite imagery (1.0 km radius) of the project site is shown in Figure 2-5 & Industries demarcated on Google imagery within 15 Km of the project site shown in Figure 2-6.



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Figure 2-3Satellite Imagery (10 km radius) of the project site



Figure 2-4 Satellite Imagery (5.0 km radius) of the project site

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Figure 2-5Satellite imagery (1.0 km radius) of the project site



Figure 2-6 Industries demarcated on Google imagery within 15 Km of the Project Site

# 2.4 Existing Environmental Setup

The major industries within 10km radius from the project site along with their distance and directionare given in**Table 2-1**. The site does not fall within the CRZ area. The details of nearest human settlement from the project site are provided below in the **Table 2-2**.

S. No	Industries	Distance ( <u>~</u> km)	Direction
1.	L&T ECC Tower Testing & Research Station	10.1	ENE
2.	L&T Construction & Business Centre	10.35	ENE
3.	Annai Flour Mills (P) Ltd	10.14	ENE
4.	Clarient	8.78	E
5.	FritzmeierMotherson Cabin Engg	9.88	E
6.	MyunghawaAutomotiveindia (P) Ltd	10.35	E
7.	YoeYoe Electronics India (P) Ltd	11.1	E
8.	TVS Infrastructure (P) Ltd	8.27	E
9.	Prolec GE Works	6.16	E
10.	GOMS Powerfab (P) Ltd	8.43	E
11.	L&T Rubber Processing	4.46	ESE
12.	Prabha Auto Pairs (P) Ltd	3.09	ESE
13.	Prabha Industries	3.3	ESE
14.	Kamachi Amman Co-Op Spinning Mill	4.45	SE
15.	Hanchang India (P) Ltd	14.08	ESE
16.	Precon Structure (P) Ltd	13.94	ESE
17.	HatsunAgro Products Ltd	2.24	WSW
18.	Kwality Milk Foods Ltd	3.06	WSW
19.	Real Gravure Printers	2.95	WSW
20.	Deiva Industries	6.56	S
21.	Rajan&Rajan Industries	7.34	SSW
22.	Alpha Engg Industry	7.36	SSW
23.	Govt Work Shop	7.46	SSW
24.	Sri Krishna Industries	7.55	SSE

Table	2-1	List	of	Industries	within	10km	radius	of	the	project	site
IUNIC		LIGU	<b>U</b> 1	maastrics	*****	101111	radias	<b>U</b> 1		piojool	Site

#### Table 2-2 Nearest Human Settlement

S.No	Villages	Distance (~km)	Direction	Population(Census 2011)
1.	Pondur	2.70	NE	2347
2.	Thirumangalam	2.89	NW	4012
3.	Irungulam	1.01	N	494
4.	Karapettai	0.793	SSE	-
5.	Karai	1.24	ENE	2091

#### 2.5 Project Cost

The total capital investment after expansion is INR 1400 Lakhs&break up of cost is detailed in **Table 2-3**.

 Table 2-3 Total capital investment after expansion

S. No.	Cost	INR (Lakhs)
1	Land	750
2	Machineries	400
3	Erection	50
4	Implementation of Environmental Management Plan	200
	Total	1400

# 2.6 Proposed Schedule for Approval & Implementation

The time schedule for completion of the proposed project is given in the following **Table 2-4**.

S. No	Particulars	Time schedule
1	Environmental Clearance	Oct 2019
2	Consent to Establishment from TNPCB	Dec 2019
3	Supply and erection of equipments	Jan -Mar 2020
4	Consent to Operate from TNPCB	Apr 2020

# Table 2-4Time schedule for completion of the proposed project after EC

# 2.7 Size or Magnitude of Operation

In view of fulfilling market requirement, KKL proposes to expand Camphor production capacity from 110 MT/Month to 550 MT/Month and overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and increase in total land area located at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu–631552. Plant process flow chart is given in **Figure 2-7.** The total capital investment after expansion is INR 1400Lakhs the breakup details of the project cost is given in **Table 2-3**. The existing and proposed product details are given in **Table 2-5**.

# 2.8 Technology & Process Description

# 2.8.1 Process Description

This section deals with raw materials requirement, process, material balance and solvent recovery etc.

# 2.8.2 Products Manufactured

M/s Kanchi Karpooram Ltd is engaged to manufacturing of Camphor and its Derivatives.In the view of fulfilling market requirement, we are proposing enhancement of Camphor Production capacity from 110 MT/Month to 550 MT/Month and overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and its Derivatives. The existing and proposed product details are given in**Table 2-5.** Products MSDS and raw material MSDS are enclosed as **Annexure-6 & Annexure-7** respectively.

S. No	Units	Existing Capacity (MT/Month)	Proposed Expansion (MT/Month)	After Expansion (MT/Month)			
I. Product							
1	Camphor	110	440	550			
	Sub Total 110 440 550						
II. I	By Products						
1	Terpeneolene / Dipentene	49.6	300	349.6			
2	Rosin Oil	5.05	4.95	10			
3	Spent Caustic lye	36.11	0	36.11			
4	Sodium Acetate Tri Hydrate	115.5	460	575.5			

# Table 2-5Product details of the Project for Existing and after Expansion

M/s Kanchi Karpooram Ltd				EIA/EMP Report			
5	Sodium Acetate as liquor/Alternate to Solid tri hydrate)	193	0	193			
6	Gum Rosin	295.62	0	295.62			
7	Camphor Oil	2	0	2			
	Sub Total	696.88	764.95	1461.83			
III.	Intermediates						
1	Turpentine oil(Turpentine KATEL)	98.475	-	98.475			
2	Camphene	110	440	550			
3	Iso Bornyl Acetate	170	340	510			
4	Esters	15	0	15			
5	Maleics	15	0	15			
6	Phenolics	20	0	20			
7	Rosin Size	100	0	100			
8	Other Rosin Derivatives	20	0	20			
9	Terpenic Oil	20	0	20			
10	Pine Oil (Terpenol)	40	60	100			
11	Longifoluences	10	0	10			
12	Double Distilled Turpentine	10	20	30			
13	Pine Tar	15	45	60			
14	Pine Pitch	6.5	30	36.5			
15	Iso Bornyl Crude	110	440	550			
	Sub Total 759.975 1375 2134.975						
	Grand Total (I+II+III) 1566.855 2579.95 4146.805						

# 2.8.3 Detailed Manufacturing Process Description

The project was designed for manufacturing of Camphor and its Derivatives. Since, it is an Expansion project for Camphor and its derivatives production and increase in total land area. In the view of fulfilling market requirement, we are proposing enhancement of Camphor Production capacity from 110 MT/Month to 550 MT/Month and overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month. The existing and proposed product details are given in **Table 2-5.** Products MSDS and raw material MSDS are enclosed as **Annexure-6 & Annexure-7** respectively. The process flow diagram is shown in **Figure 2-7**. The manufacturing Process enclosed as **Annexure-15**.



Figure 2-7Manufacturing Process Flow Chart

# 2.9 Raw Materials Requirement

Raw materials like Natural Turpentine, Pipene, Acetic acid and Catalysts are required for the proposed project. List of Raw materials are summarized in **Table** 2-6 and MSDS of raw materialsare enclosed as **Annexure–7**.

#### Table 2-6 List of raw material for existing & proposed expansion

S. No	Raw-Material Name	Raw-Material Quantity (MT/Month)		After Expansion (MT/Month)	Mode of Storage
1	Oleo Pine Resin	400	0	400	Drums
2	Commercial Alpha Pinene		-		Above ground storage tank
3	Alternatively Turpentine Oil	171	604	0 <i>EE</i>	Above ground storage tank
4	Alternatively Gum Turpentine	171	004	000	Above ground storage tank
5	Alternatively Camphene	110	440	550	Above ground storage tank
6	Acetic Acid	60.5	242	302.5	Above ground storage tank
7	Alternatively spent (30%) Acetic Acid for Sodium Acetate	16	0	16	Above ground storage tank
8	Caustic Soda	38.5	154	192.5	Above ground storage tank
9	Xylene	9	15	24	Above ground storage tank
10	Calcium Hydroxide	0.5	1.0	1.5	bags
11	Titanium Di Oxide	0.5	1.0	1.5	bags
12	Sodium - Bi - Carbonate	1.5	1.0	2.5	bags
13	Copper Carbonate	0.88	1.88	3.0	bags
14	Indion Resin - 140	0.025	0.20	0.225	bags
15	Hydrochloric Acid	1.0	1.5	2.5	Carbuoy
16	Copper Nitrate	1.88	3.12	5	bags
17	Alternatively Copper	1.25	0	1.25	bags
18	Nitric Acid	2.0	0	2.0	Carbuoy
19	Sulphuric Acid	0.05	0	0.05	Carbuoy
20	Benzene	1.0	0	1.0	Drums
21	Activated Carbon	0.5	1	1.5	Bags
22	Phosphoric Acid	2.8	2.2	5.0	Drums
23	Emulsifier	0.02	0	0.02	Bags
24	Maleic Anhydride	6	0	6.0	Bags
25	Bisphenol 'A'	1.5	0	1.5	Drums
26	Diethylene Glycol	0.8	0	0.8	Drums
27		2.5	0	2.5	Drums
28	IriphenylPhosphite (TPP)	0.02	0	0.02	Carbuoy
29	Magnesium Oxide (MGO)	0.02	0	0.02	Bags
30	Paraformaldehyde	1.5	0	1.5	Bags
31	PentaErithritol	3.0	0	3.0	Bags
32	Para Tertiary Butyl Phenol	2.0	0	2.0	Bags
33	Oxalic Acid	0.4	0	0.4	Bags
34	Tolunene	5.0	0	5.0	Drums
35	Fumaric Acid	0.5	0	0.5	Bags
36	Mineral Turpentine Oil(MTO)	7.5	0	7.5	Drums
	Total	849.645	1548.14	2397.785	

# 2.10 Source of Supply of Raw Materials & Marketing Area of final Products

Raw materials required for the production of Camphor and its Derivatives is shown in **Table 2-6**. MSDS of raw materials are appended in **Annexure-7**. MSDS for products is enclosed as **Annexure-6**.

# 2.11 Mode of Transportation

Raw materials and finished products are transported thru trucks by road. The workforce is sourced locally who come to the factory in their own transport arrangements by road. Fire wood is transported through trucks by road.

# 2.12 Storage Facility for Raw Materials and Products

Adequate storage facilities with optimum inventories are provided for the raw materials and products. The raw materials, products and others storage capacities are detailed in below **Table 2-7.** 

S. No	Itom	Proposed Storage Capacity (MTPM)			
	lien	Existing	Proposed	After Expansion	
1	Raw materials	350	350	700	
2	Solvents(Xylene)	20	10	30	
3	Products Storage	500	-	500	
	Total	870	360	1230	

#### Table 2-7 Details of Storage Facilities

# 2.13 Site Layout

The project site layout is demarcating with various units. Existing Site layout is appended in **Annexure-12** for proposed expansion project site layoutis shown in **Figure 2-8** and enclosed as **Annexure-12A**.



Figure 2-8Existing Project Site Layout





Figure 2-10 Photographs of the factory

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Figure 2-11 Site Photographs of the existing facilities

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# 2.14 Resource optimization

# 2.14.1 Resource Conservation Activities will be adapted after expansion:

KKL intend to install a DCS system wherein the there will be a better control of the parameters which will ensure optimum throughput with lesser losses, Installation of PP / HDPE pipelines for cooling water circulation which has lesser pressure drop across the pipe. Pumping of feed to all the Reactors / distillation Columns will be done through a Flow meter which ensures better control and will avoid human errors. Additional Cooling condenser will be provided for Dehydrogenation section which willprevent the loss of Xylene. KKL will be installing a Chilling Plant to prevent / reduce loss of Xylene and Acetic acid.

# 2.14.2 Recycling /Reuse of Solvents

Solvents play an essential role in chemical processing for controlling the reaction rate, facilitating heat and mass transfer and enabling product separation and purification, which cannot be replaced easily with other alternatives. Various Chemicals are proposed to be used during the process of manufacture of the proposed products. There is no recovered and recycled process are involved. The solvents storage (Existing &Proposed) is detailed in**Table 2-8**. Explosive Licenses from PESO are enclosed as **Annexure-21**.

S.	Proposed	Storage	Petroleum	Quan	tity(No. of tanks in KL)		
No	Chemical Name	Mode	classification	Existing	Proposed	After expansion	
1	Natural Turpentine Oil		В	*5Nos X 27	2 Nos X 80 5 Nos X 90	2 Nos X 80 5 Nos X 90	
2	Xylene	Above Ground	ove B 1 Nos X 20 1 N ound		1 Nos X 10	1 Nos X 20 1 Nos X 10	
3	Acetic Acid	Level tank	-	1 Nos X 40	1 Nos X 40	2 Nos X 40	
4	Caustic soda	-	-	1 Nos X30	-	1 Nos X30	

Table	2-8Solvent	Storage	Details
-------	------------	---------	---------

Note: Existing 5Nos \*X 27 KL tanks will be removed during the Expansion Explosive Licenses from PESO are enclosed as **Annexure-21**.

# 2.15 Resource Requirements

# 2.15.1 Land requirement and Land Use Planning

The total land area is 10.23 Acres. Existing area is 6.95 Acres, Proposed area 3.28 Acres. The existing land classified for Industrial purpose. GO obtained from Govt. of Tami Nadu vide GO. No. 526, 704, newly acquired land for proposed expansion is categorized as a patta land& applied for land use conversion to industrial use from concern departments (Sy. No.667/1,668/1,668/2A, 667/2,668/2,667/2A, 668/2A&670/1.The Land use pattern of the project (existing & proposed expansion) are given in **Table 2-9**. Project site layout plan is given in **Figure 2-8**. Photographs of the factoryare appended in **Figure 2-10**. Photographs of the facilities in factory are given in **Figure 2-11**.

9		E	xisting		P	roposed	· ·	After	Expansi	on
s. No	Description	Sq. m	Acre s	%	Sq.m	Acres	%	Sq.m	Acres	%
1	Built-up area	6664.11	1.65	23.74	3387.30	0.84	25.53	10051.41	2.48	24.28
2	Green Belt	9330.00	2.31	33.24	4378.85	1.08	33.00	13708.85	3.39	33.12
3	Roads	1989.21	0.49	7.05	3145.99	0.78	23.71	5135.20	1.27	12.41
4	Parking area	0	0.00	0.0	2313.50	0.57	17.44	2313.50	0.57	5.59
5	Firewood storage	6658.02	1.64	23.60	0	0.00	0.0	6658.02	1.65	16.08
6	Vacant Land	3484.31	0.86	12.37	43.60	0.01	0.32	3527.91	0.87	8.52
	Total	28125.65	6.95	100	13269.24	3.28	100	41394.89	10.23	100

#### Table 2-9 Land Use Pattern of the project (existing and proposed)

# 2.15.2 Power Requirements

The existing power requirement is 260 kVA and for the proposed expansion, additional power required will be 100 kVA. Thus the total power requirement after expansion will be 360 kVA. The Power supply is from Tamil Nadu Electricity Board, TNEB agreement enclosed as **Annexure-10**. DG set used as an alternate source of power during power failure. The Power requirement for existing and proposed expansion is summarized in**Table 2-10**.

	<b>U</b>		. /	
S. No	Details	Existing	Proposed	After Expansion
1	Power Requirement (kVA)	260	100	360
2	DG Backup- (kVA)	1 x 250* 1 x180	1 x380 -	1 x380 1 x180
3	TFH(Wood Fire heater)MW/hr	1 x1.74	1 x 4.65	1 x 1.74 1 x 4.65

#### Table 2-10 Power/Energy requirement details (Existing and after Expansion)

Note: Existing \*1 x 250 kVA DG will be removed during expansion

DG sets will be used in case of emergency during the power failure. Agreement obtained from TNEB is enclosed as **Annexure-10**.

# 2.15.3 Fuel Requirements

Diesel and Fire wood are the major fuels for Existing and Proposed expansion project. The details of fuels and their quantities are given in **Table 2-11**.

# Table 2-11 Fuel Requirement Details (Existing & Proposed Expansion)

			Capacity			
S.No	Details	Existing	Proposed	After Expansion	Source	Fuel for
1	Fire wood (MT/Month)	300	500	800	Local Suppliers	Fuel for TFH 1 x 1.74 & 1 x 4.65 MW/hr
2	Furnace oil (KL/Month)	13.8	-	13.8	Local Suppliers	Furnace
3	Diesel (HSD) liters/Month	300	-	300	HP/BPCL/ IOCL/Relia nce	Fuel for DG set

# 2.15.4 Manpower

KKL Currently providing employment for about 140 employees which include employees on roll and contract workmen. After expansion, the company will additionally employ around 20 employees. The Manpower details are provided in **Table 2-12**.

S. No	Description	Permanent	Contractual	After Expansion
1	Existing (Nos)	100	0	100
2	Proposed (Nos)	20	20	40
	Total(Nos)	120	20	140

#### Table 2-12Man power of the Project

Manpower during Construction Phase: 20 Nos

# 2.15.5 Water Requirement

The total water requirement for existing is 28.1 KLD (fresh water 21.2 KLD and treated water 6.9KLD). Water requirement for proposed will be 96 KLD (fresh water 77.5 KLD and treated water 18.5 KLD). Fresh water includes direct use (19 KLD), pretreated (36 KLD) and reuse water (22.5KLD). Water requirement for construction phase is 50 KLD, since it is a product enhancement in Camphor production capacity from 110 MT/Month to 550 MT/Month and overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and increase in total land area. Proposed project is for enhancement of camphor production capacity and its derivatives and increase in total land area.

The water requirement will be met from existing bore well (3Nos) within the project premises. NOC is obtained from Water Resource Department Tamil Nadu for abstracting ground water is enclosed as **Annexure-20**, Water balance chart for the Existing facility is show in **Figure 2-12** and enclosed as **Annexure-8** water balance chart for the proposed expansion is appended in **Figure 2-13** and also enclosed as **Annexure-9**.

# 2.15.5.1 Existing Water Requirement

The total water requirement for existing is 28.1KLD Water balance chart for the existing facility is shown in **Figure 2-12** enclosed as **Annexure-8**. Existing water requirement and break up details are given in **Table 2-13**.

S.	Description	ption Total		quirement LD)	Wastewater		Demontre
No		ent	Fresh water	Treated water	generation	LOSS	Remarks
1	Cooling & Boiler feed	5.0	5.0	-	1.0	4.0	1 KLD of wastewater is sent to ETP
2	Saponification Washings	6.5	6.5	-	6.5	-	Wastewater from saponification washings is being used for Greenbelt after treatment.

Table 2-13	Existing wa	ater Red	uirement
	EXISTING W		

**EIA/EMP** Report

3	Softener regeneration	0.7	0.7	-	0.7	-	Wastewater is being sent to Solar evaporation pond after treatment in ETP
4	Domestic usage	9.0	9.0	-	7.0	2.0	Wastewater is being disposed to septic tank followed by soak pit.
5	Green Belt	6.9	-	6.9	-	-	Treated water from ETP is being used for Green Belt.
Total		28.1	21.2	6.9	15.2	6.0	



Figure 2-12 Water balance chart for the Existing facility

# 2.15.5.2 Water requirement for Proposed Expansion

The total water requirement for operation phase will be 96 KLD (fresh water is 77.5KLD and treated/recycled water is 18.5KLD). Fresh water includes direct use 19 KLD, reuse 22.5 KLD and pretreated water 36 KLD. Water balance chart for the proposed expansion is shown in **Figure 2-13** and enclosed as **Annexure-9**. Proposed water requirement and break up details are given in **Table 2-14**.

		Total		Water I	requirement	s	Wastewat	_	
S. No	Details	requirem ent	Fresh water	Treated water	Pretreated water	Reuse water	er Generatio n	Loss	Remarks
1	Cooling	45		0.0	26		Ro Reject 22.5	42	RO Reject will have TDS of <2100 mg/l it will
1	Tower	2	-	9.0	30	_	CT blow down 2.0	40	CT Blow down will be sent to ETP
2	Saponifi cation washing s	10	10	-	-	-	9.5	0.5	Wastewater will send to ETP (ZLD Concept) treated water will be used for Cooling Tower makeup
3	Domesti c	9.0	9.0		-	-	8.0	1.0	10 KLD of STP is proposed for expansion project. Treated water will be used for Green Belt.
4	Green Belt	27	1	7	-	20	-	27	Ro Reject (20KLD) Treated water(7KLD) from STP will be used for Green Belt
5	Fire water Storage tank	2.0	0	2.0	-		-	2.0	Ro Reject will be used for Firewater storage make up
6	Floor & Area washing s	3.0	-	0.5	-	2.5	-	3.0	Ro Reject will be used for Floor &Area washings
	Total	96	19.0	18.5	36.0	22.5	19.5	76.5	

Table 2-14 Water rec	uirement and breaku	p after expansion

Total requirement after expansion is 96 KLD

Fresh water requirement:19+36+22.5= 77.5 KLD(Direct use 19KLD, Pretreated water 36KLD and reuse water 22.5 KLD is included in fresh water)

Recycled water will be 18.5 KLD.

No fresh water required for Green Belt, Fire water storage tank makeup and Floor washings.

**Note:** RO permeate water will be Cooling Water. Ro Reject water will have TDS <2100mg/l so, will be used for Green belt, Fire water storage tank makeup & Floor /area washings. Existing WastewaterTest reports are enclosed as **Annexure-19**.

**EIA/EMP** Report



Figure 2-13 Water balance chart after expansion

## 2.16 Liquid wastewater management

#### 2.16.1 Industrial Effluent Treatment

Industrial Effluent generation and ETP Details are given inTable 2-15.

c		Effluent (KLD)		T	reatment					
No	Description	Existing	After expansion	Existing	After expansion	Remarks				
1	Domestic	7.0	8.0	Septic Tank	Package STP (10 KLD Capacity)	Treated Sewage will be used for Green Belt				
2	Ind. effluent generation	8.2	11.5	ETP (20 KLD)	ETP-20 KLD (ZLD Concept)	9.0 KLD of treated is used for CT blowdown. 2.0 KLD will be used for Firewater storage 0.5 KLD Floor washings				

#### Table 2-15 Details of Sewage/Wastewater Treatment and Disposal

#### 2.16.1.1 Existing

- Total water requirement for existing is 28.1KLD, sourced from existing bore wells within project site.
- Cooling tower feed is 5.0KLD. Blow down is 1.0KLD is beingsent to dedicate Effluent Treatment Plant.
- Process washings: Saponification washings 6.5KLD is being used for green belt.
- Softener regeneration 0.7KLD is being sent to solar evaporation ponds.
- A domestic use is 7.0KLD is being disposed to septic tank followed by soak pit.

# 2.16.1.2 Proposed

- Total water requirement for proposed expansion is 96KLD (Fresh water 77.5 KLD and Treated water 18.5KLD), sourced from existing bore well within project premises.
- Fresh water will be 77.5 KLD (Direct use 19 KLD, reuse water 22.5 KLD and pretreated water 36 KLD)
- Cooling Tower requirement will be 45KLD (RO Permeate/pretreated water is 36KLD+Treated water 9KLD) blow down will be 2.0KLD. It will be treated in ETP(ZLD Concept will be followed)
- RO Reject is 22.5KLD will be used for Green belt (20KLD) & Floor washings (2.5KLD).
- Saponification washings 9.5KLD will send to dedicated Effluent Treatment Plant followed by proposed MEE.
- 10 KLD of Packed STP is proposed for expansion project. Treated water (7.0KLD) will be used for Green belt.

Flow diagram of Effluent Treatment Plant of the Project is shown in **Figure 2-14**.

EIA/EMP Report



EIA/EMP Report



Figure 2-15 Proposed Effluent Treatment Plant (ZLD) Process Flow diagram

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# 2.16.2 Domestic Wastewater Treatment

Existing domestic wastewater is being sent to septic tank fallowed by soak pit. The existing and proposed domestic wastewater disposal details are given in **Table 2-16.** 10KLD of Packaged STP is proposed for expansion. Sectional view of Packaged Sewage Treatment Plant is given in **Figure 2-16.** Process Description of Package Sewage Treatment Plant is shown in **Figure 2-17**.

The existing and proposed Domestic wastewater disposal details are given in **Table 2-16**. Process Description of proposed Packaged Sewage Treatment Plant is shown in **Figure 2-19**.

S. No	Description	Domestic water requirement	Sewage Generation	Treatment Units	Disposal
1	Existing (KLD)	9.0	7.0	Septic Tank followed by soak pit	Disposed into septic tank followed by soak pit
2	After expansion (KLD)	9.0	8.0	10 KLD of Packaged STP	Treated sewage of 7 KLD will be used for green belt. 1.0 kg/day sludge generated from STP will be used as Manure for Green belt

#### Table 2-16 Domestic Wastewater Generation and Management

#### Table 2-17 Package STP Inlet & outlet characteristics of domestic sewage

S. No	Parameter	HECS-Daiki STP Inlet	HECS-Daiki STP Outlet	MoEF &CC Standard
1	рН	3.0-8.0	6.0-8.0	6.5-9.0
2	BOD (mg/l)	300	20	<20
3	COD (mg/l)	500	<50	-
4	TSS (mg/l)	240	<30	<50
5	Oil & Grease (mg/l)	40	<10	-
6	T-N (mg/l)	50	<45	-
	F. Coliform (MPN/100ml)	600	<100	<1000



# 2.16.3 Process Discription of Package Sewage Treatment Plant:



#### Figure 2-17Process explanation of Package STP

# 2.17 Air Pollution Control Measures

- Emissions from DG &TFH: The emissions from DG and TFH will be predominantly PM, SO<sub>2</sub> and NOx where adequate stack height is provided as per the TNPCB Norms to ensure proper dispersion of these pollutants and also inbuilt acoustic enclosure is provided in order to meet the National Ambient Air Quality standards prescribed by CPCB.
- 2. Distillations columns & Reactors: Pumping of feed to all the Reactors / distillation Columns will be done through a Flow meter which ensures better control and will avoid human errors. Additional Cooling condenser will be provided for Dehydrogenation section which will prevent the loss of Xylene/VOCs. KKL will be installing a Chilling Plant to prevent / reduce loss of Xylene and Acetic acid.
- 3.39 acres (33.14%) land is allocated for Green Belt & 68% of Green belt is being developed & maintained remaining 32% of Green Belt will be developed during expansion. This will mitigate the emissions.
- 4. Ash generation from fire wood is 8 kg/day in existing &14 kg/day after expansion. Ash from fire wood is also being taken by farmers to be used in their fields. Partial quantity is being used to Green belt within project.
- 5. Prequently monitoring the Ambient Air quality of the premises conforms to the national ambient air quality standards. Existing Environmental Test reports enclosed as **Annexure-18.** The Air Pollution Control measures are summarized in **Table 2-18.**

S. No			Capacity		470	Stack Height in	Gaseous
	Details	Existing	Proposed	After expansion	APC	meters (AGL)	(Nm <sup>3</sup> /hr)
1	DG Power Back	1 x 250*	1 x 380	1 x 380	Stack	12	2239
	up(KVA)	1 x 180	-	1 x 180	Stack	7.5	1707
2	Steam Boiler (Not in Use)* T/Hr	1 x 1*	-	-	Stack	20	6997
				1 × 1 74	Stack		1669**
3	TFH (Wood Fire	1 x 1.74	1 x 4.65	1 X 1.74	with	30	18000
	Heater)IVIVV/Hr			1 x 4.65	Dust collector		

#### Table 2-18 Air Pollution Control Measures (Existing and Proposed Expansion)

Note: 1.\* Steam Boiler (Not in Use) will be discarded during expansion

2.\* 1 x250(Not in Use) will be removed during expansion

3. Each TFH will have individual dust collector and common stack

4. Existing 4 (Nos) stacks are available, after expansion it will be reduced to 3 (Nos) stacks

5. \*\* 1(No) TFH will be operational & remaining 1 (No) TFH will be standby

S. No.	Fugitive or Noise Emission Sources	Type of Emission	Existing	Proposed	After expansion	Control measures Proposed	Remarks	
1	Reactors	Acid fumes/	11	10	21	Individual	It' is a dosed	
1		VOC		10	21	condenser	loop system	
2		Acid fumes/	Б	2	6	Individual		
2	Distillation columb	VOC	5	3	0	condenser		
2		Naiaa		1 1 200	1 , 200	Acoustic		
3	DG I(KVA)	NOISE	T X 250	1 X 300	1 X 300	endosures		
4		Neico	1 1 100		1 v 100	Acoustic		
4	LGZ (KVA)	INDISE	1 X 180	-	TX 180	endosures		

#### Table 2-19 Fugitive & Noise Emission

Note: \*1 x 250(Not in Use) will be removed during expansion

## 2.18 Waste Management and Disposal Method

#### 2.18.1 Municipal Solid Waste Management

#### **Construction Phase**

- Construction waste: Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.
- Municipal waste generation during construction phase will be 9 kg/day& will be disposed as per norms.
- No Demolitions activities are involved in this proposed project.

#### **Operation Phase**

- Municipal Solid Waste generation form existing facility is 53 kg/day and 69 kg/day (STP Sludge 1.0 kg/day will be used as manure for green Belt) will be generated after expansion and will be disposed offinto local municipal bins.
- Ash generation from fire wood is 8 kg/day (existing), 14 kg/day (After expansion)
- Ash from fire wood is also being taken by farmers to be used in their fields.
- Sludge from ETP will be send to TSDF. Solid waste generation and management details for existing and proposed are summarized in**Table 2-20.**

S. No	Waste	Quantity (kg/day)			Collection	Treatment / disposal	
		Existing	Proposed Expansion	After Expansion	method	method	
1	Organic	40.5	8.1	48.6	Bins	Municipal bin including food waste	
2	Inorganic	4.5	0.9	5.4	Bins	TNPCB Authorized dealers	
3	Ash from Fire wood	8.0	8.0	16.0	Bags	Given to local former for agriculture purpose	
4	STP Sludge	-	1.0	1.0	Bins	Dried and used as manure for green belt development	
	Total	53.0	18.0	71.0			

#### Table 2-20 Solid Waste Generation and Management (Existing & Proposed Expansion)

**Note:** Manpower- Existing: 100 Nos, after Expansion: 140 Nos, Construction Phase is 20NosAs per CPCB guidelines: MSW per capita/day =0.45 kg/day

## 2.18.2 Hazardous Waste Management

The Hazardous wastes will be stored in isolated area above concrete platform under roofed shed. These wastes will be segregated & stored and will be disposed off by giving it to the TNPCB authorized dealers/recycler/TSDF within a stipulated period of time (90 days).

The high calorific value waste like used filter cloth etc. will be sent to TSDF (TNWML, Gummudipoondi). Hazardous waste materials will be properly disposed as per the Hazardous and Other wastes (Management, Handling and Transboundary Movement) Rules 2016. Agreement will be made with TSDF approved dealers for safe disposal of hazardous wastes. Agreement for Hazardous waste disposal is enclosed as **Annexure-11**. The type of hazardous waste and the quantity generated are detailed in **Table 2-21**.

e	Saha	Turos of the Hazardours		Quantity		
No	dule	waste	Existing	Proposed	After Expansion	Mode of Disposal
1	33.1	Discarded containers/ barrels/liners contaminated with hazardous wastes / chemicals(MTPA)	88	6	94	Will be disposed to TNPCB authorized recyclers
2	5.2	Spent oil (Litre /M)	100	10	110	Re use in Process (Pine Tar)
3	-	Waste Furnace oil (Litre /M)	1.0		1.0	Re use in Process (Pine Tar)
4	34.3	ETP Sludge (MTPA)	0.551	0.544	1.095	TNWML, Gummidipoondi (TSDF)

#### Table 2-21 Hazardous Waste Generation and Management

# 2.19 Infrastructure Facility

During operation phase the office room and canteen facilities are being provided to the employees. The existing site layout is enclosed as **Annexure-12** proposed site layout is enclosed as **Annexure-12A**. Total factory footprint is divided into various sections like Production Blocks, Engineering, Warehouses, Administration, Canteen, Toilets etc. Building components break up with adequate space & provision for operations is given in**Table 2-22**.

Table 2-22Land use bleak up details										
s. No	Description	Existing			Proposed			After Expansion		
		Sq.m	Acre s	%	Sq.m	Acres	%	Sq.m	Acres	%
1	Built-up area	6664.11	1.65	23.74	3387.30	0.84	25.53	10051.41	2.48	24.28
2	Green Belt	9330.00	2.31	33.24	4378.85	1.08	33.00	13708.85	3.39	33.12
3	Roads	1989.21	0.49	7.05	3145.99	0.78	23.71	5135.20	1.27	12.41
4	Parking area	0	0.00	0.0	2313.50	0.57	17.44	2313.50	0.57	5.59
5	Firewood storage	6658.02	1.64	23.60	0	0.00	0.0	6658.02	1.65	16.08
6	Vacant Land	3484.31	0.86	12.37	43.60	0.01	0.32	3527.91	0.87	8.52
	Total	28125.65	6.95	100	13269.24	3.28	100	41394.89	10.23	100

#### Table 2-22Land use break up details
# 2.20 Machinery & Equipment Details

The Plant Facilities have been designed and set up with the objective to carry out almost all chemical reactions and processes. Details of plant and machinery and utility equipments used for the production. The list of Plant and Machineries for existing and proposed project are given in **Table 2-23 to Table 2-26.** Process-Resource Conservation Systems for Proposed Expansion is summarized in **Table 2-27.** 

S.	Description of Main	Nos	Nos Capacity			
No	Machineries	1405	Dia(mm)	Height(m)	Туре	Internals
1	Gum Turpentine/Pinene SS	1	1000	22	Patch	Random
1.	Column(mm)	I	1000	~~~	Daluri	packing
2.	Camphene Fractionation SS	1	1000	22	Batch	Random
	Column (mm)	1		~~~~	Daluri	packing
2	Crude Isobornyl acetate fraction	*2 500	500 6	Batch	Random	
Э.	columns (mm)	2	500	0	Daton	packing
1	Camphor Distillation SS Packed	1	400	Q	Patch	Random
4.	Column (Nos)	I	400	0	Dalut	packing

#### Table 2-23 List of Process Distillation Columns (Existing)

Note: \* Item no.3 (2x 500 mm) fraction columns will be dismantled after expansion, proposed new column (1 x 500 mm and 1 x 700mm dia)

S No	Description of Main	Nec				
3. NO	Machineries	INUS	Dia(mm)	Height(m)	Туре	Internals
1.	Gum Turpentine/Pinene	1	1000	22	Continuous	Structured
2.	Camphene Fractionation SS Column (mm)	1	1000	22	Continuous	Structured packing
3.	Crude Isobornyl acetate fraction columns (mm)	2	1 x 500 1 x 700	10	Continuous	Structured packing
4.	Camphor Distillation SS Packed Column (Nos)	2	1 x 400 1 x 500	1 x 8 1 x 14	Continuous	Structured packing

#### Table 2-24 List of Process Distillation Columns (after expansion)

**Note:** Proponent proposed to change the distillation column form batch to continuous with internals also changed from random packing to structured packing this will increase the throughput.

SNO	Description of Main Machineries	Capacity (No	After	
3. NO	Description of Main Machinenes	Existing	Proposed	Expansion
1	Isomerisation reactor (KL)	2x6	2x 12	2x6 2x12
2	Campene Esterification reactor (KL)	3x 6	1 x 12	3x6 1x12
3	Saponification (Isobornyl acetate) reactor (KL)	2x6	3 x 12	2x6 3x12
4	Dehydrogenation reactor (KL)	3x3 1x7	2 x 12	3x3 1x7 2x12
5	De bottlenecking Activities -Saponification of		2 x 12	2 x 12

#### Table 2-25 List of Reactors

S. No	Description of Main Machineries	Capacity (No	After	
	Description of Main Machinenes	Existing	Proposed	Expansion
	Isobornylacetate &washing reactor (KL)			

#### Table 2-26 List of Utility systems

S No	Description of Main Machineries	Capacity (No	After	
<b>3. NO</b>	Description of Main Machinenes	Existing	Proposed	Expansion
1.	Cooling Tower (m³/hr)	1x 300	1x400	1x400
				IX 300
2	TEH (Wood Fire heater(MW/hr)	1x 1.74	1 x 4.65	1 x 1.74
				1 x 4.65
3.	Fire water Pump (m³/hr)	150	-	150

#### Table 2-27Process-Resource Conservation Systems for Proposed Expansion

S. No	Name of the system
1	DCS Systems
2	HDPE Cooling water circulation system
3	Additional Cooling condenser for Xylene
4	Chilling Plant to prevent loss of xylene and Acetic acid
5	Distillation columns internals will be changed from random to Structural packings to improve the efficiency and throughput of the column

# 2.21 Schematic representation of the feasibility drawing which give information important for EIA purpose

A schematic representation of the overall feasibility and environmental assessment process is shown in **Figure 2-18.** The EIA process is composed of the following stages:

- Study of project information
- Screening & Scoping
- Environmental Pre-Feasibility study & application for approval of TOR
- Collection of detailed project management plan/report
- Baseline Data collection
- Impact identification, Prediction & Evaluation
- Mitigation measures & delineation of EMP
- Risk Assessment and Safety & Disaster Management plan
- Review & finalization of EIA Report based on the TOR requirements.
- Public Hearing/Public Consultation
- Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.



Figure 2-18 Feasibility & Environmental Assessment Process

# 2.22 Description of mitigation measures to meet the environmental standards

# 2.22.1 Impacts due to Land acquisition and location

The proposed expansion project is situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu - 631552. The total land area is 10.23 acres located at ~2.18 km (South) away from District head quarter is Kancheepuram. Existing Land ownership documents enclosed as **Annexure-1** and proposed land ownership documents are enclosed as **Annexure-1**. The project site area is converted for industrial use GOs (GO. No 526, 704) obtained from Govt. of Tamil Nadu is enclosed as **Annexure-2**. Newly acquired land for proposed expansion is categorized as a patta land& applied for land conversion to industrial use from concern departments. Existing & Proposed Land ownership document are enclosed as **Annexure-1& Annexure-1A** respectively. Therefore, there will not be any impact due to land acquisition and location.

# 2.23 Construction phase

Since it is expansion of production capacity and increase in total land area (3.28 Acres) adjacent to existing facility with few additional of infrastructure facilities like Storage tanks, warehouse, administration block, over head tank internal roads& parking construction activities are proposed in new land. Total project land after expansion is about 10.23 acres (Existing 6.95 and proposed 3.28 Acres). Bore well investigation studies are carried out by Water Resource Department Tamil Nadu and NoC obtained for abstracting the ground water is enclosed as **Annexure-20**. Pre-construction soil investigation was carried out and the report enclosed in **Annexure-14**.

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:

- 1. Site preparation (fencing, boundary & clearing of site).
- 2. Excavation, backfilling and levelling
- 3. Hauling and dumping of earth materials & construction spoils.
- 4. Foundation works.
- 5. Fabrication erection of Steel structures such as, Tanks, Pipelines and Sheds.
- 6. Construction of internal roads drains & water supply.
- 7. Painting and finishing.
- 8. Cleaning, landscaping and plantations.

#### 2.23.1 Land Environment

#### Impacts

The activities carried out during the construction phase will involve a change in the land use from vacant industrial land to a built up industrial land, which will pose the following impacts on the land environment.

- 1. Compaction of soil and a change in the soil structure due to the use of heavy construction vehicles and machineries.
- 2. Removal of soil from the site.
- 3. Mixing of the topsoil and subsoil.
- 4. Dispersion of dust.

#### Mitigation measures

- 1. Employing techniques such as restricting access during wet conditions, using protective boarding and low ground pressure machineries to minimize compaction of soil.
- 2. The removed soil will be properly stored for subsequent reinstatement.
- 3. Reuse of excess excavated material for road development, green belt development and landscaping.

- 4. A well designed closed depository for storage of construction materials to prevent land/soil pollution.
- 5. Effective stabilization of altered landforms to minimize soil erosion and the potential for water pollution (e.g. Vegetation).
- 6. Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.

# 2.23.2 Air Environment

#### Impact

The activities that might lead to a decline in the local air quality due to generation of dust are

- 1. Site Preparation-fencing, boundary and clearing of site will cause disturbance to the surroundings.
- 2. Excavation, backfilling and levelling.
- 3. Hauling and dumping of earth materials and construction spoils.
- 4. Foundation works can cause dust generation which will decrease the air quality and it can impact the labours working.
- 5. Fabrication, erection of steel structures such as tanks, pipelines and sheds.
- 6. Construction of internal roads drains and water supply.
- 7. Cleaning and landscaping.
- 8. Emission from Construction DG & Construction Equipments.

#### Mitigation measures

- 1. Barricading the construction area and minimizing exposed areas to reduce dust generation.
- 2. Areas generating dust during dry weather will be sprayed with water.
- 3. Creation of vegetation screens to act as a barrier to dust.
- 4. Appropriate enclosed areas for storage of construction materials.
- 5. Facilitating the workers with the required personal protective equipments.
- 6. Efficient usage and maintenance of equipments/machineries to lower air emissions, noise pollution and consumption of energy resource.
- 7. Exhaust vent of DG set will be provided with adequate stack height to ensure quick dispersal of gaseous emissions.
- 8. Periodic monitoring and maintenance of transport vehicles to check on the quality of emission to be within permissible limits and consumption of fuel.
- 9. Regular inspection of construction site to ensure timely removal and disposal of construction debris to the dumping sites or for recycle/reuse

# 2.23.3 Water Environment

#### Impacts

- 1. Contamination of watercourses by leakage from fuel and materials storage areas.
- 2. Oil and suspended solids in run-off from vehicles and access roads.
- 3. Use of heavy machineries and vehicles causes compaction of topsoil due to which a change in the surface water drainage pattern may occur.
- 4. Generation of sewage / process effluent and blow down.

#### Mitigation measures

- 1. The water demand during the construction phase will be met from borewell within factory premises the authority.
- 2. Impenetrable lining will be provided to storage premises to avoid accidental mixing or fugitive losses.
- 3. Storehouse will be located at a distance away from the water storage area to prevent accidental release or spillage.
- 4. Proper management of rain water run-off during monsoon and creating bunds to utilize the rain water for construction purpose.
- 5. An appropriate water management system will be implemented.

#### Wastewater Management

#### Domestic:

The sewage generated from domestic use will be disposed in septic tank and it will be cleared periodically.

#### 2.23.4 Noise Environment

#### Impacts

- 1. The major sources of noise generation at the construction site are pneumatic hammers, DG sets, compressors, concrete mixers, operating machineries, horns & acoustic signals and communication among workers.
- 2. Noise nuisance causes discomfort and health related issues in those who work at the site and those who reside in the neighbouring villages.

#### Mitigation measures

- 1. Barricading the construction site.
- 2. The green belt will help in reducing the noise nuisance.
- 3. Selection of equipments of high quality.
- 4. Proper planning and organizing of construction activities which will help in avoiding loud verbal exchanges between the intervening parties.
- 5. Transportation activities will be carried out only during the day and only in case of emergency, the transportation activities will be permitted in night time.
- The vehicles used for construction activities and transportation of materials will be provided with the horn of low noise level as recommended by RTO/ concerned authorities.
- 7. Minimization of operation time of noisy equipment and operation of machineries/equipment that generate high levels of noise only during day time.
- 8. Inadequate use of plant and equipment, namely, running on full power when the work does not necessitate it will be avoided.
- 9. Personal protective equipments, education and public awareness and exposure control through rotation of work will be provided to the workers engaged in construction activities in the area generating high levels of noise.

# 2.23.4.1 Waste generation

Sources of waste are construction debris such as bricks, steel scrap, wooden scrap, sand and gravel etc.

#### Mitigation measures

- 1. Prior to commencement of construction works, assessment of materials required, location and planning of available space for its storage will be conducted.
- 2. Quality control will be implemented to reject defective materials at the time of delivery thus avoiding later disposal.
- 3. Stockpiles of sand, gravel, soil will be situated in such a manner that they do not spill or washed onto the adjacent roads.
- 4. Materials that come in will be labelled and the date of receiving will be recorded.
- 5. Preparation of proper waste management system which includes identification of wastes, collection, segregation, storage and disposal methods.
- 6. Recycling and reuse of certain construction debris.
- 7. Spent oils and other lubricants from equipment will be collected in enclosed containers before disposing it to approved recyclers

# 2.23.4.2 Ecology

The proposed expansion project is camphor and its derivatives within the existing facility and increase in total land area. The new land is adjacent to existing facility; hence no impacts have been expected to arise on the biological environment. Except for the removal of weeds, the ecological status of the site will be well maintained by conserving/developing the greenbelt at the site.

# 2.23.4.3 Social Environment

- The impacts of construction activities is beneficial on the social environment as it contributes to the economic and social development by providing employment to about 20 workers during the construction phase and thereby raising the standards of living and quality of life.
- 2. Procurement of construction materials locally leads to increase in trading opportunities

# 2.24 Operation Phase

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. The adverse effects that are likely to occur during this operational phase of the project are: Air Pollution (gaseous emissions), Effluent generation, Noise generation, Solid waste generation etc.

# 2.24.1 Land Environment

The Proposed project is expansion of production capacity along with addition of 3.28 Acres land adjacent to existing facility with few additions of infrastructure facilities. The existing project land is converted to industrial use, existing land conversions GO s are obtained from Govt. of Tamil Nadu are enclosed as **Annexure-2.** Newly acquired land for proposed

expansion is categorized as a patta land& applied for land conversion from concern departments. Hence there will be no change in land use pattern.

#### a) Impact on Land due to Discharges

In the existing facility sewage is being collected in septic tank and is being cleaned periodically. In the proposed expansion project the sewage generated will be treated in proposed 10 KLD of packed STP and treated water will be used for Green belt.

Existing industrial effluent is being treated in ETP; treated water is being used for Green belt. Industrial effluent generation will be 11.5 KLD for proposed expansion, will be treated in ETP followed by proposed ZLD concept and Treated wastewater will be used for cooling tower makeup and firewater storage.Same practice will be continued even after expansion. Hence there will be no discharge on land premises. Hence no adverse impacts due to existing and proposed facilities/activities on water environment

#### **Mitigation Measures**

- 1. Periodic maintenance and check of wastewater conveyance pipelines
- 2. Attempt to restore by replacing a part or putting together the torn or broken parts of the conveyance pipeline in case of any leakage is detected.
- 3. Necessary preventive measures for spillage from pipelines, such as surface RCC channels along the pipelines are adopted.
- 4. Lining of effluent collection tank
- 5. Treated wastewater quality shall be ensured as per standards before using it for various requirements.

#### b) Impacts due to Soil Contamination

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various activities in the project site like ash from fire wood, sludge from ETP, STP,DG Waste oil, Waste Furnace oils and solid wastes from domestic activities etc,. Poor management of such materials/wastes from the operations is a potential risk of soil contamination.

#### **Mitigation Measures**

Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination. The wastes generated will be stored in temporary storage facility and transferred to nearby Treatment, Storage and Disposal Facility (TSDF) and also to the approved vendors of Tamil Nadu State Pollution Control Board (TNPCB) landfill. However, waste minimization techniques will be adopted in order to minimize the generation of wastes.

# 2.24.2 Air Environment

Air pollutants in the form of oxides of nitrogen, sulfur & PM from generators, boilers, Thermic Fuid Heater (Fire wood) & acid mist/VOCs from the process section, contribute and cause certain impacts on the air quality.

APC measures are adequate stack height to disperse the pollutants. Adequate green belt has been developed to mitigate the pollution arising due to movement of vehicles. Regular monitoring of DG-stack and ambient air quality will be carried out. Air Pollution Control Measures are provided in **Table 2-28.** Regular monitoring is conducted on monthly basis. Existing Environmental test reports are enclosed as **Annexure-18.** 

		Capacity			Stack	Gassouls
Details	Existing	Proposed	After expansion	APC	Height in meters (AGL)	Discharge (Nm3/h)
DG Power Back	1 x 250*	1*380	1 x 380	Stack	12	2239
up(KVA)	1 x 180	-	1 x 180	Stack	7.5	1707
Steam Boiler (Not in Use)T/Hr	*1 x 1T/Hr	-	-	Stack	20	6997
TFH (Wood	1 × 1 71	1 × 4 65	1 x 1.74	Stack with	20	1669**
MW/Hr	1 X 1.74 1	I X 4.00	1 x 4.65	collector	- 30	18000

 Table 2-28 Air Pollution Control Measures (Existing and Proposed Expansion)

Note: 1.\*Steam Boiler (Not in Use) will be discarded during expansion

2. \*1 x250(Not in Use) will be removed during expansion

3. Each TFH will have individual dust collector and common stack

4. Existing 4 (Nos) stacks are available, after expansion it will be reduced to 3 (Nos) stacks

5. \*\* 1(No) TFH will be operational & remaining 1 (No) TFH will be standby

S. No.	Fugitive or Noise Emission Sources	Type of Emission	Existing	Proposed	After expansion	Control measures Proposed	Remarks
1	Reactors	Acid fumes/	11	10	21	Individual condenser	It' is a dosed
2	Distillation colums	Acid fumes/ VOC	5	3	6	Individual condenser	
3	DG 1(kVA)	Noise	1 x 250*	1 x 380	1 x 380	Acoustic enclosures	
4	DG2(kVA)	Noise	1 x 180	-	1 x 180	Acoustic enclosures	

#### Table 2-29 Fugitive & Noise Emission Control Measures (existing&proposed)

Note: \*1 x 250(Not in Use) will be removed during expansion

#### Mitigation Measures

- Emissions from DG &TFH : The emissions from DG and TFH will be predominantly PM, SO<sub>2</sub> and NOx where adequate stack height is provided as per the TNPCB Norms to ensure proper dispersion of these pollutants and also inbuilt acoustic enclosure is provided in order to meet the National Ambient Air Quality standards prescribed by CPCB.
- Distillations columns & Reactors: Pumping of feed to all the Reactors / distillation Columns will be done through a Flow meter which ensures better control and will avoid human errors. Additional Cooling condenser will be provided for Dehydrogenation

section which will prevent the loss of Xylene/VOCs. KKL will be installing a Chilling Plant to prevent / reduce loss of Xylene and Acetic acid.

- 3.39 acres (33.12%) land is allocated for Green Belt& 68% of Green belt is being developed & maintained remaining 32% of Green Belt will be developed during expansion. This will mitigate the emissions.
- Ash generation from fire wood is 8 kg/day in existing &14 kg/day after expansion. Ash from fire wood is also being taken by farmers to be used in their fields. Partial quantity is being used to Green belt within project.
- Prequently monitoring the Ambient Air quality of the premises conforms to the national ambient air quality standards. Existing Environmental Test reports enclosed as Annexure-18.

# 2.24.3 Noise Environment

#### Impact

Noise generation sources during operation phase are classified into two categories:

- Stationary sources due to operation of heavy duty machineries at the project site like Compressors, DG sets, Pumps etc.
- Mobile sources corresponding 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 compressors, pumps, DG sets etc., also generate vibrations during operational phase and may cause exposures to the workers/operators engaged at these units.

# **Mitigation Measures**

- The major noise generating equipment like Compressors, DG sets, 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.
- > Adequate PPE will be provided to the staff exposing to noise risks.
- > Acoustic silencers will be provided in equipment wherever necessary.
- Acoustic design with sound proof glass paneling will be provided for critical operator cabins / control rooms of individual modules as well as central control facilities.
- 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 minimize noise emissions.

- Implementation of greenbelt for noise attenuation will be undertaken: shrub plantation; landscaping with horticulture; and Tree plantation at vehicle parking areas and along approach roads.
- Ambient noise levels will be monitored at regular intervals during operational phase of the project.
- Transportation Management Plan will be prepared and the transportation of construction materials will be planned in line with the same.

#### 2.24.4 Water Environment

#### Potential Impact due to Location

#### Impact on Existing Water Resources

Water requirement of existing unit was mainly for saponification washings, cooling water, domestic use& green belt etc.The total water requirement for the existing unit is 28.1 KLD, of which 21.2 KLD is fresh water and 6.9 KLD is treated water. The water requirement is met through Bore wells located within the plant premises.

Sewage (9.0KLD) is generated from domestic use, disposed through septic tank followed by soakpit. An effluent is generated from saponification washings (6.5KLD) and cooling tower blowdown (1.0KLD). The wastewater from saponification washings is being used for Green Belt. Cooling Tower blowdown is treated in dedicated ETP, treated water used for utilities. Hence no adverse impacts due to existing facility on water environment.

The water requirement will be met through existing bore well (3Nos) within the project premises. NOC is obtained for abstracting ground water is enclosed as **Annexure-20**. Water balance chart for the Existing facility is shown in **Figure 2-12** and enclosed as **Annexure-8 &** water balance chart for the proposed expansion is appended in **Figure 2-13** and also enclosed as **Annexure-9**.

#### Impact on Proposed Water Resources

The total water requirement during construction phase will be 50 KLD and operational phase will be 96KLD, of which 77.5 KLD is fresh water (direct use 19 KLD, pretreated 36KLD and reuse water 22.5KLD) and 18.5 KLD is treated water. The total water requirement is met through bore wells (3Nos) located within the Plant premises. NOC is obtained from Water resource Department Tamil Nadu for abstraction of Ground Water is enclosed as **Annexure-20.** 

Industrial wastewater generation from saponification washings (9.5 KLD) & Cooling Tower (2.0KLD) blow down; it will be treated in existing 20 KLD of ETP. ZLD Concept will be proposed for expansion project. Treated water will be used for Cooling Tower makeup, floor washings and firewater storage tank makeup.

Domestic effluent will be treated in proposed 10 KLD of packed STP. Treated domestic wastewater will be used for Green Belt. Treated wastewater is being recycled within the facility.Hence no adverse impact due to the proposed project on water environment.

#### Impacts to Surface Water Bodies

The surface water and groundwater are the life line of the villages. All the ponds in the area are working as recharge sites for the under lying groundwater and hence the surface water and ground water systems are acting like a single unit and therefore cannot be seen in Isolation.

Any contamination in surface drainage due to operation of project could collapse the system and will have serious impacts to the water resources especially the availability of potable water in the PIA area. The impacts will be high in the core area especially the 5.0 km radius area.

Therefore, the proponent will maintain ZLD (Zero waste discharge) Concept to the existing ETP whose design is for 20 KLD and the existing inflow is 6.5 KLD and after expansion it is expected to be 11.5 KLD.

The RO permeate water of 9.0 KLD will be utilized in Cooling Tower makeup water. The RO rejects water of 2.5 KLD will be used in fire water make up and floor washings. Impervious Solar Pond of 120 Sq.mts will be utilized as backup provision.

Suitable flow meter and control mechanism will be deployed to ensure no water will be discharged outside. Thus, there will be no impact on ground water and surface water Environment.

#### Mitigation Measures

Though the proposed development is withdrawing ground water, the following measures proposed as a part of development to improve the ground water scenario and also to ensure that ground water is not contaminated.

Strategic plans such as implementing the following structures for rainfall harvesting and groundwater recharging purposes in project site will be adhered.

- Recharge pits
- Only roof-top rain water harvesting
- Rainwater storage ponds/tanks
- Storage cum recharge ponds
- > Monitoring of water quality and groundwater level variations in the project site.

#### Impacts due to waste water generation

The source of wastewater generation from the project is as follows:

- Industrial process wastewater/effluent(Saponification washings)
- cooling water blow down
- Domestic wastewater/Sewage
- Area/floor washings, etc.

The details of wastewater quantities to be generated from the project are discussed in **Section 4.3.6.** The untreated wastewater if discharged into nearby surface water may affect the surface water and/or if disposed of on land without treatment may pollute the ground and surface water.

# **Mitigation Measures**

Various mitigation measures are proposed to be adopted to minimize the impact if any on the water environment due to the wastewater/runoff generation during the operation phase of the project.

- > Institutional arrangement for monitoring of water by pollution.
- > Corrective and preventive measures if any contamination happens.
- Monitoring should ensure early determination of any threats to water resources in terms of contamination.
- If contaminated, proper expertise will be brought to schematize the various recharge mechanism to reduce or nullify the impact effects.

#### 2.24.4.1 Waste water quality, quantity and treatment methods

The sewage from domestic use will be treated in proposed Packaged STP. Process description of Packed STP is as follow:

#### Process description of Packaged STP:





Figure 2-19Sectional View of Package Sewage Treatment Plant

Tabl	le 2-30 Package ST	P Inlet &outle	t characte	ristics of	domestic	wastewater
					-	

S. No	Parameter	HECS-Daiki STP Inlet	HECS-Daiki STP Outlet	MoEF &CC Standard
1	рН	3.0-8.0	6.0-8.0	6.5-9.0
2	BOD (mg/l)	300	20	<20
3	COD (mg/l)	500	<50	-
4	TSS (mg/l)	240	<30	<50
5	Oil & Grease (mg/l)	40	<10	-
6	T-N (mg/l)	50	<45	-
7	F. Coliform (MPN/100ml)	600	<100	<1000

# Process description for ETP

The Process Flow Diagram of ETP for existing and proposed facility is shown in Figure 2-14.

# Stage 1 Primary Treatment

- All Effluent will pass through a Bar Screen Chamber to remove solids and other larger sized floating substances which is likely to clog pumping machinery.
- Effluent after screening will enter into Oil Separation Tank provided with a baffle and Tee to remove free oil. Oil will be removed periodically, manually, being a small amount. If required Oil Skimmer will be provided.
- The Oil Free effluent will be collected in a tank provided with a diffuse Aeration System for effluent pH homogenization. This effluent will be Neutralize by addition of Acids. The neutral effluent will be pumped to the Flash mixer for further treatment.
- Alum solution will be added for final pH correction and to improve the settling of effluent entering into the flash mixer. For floc formation suitable polyelectrolytewill be added in the flash mixer which increases the floc size to increase the settling rate of solids.
- The effluent will be taken to Clariflocculator to settle solids. The settled sludge from the bottom of the Clariflocculator will be sent to the sludge drying beds/Decanter for

dewatering. Filtrate from the beds will be sent back to the Equalization Tank and sludge cake will be send to CHWTSDF for disposal. Primary clarification/treatment is expected to reduce BOD – COD by about 40 to 50%. After primary treatment, effluent will enter into Anaerobic Tank for biological treatment.

#### Stage 2 Biological Treatment

The biological treatment will be in two stages of Anaerobic (Upflow Anaerobic) and Aerobic (Activated Sludge Process)

#### Up flow Anaerobic Filter

The effluent from the Clarifloculator will enter into up flow anaerobic Bioreactor for BOD and COD reduction. The anaerobic system consists of plastic media on which anaerobic bacteria will be cultivated which will degrade the organic matter which in turn will reduce BOD & COD of the effluent.

Effluent will move upwards in the Anaerobic Bioreactor thereby coming in contact with microbes. To develop microbes, sewage/cow dung or similar seeding will be used. Once microbes are developed, effluent will be added in increments of 5%, reaching to 100 % over a time. Seeding and cultivation process is expected to be 15-30 days.Effluent BOD/COD reduction across Anaerobic Process is expected to be 75 to 80%.

#### **Activated Sludge Process**

After anaerobic process, effluent will be further treated by Activated Sludge Process (ASP) to further reduce BOD/COD and meet prescribed limits for disposal. Activated Sludge Process will comprise of the following

- An Aeration Tank equipped with Self closing diffusers powered by Twin Lobe Blowers.
- Secondary Clarifiers for settling of biological sludge which will be recycled back to Aeration tank
- Return sludge pumps to recycle settled sludge in the secondary clarifiers back to the aeration tank
- In the activated sludge process, the bacteria in the Aeration Tank will degrade the organic matter into simple substances like minerals and water thus reducing its BOD and COD up to 80 to 90%. I

The Aeration Tank Extended Aeration System is designed on the following basis:

- Self-closing diffusers are provided on the floor of the Aeration Tank, which feed air. In the Aeration Tank there is a mixture of incoming organic waste, return sludge and air provided by fine bubble diffusers. After 24 hrs of aeration mixture of microbes & organic waste is sent to Secondary Clarifiers for separation of sludge from water. The sludge is settled whereas the clear effluent overflows to the Treated Water Tank.
- The settled sludge will be recycled back to the Aeration Tank using the Return Sludge Pumps to maintain the 3000mg/l of MLSS concentration. Excess sludge will be sent to sludge drying beds for dewatering purpose, in a calculated

quantity. The dried sludge from the beds will be used as manure whereas the filtrate will be sent to raw effluent sump. Activated sludge process is expected to reduce the BOD/COD by 80 to 90 %.

#### Stage 3 Tertiary Treatment

The effluent after biological treatment will be further treated to reduce BOD and COD using Pressure Sand Filter and Activated Carbon Filter to remove all the suspended solids and to remove colour. This step will reduce BOD and consequentially COD.

#### Stage 4 Reverse Osmosis

To reduce Total dissolved solids, effluent will be processed in a Reverse Osmosis system. Here high pressure pumps force effluent through membranes, which allow only water to pass through (permeate) retaining all the dissolved salts (reject). Permeate will be sent back for reuse.

#### Mitigation measures

- ETP to treat industrial effluents.
- Treated water from ETP is being used for Green belt and Floor/area washings.
- The sewage from domestic use will be treated in STP.
- The runoff from uncontaminated areas will be used for greenbelt area.

PCB authorization for Hazardous waste disposal will be obtained. Agreement made with TSDF approved dealers for safe disposal of hazardous wastes is enclosed as **Annexure-11**. The wastewater from ETP is being used for Green belt and Floor/area washings within the facility. There will be no discharge to land environment. Anticipated characteristics of effluents are provided in **Table 2-31**. The existing and proposed ETP flow diagram enclosed as **Annexure-27**. The proposed STP flow diagram is provided in **Annexure-26**.

S. No.	Parameters	ETP Inlet	ETP Outlet	RO Permeate	TNPCB Tolerance Limits for Trade Effluents water into Inland surface water
1	pН	3-5	7.0-8.0	7.0-8.0	5.5 to 9
2	TSS	100-200	<100	<1	100
3	TDS	1500-2000	<2100	<200	2100
4	COD	8000-10000	<250	<50	250
5	BOD	2000-2500	<30	<5	30
6	Phenols	3-5	<1.0	<1.0	1.0
7	Oil and grease	50-100	<10	<1	10
8	Flow rate	1 KL/Hr	1 KL/Hr	0.5 KL/Hr	-
		All parameter	s except pH ar	e expressed as r	ng/l

 Table 2-31: Characteristics of Effluent Generated (Composite)

# 2.24.5 Biological Environment

There are no identified migratory paths for major and minor wildlife in the project site and the study area. The identified fauna which are observed at the project site and in the study area are local migrants only. Therefore, the proposed project operations are not likely to have any adverse impact on the paths for avi-fauna. Awareness will be given to workers about the importance and conservation of terrestrial ecology and biodiversity.

#### 2.24.6 Solid waste management

#### Impact due to Solid Waste Generation

During operation phase, various types of solid waste are likely to be generated which can be broadly categorized as Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste generation may include Biodegradable, Recyclable and Inert compounds. The details of solid waste generation and its management proposed are discussed in **Chapter 2**, **Section 2.18.** If the solid waste generated is not properly managed and disposed in unauthorized manner, it will impact on soil quality, groundwater and air quality.

#### Solid waste management

Strict guidelines will be put in place in order to manage the solid waste generation during the operational phase of the development. The main goals of the guidelines will be to ensure adopting recycling techniques and encouraging sorting of solid waste at source into organic and inorganic wastes. Waste management concept is given in **Figure 2-20**.



Figure 2-20 Waste Management Concept

# 2.25 Assessment of new and untested technology for the risk of technological failure

The project is "Manufacturing of Camphor production and its Derivatives" industry with R & D activity. The process used for production is made Kanchi Karpooram Ltd in house there would not be any changes in the process. The manufacturing processes for these products are tried & tested method, and therefore there is no risk of technological failure. In addition to this the facility is being backed up by the R & D centre there would be continuous efforts for optimization of the processes to care of the any technological failures.

# CHAPTER – 3 DESCRIPTION OF ENVIRONEMENT

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# **3 DESCRIPTION OF ENVIRONEMENT**

# 3.1 Preamble

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the proposed project for M/s Kanchi Karpooram Limited., with total area of 10.23 Acres (41394.89 Sq.mt) located at, Plot No. SF.No. 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2A, 667/2A, 668/2A & 670/1. M/s Kanchi Karpooram Limited Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu. The primary baseline data was monitored covering one season three (3) months i.e., from July 2018 – Sep 2018, and secondary data was also collected from Government and Semi-Government organizations. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) Ltd, Chennai, and a MoEF&CC approved Environmental Testing Laboratory for the following environmental components.

- Meteorology: Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- Refer Section 3.6
- Ambient Air Quality: Particulate matter <10 micron size (PM<sub>10</sub>), Particulate matter <2.5 micron size (PM<sub>2.5</sub>), Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Carbon Monoxide (CO), Lead (Pb), Ozone (O<sub>3</sub>),Benzene (C<sub>6</sub>H<sub>6</sub>), Benzo (a) pyrene (C<sub>20</sub>H<sub>12</sub>), Arsenic (As), Nickel (Ni), Ammonia (NH<sub>3</sub>), Total Volatile organic Compound (TVOC).Total Hydro Carbons (THC), Chlorine, HCl, HBr, H<sub>2</sub>S, HF & CS<sub>2</sub>- Refer Section 3.7
- Ambient Noise Levels: Day equivalent noise levels, Night equivalent noise levels Refer Section 3.8
- Inland Water Quality: Groundwater Quality, Surface Water Quality Refer Section 3.9
- Soil Quality Refer Section 3.10
- Ecology Refer Section 3.11
- Social Economic Status Refer Section 3.12

# 3.2 Study Area

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 core area covering Enadur Village, Parandur Road,Karaipettai Post, Kancheepuram Taluk, Tamilnadu.

# 3.3 Description of the Study Area

As Described in Chapter 1 Introduction the site is located approximately 3.09 km SSW away from the Kancheepuram Railway station and 49.63 km (ENE) from Chennai International Airport- Chennai. 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 study area of Project site is given in **Figure 3-1** and Topo Map of the study area is given in **Figure 3-2**.



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



Figure 3-2 Topo Map of the Study area

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# 3.4 Environmentally/Ecologically Sensitive areas

The details of environmentally/ecologically sensitive areas covering within 15 km from project boundary are given in Table 3-1 and Figure 3-3.

s. No	Areas	Name/ Identity	Aerial d	Aerial distance (within 15 km) proposed project location boundary			
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	Nil				
			S. No	Name of the Location	Distance(~km)	Direction	
			Rivers				
	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		1	Palar river	8.27	SSW	
2			2	Vegavati river	5.39	SW	
		Yes	Lakes				
			1.	Tamarai Tangal	0.02	W	
			2.	Tonneri Tank	12.06	E	
			3.	Kaveripak N	14.47	WSW	
			4.	Pamba Kalvai	4.07	NNW	
			5.	Nathapettai lake	4.92	SE	
			6.	Mamandur Tank	12.62	SSW	
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	Nil				
4	Inland, coastal, marine or underground waters	No	Nil				
5	State, National boundaries	No	Nil				

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

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		S. No	Name of the Monuments Distance		(~km)	Direction		
		1.	Kailasanathar Temple		4.25	SW		
		2.	Vaikuntaperumal Temple		4.28	SSE		
		3.	Piravathanesvara Temple		3.37	S		
		4.	Iravathanesvara Temple		3.39	S		
		5.	Muktesvara Temple		4.15	SSW		
		6.	Mathangesvara Temple		4.41	S		
		Places of worships :						
	m No	S. No	Places of worships		(~)Distance	Direction		
Routes or facilities used by the public for		1.	Sri Manikandeswara Swamy Temple		9.95	NW		
		2.	Najma - Masjid		10.12	W		
		3.	Sri Vijaya Raghava Perumal temple Ekambareswarar Temple		9.98	W		
		4.			3.18	SSW		
		5.	Sri Pachai Vanna Perumal Temple		3.49	S		
		6.	Sri Pavala Vanna Perumal Temple		3.53	S		
access to recreation or other tourist, pilgrim		7.	Kailasanathar Temple		4.25	SW		
areas		8.	Pandavar Perumal Temple		3.87	SSW		
		9.	Jurahareswar Temple		3.87	SSW		
		10.	Kamachi Amman Temple		3.84	S		
		11.	Ulagalantha Perumal Temple		4.05	S		
		12.	Kachabeswarar Temple		4.21	S		
		13.	TMN Temple		4.89	SSW		
		14.	Perinba Prayer House		5.55	SW		
		15.	Bodhidharma Temple Sathyanateswarar Temple		4.42	SSE		
		16.			5.21	SSE		
		17.	Perumal Temple		5.63	S		
		18.	Jerusalem Workship		6.31	SSW		
		19.	Panadudeeswarar Temple		5.97	S		
		20.	Thiruvelakai Temple		5.91	S		
		21.	Manikandeswar Temple		5.95	SSE		
		22.	Narashima Temple		7.85	SSW		
		23.	Sri Varadharaja Perumal Temple		6.37	SSE		

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			24	Punnivakodeswarar Temple	657	SSE
			24. Fullingaroueswarar temple		10.74	SSW
			20.	Thalapureeswarar Temple	13.31	SW
			27.	Rani Amman Temple	10.35	SE
			28.	Sri Ashtabujangaram Temple	5.85	S
			29.	Punadudeeswarar Temple	5.95	SSW
			30.	Govimthavadi Temple	8.67	NW
			31.Vaikuntaperumal Temple32.Iravathanesvara Temple33.Mathangesvara Temple		4.28	SSE
					3.39	S
					4.41	S
			34.	Muktesvara Temple	4.15	SSW
7	Defense installations	No	Nil			
8	Densely populated or built-up area	Yes	Kancheepuram=2.18Km (S)			
			S. No	Hospitals	Dist. (~Km)	Direction
			1	Upgraded PHC	10.35	W
			2	Meenakchi Medical College & Research Centre	1.58	SE
			3	Aringer Anna Cancer Institute	0.96	SE
			4	ABCD Hospital	4.17	S
			5	Lakshmi Hospital	4.28	S
			6	Narbhavi Hospital	4.35	SW
	Areas occupied by sensitive man-made		7	Govt Hospital	5.44	SW
9	land uses (hospitals, schools, places of	No	8	Surva Clinic	4.45	S
	worship, community facilities)		9	CSI Hospital	4.58	S
			10	Manohar Hospital	4.53	SSE
			10	DKK Hospital	4.78	S
			12	Life Care Hospital	4.7	S
			13	Govt Dist HQ Hospital	4.78	S
			14	Vasan Eve Care Hospital	5.06	S
			15	Vengudi Hospital	5.15	S
			16	KH Hospital	6.35	SSW
1		1			0.00	

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1	17	PH Center GH 5.31				SSE
	18	PH Centre 14.44				SSW
S.M	No	Schools and collages	Distance	(~ <b>Km)</b>	Direc	ction
	1.	Park Global School	8	.2		NNW
	2.	P.T.Lee College of Engg & Tech	5.	95		NNW
	3.	Jai Mathaajee College of Engg	3.	44		NW
	4.	L&T Safety School	10.31         ENE           1.96         W           1.87         W		ENE	
	5.	Narasimma Pallavan Polytechnic College			W	
	6.	Pallavan College of Engg			W	
	7.	University College of Engg	0.	79		WSW
	8.	Janus CBSC School	7.	21		W
	9.	Govt School	9.	88		W
	10.	Sri Krishna College of Arts & Science	6.	14		WSW
	11.	Tirumalai Engg College	5.	67		WSW
	12.	Meenakchi Medical College	1.43 0.73			ESE
	13.	Bakthavachalam Polytechnic College				SE
	14.	SCSVMV University2.55Sri CSV Mahavidyalaya2.61Sri Sankara Arts & Science College2.99		55		SE
	15.			61		SE
	16.			99		SE
	17.	Govt Primary School	3.4	45		SSW
	18.	Cholan MHSS	3.	32		SSW
	19.	Dwarkesh Vidhyashram	3.	78		SSW
	20.	SSKV MHSS	4.	03		S
	21.	Guruksetra PS	4.	56		SSE
	22.	Mamallan MHSS	4.	63		SSE
	23.	Kanchi Global School	4.	56		SSW
	24.	Govt. School	6.	06		SSW
	25.	Sanskrit College	6.	31		SSW
	26.	Aadura Spl School	6.	73		S
	27.	Pachaiappas Womens College	6.	13		S
	28.	Bharathidasan MHSS	7.	68		SSW
	29.	Govt MS	7.	67		SE

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30.	Pachaiappas College for Men	7.42	SE
31.	Govt HSS	8.99	SE
32.	JSN School of Management	10.04	S
33.	Dusi Polytechnic College	10.75	S
34.	Kanchi Pallavan Engg College	11.64	SSW
35.	AMA College of Engg	13.38	SW
36.	Govt HS	14.29	SSW
S. NO	Places of worships	Listance(~Km)	Direction
1.	Sri Manikandeswara Swamy Temple	9.95	NW
2.	Najma – Masjid	10.12	W
3.	Sri Vijaya Raghava Perumal temple	9.98	W
4.	Ekambareswarar Temple	3.18	SSW
5.	Sri Pachai Vanna Perumal Temple	3.49	S
6.	Sri Pavala Vanna Perumal Temple	3.53	S
7.	Kailasanathar Temple	4.25	SW
8.	Pandavar Perumal Temple	3.87	SSW
9.	Jurahareswar Temple	3.87	SSW
10.	Kamachi Amman Temple	3.84	S
11.	Ulagalantha Perumal Temple	4.05	S
12.	Kachabeswarar Temple	4.21	S
13.	TMN Temple	4.89	SSW
14.	Perinba Prayer House	5.55	SW
15.	Bodhidharma Temple	4.42	SSE
16.	Sathyanateswarar Temple	5.21	SSE
17.	Perumal Temple	5.63	S
18.	Jerusalem Workship	6.31	SSW
19.	Panadudeeswarar Temple	5.97	S
20.	Thiruvelakai Temple	5.91	S

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Manikandeswar Temple5.95Narashima Temple7.85Sri Varadharaja Perumal Temple6.37Punniyakodeswarar Temple6.57Mosque10.74Thalapureeswarar Temple13.31Rani Amman Temple10.35Sri Ashtabujangaram Temple5.85Punadu deeswarar Temple5.95
Narashima Temple7.85Sri Varadharaja Perumal Temple6.37Punniyakodeswarar Temple6.57Mosque10.74Thalapureeswarar Temple13.31Rani Amman Temple10.35Sri Ashtabujangaram Temple5.85Punadu deeswarar Temple5.95
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. Sri Ashtabujangaram Temple 5.85
Punadu deeswarar Temple 5.05
. Govimthavadi Temple 8.67
. Vaikuntaperumal Temple 4.28
. Iravathanesvara Temple 3.39
. Mathangesvara Temple 4.41
. Muktesvara Temple 4.15
ko Common places Distance(~Km) Di
AJS Kalyana Mahal 6.32 W
Railway Station, Kanchipuram 2.99
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44
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Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76Head Post Office4.83
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76Head Post Office4.83Taluk Office5.53
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76Head Post Office4.83Taluk Office5.53District Collector Office5.87
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76Head Post Office4.83Taluk Office5.53District Collector Office5.87S.P. Office6.1
Railway Station, Kanchipuram2.99East Railwaystation, Kanchipuram3.78Police Station3.44Sringeri Saradha Peetam Kalyana Mandapam3.73Sub Post Office4.22Taluk Police Station4.65District Sports Stadium4.76Head Post Office5.53Taluk Office5.87S.P. Office6.1DIG Office6.46

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			15.	Anna Memorial House	6.26	SSE			
			S. No	Name of the Location	Distance(~km)	Direction			
			Rivers						
Areas containing important, high or scarce resources 10 (ground water resources, surface resources, forestry, agriculture, fis tourism, minerals)			1	Palar river	8.27	SSW			
	Areas containing important, high quality or scarce resources		2	Vegavati river	5.39	SW			
			Lakes						
	(ground water resources, surface	No	1.	Tamarai Tangal	0.02	W			
	resources, forestry, agriculture, fisheries,		2.	Tonneri Tank	12.06	E			
	tourism, minerals)		3.	Kaveripak N	14.47	WSW			
			4.	Pamba Kalvai	4.07	NNW			
			5.	Nathapettai lake	4.92	SE			
			6.	Mamandur Tank	12.62	SSW			
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	Nil						
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	No	The proj	ect location falls under Seismic Zo	one –III as per India Seism	ic Mapping			

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

### 3.5 Physical Conditions

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, Physiography
- Natural resources
- Climatic conditions, seismic zone characteristics and natural hazard

# 3.5.1 PIA District Profile

Kancheepuram district is situated on the northern East Coast of Tamil Nadu and is adjacent by Bay of Bengal and Chennai city and is bounded in the west by Vellore and Thiruvannamalai district, in the north by Thiruvallur district and Chennai district, in the south by Villuppuram district in the east by Bay of Bengal. It lies between 11° 00 to 12° 00' North latitudes and 77° 28 to 78° 50 East longitudes. The district has a total geographical area of 4393.37 Sq.Kms and coastline of 87.2 Kms. Kancheepuram, the temple town is the district headquarters. For administrative reasons, the district has been divided into 4 revenue divisions comprising of 13 taluks with 1137 revenue villages. For development reasons, it is divided into 13 development blocks with 633 Village Panchayats.

Source: https://kancheepuram.nic.in/about-district/

# 3.5.2 Climatic Conditions

Kancheepuramdistrict generally experiences hot and humid climatic conditions. The months between April and June are generally hot with temperatures going up to an average maximum of 36.6°C. In winter (December -January) the average minimum temperature is 19.8°C. The pre-monsoon rainfall is almost uniform throughout the district. The coastal regions receive more rainfall than the interior ones. Northeast and Southwest monsoons are the major donors, with 54% and 36% contribution each to the total annual rainfall. During normal monsoon, the district receives a rainfall of 1200mm. The normal annual rainfall over the district varies from 1105 mm to 1214mm.

Source: http://www.tnenvis.nic.in/WriteReadData/UserFiles/file/4\_KANCHEEPURAM\_TEMPERATURE.pdf

# 3.5.3 Natural Resources of Kancheepuram District

# 3.5.3.1 Flora & Fauna

The flora of this district has about 1150 species and infra specific taxa belonging to 131 families. The vegetation of the district is broadly grouped into five major types: i) Scrub jungles; ii) Psammophytic vegetation; iii) Halophytic vegetation; iv) Mangrove vegetation; and v) Aquatic vegetation. With regard to fauna, no special and distinguishing variety is available in the district. The herpotofauna (amphibian and reptiles) of the district comprises of 10 species of frogs and toads, two species of turtles, 11 species of lizards and 15 species of snakes. Almost all the representatives of the forms found commonly throughout the State of Tamil Nadu are found in this district as well. A list of water-birds, raptors, ground-birds, waders and treetop and bush birds are seen at the Vedantangal tank, its bund and the periphery. Migratory birds are also seen at Vedantangal tank.

Source: http://shodhganga.inflibnet.ac.in/bitstream/10603/182879/4/chap%203.pdf

#### 3.5.3.2 Forest Resources

The total forest area in the district is 23,586 ha spread in the interior regions of the district. In this 366.675 ha are Reserved Land. Much of the natural forests have been converted into man-made forests since the late 1950s. However, chunks of natural forests still exist in Hanumanthaputheri, Maiyur and parts of Kelambakkam R.F. which still support the original vegetation. Kancheepuram district has the singular distinction of having established woodlots in community (Poramboke) lands vested with the panchayat. Way back in 1961, the first ever community plantation- the precursor of the present day social forestry was raised near Sunguvarchatram in panchayat lands. The major forest product, the industrial pulpwood obtained from Eucalyptus plantations, is supplied for paper manufacturing. Thelops and tops left after extracting the pulpwood is sold as fuel wood. Fuel wood is extracted also from the Casuarina plantations. Cashew is the important Non Timber Forest Produce which contributes a major share of forest revenue.

Source: http://www.tnenvis.nic.in/files/KANCHEEPURAM%20.pdf

# 3.5.3.3 Irrigation

The chief irrigation sources in the area are the tanks, wells tube wells and canals. Tank irrigation is highest in Madurantakam block followed by thirukalukkundram, Acharapakkam, Sriperumpudur, Tirupporur, Walajabad, Chittamur, Lattur, Kattankolathur, Lathur, Kundrathur, Kancheepuram, St. Thomas Mount Blocks.

Source: http://cgwb.gov.in/district\_profile/tamilnadu/kancheepuram.pdf

# 3.5.3.4 Agricultural Resources

Agriculture is the main occupation of the people with 47% of the population engaged in it. Paddy is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals & Millets and Pulses are the other major crops cultivated. Palar River along with Tanks and wells are the main sources of irrigation in this district. Following table shows the details of agriculture in the district.

S. No	Classification	Area in Ha.			
1	Total Cropped area	1,98,543			
2	Net Area sown	1,60,090			
3	Area sown more than once	38,453			
Area Under Principal Crops					
1	Rice	1,45,966			
2	Millets and Cereals	1217			
3	Pulses	2,966			
4	Sugarcane	7586			
5	Ground nut	28,766			
6	Gingelly	912			
7	Cotton	53			

Source: http://www.tnenvis.nic.in/files/KANCHEEPURAM%20.pdf

# 3.5.3.5 Mineral Resources

Granite, stone quarry, sand quarry, silica sand and clay are the minerals available in Kancheepuram district. Following table shows the availability of mineral resources.

S. No	Name of Mineral         Estimated Availability (in metric tones)			
1	Silica sand	6,00,000		
2	White day	5,00,000		
3	Black granite	3,75,000		
4	Stone	75,00,000		
5	Sand	45,00,000		

# Table 3-2 Estimated Availability of Mineral resources

Source: http://www.tnenvis.nic.in/files/KANCHEEPURAM%20.pdf



Figure 3-4 Minerals Map of TamilNadu

# 3.5.4 Land Use & Land Cover

Total geographical area of Kancheepuram district is 4433.00Sq.km. Built up-Urban area is 210.87Sq.km. Details of land use/land cover statistics for kancheepuram district. Details of land use/land cover statistics for Kancheepuram district were given in **Table 3-3** and Land Use map of Kacheepuram districts given in **Figure 3-5**. Land Use pattern of Kancheepuram district (2011-12) is given in **Figure 3-6**.

S.No	Division of Land Use/Land Cover	Area in Sq.Km	Area in Hectares	Area in Acres	%
1.	Builtup, Urban	210.87	21087	52107.03	4.76
2.	Barren/ unculturable/ Wastelands, Scrub land	140.21	14021	34646.59	3.16
3.	Agriculture, Plantation	135.98	13598	33601.34	3.07
4.	Wetlands/Water Bodies, River/Stream/Canals	109.7	10970	27107.42	2.47
5.	Forest, Forest Plantation	70.89	7089	17517.27	1.60
6.	Barren/unculturable/ Wastelands, Salt Affected land	51.51	5151	12728.38	1.16
7.	Builtup, Mining	17.07	1707	4218.082	0.39
8.	Barren/ Unculturable/Wastelands, Barren rocky	2.97	297	733.9019	0.07
9.	Forest, Evergreen/Semi evergreen	0.75	75	185.3288	0.02
10.	Agriculture, Crop land	2578.67	257867	637202.3	58.17
11.	Wetlands/Water Bodies, reservoir/Lakes/ponds	606.67	60667	149911.2	13.69
12.	Builtup, Rural	202.69	20269	50085.71	4.57
13.	Wetlands/Water Bodies, coastal Wetland	91.13	9113	22518.68	2.06
14.	Forest, Deciduous	71.71	7171	17719.9	1.62
15.	Forest, Scrub Forest	67.19	6719	16602.98	1.52
16.	Agriculture, Fallow	50.63	5063	12510.93	1.14
17.	Barren/unculturable/Wastelands, Sandy area	23.15	2315	5720.481	0.52
18.	Barren/unculturable/ Wastelands, Gullied/Ravinous Land	1.2	120	296.526	0.03
	Total	4433.00	443300	1095414	100

 Table 3-3 District land use/land cover statistics for Kancheepuram district



Figure 3-5 Land Use Map of Kancheepuram District




## 3.5.4.1 Land Use Pattern of the Study Area

Total Project Study Area is 324.8 Sq. Km. Land Use /Land Cover statistics of 10 Km radius of the Study Area is given in **Table 3-4** and land Use pattern of Study area is given in **Figure 3-7** and LULC map of the Study area is given in **Figure 3-8**.

S.No	Description	%	Sq.Km	Acres	Hector	
1	Cropland	44.246	143.71	35511.46	14371	
2	Fallow land	24.184	78.55	19410.10	7855	
3	Reservoirs/Lakes/Ponds	20.711	67.27	16622.75	6727	
4	River/ Stream/ Canals	3.304	10.73	2651.44	1073	
5	Urban	an 3.491 11.34 2802.17				
6	Rural 2.127 6.91 1707		1707.50	691		
7	Scrub land	0.819	2.66	657.30	266	
8	Salt affected land	0.329	1.07	264.40	107	
9	Plantation	0.182	0.59	145.79	59	
10	Sandy Area	0.145	0.47	116.14	47	
11	Mining	0.462	1.5	370.66	150	
	Total	100	324.8	80259.704	32480	

Table 3-4 Land Use/Land Cover statistics of 10 Km radius of the Study Area



Figure 3-7 Land Use Pattern of the Study Area



Figure 3-8 Land use/Land cover map of the Study Area

## 3.5.5 Topography

The district has normal weather during winter but very hot in the summer. Rainfall depends mainly on the North East Monsoon. River Palar is the main river in the district, which is not perennial. Cheyyar and Vegavathy rivers are tributaries of Palar and join it at Thirumakkudal. Physical map of Tamilnadu state is given in **Figure 3-9.** Contour map of the Study area is given in **Figure 3-11**.

Source: http://dcmsme.gov.in/dips/2016-17/DIP.KANCHEEPURAM.2015.16.pdf



(Source: http://www.mapsofindia.com/Tamil Nadu)

Figure 3-9 Physical map of Tamil Nadu State



Figure 3-10Topo Map of Study area







Figure 3-11Contour map of Study Area

## 3.5.6 Geology of PIA District

Sedimentary rock type forms the dominant geological formation of kancheepuram district. hard rock type place 2<sup>nd</sup> which covers 30% of total geological formations. Granite, Gneiss, Chronockite, Sandstone, Sandy clay, Laterite, Alluvium and Marine deposits are the geological formations of the kancheepuram district. Geology map of the PIA district is given in**Figure 3-4** 

### 3.5.7 Geomorphology of PIA District

The prominent geomorphic units identified in the district through interpretation of satellite imagery are i) Chingleput-Tirukkalukkunram Surface (Erosional) ii) Palar Surface (fluvial and iii) Mamallapuram (Mahabalipuram) surface (Marina) etc. The elevation of the area ranges from 100 m amsl in the west to a sea level in the east. The major part of the area is characterised by an undulating topography with innumerable depressions, which are used as irrigation tanks. Three beach terraces ranging in elevation between 4 mark the coastal tract and 12 m with broad inter terrace depressions. The coastal plain displays a fairly low level or gently rolling surface and only slightly elevated above the local water surfaces on rivers. The straight trend of the coastaline is a result of development of a vast alluvial plain. There are a number of sand dunes in the coastal tract. The coastal landforms include estuarine tidal, mud flats or lagoons and salt marsh etc. Geomorphology of the study area is shown in **Table 3-5**.

S .No	Geomorphology	Area (Sq. km)	Area (Acre)	Area (Hectare)	Area %
1	Denudational Origin-Pediment-PediPlain Complex	96.81	23922.24	9681	29.81
2	Fluvial Origin-Active Flood Plain	2.56	632.59	256	0.79
3	Coastal Origin-Older Deltaic Plain	147.43	36430.69	14743	45.39
4	Waterbodies	79.64	19679.44	7800	24.01
	Total	324.8	80259.70	32480	100

#### Table 3-5 Geomorphology of the study area

Source: http://cgwb.gov.in/district\_profile/tamilnadu/kancheepuram.pdf



Figure 3-12Geomorphology Pattern of the Study Area



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Figure 3-13 Geomorphology Map of Study Area

#### 3.5.8 Hydrogeology of PIA district

The district is underlain by both sedimentary and fissured formations. The important aquifer system in the district are constituted by 1) unconsolidated and semi consolidated formations and 2) weathered, fissured and fractured crystalline rocks.

**Porous Formation Semi Consolidated formation:** Gondwana sandstones and shales and Tertiary mottled clays and sandstones represent the porous, semi-consolidated sediments. Ground water occurs under water table conditions to confined conditions in the intergranular spaces of sandstones, sands and in the bedding planes and thin fractures of shales. The ground water occurs under water table conditions and the depth of the wells ranges from 5 to 10 m bgl. The depth to water level ranged from 2.89 to 4.09 m bgl during May 2006 and 1.05 to 3.40 m.bgl during Jan'2007. The specific capacity of porus formation ranged from 1.00 to 80.00 lpm/m/dd.

**Ground Water in Unconsolidated Alluvium**: These unconsolidated formations occur mainly along the banks of Palar and Cheyyar rivers and the sand layers of this alluvium form the potential aquifer. Between Walajabad and Kancheepuram, small diameter dug wells tap the alluvium with depths ranging between 6 and 12 m bgl. The yield ranges from 25 to 35 m<sup>3</sup> /hr.Depth of filter point and dug cum bore wells ranges from 10 - 21 m bgl and yield is around 20 m<sup>3</sup> /hr. The yield of infiltration wells with varying depths of 5 - 12 m bgl is around  $35 \text{ m}^3$  /hr.In areas covered by the laterites; the ground water is developed by means of dug wells in the depth of 4 to 6 m bgl. Along the coast, windblown sand acts as aquifer zones and ground water extraction is by means of shallow dug wells with radial arms. The wells can sustain for 3 to 6 hours pumping and yield is around 15 m<sup>3</sup> /hour.

**Fissured Formation**: The movement of ground water is fissured crystallines is principally controlled by joints, fissured, fractures and their interconnections. Ground water in fissured crystallines is developed by means of dug wells, dug-cum-bore wells and bore wells. The wells range in depth between 6 and 17.00 m bgl. The depth to water level ranged from 3.50 – 8.34 m bgl during May 2006 and 1.32 - 7.53 m bgl during January 2007. The yield of the wells varies from 30 to 100 m3 /day (January-March). The depth of dug cum bore wells ranges from 25 to 45 m bgl. The depth of bore wells ranges up to 200 m bgl. The piezometric head ranges from 2.05 to 5.98 m bgl during May 2006 and 0.70 - 3.75 m bgl during Jan'2007 and the yield ranges up to 12 lps. The specific capacity in the fissured formation ranges from 10 -250 lpm/m/dd.

Source: http://cgwb.gov.in/district\_profile/tamilnadu/kancheepuram.pdf



Figure 3-14 Hydrogeology Map of PIA district

#### 3.5.9 Drainage Pattern in PIA District

Palar and Cheyyar are the important rivers. The drainage pattern in general is sub-dendritic and radial. All the rivers are seasonal and carry substantial flows during monsoon period. River Palar, a major river course, which drains this district originates from Western Ghats in Karnataka state, and discharges in Bay of Bengal near Pudupattinam. The Cheyyar, a tributary of Palar originates from the Jawadu Hills of Tiruvannamalai district. It has a northeasterly flow in Kancheepuram district and confluences with the Palar near Pazhaiyaseevaram. Other seasonal river like Korattalaiar and Tandiar drain this district partly on the northern and southern part respectively.Drainage map of the study area is given in **Figure 3-15**.

Source: http://cgwb.gov.in/district\_profile/tamilnadu/kancheepuram.pdf



### 3.5.10 Soils in PIA District

Soils have been classified into 1) clayey soil, 2) red sandy or red loamy soil 3) Red sandy brown clayey soil and 4) Alluvial soil. Of the above soils brown clayey soil is the most predominant, covering more than 71 percent of the areal extent of Kancheepuram district. Alluvial soils are found on the banks of Palar, Cheyyar and other rivers. The river alluvium is transported and is seen in coastal area of this district. Sandy coastal alluvial (arenacious soil) occurs along the seacoast as a narrow belt.

Source: http://cgwb.gov.in/district\_profile/tamilnadu/kancheepuram.pdf

#### 3.5.11 Cyclones & Depressions, Winds and Coastal Erosion in PIA District

Kancheepuram, being a part of the Indian subcontinent, experiences tropical cyclones which originate from the depression generated in the Bay of Bengal during the northeast monsoon season (October to December). It experiences an average of 2 - 3 cyclones annually. According to GSHAP (Global Seismic Hazard Map) data, Kancheepuram lies in a low to moderate hazard zone. As per the 2002 Bureau of Indian Standards (BIS) map, Tamil Nadu & Puducherry fall in Zones II & III. Historically, parts of this region have experienced seismic activity in the M5.0 range. A moderate earthquake occurred in the Bay of Bengal, off the coast of the union territory of Puducherry, on 25 September 2001 at 20:26 PM local time resulting in three deaths and minor damage to property in coastal Tamil Nadu.



# 3.5.12 Seismicity

As per the IS:1893 (Part-1) 2002 of Bureau of Indian Standards (BIS), the project location/study area falls in Zone III, which is categorised as a moderate risk least active (as per map) zone. The Earthquake Hazard map of India is shown in **Figure 3-17.** 



## 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 postmonsoon 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. It is used as input for air quality dispersion models for predicting the post project environmental scenario i.e. ground level concentrations due to proposed utilities like Boilers & DG sets, etc.

## 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 (primary data) was generated during (July - Sep 2018). 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 minambakam. The Climatological data for Chennai (minambakam)( $13^{\circ}$ ' N and  $80^{\circ}$  11' E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30-year period, 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 3-6**.

Month	Temp (°C)		Rainfall (mm)		Relative Humidity (%)		Station Level Pressure hPa		Mean Wind Speed	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total	No.of days	08:30	17:30	08:30	17:30	(kmph)	08:30	17:30
Jan	29.0	20.5	28.2	1.4	83	64	1013.6	1010.3	5.5	N	E
Feb	31.0	21.7	4.0	0.4	80	63	1012.2	1008.9	6.8	W	E
Mar	33.4	23.5	3.3	0.2	76	63	1010.7	1007.0	8.2	S	SE
Apr	35.7	26.1	11.2	0.7	71	66	1008.1	1004.1	10.4	SW	SW
May	38.0	27.7	46.6	1.7	63	62	1004.9	1001.3	11.1	S	SE
Jun	37.4	27.3	74.7	4.9	59	56	1003.6	1000.0	11.6	W	SE
Jul	35.4	26.2	130.5	7.7	67	60	1004.2	1000.7	9.9	W	S
Aug	34.5	25.6	145.8	8.4	71	63	1005.0	1001.4	9.4	W	S
Sep	34.2	25.3	169.2	8.5	74	68	1006.5	1002.9	7.9	W	SE

#### Table 3-6Climatological Summary – Chennai (Minambakkam)(A) (1971-2000)

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Month	Temp (°C)		Rainfall (mm)		Relative Humidity (%)		Station Level Pressure hPa		Level Mean Wind Speed		Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total	No. of days	08:30	17:30	08:30	17:30	(kmph)	08:30	17:30	
Oct	32.0	24.4	293.9	10.0	81	74	1008.7	1005.5	5.8	W	E	
Nov	29.7	22.9	361.6	10.4	83	74	1010.8	1008.0	5.7	N	NE	
Dec	28.6	21.5	173.0	6.2	82	69	1013.2	1010.2	5.9	N	NE	
Max.	38.0	27.7	293.9	10.4	83	74	1013.6	1010.3	11.6			
Min.	28.6	20.5	3.3	0.2	59	56	1003.6	1000.0	5.5	Prede	Predominant	
Avg. /Total.	33.2	24.4	1441.9	60.5	74	65	1008.5	1005.0	8.2	Wind E - West	Directions to East	

As per the above IMD Climatological Table 3-6 the observations drawn are the following.

- Daily maximum temperature is 38°c and the daily minimum temperature is 20.5°c were recorded in the months of May and January respectively.
- Maximum relative humidity of 83% were recorded in January and November month. Minimum relative humidity of 56% was recorded in the months of June month.
- Maximum and minimum rainfall of 361.6 mm and 3.3 mm was recorded in the months of November and March. Annual total rainfall recorded in the region was 1441.9 mm.
- Maximum and minimum mean wind is 11.6 kmph and 5.5 kmph was recorded in the months of June and January respectively. Annual wind predominant pattern is **west to east.**

## 3.6.4 Meteorological data during Study Period

The meteorological data of study period was used for interpretation of baseline status and to simulate the meteorological conditions for prediction of impacts in modeling studies. Meteorology Data for the Study Period (**July-September 2018**) is presented in **Table 3-7**.



## Figure 3-18 Wind Rose during study period (July to Sep 2018)

S. No	Parameter	Observation
		Max Temperature: 38ºC
1.	Temperature	Min Temperature: 22°C
		Avg Temperature: 30.5°C
2.	Average Relative Humidity	68.66%
3.	Average Wind Speed	3.9 m/s
4.	Predominant Wind Direction	South west

#### Table 3-7Meteorology Data for the Study Period (July to Sep 2018)

#### 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: 30.5 °C
- Average Relative humidity: 68.66 %
- Average Wind speed: 3.9 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 1750m during 6Am to 6Pm, the maximum recorded at 5Pm, July 2018. This is shown in the following **Figure 3-19**.



Figure 3-19 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
- 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 annual wind predominance. The annual wind predominance is from

West to East as per IMD. Wind rose during the period July to September 2018 is given in which depicts the annual wind pattern. Map showing the AAQ monitoring locations is given in **Figure 3-20**. Ambient Air Quality Monitoring Sampling locations are given in **Table 3-8**.

Station Code	Location	Type of Wind	Distance (km) from Project boundary	Azimuth Directions		
A1	Project Site	-	Within Site			
A2	Siruvakkam	c/w	3.94	Ν		
A3	Vedal	d/w	7.75	E		
A4	Kanchipuram(periya)	c/w	4.30	S		
A5	Netteri	c/w	3.88	SW		
A6	Sitterimedu	u/w	2.70	W		
A7	Sekkankulam	d/w	7.63	E		
A8	Ayyampettai	c/w	8.68	SSE		

Table 3-8 Details of Ambient Air Qua	ality Monitoring Locations
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Figure 3-20 Map showing the Ambient Air Quality 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. during Pre-Monsoon season (July-Sep 2018).  $PM_{10}$ ,  $PM_{2.5}$ ,  $SO_2$ ,  $NO_x$ , Pb,  $NH_3$ ,  $C_6H_6$ ,  $C_{20}H_{12}$ , As, NiTVOC, THC and other process-specific pollutants like Chlorine, HCl, HBr,  $H_2S$ , HF and  $CS_2$  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 3-9**.

S. No	Parameters	Analytical method	NAAQ stand	ards: 2009	Sampling Time
1	Sulphur Dioxide (SO <sub>2</sub> ), µg/m³	IS:5182(Part-2):2001 (Reaff:2006)	50 (Annual)	80(24 Hours)	24 Hours
2	Nitrogen Dioxide (NO <sub>2</sub> ), µg/m <sup>3</sup>	IS: 5182 (Part - 6): 2006	40 (Annual)	80 (24 Hours)	24 Hours
3	Particulate Matter (PM <sub>2.5</sub> ), µg/m <sup>3</sup>	IS: 5182 (Part - 23): 2006	40 (Annual)	60 (24 hours)	24 Hours
4	Particulate Matter (PM <sub>10</sub> ), µg/m <sup>3</sup>	IS:5182 (Part–23): 2006	60 (Annual)	100 (24 hours)	24 Hours
5	CO mg/m <sup>3</sup>	IS:5182(Part-10):1999 (Reaff:2006)	2 (8 hours)	4 (1hour)	8 Hours
6	Pbµg/m³	IS:5182(Part-22):2004 (Reaff:2006)	0.5(Annual)	1(24 hours)	24 Hours
7	Ο <sub>3</sub> , μg/m³	IS: 5182 (Part – 9): 1974	100(8hours)	180 (1hour)	8 Hours
8	NH₃, µg/m³	APHA(air) 2nd edition (Indophenol-blue method)	100(Annual)	400(24 hours)	8 Hours
9	Benzene, µg/m³	IS:5182(Part-11):1999 (RA:2009)	5 (Annual)	5 (Annual)	24 Hours
10	Benzo (a) pyrene, ng/m³	IS:5182(Part– 12):2004(RA:2009)	1 (Annual)	1 (Annual)	24 Hours
11	Arsenic, ng/ m <sup>3</sup>	APHA (air) 2nd edition	6 (Annual)	6 (Annual)	24 Hours
12	Nickel, ng/ m³	In house method (AAS method) Based on CPCB guidelines Volume 1	20(Annual)	20 (Annual)	

Table 3-9 Analy	vtical Methods for An	lysis of Ambient Ai	r Quality	V Parameters	
	yucai methoda ior An		i Quant	y i alameters	

### 3.7.2.1 Results and Discussions

The variations of the pollutants  $PM_{10}$ ,  $PM_{2.5}$ ,  $SO_2$ ,  $NO_2$ , CO, Pb,  $O_3$ ,  $NH_3$ ,  $C_6H_6$ ,  $C_{20}H_{12}$ , As & Ni are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November 2009. Ambient Air Quality Monitoring Data (July - September 2018) for the study area is given in **Table 3-10** and trends of measured ambient concentration in the study area were graphically represented in **Figure 3-21**.

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						Loca	tions			
Parameters	Conc.	NAAQ Standards	Project Site	Siruvakkam	Vedal	Kanchipuram (periya)	Netteri	Sitterimed u	Sekkankulam	Ayyampettai
			A1	A2	A3	A4	A5	A6	A7	A8
	Min.		50.3	42.3	49.3	54.2	44.1	51.2	38.4	42.3
$PM_{10}$ Conc.	Max.	100	71.2	63.9	64.2	68.7	59.7	60.2	67.4	66.2
(µg/m²)	Avg.	(24 Hours)	59.7	51.2	56.3	61.4	53.8	55.2	51.8	53.8
	98th 'tile		70.3	62.7	63.2	67.6	59.5	60	64.4	65.5
	Min.		25.8	18.9	23.4	21.2	24.6	23.4	23.4	24.1
PM <sub>2.5</sub> Conc.	Max.	60 (24 Hours)	35.1	34.6	29.4	35.7	31.6	33.8	31.8	32.4
(¤9)	Avg.		30.5	27.7	26.6	30.5	29.0	28.3	26.6	28.6
	98th 'tile		34.4	34.4	29.4	34.7	31.6	33.7	31.0	31.8
	Min.		5.0	7.6	6.6	10.6	5.6	7.9	7.6	8.8
SO <sub>2</sub> Conc.	Max.	80	10.3	13.5	13.4	18.2	14.4	15.7	15.7	12.6
(µg/m³)	Avg.	(24 Hours)	6.9	10.2	9.4	13.7	8.6	11.6	10.8	10.7
	98th 'tile	_	9.9	13.4	12.5	17.4	13.5	15.6	14.6	12.6
	Min.		24.8	20.4	19.8	24.6	17.6	20.1	16.8	20.1
NO <sub>2</sub> Conc.(µg/m³)	Max.	80	33.6	27.1	26.5	33.6	27.6	26.2	28.1	28.4
	Avg.,	(24 Hours)	28.2	24.3	23.6	29.2	23.6	22.4	21.0	23.4
	98th 'tile		32.8	27.0	26.4	33.0	27.1	25.3	27.9	27.8
Pb (µg/m³)	Avg.	1 (24 hour)	0.47	0.8	0.54	0.35	0.25	0.39	0.21	0.41
CO (mg/m³)	Avg.	4	0.46	0.65	0.24	BDL( DL 0.05)	BDL	0.27	BDL( DL 0.05)	0.44

 Table 3-10 Summary of the average baseline concentrations of pollutants

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						Loca	ations			
Parameters	Conc.	NAAQ Standards	Project Site	Siruvakkam	Vedal	Kanchipuram (periya)	Netteri	Sitterimed u	Sekkankulam	Ayyampettai
			A1	A2	A3	A4	A5	A6	A7	<b>A</b> 8
		(1hour)					(DL 0.05)			
O₃ (μg/m³)	Avg.	180 (1hour)	12.35	10.39	10.53	11.27	12.83	11.75	11.09 10.09	
C₀H₀ (µg/m³)	Avg.	5 (Annual)	2.1	BDL (1)	1.57	BDL (1)	BDL(1)	BDL (1)	BDL (1)	BDL (1)
C <sub>20</sub> H <sub>12</sub> (a) , (ng/m³)	Avg.	1 (Annual)	BDL(DL 1)	BDL(DL 1)	BDL(DL1)	BDL(DL 1)	BDL (DL 1)	BDL(DL 1)	BDL(DL 1)	BDL(DL 1)
As (ng/ m³)	Avg.	6 (Annual)	BDL (2)	BDL (2)	BDL (2)	BDL (2)	BDL (2)	BDL (2)	BDL (2)	BDL (2)
Ni (ng/m³)	Avg.	20 (Annual)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)	BDL (DL 10)
TVOC(µg/m³)	Avg.	-	0.08	0.074	0.068	0.068	0.095	0.077	0.058	BDL(DL 0.025)
THC (ppm)	Avg.	-	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)
NH₃ (µg/m³)	Avg.	400 (24hours)	5.6	6.0	5.3	5.2	6.7	6.3	7.4	5.8
Cl (µg/m³)	Avg.	-	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)	BDL (DL 145)
HCI (mg/m³)	Avg.	-	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)	BDL (DL 0.75)
HBr (mg/m³)	Avg.	-	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)	BDL (DL 0.70)
H₂S (µg/m³)	Avg.	-	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)	BDL (DL 6)
HF (mg/m³)	Avg.	-	BDL (DL 0.16)	BDL (DL 0.16)	BDL (DL 0.16)	BDL (DL 0.16)	BDL (DL 0.16)	BDL (DL 0.16)	BDL (DL 0.16)	BDL(DL 0.16)

Note: BDL (Below detection limit), DL (Detection limit)

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### 3.7.2.2 Observations

The ambient air quality has been monitored at 8 locations for 19 parameters including 12 parameters as per NAAQS, 2009 within the study area. The baseline levels ranged as  $PM_{10}(38.4-71.2\mu g/m^3)$ ,  $PM_{2.5}(18.9-35.7\mu g/m^3)$ ,  $SO_2$  (5.0-18.2 $\mu g/m^3$ ),  $NO_2(16.8-33.6\mu g/m^3)$ , CO (0.24-0.65 mg/m<sup>3</sup>) and some are BDL, all the parameters are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period.

## 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, rural and sensitive areas. Noise levels were recorded on an hourly basis for one complete day at each location using pre- calibrated noise levels. Sampling images and map noise showing the noise monitoring locations are given in **Figure 3-22**.

#### 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 **Table 3-11**.

S.	Location	Locat	Distance (km) from	Azimut Noi h di		Noise level in dB(A) Leq		PCB ndard	Environmental				
No	Location	Code	Project boundary	Directi on	Day	Night	Lday (Ld)	LNight (Ln)	Setting				
1	Project Site	N1	Within Site		65.3	60.0	75	70	Industrial				
2	Siruvakkam	N2	3.94	N	52.3	44.1	55	45	Residential				
3	Vedal	N3	7.75	E	51.9	42.4	55	45	Residential				
4	Kanchipuram (periya)	N4	4.30	S	59.1	48.3	65	55	Commercial				
5	Netteri	N5	3.88	SW	51.9	42.6	55	45	Residential				
6	Sitterimedu	N6	2.70	W	50.5	42.1	55	45	Residential				
7	Sekkankulam	N5	7.63	E	51.7	43.2	55	45	Residential				
8	Ayyampettai	N7	8.68	SSE	52.1	43.1	55	45	Residential				

Table 3-11 Day and Night Equivalent Noise Levels

## 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 levels was about 65.3 dB(A) and 60.0 dB(A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In commercial area, day time max noise levels were about 59.1 dB(A) and 48.3 dB(A) during night time, which is within prescribed limit by CPCB (65 dB(A) Day time & 55 dB(A) Night time).
- In residential area day time noise levels varied from 50.5 dB (A) to 52.3 dB (A) and night time noise levels varied from 42.1 dB (A) to 44.1 dB (A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels in Residential area noise are within the limit prescribed by CPCB (55 dB (A) Day time & 45 dB (A) Night time).

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Figure 3-22 Map showing the noise monitoring locations

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#### 3.9 Water Environment

#### 3.9.1 Surface Water Resources

The Palar and Cheyyar rivers are two major rivers draining in this region. Palar Riveroriginates from Nandi hills in Chikkaballapura district of Karnataka state and enter Kancheepuram district, Tamilnadu after flows through Karnataka and Andhra Pradesh.

#### 3.9.2 Surface Water Quality Assessment

Water quality monitoring and assessment can be used to determine ambient water quality, the extent and causes of a water quality problem, or to measure the effectiveness of best management practices being implemented in water system. Monitoring helps to determine the trends in the quality of the aquatic environment and the impact due to the release of contaminants, other anthropogenic activities, and/or by waste treatment operations (impact monitoring).To establish the baseline status of water environment, the representative sampling locations for surface water within a radial distance of 10Km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters is given in **Table 3-12**. Water sampling and map of sampling location are given in **Figure 3-23**.

S. No	Parameter Measured	Test Method
1	Colour	IS:3025 (Part- 4) 1983 (Reaff 2006)
2	Turbidity	IS 3025(Part - 10):1984
3	рН	IS:3025 (Part - 11): 1983 (Reaff: 2006)
4	Conductivity	IS:3025 (Part - 14): 1983 (Reaff: 2006)
5	Total Dissolve Solids	IS: 3025:1(Part - 16) 1984 (Reaff 2006)
6	Total Suspended Solids	IS 3025 (Part - 17) 1984 (Reaff 1996)
7	Alkalinity as CaCO3	IS:3025,1 (Part - 23) 1986 (Reaff 2009)
8	Total Hardness as CaCo3	IS:3025 (Part - 21) 1983 (Reaff 2006)
9	Sodium	IS:3025,5(Part - 45) 1993 (Reaff 2006)
10	Potassium	IS:3025,5(Part - 45) 1993 (Reaff 2006)
11	Calcium as Ca	IS 3025 (Part - 40):1991
12	Magnesium as Mg	IS 3025 (Part - 46) 1994
13	Carbonate	IS 3025, (Pt 23) 1986 (R 2006)
14	Bi carbonate	IS 3025, (Pt 23) 1986 (R 2006)
15	Chloride	IS 3025 (Part - 32):1988
16	Sulphate SO4	IS 3025(Part - 24):1986
17	Nitrate as NO3	ASTM (Part - 31)1978
18	Phosphate	IS 3025 (Pt 45) 1993 (R 2006)
19	Fluorides as F	IS 3025 (Part - 60):2008
20	% Sodium	IS 3025 (Pt 45) 1993 (R 2006)
21	SAR	IS 3025 (Pt 45) 1993 (R 2006)
22	RSC	IS 3025 (Part - 26):1986
23	Cyanide	IS 3025 (Part-27):1986
24	Arsenic	IS 3025:(Part-37):1988(Reaff 2009)
25	Boron	IS:3025 (Part - 57):2003

Table 3-12 Test methods used for the analysis of water quality parameters

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26	Cadmium	IS 3025 (Part - 41)1991
27	Chromium, Total	IS:3025 (Part - 52) 2003 (Reaff 2009)
28	Copper	IS:3025 (Part - 42)1992 (Reaff: 2009)
29	Iron	IS 3025 (Part - 53):2003
30	Lead	IS:3025 (Part - 47) 1994 (Reaff 2009)
31	Manganese	IS 3025:(Part - 59):2006
32	Mercury	IS 3025 (Part48):1994 RA 1999
33	Nickel	IS 3025:(Part-54):2003(Reaff 2009)
34	Selenium	IS 3025 Part (56)2003
35	Zinc	IS:3025 (Part - 49) 1994 (Reaff 2009)
36	Dissolved Oxygen	IS:3025 (Part - 38)1989 (Reaff 2009)
37	BOD	5210B APHA22nd Edn 2012
38	COD	IS:3025 (Part-58)-2006

# Table 3-13 Details of Surface water sampling locations

S. No	Name of the Water body	Location Code	Distance from Project Boundary	Direction from project boundary
1.	Near Project site	SW1	0.04	W
2.	Lake near Parandur	SW2	7.48	NNE
3.	Nirvalur	SW3	8.77	SSW
4.	Sekkankulam	SW4	9.04	E
5.	Neikuppam lake	SW5	9.51	SE
6.	Nathapettai Lake	SW6	5.93	SSE
7.	Palar River	SW7	9.41	S
8.	Vegavati river	SW8	5.76	SW



Figure 3-23 Map showing the surface water monitoring locations

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S.No.	Parameters	Units	SW1-Near Project site	SW2- Lake Near Parandur	SW3- Nirvalur	SW4- Sekkankulam	SW5- Neikuppa m Lake	SW6- Nathapettai Iake	SW7- Palar River	SW8- Vegavati River
1	Colour	Hazen Unit	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)
2	Turbidity	NTU	17	5	16	8	19	7	2	18
3	pH (at 25 °C)	-	7.98	7.87	8.32	6.65	7.16	8.41	7.91	7.01
4	Electrical conductivity	µS/om	410.3	863	410	442	512	601	542	599
5	Total Dissolved Solids	mg/l	253	544	251	272	315	377	336	371
6	Total Suspended Solids	mg/l	12	10	15	18	17	20	5	7
7	Total Alkalinity as CaCO3	mg/l	98.4	124.9	78.1	78.0	102.5	133.9	124.6	125.4
8	Total Hardness as CaCO3	mg/l	111.9	332.5	61.7	50.1	190.2	233.0	220.2	210.8
9	Sodium as Na	mg/l	24	31	28.6	57.6	24	29.6	20.6	31.2
10	Potassium as K	mg/l	3	10	20.7	2	2	3.1	4	4.5
11	Calcium as Ca	mg/l	25	45	11.2	10.02	44.09	41.2	40.08	42.3
12	Magnesium as Mg	mg/l	12	53.46	8.2	6.08	19.44	31.59	29.16	25.52
13	Carbonate #	mg/l	BDL(DL1)	BDL(DL1)	BDL(DL1)	BDL(DL1)	BDL(DL1)	BDL(DL1)	BDL(DL1)	BDL(DL1)
14	Bi Carbonate #	mg/l	120.0	152.4	95.3	95.2	125	163	152	153
15	Chloride as Cl	mg/l	40.46	162.82	53.4	61.3	62.55	65.3	53.99	65
16	Sulphate as SO4	mg/l	18.4	70	24.1	29.1	25.1	30.1	23.4	35.1
17	Nitrate as NO3	mg/l	2.74	6.1	2.14	2.54	3.82	2.3	3.82	4.5
18	Phosphate as	mg/l	BDL	BDL	BDL	0.13	BDL	1.65	0.22	BDL

 Table 3-14 Physicochemical parameters of surface water samples from study area.

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S.No.	Parameters	Units	SW1-Near Project site	SW2- Lake Near Parandur	SW3- Nirvalur	SW4- Sekkankulam	SW5- Neikuppa m Lake	SW6- Nathapettai Iake	SW7- Palar River	SW8- Vegavati River
	PO4#		(DL0.02)	(DL0.02)	(DL0.02)		(DL0.02)			(DL0.02)
19	Fluoride	mg/l	0.25	0.56	0.21	0.28	0.45	0.56	0.34	0.46
20	Cyanide	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)
21	Arsenic as As	mg/l	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL(DL 0.005)	BDL (DL 0.005)
22	Cadmium as Cd	mg/l	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)
23	Chromium as Cr	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)
24	Copper as Cu	mg/l	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)
25	Iron as Fe	mg/l	0.029	BDL (DL0.02)	0.036	0.03	0.04	BD (DL0.02)	0.03	BDL (DL0.02)
26	Lead as Pb	mg/l	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)
27	Manganese as Mn	mg/l	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)
28	Mercury as Hg	mg/l	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)	BDL (DL 0.0005)
29	Nickel	mg/l	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)
30	Selenium as Se	mg/l	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)
31	Zinc as Zn	mg/l	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	0.39	BDL (DL 0.1)
32	Oil and Grease	mg/l	4	4.5	5	6.8	4.5	7	5	4
33	Sulphide as S2-	mg/l	0.08	BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.04)	0.32	BDL (DL0.04)	0.08	BDL (DL0.04)
34	Dissolved oxygen	m	5.5	5.5	5.2	5.6	5.5	5.8	6.1	5.9

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S.No.	Parameters	Units	SW1-Near Project site	SW2- Lake Near Parandur	SW3- Nirvalur	SW4- Sekkankulam	SW5- Neikuppa m Lake	SW6- Nathapettai Iake	SW7- Palar River	SW8- Vegavati River
35	BOD,3 days at 27°C as O2 #	mg/l	3	3.7	3.5	3.6	3.5	3.4	3	3.2
36	Chemical oxygen demand as O2 #	mg/l	10	12.3	10.1	11.3	12.4	11.7	9.4	9.9

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## 3.9.2.1 Results and Discussions

- pH in the collected surface water samples varies between 6.65-8.41.
- The Total Dissolved Solids range from 251 mg/l to 544 mg/l, highest being in sample from SW-2 Lake near parandur while lowest in SW3- lake near Sivankoodal all the TDS values are well within limit except SW2 IS :2296:1992
- The chloride content in the surface water for study area ranges from 40.46mg/l to 162.82 mg/l highest from location SW2.
- The sulphate content in the surface water of the study area varies between 18.4mg/l – 70 mg/l.
- The Total hardness ranges between 50.1mg/l 332.5 mg/l, highest from SW2 i.e .lake near parandur and lowest from SW4 siruvedal lake
- The concentration of heavy metals likes As, Cd, Cr, Pb, Mn, Hg, Ni and Se at all the locations are below the limits of IS 2296:1992.

S.No	Parameters	Unit	Α	В	С	D	Е
1	Colour	Hazen	10	300	300		
2	Turbidity	NTU					
3	рН		8.5	8.5	8.5	8.5	8.5
4	Conductivity	µS/cm				1000	2250
5	Total Dissolved Solids	mg/l	500		1500		2100
6	Alkalinity as CaCO₃	mg/l					
7	Total Hardness as CaCo <sub>3</sub>	mg/l	300				
8	Calcium as Ca	mg/l	80.10				
9	Magnesium as Mg	mg/l	24.28				
10	Sodium	mg/l					
11	Potassium	mg/l					
12	Chloride as Cl	mg/l	250		600		600
13	Sulphate as SO4	mg/l	400		400		1000
14	Phosphate	mg/l					
15	Nitrate as NO <sub>3</sub>	mg/l	20		50		
16	Fluorides as F	mg/l	1.5	1.5	1.5		
17	Cyanide	mg/l	0.05	0.05	0.05		
18	Arsenic	mg/l	0.05	0.2	0.2		
19	Cadmium	mg/l	0.01		0.01		
20	Chromium, Total	mg/l	0.05	0.05	0.05		
21	Copper	mg/l	1.5		1.5		
22	Iron	mg/l	0.3		50		
23	Lead	mg/l	0.1		0.1		
24	Zinc	mg/l	15		15		

#### Table 3-15Surface water Standards

25	Manganese	mg/l	0.5				
26	Selenium	mg/l	0.01		0.05		
27	Mercury	mg/l	0.001				
28	Dissolved Oxygen	mg/l	6	5	4	4	
29	COD	mg/l					
30	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 Groundwater resources

The ground water resources have been computed jointly by Central Ground Water Board and State Ground & Surface Water Resources Data Centre (PWD, WRO, Government of Tamil Nadu) as on 31<sup>st</sup> March 2004. The computation of ground water resources available in the district has been done using GEC 1997 methodology. The shallow alluvial aquifer along Palar and Cheyyar rivers serve as an important source of drinking water between Kancheepuram to Ayyapakkam and Chingleput to Tambaram. The important tanks, which are being used for drinking water purposes, are given below:

1) Chembarampakkam tank 88.3 m<sup>3</sup>

- 2) Madurantakam tank 609.00 m<sup>3</sup>
- 3) Uttiramerur tank 958.80 m<sup>3</sup>
- 4) Tenneri tank1106.70 m<sup>3</sup>

The groundwater potential of the gross geographical area of the basin is estimated on prorata basis from the district-wise groundwater resources-2009 published by the Central Groundwater Board (CGWB) as given in **Table 3-16.** Depth to water level during Pre Monsoon & Post Monsoon for kancheepuram District, Tamil Nadu, is given in **Figure 3-24**. The status of categorization of Sriperumbudur Firka as on March 2013 is Safe (>70%).

Attribute	Potential /Quantity
Net Groundwater Availability (in MCM)	1055.25
Existing Gross Groundwater draft for all users (in MCM)	694.19
Stage of Groundwater development (in %)	66 %
Categorization of District	Safe

#### Table 3-16 Groundwater Potential in Kancheepuram district

Source: (<u>http://www.twadboard.gov.in/twad/co</u>& http://www.twadboard.gov.in/twad/kancheepuram)


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## 3.9.3.1 Groundwater 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 **Table 3-17** and **Table 3-18**. Map showing the groundwater monitoring locations are given in **Figure 3-25**.

Station	Location	Distance (km) from	Azimuth				
Code		Project boundary	Directions				
GW1	Project Site	Near to Site					
GW2	Siruvakkam	3.94	Ν				
GW3	Vedal	7.75	E				
GW4	Kanchipuram (periya)	4.30	S				
GW5	Netteri	3.88	SW				
GW6	Sitterimedu	2.70	W				
GW7	Sekkankulam	7.63	E				
GW8	Ayyampettai	8.68	SSE				

 Table 3-17 Details of Groundwater Quality Monitoring Locations



Figure 3-25 Map showing the groundwater monitoring locations

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S.No	Parameters	Units	IS 10500: 2012 Acceptab le Limit	GW-1 Project Site	GW-2 Siruvakka m	GW-3 Vedal	GW-4 Kanchipura m (periya)	GW-5 Netteri	GW-6 Sitterimedu	GW-7 Sekkankula m	GW-8 Ayyampett ai
1	Colour	Haze n Uhit	5	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)	BDL(DL5)
2	Turbidity	NTU	1	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)	BDL (DL0.1)
3	pH (at 25 °C)	-	6.5-8.5	7.7	7.98	7.87	7.87	7.42	8.04	7.82	7.2
4	Electrical conductivity	µS∕c m		1256	1321	1793	1525	1865	1945	963	1207
5	Total Dissolved Solids	mg/l	500	854	876	1218	1014	1235	1310	591	754
6	Total Suspended Solids	mg/l		BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)
7	Total Alkalinity as CaCO3	mg/l	200	131	123	139	123	143	156	123	148
8	Total Hardness as CaCO3	mg/l	200	330	241	410	220	611	581	200	360
9	Sodium as Na	mg/l		107	138	204	180	187	297	69	95
10	Potassium as K	mg/l		7	10	14	16	17	21	5	7
11	Calcium as Ca	mg/l	75	72.14	52.06	76.15	40.08	120.24	112.22	40.08	72.14
12	Magnesium as Mg	mg/l	30	36.45	27.01	53.46	29.16	75.33	72.9	24.3	43.74
13	Carbonate #	mg/l		BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)	BDL (DL1)
14	Bi Carbonate #	mg/l		160	150	170	150	175	190	150	180
15	Chloride as Cl	mg/l	250	222.7	247.03	425.6	265.24	385	421	143.52	197.95
16	Sulphate as SO4	mg/l	200	166.28	167.91	162.82	238.19	162.47	174.0	98.21	84.18
17	Nitrate as NO3	mg/l	45	5.82	5.22	6.1	6.14	5.8	6.28	5.02	5.42

Table 3-18 Physico chemical analysis of Ground water samples from study area

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S.No	Parameters	Units	IS 10500: 2012 Acceptab le Limit	GW-1 Project Site	GW-2 Siruvakka m	GW-3 Vedal	GW-4 Kanchipura m (periya)	GW-5 Netteri	GW-6 Sitterimedu	GW-7 Sekkankula m	GW-8 Ayyampett ai
18	Phosphate as PO4 #	mg/l	-	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)
19	Fluoride	mg/l	1	0.52	0.49	0.56	0.58	0.52	0.54	0.48	0.49
20	Cyanide	mg/l	0.05	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)
21	Arsenic as As	mg/l	0.01	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)
22	Cadmium as Cd	mg/l	0.5	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)
23	Chromium as Cr	mg/l	0.003	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)
24	Copper as Cu	mg/l	0.05	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)
25	Iron as Fe	mg/l	0.05	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)
26	Lead as Pb	mg/l	0.3	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)
27	Manganese as Mn	mg/l	0.01	BDL (DL0.05)	BDL (DL0.05)	BDL(DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)
28	Mercury as Hg	mg/l	0.1	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)	BDL (DL0.001)
29	Nickel	mg/l	0.001	BDL (DL0.05)	BDL (DL0.05)	BDL(DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)	BDL (DL0.05)
30	Selenium as Se	mg/l	0.02	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)	BDL (DL0.005)
31	Zinc as Zn	mg/l	0.01	BDL (DL 0.1)	BD L(DL 0.1)	BDL (DL 0.1)	0.224	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)	BDL (DL 0.1)
32	Sulphide as S2-	mg/l		BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.04)	BDL (DL0.02)	BDL (DL0.02)
33	Oil and Grease	mg/l		BDL(DL4)	BDL(DL4)	BDL(DL4)	BDL(DL4)	BDL(DL4)	BDL(DL4)	BDL(DL4)	BDL(DL4)

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