

Environmental Impact Assessment Report

for

Proposed Expansion of PCBL (TN) Limited from 550 to 675 TPD of Different grades of Carbon Black and 36 MW Waste Heat Recovery based Cogeneration Captive Power plant

at

**Thervoy Kandigai Village, Tiruvallur District,
Tamil Nadu**

Project/Activity Sl. No. 5(e), Category (A)



Project Proponent
PCBL (TN) Limited



Environmental Consultant
ABC Techno Labs India Pvt Ltd.



April 2024



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Project Proponent Declaration

[in compliance with MoEF Office Memorandum No. J-11013/41/2006-IA.II (I) dated 04.08.2009]

We, M/s. PCBL (TN) Limited proposes the expansion of existing plant of production capacity from 550 to 675 TPD of Different grades of Carbon Black at Thervoy Kandigai Village, Tiruvallur District, Tamil Nadu. The Proposal requires prior EC under EIA Notification under Sl. No.5(e)-Category 'A', as amended. Accordingly, PCBL (TN) Limited has filed the ToR Application to MoEF&CC on 07.03.2024. The Proposal was granted for auto generated ToR vide F. No. IA-J-11011/95/2024-IA-II(I) dated 14.03.2024.

The EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including Sector-20 (Petrochemical based processing) for Category 'A' by the National Accreditation Board for Education & Training (NABET), Quality Council of India vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with Validity till 16.11.2025 (Sl. No. 4 of QCI/NABET List dated 26.04.2024). The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.05.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (MoEF&CC) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

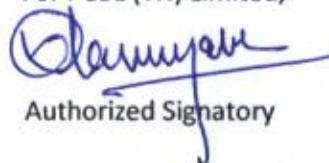
The Environmental Impact Assessment (EIA) Report have been prepared in compliance with the awarded ToRs and as per the generic structure proposed in EIA Notification 2006 and submitted. The data submitted in the EIA Report are factually correct.

Date : 03 May 2024

Place : Thiruvallur



For PCBL (TN) Limited,



A handwritten signature in blue ink, appearing to read "Balaji".

Authorized Signatory

PCBL (TN) Limited

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Environmental Impact Assessment Report for Proposed
Expansion of PCBL (TN) Limited from 550 to 675 TPD of
Different grades of Carbon Black at Thervoy Kandigai
Village, Tiruvallur District, Tamil Nadu



EIA Consultant Undertaking

[in compliance with MoEF Office Memorandum No. J-11013/41/2006-IA.II (I) dated 04.08.2009]

M/s. PCBL (TN) Limited proposes the expansion of existing plant of production capacity from 550 to 675 TPD of Different grades of Carbon Black at Thervoy Kandigai Village, Tiruvallur District, Tamil Nadu.

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The Environmental Impact Assessment (EIA) Report have been prepared in compliance with the awarded ToRs and as per the generic structure proposed in EIA Notification 2006 and submitted. The data submitted in the EIA Report are factually correct.

For ABC Techno Labs India Private Limited,

Date : 03.05.2024

Place : Chennai

Authorized Signatory



Disclosure of Experts

Details as per Schedule of EIA Notification 2006, as amended till date

Name of the Project EIA report for the Proposed Expansion of PCBL (TN) Limited from 550 to 675 TPD of Different grades of Carbon Black at Thervoy Kandigai Village, Tiruvallur District, Tamil Nadu

Schedule as per EIA notification 2006 5 (e)

Category A

NABET Sector No. 20

Declaration:

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

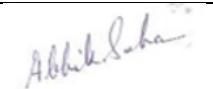
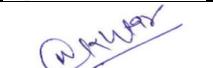
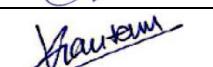
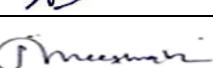
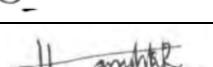
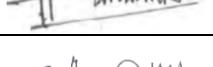
EIA Coordinator (EC)

Name : Mohit Kumar Ray

Signature 

Period of involvement : May 2021 - Feb 2024

Contact information : abc@abctechnolab.com

Sl.No.	Functional Areas	Name of the Expert/s	Involvement (Period)	Signature
1	WP	Vaishnavi Dhinakaran	May 2021-Feb-2024	
2	SHW			
3	AP	Abhik Saha	May 2021-Feb-2024	
4	EB			
5	AQ	Mohammad Akhtar	May 2021-Feb-2024	
6	RH	Vinod Kumar Gautam	May 2021-Feb-2024	
7	HG	Dr. Veezhinathan Subramaniyam	May 2021-Feb-2024	
8	NV	Haneesh KR	May 2021-Feb-2024	
9	LU	Dr. N Rama Krishnan	May 2021-Feb-2024	
10	SE			



Declaration by the head of the Accredited Consultant Organization

I, Mr. G. Murugesh, hereby confirm that the above-mentioned experts prepared the EIA/EMP Report for the proposed Expansion of PCBL (TN) Limited from 550 to 675 TPD of Different grades of Carbon Black at Thervoy Kandigai Village, Tiruvallur District, Tamil Nadu

I also confirm that ABC Techno Labs India Pvt. Ltd. shall be fully accountable for any misleading information mentioned in this statement.

Signature

A handwritten signature in blue ink, appearing to read "G. Murugesh".

Name

: Mr. G. Murugesh

Designation

: Chairman & Managing Director

Name of the EIA Consultant Organization

: ABC Techno Labs India Private Limited.

NABET Certificate No. & Issue Date

: NABET/EIA/2225/RA0290 dated 11.06.2023 with Validity till 16.11.2025



ToR compliance matrix

In order to assess, the environmental impacts due to the proposed expansion. Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP) report has been prepared.

As a part of the process, the application (Form-1 & PFR) submitted for the proposed expansion project was considered by the Expert Appraisal Committee (EAC) and issued the auto generated Terms of Reference (ToR). The Committee has suggested the specific and standard Terms of Reference (ToR) for preparation of the EIA report vide its File No. IA-J-11011/95/2024-IA-II(I) and ToR identification no. TO24B2302TN5275112N dated 14.03.2024.

The ToR condition stipulated by MoEF&CC and its status of compliance are as follows;

SI.No.	ToR Conditions	Compliance
		Specific ToRs
1.	Details on Requirement of raw material, its source of supply and storage at the plant	The raw material required are Carbon Black Feed Stock, Molasses, Potassium Nitrate/Potassium Carbonate/ Hydrochloric Acid/Caustic Soda, Water Treatment Chemicals, Light Diesel Oil/High Speed Diesel. A major portion of CBFS is imported and a minor quantity occasionally met by indigenous. The other raw materials are indigenous. The CBFS and HSD are stored in cylindrical tanks as per OISD norms. The rest of the chemicals are mainly for water treatment and stored at respective area within the storage building.
2.	Complete process flow diagram for all products with material balance	Complied. Refer Figure 2.5 and 2.6 for Flow diagram and Material Balance respectively.
3	Details on requirement of auxiliary chemicals, solvents, catalysts, solvents, catalysts, reactors and utilities to support the unit processes	The auxiliary chemicals are potassium nitrate and carbonate. The HCL and caustic soda is used for DM water. The quantity is mentioned in Table 2.4 .
4.	Brief description of equipments for various process	The production of carbon black needs equipment like reactors, dryer, waste heat recovery boilers, preheaters, Turbo generators, CPP cooling towers, bag filters, ETP, STP, RO with MEE to ensure ZLD, pumps for raw material



SI.No.	ToR Conditions	Compliance
		handling and for utilities. For details refer Table 2.3 .
5.	Details of proposed source – specific pollution control schemes and equipments to meet the national standards.	Emission sources and control measures are given in Table 2.7 . Mainly bag filters are used for APC along with waste heat recovery boilers. ETP, RO and MEE are ensured for ZLD.
6.	Details on VOC emission control system from vents, stacks, fugitive emissions and flare management, etc.,	VOCs are controlled in the reactor itself. Fugitive emissions are not expected as the process is in closed loop pneumatically controlled. For Flare, individual flare stack is provided as a part of process requirement.
7.	Details on proposed LDAR protocol	Leak detection and repair (LDAR) is system of procedure a facility utilizes to locate repair leaking components including valves, pumps, tanks and reactors in order to minimize the emission of fugitive volatile organic components and hazardous air pollutants and connected to DCS.
8.	Ambient air quality should include total hydrocarbon, methane and non-methane hydrocarbon & VOC and VCM (if applicable)	AAQ covers total hydrocarbon, methane and non-methane hydrocarbon & VOC and the results are given in Table 3.10 .
9.	Risk assessment & Disaster Management plan <ul style="list-style-type: none"> • Identification of hazards • Consequence analysis • Measures for mitigation of risk 	LSIR contour has not generated as the risk level is low i.e., 1E-09 per year. There will be no significant community impacts or environmental damage consequences; and The hazardous event scenarios and risks in general at plant adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System. F-N curve is not generated as effect is not reaching off-site population However, Jet Fire, Flash Fire, Pool Fire have been conducted and enumerated in the Chapter 7 under Section 7.1 .



Sl.No.	ToR Conditions	Compliance	
		Standard ToRs	
1. Executive summary			
1.1	Executive summary	Complied	
2. Introduction			
2.1	Details of EIA consultant including NABET accreditation	The EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including Sector-20 (Petrochemical based processing) for Category 'A' by the National Accreditation Board for Education & Training (NABET), Quality Council of India vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with Validity till 16.11.2025.	
2.2	Information about the project proponent	Mr. Rakesh Kumar Nayak, Whole time Director, Plot No. A-7, SIPCOT Industrial Park, Thervoy Kandigai village, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu - 601202 9674412341, pcbltn@rpsg.in	
3. Project Description			
3.1	Cost of project and time of completion	The Project Cost for expansion is estimated to be about Rs. 360.00 Crore. The project is planned to be completed within 18 months from the date of EC.	
3.2	Products with capacities for the proposed project. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any	Earlier EC for 550 TPD is enclosed as Annexure - I . The details of expansion and existing products are given in Table 1.2 .	
3.3	List of raw materials required and their source along with mode of transportation	The raw material required are Carbon Black Feed Stock, Molasses, Potassium Nitrate/Potassium Carbonate/ Hydrochloric Acid/Caustic Soda, Water Treatment Chemicals, Light Diesel Oil/High Speed Diesel. A major portion of CBFS is imported and	



Sl.No.	ToR Conditions	Compliance
		a minor quantity occasionally met by indigenous. The other raw materials are indigenous and transported by roads with the specific entry gates.
3.4	Other chemicals and materials required with quantities and storage capacities	No other chemicals other than list given in Sl.No. 3.3 .
3.5	Details of emissions, effluents, hazardous waste generation and their management. Requirement of water, power, with source of supply, status of approval, water balance diagram, man power requirement (regular and contract).	There are 27 nos. of. Stacks including flare and CPP stacks. Emissions details are shown in Table 4.5 . Hazardous waste generation are shown in Table 2.8 and disposed through TSDF. Total power requirement after expansion is ~11.8 MW from CPP. Water Balance is shown as Figure 2.8 and the requirement is 3737 KLD. Total manpower requirement after expansion is 360 (230 P + 130 C).
3.6	Project description along with major equipments and machineries, process flow sheet (quantitative) from raw materials to products to be provided	The production of carbon black needs equipment like reactors, dryer, waste heat recovery boilers, preheaters, Turbo generators, CPP cooling towers, bag filters, ETP, STP, RO with MEE to ensure ZLD, pumps for raw material handling and for utilities. Refer Figure 2.5 and 2.6 for PFD and Mass balance respectively.
3.7	Hazard identification and details of proposed safety systems	The plant is covered with fire hydrant as per the requirement of PESO and OISD norms. LDAR protocol is adopted. The plant is connected with DCS. Automatic package machines are provided.
3.8	Expansion/Modernization proposals: a. Copy of all the environmental clearance(s) including amendments thereto obtained for the project from MOEFF/SEIAA shall be attached as an annexure. A certified copy of the latest monitoring report of the regional office of the Ministry of Environment and Forests as per	Copy of existing EC, CTE & CTO is enclosed as Annexure I & II . CCR from IRO is attached as Annexure III .



Sl.No.	ToR Conditions	Compliance
	<p>circular dated 08th june,2022 on the status of compliance of conditions stipulated in all the existing environmental clearances including amendments shall be provided. In addition, status of compliance of consent to operate for the ongoing/existing operation of the project from SPCB shell be attached with the EIA-EMP report.</p> <p>b. In case of existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of EIA Notification 1994 and/or EIA notification 2006 shall be provided. Copies of consent to establish/No Object certificate and Consent to operate (in case of units operating prior to EIA notification 2006, CTO and CTO of FY 2005 – 2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shell be submitted.</p>	<p>Not Applicable. EC Obtained</p>
4. Site Details		
4.1	Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	<p>The proposed expansion project has planned to be setup within the SIPCOT Industrial Complex within the existing PCBL (TN) Limited complex, Thervoy Kandigai Village, Gummidi poondi Taluk, Tiruvallur District, of Tamil Nadu State covering an area of 62.46 acres.</p> <p>The proposed project is expansion. Hence other alternative sites are not applicable.</p>
4.2	A toposheet of the study area of radius of 10 km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-	<p>Toposheet covering 10 km radius in 1:50,000 scale is shown as Figure 1.3. The Eco sensitive map is shown as Figure 1.4. No ecological sensitive</p>



SI.No.	ToR Conditions	Compliance																					
	sensitive areas and environmentally sensitive places)	zone are identified within 10 km radius other than R.F.																					
4.3	Co-ordinates (lat-long) of all four corners of the site. Google Map-Earth downloaded of the project site. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">SI.No.</th><th style="text-align: center;">Latitude</th><th style="text-align: center;">Longitude</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td><td style="text-align: center;">13°21'49.06"N</td><td style="text-align: center;">79°58'42.93"E</td></tr> <tr> <td style="text-align: center;">2.</td><td style="text-align: center;">13°21'49.01"N</td><td style="text-align: center;">79°58'59.24"E</td></tr> <tr> <td style="text-align: center;">3.</td><td style="text-align: center;">13°21'53.45"N</td><td style="text-align: center;">79°58'59.27"E</td></tr> <tr> <td style="text-align: center;">4.</td><td style="text-align: center;">13°21'53.34"N</td><td style="text-align: center;">79°59'7.54"E</td></tr> <tr> <td style="text-align: center;">5.</td><td style="text-align: center;">13°21'39.40"N</td><td style="text-align: center;">79°59'7.60"E</td></tr> <tr> <td style="text-align: center;">6.</td><td style="text-align: center;">13°21'39.17"N</td><td style="text-align: center;">79°58'43.00"E</td></tr> </tbody> </table> <p>Refer for Google earth imagery in Figure 1.2. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities are shown as Figure 2.2. Industrial area /Estate /Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate is shown as Figure 2.1.</p>	SI.No.	Latitude	Longitude	1.	13°21'49.06"N	79°58'42.93"E	2.	13°21'49.01"N	79°58'59.24"E	3.	13°21'53.45"N	79°58'59.27"E	4.	13°21'53.34"N	79°59'7.54"E	5.	13°21'39.40"N	79°59'7.60"E	6.	13°21'39.17"N	79°58'43.00"E
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4.4	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of Plantation/greenbelt, in particular.	Greenbelt photographs are enclosed as Figure 2.11 .																					
4.5	Land use break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc. shall be included. (not required for industrial area).	The project site of 62.46 acres falls in SIPCOT Industrial Complex.																					
4.6	A list of major industries with name and type within study area (10km radius) shall be incorporated.	The project falls in Industrial area and the industrial units are given in Table 7.22 .																					
4.7	Details of Drainage of the project up to 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be	Refer for Drainage Map as Figure 3.8 . There is no major river falls within 1 km. As the river is not falling within 1 km other details are not applicable.																					



SI.No.	ToR Conditions	Compliance
	provided. (Mega green field projects).	
4.8	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	The land lease is given by SIPCOT for 99 years.
4.9	R&R details in respect of land in line with state Government policy.	Not Applicable as the land belongs to SIPCOT.
5. Forest and wildlife related issues (if applicable):		
5.1	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)	Not Applicable
5.2	Land use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha).	Not Applicable
5.3	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not Applicable
5.4	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden- thereon	Not Applicable
5.5	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area	During the baseline survey, there is no Schedule-I fauna identified in the plant area. However, the schedule – I fauna like Oriental Honey Buzzard, Black Kite, Shikra, Indian Peafowl and Indian Flapshell Turtle have been



Sl.No.	ToR Conditions	Compliance
		identified in the buffer zone which is about 9.5 km from the proposed site. The conservation plan for the same is prepared and enclosed as Annexure IV to this EIA report which will be scrutinized and vetted in consultation with forest department.
5.6	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.	Not Applicable
6. Environmental Status		
6.1	Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	This height is determined by the observation of the atmospheric temperature profile. The inversion level during March to May ranges from 700m at 8 A.M. and 1000m at 5 P.M. For detail refer Figure 3.4, 3.5 & 3.6 .
6.2	AAQ data (except monsoon) at 8 locations for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, VOC, NMHC and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	AAQ data was carried out valid up to May 2024. Additional data have been collected and included for a Month in report and the data is being continued for balance three months.
6.3	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Refer Annexure V for Raw Data. Min., Max., Average and 98% values are given in Table 3.10 .
6.4	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight	As there is no river surface water from lakes have been collected and compared with best of use norms as per



SI.No.	ToR Conditions	Compliance
	locations as per CPCB/MoEF&CC guidelines.	CPCB. For surface water results refer Table 3.17 .
6.5	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.	No.
6.6	Ground water monitoring at minimum at 8 locations shall be included.	Included. Refer Table 3.16 compared with IS 10500 and all the parameters are within the permissible limits.
6.7	Noise levels monitoring at 8 locations within the study area.	Monitored. Refer Table 3.13 . The recorded noise levels are within the limits.
6.8	Soil Characteristic as per CPCB guidelines.	Carried out. Refer Table 3.19 for results.
6.9	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	The traffic study was carried out at one location. PCBL (TN) Limited is located near to Thervoy kandigai village about 1.53km in the Northeast direction on SH - 51 which is leading to Puthur. Since the plant is located on the isolated path major traffic is not expected. From the study, the density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period February 2024. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed expansion of PCBL plant, the traffic density will have negligible increase and there will be no change in V/C ratio. The existing PCU per day volume of SH-51 is about 15441 against the capacity of 36000 PCU per day.
6.10	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule- I fauna are found within the study area, a Wildlife	The detailed study revealed dominance of <i>Cocos nucifera</i> , <i>Azadirachta indica</i> , <i>Acacia auriculiformis</i> , <i>Acacia nilotica</i> , etc. Totally 38 species of trees found in the study area along with 21 shrub species, 21 herb species and 17 climber species. <i>Prosopis juliflora</i> ,



Sl.No.	ToR Conditions	Compliance
	Conservation Plan shall be prepared and furnished.	<p><i>Lantana camara, Achyranthes aspera, Datura metel</i> were found to be the predominant species among shrub. Among the herbaceous species <i>Euphorbia hirta, Aerva lanata, Ageratum conyzoides, Boerhavia diffusa, Eclipta prostrata</i> etc. found to be abundant.</p> <p>Livestock like cattle, buffalo, goat, poultry, duck and pig are reared for dairy products, meat, egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area. Species recorded/reported from the study area, out of which 5 species belongs to Schedule-I, 38 species belongs to schedule-II, 1 species belongs to Appendix-II and 1 species belongs to Appendix-III, and there are no endangered, threatened wild animal species in the study area.</p> <p>For Schedule I fauna, the conservation plan is given in Annexure IV.</p> <p>To assess the planktonic profile of Phytoplankton and Zooplankton, 3 water samples from Kakkavakkam Lake, Arani Lake and Uttukkottai Eri have been collected. About 20 macrophytes have been observed in study area and about 21 phytoplanktons, 15 zooplanktons and 21 fish species were also observed.</p>
6.11	Socio-economic status of the study area.	<p>As per 2011 census the study area comprising of 1,01,222 persons inhabited in the 10km radius study area. The distribution of population in the study area males and females constitute about 49.29% and 50.71%. The nearest village is Thervoy kandigai and the population details are total - 3,122 of which 1,558 are male while 1,564 females.</p>

7. Impact and Environment Management Plan



SI.No.	ToR Conditions	Compliance
7.1	<p>Assessment of ground level concentration of pollutants from the stack emission based on site specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.</p>	<p>AERMOD is used for cumulative ground level concentrations. The GLC and isopleths are shown in Figure 4.2, 4.3 & 4.4 and Table 4.7 which covers on the street map and nearby habitation.</p>
7.2	<p>Water Quality modeling - in case of discharge in water body</p>	<p>Not Applicable. ZLD is adopted.</p>
7.3	<p>Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor cum- rail transport shall be examined.</p>	<p>The no. of trucks for transporting raw material of 34,204 MT/month is estimated to be 696 trucks. The estimated emissions due to transportation of raw material via. roads are given in Table 4.6.</p>
7.4	<p>A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.</p>	<p>The total requirement of water after proposed expansion is about 3953 KLD. Out of this, about 683 KLD will be recycled within the process. The estimated domestic water requirement is estimated to be about 57 KLD. The approval obtained for fresh water requirement is about 3737 KLD which will be met from SIPCOT. The entire amount of 683 KLD of wastewater being recirculated into system after primary treatment with the help of RO and MEE to ensure ZLD. For further</p>



SI.No.	ToR Conditions	Compliance
		details refer Chapter 2 under Section 2.11.1.
7.5	Details of stack emission and action plan for control of emissions to meet standards.	The various air pollution control measures as envisaged for the project are suitable stack height for the Boilers and DG emissions, Bag filters, Venturi scrubbers. The process off gases after recovering the heat with the help of heat exchangers will be passed through bag filters. The cleaned tail gas as a fuel will be used in the power plant. During emergency situation related to process (during startup or change of fuel), the process gas will be scrubbed by Venturi scrubbers and the cleaned gas will be released into atmosphere with the help of stack attached with Venturi scrubbers. To meet the dispersion requirement about 27 No. of stacks ranging height from 20 to 90m are provided at plant. For further details refer Table 2.7.
7.6	Measures for fugitive emission control	The process and products is in closed loop. Hence, the fugitive emissions are not expected. To control fugitive emission due to vehicles movement, RCC roads are laid within the plant.
7.7	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation and natural resource conservation.	Hazardous waste will be disposed through TSDF and MoU is enclosed as Annexure VI . PCBL (TN) Limited had obtained Hazardous Waste Authorization from TNPCB. Heat exchangers are provided to recover the waste heat from the reactor gas and used to pre heat the air used for reactors. WHRB in line boiler is provided to meet the process stream. The product filtered gas is used for CPP as fuel. Rain water harvesting plant is provided to conserve the water resource consumption. Excess power generated from the plant about 22 – 24 MW will be connected to grid after plant consumption of 11.4 MW of PCBL.



SI.No.	ToR Conditions	Compliance
7.8	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Not applicable. Coal is not used in the process.
7.9	Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Greenbelt will be developed in the factory premises and will occupy a total area of about – 83,589 Sq.m. (i.e. 33 % of the total plot area). The species and plantation norms will be as per directives of CPCB guidelines in consultation with local forest department. The native species will be predominantly planted. The native species like teak, Mahogany, illupai, pungai, neem marudhu, naval are predominantly planted. The saplings of native species have been provided by Forest Department and around 1300 saplings have been planted in the project site.
7.10	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	There is an increase in surface run – off due to construction of PCBL (TN) Limited. The increase runoff will be directed to rainwater storage pond having capacity of 4200m ³ . The excess runoff of about 1,64,675.68 m ³ /yr (i.e., pre-construction stage quantity) will be drained into canal which is having sufficient carrying capacity. The harvested water will be used for plant purposes.

8. Occupational health

8.1	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	The existing fund of Rs.10 lakhs will be continued for expansion.
8.2	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, color vision and any other ocular defect) ECG, during pre-placement and periodical examinations give	Before recruitment, the employee will pass through medical test covering chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, color vision and any other ocular defect) ECG. These data will be updated once in a year.



SI.No.	ToR Conditions	Compliance
	the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	
8.3	Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.	CBFS and HSD are the hazardous material used within the plant and within the PEL. Other water treatment chemicals like Potassium Nitrate / Potassium Carbonate/ Hydrochloric Acid/ Caustic Soda are used and they are maintained as per MSDS.
8.4	Annual report of health status of workers with special reference to Occupational Health and Safety.	Enclosed as Annexure VII
9. Corporate Environment Policy		
9.1	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Complied. Refer Chapter 6 under Section 6.6 for details.
9.2	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	Yes.
9.3	What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	A separate EMC is provided. The EMC is headed by a Plant Head and EHS Engineer will be reporting to Plant Head for ensuring the compliance. For further details refer Chapter 10 under Section 10.2 .
9.4	Does the company have system of reporting of non-compliances/ violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This	Yes. The reporting mechanism is detailed in the policy. For further details refer Chapter 6 under Section 6.6 .



Sl.No.	ToR Conditions	Compliance
	reporting mechanism shall be detailed in the EIA report.	
10. Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labor force during construction as well as to the casual workers including truck drivers during operation phase.		
	Sanitation and Canteen cum restrooms along with bathhouse are provided. Refer general layout as Figure 2.2.	
11. Enterprise Social Commitment (ESC)		
11.1	Adequate funds shall be earmarked towards the extended EMP and item-wise details along with time bound action plan shall be included for Socio-economic development activities.	About 2.7 Crore is additionally earmarked under CER. Time bound action plan are included in the Table 8.1. In addition to that already committed CER cost of Rs. 6.15 Crore.
11.2	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.	No litigation against the proposed project.
11.3	A tabular chart with index for point wise compliance of above TOR.	Complied.

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Executive summary

The global Carbon Black market size was valued at USD 14192.69 million in 2023 and is expected to expand at a CAGR of 5.56% during the forecast period, reaching USD 19632.1 million by 2031. Carbon black is a kind of amorphous powder with large specific area and it can be derived from incomplete combustion of aromatic hydrocarbons. Carbon black is mainly used as reinforcing filler in tires and other rubber products, to be used in the plastics, paints, and inks industry, carbon black can also use as a color pigment.

M/s. PCBL (TN) Limited is operating at SIPCOT Industrial Park, Thervoy Kandigai village, Gummidipoondi Taluk, Thiruvallur District of Tamil Nadu and possess Environmental clearance issued by MoEF&CC vide File No. J-11011/128/2021-IA-II(I) dated 27.08.2021 and valid Consent to Operate till 31.03.2028 with the production capacity of 1,47,000 MTPA. Now, the company has planned to expand its production from 550 to 675 MTPD (1,92,500 to 2,36,250 TPA) and 36 MW of waste heat recovery based cogeneration captive power plant.

The project attracts environmental clearance under project activity Sl.No. 5 (e) Petrochemical based processing (Processes other than cracking & reformation and not covered under the complexes) as per general conditions, Tamil Nadu- Andhra Pradesh interstate boundary falls at a distance of ~ 2.67 Km (W) and the project is being appraised as category "A" with MoEF&CC for obtaining Environmental Clearance. ToR has been issued by MoEF&CC vide File no: IA-J-11011/95/2024-IA-II(I) dated 14.03.2024 with exemption of Public Hearing. The project site is located in SIPCOT industrial area and ecological sensitive area is not located within 10 km radius of the study area. There is no perennial river within the study area except seasonal lake project site Lake near Teruvai at 0.91 km in NE direction and there are 7 RF in the study area. The Thervoy population which is the nearest village is about 3,122 out of which 1,558 are Male while 1,564 are Females.

M/s. PCBL (TN) Limited has entrusted the services of M/s. ABC Techno Labs India Pvt. Ltd, Chennai to carry out EIA study and preparation of Environmental Impact Assessment (EIA) report which is an NABET accredited environmental consultant for 25 sectors including Petrochemical Based Processing for Category 'A' to assess the anticipated impacts of the proposed expansion project.

The proposed expansion project involves to enhance the production capacity of 550 to 675 MTPD. The total land extent of 62.46 acres (25.2767 Ha.) which includes additional land of 2.44 acres had been allotted by SIPCOT for the purpose of expansion of PCBL (TN) Limited.

The products before and after expansion along with capacities are as follows:

Sl.No.	Products	Existing capacity		Proposed capacity		Total Capacity	
1.	Different grades of Carbon Black	550 MTPD	1,92,500 MTPA	125 MTPD	43,750 MTPA	675 MTPD	2,36,250 MTPA
2.	Cogeneration Captive Power Plant	36 MW		-		36 MW	



The raw material required are Carbon Black Feed Stock, Molasses, Potassium Nitrate / Potassium Carbonate/ Hydrochloric Acid/ Caustic Soda, Water Treatment Chemicals, Light Diesel Oil/ High Speed Diesel.

The production of carbon black needs equipment like reactors, dryer, waste heat recovery boilers, preheaters, Turbo generators, CPP cooling towers, bag filters, ETP, STP, RO with MEE to ensure ZLD, pumps for raw material handling and for utilities.

Carbon Black is manufactured from highly aromatic hydrocarbon oils, which are thermally cracked at high temperature in specially designed reactor. Carbon Black particles formed are recovered and converted into pellets for ease of storage, handling and transportation and product cleaned gas will be used for CPP as fuel.

The manufacturing process starts from feedstock Storage and Pumping from tanker to large CS fixed roof tanks which is maintained at about 60-80 °C. temp. in the tank through external steam heating or hot feedstock return from the plant.

Two different designs of reactors are employed for manufacturing Hard & soft Black reactors to produce the various grades of Carbon Black conforming to ASTM Standards/Customer Specifications.

Preheated feedstock of about 250-350 °C. is atomized and sprayed inside the reactor through specially designed nozzles. The reaction chamber which is lined with high temperature special refractory to withstand at a temp. of approx. 2000 °C - 2500 °C. at a pressure of 0.5kg/sq.cm. and provide the endothermic heat for thermal cracking reaction. The reaction products moving at very high velocities are quenched with water sprays at predetermined locations inside the reactor to about 900 to 1100 °C. Sufficient length of refractory lined tunnel downstream of the reactors is provided for complete vaporization of quench water. Energy from this hot gas is recovered by heat transfer from gases laden with carbon black particles to cold air in a specially designed air pre-heater. The hot air at 800-950 °C. is used in the reactor thereby making substantial savings in the fuel requirements in the reactor operation.

Product gases laden with Carbon Black particles are cooled down to 240-260 degree centigrade in a SS venturi cooler and they enter the Process Bag Collector (PBC) section for separation of Carbon Black from gaseous products which is a mixture of CO, CO₂, CH₄, C₂H₂, N₂, H₂, Air and water vapors.

Process Bag Collector is pulse jet filter and comprises of number of modular compartments. Compartments are housed with very special type of filter bags made of fiber glass/Huy glass/membrane coated fiber glass.

Smoke coming from reactor section at 240-260 °C. enters the process bag collectors, CB particles are deposited outside the bags and Cleaned gas filtered and goes to "off gas header". The deposited CB particles outside the filter bags drop down into the hopper.

CB material collected in hoppers is conveyed through pneumatic conveying fans and Dense Bag Collector to a surge tank for pelletizing and drying section. Before conveying, the material passes through a micro pulverizer, which crushes some hard-carbonaceous particles to – 325 mesh size.

Off gases collected in the off-gas header are sent to pelletizing and drying section and energy conservation section for their 100% utilization and thus eliminate the risk of atmospheric pollution.



Water evaporated due to drying of wet pellets in the dryer along with some powdered material is removed by a Vapor Fan at the feed end of the dryer. These hot vapors are sent to a cylindrical bag filter house called Vapor Bag Collector to remove and collect the CB particles and only cleaned gases let out into the atmosphere. Vapor Bag Collector is also equipped with special bags for filtration of CB particles.

Carbon Black collected in the conical hopper is fed to the conveying line which gets mixed with the main stream. Dried pellets coming out at the exit end of the dryer are fed into a bucket elevator made of SS buckets to carry the material to the top of the silos.

Material stored in the silos is packed in 25kg. paper bags / Bulk Bags through automatic packing machines. The portable packing machines can be connected to any of the storage silos. Fully automatic packing machine along with the moving roller conveyors and bag shapers make the handling of paper bags very fast, convenient, and clean. Packed bags are stacked on wooden pallets in warehouse for storage and subsequent dispatch in trucks to the consumers.

Low Btu off gases generated in the manufacturing process of CB in the reactor section and separated from accompanying CB particles in PBC section are collected in the off-gas header to recover their calorific value in a specially designed waste heat boiler system to generate high pressure steam and in a specially designed dryer combustor furnace to supply the heat energy requirements in the pelletizing and drying section.

The quantum of high-pressure steam which can be generated through burning of these off gases meets the plant requirement of steam and power. Excess power generated is feed to the grid.

The total requirement of water after proposed expansion is about 3953 KLD. Out of this, about 683 KLD will be recycled within the process. The estimated domestic water requirement is estimated to be about 57 KLD. The approval obtained for fresh water requirement is about 3737 KLD which will be met from SIPCOT. The entire amount of 683 KLD of wastewater being recirculated into system after primary treatment with the help of RO and MEE to ensure ZLD.

The existing power requirement is ~10 MW and the estimated power requirement for expansion is ~1.8 MW. The total power requirement is ~11.8 MW. The CPP power generation is about 36 MW.

The various air pollution control measures as envisaged for the project are suitable stack height for the Boilers and DG emissions, Bag filters, Venturi scrubbers. The process off gases after recovering the heat with the help of heat exchangers will be passed through bag filters. The cleaned gas as a fuel will be used in the power plant. During emergency situation related to process (during startup or change of fuel), the process gas will be scrubbed by Venturi scrubbers and the cleaned gas will be released into atmosphere with the help of stack attached with Venturi scrubbers. To meet the dispersion requirement about 27 No. of stacks ranging height from 20 to 90m are provided at plant.

The Sewage generated is about 42 KLD will be treated disposed through Membrane based STP (50 KLD). The existing capacity of STP is 50 KLD would be sufficient for expansion also. STP treated water will be used for greenbelt development. Similarly, effluent generated from the floor washing is 176 KLD treated which will be treated through ETP capacity of 210 KLD. The total process water of about 683 KLD will be treated in Ultra filtration, RO & finally with MEE and recycled into the process to meet ZLD.



The hazardous waste will be disposed through authorized agency an agreement is already existing in this regard. It is expected municipal solid waste of about 100 kg/day is expected and will be disposed a manure after recovering the useful material. Paper / Card Board, Dust bin collection, dry leaves, grass, Metal scrap & wooden scrap will be recycled / sent to authorize dealer.

The proposed expansion will generate additional employment during construction & operation. It is expected that employment generation with a potential of 20 person's permanent and 40 persons contractual.

Greenbelt is developed in the factory premises and will occupy a total area of about – 83589 Sq.m. (i.e. 33 % of the total plot area). The species and plantation norms will be as per directives of CPCB guidelines in consultation with local forest department. The native species like teak, Mahogany, illupai, pungai, neem marudhu, naval are predominantly planted. The saplings of native species have been provided by Forest Department and around 1300 saplings have been planted in the project site.

The base line study was conducted during the pre-monsoon season from the month of March 2021 to May 2021 and secondary data collected from various Government, Semi-Government and Public sector organizations when the EC was applied for the project. Since, the validity of the baseline data is for 3 years it is contemplated to use the same data for this expansion of PCBL. However, considering the timeline period of the expiry of the present baseline data and considering surrounding development at the project site, one-month additional baseline data have also been collected from the same monitoring location during the period of February 2024 and these data corroborated with the 2021 data in sequel. The baseline data is continued for March, April and May as summer season data.

From the summary of the wind pattern for study period (March 2021- May 2021) season the predominant direction is WSW and followed by SW with less calm of 0.32 percent. The average wind speed is 2.42 m/s. The nearby India Meteorological Department station that is generating meteorological data is 58 km from the site i.e. IMD, Nungambakkam, Chennai. Hence, secondary information on meteorological conditions has been collected from IMD station.

The monthly mean maximum temperature varied from 28.5°C to 36.9°C while monthly mean minimum varied from 20.9°C to 27.9°C indicating January & December as the coldest month while May & June as hottest month.

During the month of November, the relative humidity was highest (83%). The annual average Relative humidity is 76% (at 08:30 Hours) and 69% (at 17:30 Hours). Generally, the weather during other seasons was observed to be humid.

The rainfall occurred maximum in the month of November (407.4 mm). The total rainfall received in the year is about 1391.5 mm and the monsoon period is November December. It is evident from the available IMD data that the area is not prone to any special weather phenomena like dust storm, hail, heavy down pour etc.,



Atmospheric Inversion Level

This height is determined by the observation of the atmospheric temperature profile. The inversion level during March to May ranges from 700m at 8 A.M. and 1000m at 5 P.M.

The Thiruvallur district rock type can be geologically classified into sedimentary rock 80% and hard rock 20%. The geological formation of the district is principally made up of Charnockite, Gneiss, Conglomerate, Sandstone, Shale, Laterite, Alluvium and Marine deposits. Soils in the area have been classified into red soil, black soil, alluvial soil and colluvial soil. Thiruvallur district is underlain by both porous and fissured formations.

The maximum thickness of alluvium is 30m. whereas the average thickness is about 15m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter point. The thickness of weathered zone in the district is in the range of 2 to 12m. The piezo metric head varied between 2.20 to 10.30 m bgl during premonsoon and 2.72 to 8.55 m bgl during post monsoon. The study area is demarcated by dendritic pattern with lakes at low lying area of drainage system.

The IRS-P6 satellite data of 1:50000 scale is used for land use and land cover study. From the study it is observed that about 53.03% of land use is covered by agricultural land followed by reserved forest of 16.64%.

Ambient Air Quality Monitoring (AAQM) stations were set up at eight (8) locations and the results are compared with the standards prescribed by Central Pollution Control Board (CPCB) norms.

Presentation of Results

The maximum and minimum concentrations for PM₁₀ were recorded as 64 µg/m³ and 42.3 µg/m³ respectively. The maximum and minimum concentrations for PM_{2.5} were recorded as 32 µg/m³ and 18 µg/m³ respectively. The maximum SO₂ concentrations were recorded as 8.4 µg/m³ and minimum is found to be 5.1µg/m³. The maximum and minimum NO_x concentrations were recorded as 21.6 µg/m³ and 12.2 µg/m³. It is observed that very marginal decrease in the revalidated baseline data which could be attributable due to completion of construction activity and mitigation measures already adopted in the project site.

The day time noise level at industrial zone was observed to be 49.3 dB(A) which is within the prescribed limit of 75 dB(A). The day time noise level at all rural & residential zone was observed to be 48.2 to 54.5 dB(A) which is within the prescribed limit of 55 dB(A). The night time noise level at industrial zone was observed to be 42.9 dB(A) which is within the prescribed limit of 70 dB(A). The night time noise levels at residential locations were found to be 43.5 to 45 dB(A) within the prescribed limit of 45 dB(A). From the revalidated data, it is observed that the noise level is increasing by 1dB(A) when compared with existing baseline data this could be attributable due to increased activity of the industrial area.

The pH value of the collected ground water in the study area varies from 7.56 to 7.98 and meets the acceptable limit for drinking water standards. The essential parameters of ground water are well within the permissible limits. The heavy metal parameters are also well within the IS10500 norms. The surface water analytical results are compared with best of use norms given by MoEF&CC and the observed values are well within the limit.



From the revalidated data of surface and groundwater samples, it is evident that there is no change in the chemical parameters and hence, it can be concluded the operation of plant does not have any impact on surface and ground water.

Eight numbers of soil samples have been collected from the study area and all the physical and chemical parameters are observed to be normal and the soil does not require any amendment for developing greenbelt. The detailed study revealed dominance of *Cocos nucifera*, *Azadirachta indica*, *Acacia auriculiformis*, *Acacia nilotica*, etc. Totally 38 species of trees found in the study area along with 21 shrub species, 21 herb species and 17 climber species. *Prosopis juliflora*, *Lantana camara*, *Achyranthes aspera*, *Datura metel* were found to be the predominant species among shrub. Among the herbaceous species *Euphorbia hirta*, *Aerva lanata*, *Ageratum conyzoides*, *Boerhavia diffusa*, *Eclipta prostrata* etc. found to be abundant.

Livestock like cattle, buffalo, goat, poultry, duck and pig are reared for dairy products, meat, egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area. Species recorded/reported from the study area, out of which 5 species belongs to Schedule-I, 38 species belongs to schedule-II, 1 species belongs to Appendix-II and 1 species belongs to Appendix-III, and there are no endangered, threatened wild animal species in the study area.

To assess the planktonic profile of Phytoplankton and Zooplankton, 3 water samples from Kakkavakkam Lake, Arani Lake and Uttukkottai Eri have been collected. About 20 macrophytes have been observed in study area and about 21 phytoplanktons, 15 zooplanktons and 21 fish species were also observed. The existing PCU per day volume of SH-51 is about 15441 against the capacity of 36000 PCU per day.

As per 2011 census the study area consisted of 1,01,222 persons inhabited in the 10km radius study area. The distribution of population in the study area males and females constitute about 49.29% and 50.71%

As the project site (total area 62.46 acre) is under possession of PCBL (TN) Limited and already approachable through a well laid Black topped road. The internal access roads (7m and 4m wide) for the plant site of about 4 km in length is also BT paved. Site clearing activities like removal of bushes and leveling are also not expected as the site is cleared, levelled and kept ready for 550 TPD. Hence, the impacts on air, water, noise and soil within close proximity of the project site is not expected.

The drainage density of project site is 1.15 km/sq.km and the top soil layer is unsaturated with low infiltration capacity of lateritic soil. The study area is mainly governed by simple dendritic drainage system. The surface run-off water from the project site is naturally diverted into surface water drainage system which is constructed already on either side of the road and all along the boundary wall and finally diverted to rainwater harvesting pond. The plant is located on elevated area with height ranging from 43 in West to 49 in East AMSL and away from any potential flooding water bodies. Hence, flooding of the area is not anticipated.

The estimated run-off volume for pre and post construction scenarios for project site. The annual average run-off volume increases from 1,40,690.11m³ to 3,05,365.79 m³, showing an increase of 1,64,675.68 m³ of run-off about 53.9% in post construction scenario after construction of PCBL (TN) Limited which will be passing through rainwater harvesting pond.



The construction and other associated activities will lead to emission of different pollutants, viz. particulate matter and gaseous pollutants (SO_2 and NO_x) from machineries and vehicles. Particulate matter is not expected as the plant is already paved.

In the upcoming units of PCBL (TN) Limited, air pollutants will be generated at different stages of production. The expected air pollutants are particulate matter, Sulphur dioxide, oxides of nitrogen etc. The pollutants are expected to be released from point sources like stacks & ducts. Fugitive emissions are not expected from material handling as they are in closed loop.

The existing air quality status has been reviewed. It was observed that the maximum of all C98 pollutant concentrations in the study area of PM_{10} , $\text{PM}_{2.5}$, SO_2 and NO_x are 63.54, 31.54, 9.30 and 21.51 $\mu\text{g}/\text{m}^3$ respectively. These concentrations are due to the emissions emitted into the atmosphere from the existing industrial activities in the area, road transport as well as due to urban activity in the study area.

- For estimation of $\text{PM}_{2.5}$ concentrations from proposed expansion, it is assumed that percentage of $\text{PM}_{2.5}$ present in cleaned flue gas after Bag filters contains 61.6% of the total PM.
- SO_2 emissions have been estimated based on 600 mg/Nm^3 .
- NO_x emissions have been estimated based on 600 mg/Nm^3 .

The above emissions are expected to be released from the proposed various stack ranging from 20 to 90m. Once the pollutants are emitted into the atmosphere, the dilution and dispersion of the pollutants are controlled by various meteorological parameters like wind speed and direction, ambient temperature, mixing height, etc.

It is planned to procure and transport the raw material and product through road. The PCBL (TN) Limited plant will be operating with the production capacity of 675 TPD.

In order to study the ground level concentrations in future scenario and to predict the impact on the ambient air quality due to the pollution load from the proposed expansion, air quality impact prediction modelling has been conducted considering site specific meteorological data to estimate the incremental Ground level concentrations. AERMOD computer model is used to estimate atmospheric dispersion and concentrations of the released emissions in the immediate vicinity of the sources. The GLCs has been predicted over a 10 km X 10 km area with the location of the main PCBL (TN) Limited Stack as the center.

The maximum GLCs for each grid point were predicted with respect to pollutants PM_{10} , $\text{PM}_{2.5}$, SO_2 and NO_x . In order to obtain the impact due to proposed project, Background concentration recorded in the study area are considered and the contribution due to proposed project is added to it. The predicted cumulative GLC values are as follows:

Resultant Concentrations due to Incremental GLC's at Project Site

Pollutant	Maximum AAQ Concentrations Recorded During the Study Period in Project site ($\mu\text{g}/\text{m}^3$)	Incremental Concentration ($\mu\text{g}/\text{m}^3$) – Worst Case	Resultant Concentration ($\mu\text{g}/\text{m}^3$)	Standards (mg/Nm^3)
PM	76.5	1.78	78.28.	150



Pollutant	Maximum AAQ Concentrations Recorded During the Study Period in Project site ($\mu\text{g}/\text{m}^3$)	Incremental Concentration ($\mu\text{g}/\text{m}^3$) – Worst Case	Resultant Concentration ($\mu\text{g}/\text{m}^3$)	Standards (mg/Nm ³)
NOx	15.5	0.421	15.921	600
SOx	7.7	3.94	11.64	600

Mitigation Measures

- Closed loop system is adopted for transfer of liquid / solid raw material from storage to processing areas.
- Pneumatic conveying system with bag filters is provided in production area of carbon black plant.
- Off gas generated is handled in closed loop system and used as fuel for boilers.
- Adequate stack heights of 60 and 90m is provided for boilers and dryers of carbon black plant.
- Attenuation of pollution/protection of receptor through greenbelt/green cover.
- Online monitoring of air pollutant concentrations is implemented which will be extended for expansion.
- All trucks shall be PUC Certified as required by law.
- DG Sets is operated during power failure only.

The off gases generated out of burning of fuel like LDO / HSD and Carbon Black Feed Stock (CBFS) are incinerated in Combustors of boiler. 100% off gases generated in the process are burnt in these combustors and no off-gas escape into the atmosphere and hence there is no air pollution from the gases generated in the process.

Low Btu off gases generated in the manufacturing process of Carbon Black in the reactor section and separated from accompanying Carbon Black particles in Bag Filter section are collected in the off-gas header. Inspite of their low calorific value, these gases are utilized to recover their calorific value in a specially designed boiler system to generate high pressure steam and in a specially designed dryer combustor furnace to supply the heat energy requirements in the pelletizing and drying section. PCBL (TN) Limited has installed specially designed stacks of 90mtr and 60mtr height for Boiler and Dryer respectively for proper dissipation of flue gases emitted from above mentioned incinerators (combustors).

PCBL(TN) Limited has installed Flare Stack, startup vent stack, of adequate height to meet any eventuality.

Process cum Pollution Control equipment which is used for separation of carbon black from the off gases. Clean off gas is collected in the off-gas header and is utilized by complete combustion in dryer combustion furnace and boiler furnace to achieve substantial energy conservation as mentioned above. The filter bags are designed for 100% separation efficiency.

Process cum pollution control equipment and is used for separation of carbon black from the purge gases (containing water vapor and carbon black particles) generated in the rotary dryer. Filtered and clean gases are released into atmosphere through the stack. Flue gases from this filter at a temperature of approx. 200 deg. C mainly contain water



vapor, nitrogen, oxygen & insignificant quantity of CO and SO_x. This filter also contains special fibre glass filter bags to have SPM in the stack well within the norms laid down by the Pollution Control Board.

Leak Detection and Repair (LDAR) is system of procedure a facility utilizes to locate repair leaking components including valves, pumps, tanks and reactors in order to minimize the emission of fugitive volatile organic components and hazardous air pollutants.

LDAR related sections is considered, checked and maintained regularly to control emissions from leakages. At PCBL (TN) Limited has prepared SOP and implemented.

The noise is generated due to continuous operation of machineries like blowers, fans, compressors, cooling tower fans, reactors, handling of products, vehicular movement etc. It is all likely that equipment manufacturers are to adhere the noise norms in design stage which may further reduce the noise levels. Machines would be housed in acoustic enclosures/buildings in such a way that they would not be contributing any additional noise levels in the surrounding environment.

The propagation modeling Dhawani Pro considered for operation and the predicted noise level at source during operation is 104 dB(A). The results of the noise modelling reveal that the maximum noise level will be 59.6 dB(A) at 1.5km distance due to the proposed plant. The results are predicted without any attenuation factors.

The noise reduction measures are as follows:

- Acoustic Enclosures on all major equipment in the plant is provided for noise attenuation
- Workers are provided with suitable personal protective equipment (PPE)
- Rotation of workers in the high noise area
- High noise generating areas would be identified and tags marked
- Green belt is developed to attenuate noise
- Vehicle trips to be minimized to the extent possible
- All equipment operated within specified design parameters.
- Limits for maximum permissible noise will be incorporated in the technical specifications for the machines (fans, motors & compressors)

The total water requirement after expansion is 3953 KLD. Fresh water requirement is 3737 KLD will be sourced from SIPCOT. On expansion, the industrial wastewater generation is estimated to be about 683 KLD. The entire amount of 683 KLD of wastewater being recirculated into system after treatment with the help of RO and MEE to ensure ZLD.

The effluent generated from the plant is treated in Membrane Bioreactor (MBR) based ETP capacity of 210 KLD. The treated water will meet the requirement of TNPCB norms viz. BOD <30 mg/l, TSS <30 mg/l and pH 5.5-8.5. The MBR plant consists of clarifier, oil and grease removal, closed aeration followed by pressure sand filter and activated carbon filter. The treated water is fed into ultra-filtration and the UF treated water will be passed through Two stage RO. The RO treated water will be used for process. The RO reject will be fed into Multi-Effect Evaporation (MEE) to ensure Zero liquid discharge.

About 48 KLD of sewage will be generated and the same will be treated in MBR based STP of capacity 50 KLD. The treated water from STP will be used for plantation and green belt to reduce the fresh water consumption. Hence, a major reduction in



consumption of fresh water is expected as the RO, ETP and STP is in place. In addition, the efficient rainwater management plan is also adopted for entire plant area according to the topography. The specific water consumption after expansion for PCBL (TN) Limited is 4.67KLD/Tonne against current specific water consumption 5.06KLD/Tonne of product. Effective control measures are implemented such as MBR based STP and ETP.

After expansion, approx. 260 kg per day solid waste will be generated during operation of PCBL (TN) Limited which will be collected, segregated and disposed through local panchayat as per Solid Waste Management Rules, 2016.

Hazardous Wastes are properly handled in containers and stored in hazardous waste storage areas as per rules and also bunding is provided to avoid overflow of spillage waters which can contaminate the surroundings. Recyclable waste is handed over to authorized recyclers and other hazardous waste will be disposed through approved TSDF facility. PCBL (TN) Limited had obtained Hazardous waste authorization from TNPCB.

During the baseline survey, there is no Schedule-I fauna is identified in the plant area. However, the schedule – I fauna like Oriental Honey Buzzard, Black Kite, Shikra, Indian Peafowl and Indian Flapshell Turtle have been identified in the buffer zone which is about 9.5 km from the proposed site. The conservation plan for the same is prepared and enclosed as **Annexure IV** to this EIA report which will be scrutinized and vetted in consultation with forest department.

Impact of Traffic and Transportation

PCBL (TN) Limited is located near to Thervoy kandigai village about 1.53km in the Northeast direction on SH - 51 which is leading to Puthur. Since the plant is located on the isolated path major traffic is not expected. From the study, the density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is “Excellent” and the free flow of vehicles is observed during the study period February 2024. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed expansion of PCBL plant, the traffic density will have negligible increase and there will be no change in V/C ratio.

A carbon black reactor takes in fuel as CBFS in the process for thermal cracking of hydrocarbon oils for formation of carbon black. The tread and carcass reactors are used for producing hard and soft black of carbon respectively. The existing 3 production line consists of 2 x 90, 1 x 150, 2 x 90 of reactor TPD and it is proposed to build one line to enhance the total capacity of 675 TPD. The existing technology is proved one and it is evident that the plant is running without any eventualities.

The proposed expansion of PCBL (TN) Limited requires additional land area of 2.44 Acres which is adjacent to the existing project site. The project site is located in notified Industrial Estate (SIPCOT) and it is coming under Industrial use zone as per land use classification certificate issued by District Town and Country Planning (DTCP). Hence alternative site is not applicable. However, while selecting the site initially all Environmental parameters like away from settlements and sensitive areas for construction of PCBL(TN) Limited are considered and meeting the requirement.

The key issues associated with the life cycle of a project are the monitoring of environmental parameters. Three types of environmental monitoring are ensured the compliance through the envisaged to existing EMC.



The expansion of PCBL (TN) Ltd. will cater to increased demand of carbon black which can be used as fillers in the rubber products & rubber compounds and other rubber lining equipment, plastics products, inks, paints etc. In addition to tangible benefit, the proposed expansion project will also help in enhancing energy requirement of Tamil Nadu. The major direct benefits that can be anticipated are in terms of (i) employment for the locals, both in the skilled and the semi-skilled category (ii) growth of allied rubber and automobile industries and iii) development of infrastructure facilities.

The product acts as reinforcing filler in tires and other rubber products, to be used in the plastics, paints, and inks industry. The other environmental benefit is the raw material, which is residue of oil industry Anthracene or coal tar which will be effectively used. While producing the synthetic rubber about 36 MW power is produced as a byproduct which is from the off-gas produced from the reactor.

Due to project and its expansion, the corporate environmental responsibility is earmarked Rs. 6.15 crores and Rs. 2.7 crores respectively. The amount will be spent towards education, solar power and health facilities in three financial years 2024-2027 for the local village people.

The Proposed PCBL (TN) Ltd expansion will generate additional employment of 60 nos. from the existing employment of 300 nos. In addition to the operation, about 500 personnel are likely to be employed during construction period.

The information regarding the capital cost of the project and expenditure for the implementation of environmental mitigation measures. The cost envisaged for pollution control and monitoring measures is included in the capital cost. Cost towards environmental monitoring facilities are additionally included.

The estimated expansion project cost is Rs. 360 crores and in total about 151.37 crore of the project cost is earmarked towards pollution control measures.

The EMC is headed by a Plant Head. In his day to day work, the plant head is assisted by chemists, laboratory assistants and other staff. Services of forest officials are also taken for effective implementation of plantation schemes. For development and maintenance of jobs like drainage, clearing settling pits etc. assistance from the plant's civil engineering department is taken. The officers of the department meet frequently to assess the progress and analyses the data collected during the preceding fortnight/month. Total manpower of EMC is about 6 numbers along with supporting staffs.

From the forgoing study, the proposed expansion of it is evident that PCBL (TN) Limited is environment benign as all APC, ETP, STP, three stage RO & MEE to ensure ZLD measures are provided. Hence, it is requested to grant Environmental Clearance for the project.

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1.0 Introduction

1.1 Preamble

M/s. PCBL Limited is India's largest and globally seventh largest Carbon Black producer with a total annual production capacity of 5.71 Lakh tonne in India. Carbon black is mainly consumed (80%) as raw material in tyre manufacturing industries and some are in high end specialized applications such as industrial rubber compounds and other rubber lining equipment, plastics products, inks, paints etc. It was observed that the global carbon black market had surpassed \$25 billion in 2020 growing at a Compound Annual Growth Rate (CAGR) of over 4% driven by rising demand from tyre industry, in addition to construction and manufacturing sectors which use carbon black to provide strength to industrial rubber compounds and other equipment.

The global Carbon Black market size was valued at USD 14192.69 million in 2023 and is expected to expand at a CAGR of 5.56% during the forecast period, reaching USD 19632.1 million by 2031. Carbon black is a kind of amorphous powder with large specific area. It can be obtained from the incomplete combustion of organics such as natural gas, acetylene and coal tar. Carbon black is mainly used as reinforcing filler in tires and other rubber products, to be used in the plastics, paints, and inks industry, carbon black can also use as a color pigment. M/s. PCBL (TN) Limited has heavily cut down on carbon and gas emission through cogeneration captive power plant and feeds power to grid after self-consumption.

Presently, M/s. PCBL (TN) Limited is operating at SIPCOT Industrial Park, Thervoy Kandigai village, Gummidi poondi Taluk, Thiruvallur District, Tamil Nadu – 601202 and possessing Environmental clearance issued by MoEF&CC vide File No. J-11011/128/2021-IA-II(I) dated 27.08.2021 and valid consent for operation till 31.03.2028 with the production capacity of 1,47,000 MTPA. Now, the company has planned to expand its production from 550 to 675 MTPD (1,92,500 to 2,36,250 TPA).

1.2 Purpose of the report

The proposed expansion project attracts environmental clearance from the State Environment Impact Assessment Authority (SEIAA), Project activity Sl.No. 5 (e) Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes) and Category B, as per the guidelines of EIA notification of 2006, and the amendments thereafter. However, as per general conditions, Tamil Nadu- Andhra Pradesh interstate boundary falls at a distance of ~ 2.67 Km (W) as per SOI Topo map is located within 5 km radius from the site. In view of this, the project is being appraised as category "A" with MoEF&CC for obtaining Environmental Clearance.

In this connection, ToR has been issued by MoEF&CC vide File no: IA-J-11011/95/2024-IA-II(I) dated 14.03.2024 with exemption of Public Hearing. ToR is enclosed as **Annexure VIII**. The EIA report is prepared incompliance with ToR issued by MoEF&CC.

1.3 Identification of the Project and Project Proponent

The project scope involves in expansion of production capacity from 1,92,500 to 2,36,250 TPA in various grades of specialized carbon black products along with waste heat recovery based cogeneration captive power plant (36 MW).



Name of the project proponent : Mr. Rakesh Kumar Nayak

Designation : Whole time Director

Address : Plot No. A-7, SIPCOT Industrial Park, Thervoy Kandigai village, Gummidiyoor Taluk, Tiruvallur District, Tamil Nadu - 601202

Contact Details : 9674412341

Email ID : pcbltn@rpsg.in

1.4 Need for the Project and its importance

The expansion project is proposed based on the fact that the PCBL Limited has a Good Market reach & Goodwill in South Indian tyre paint, ink & rubber Industries. PCBL Limited has a sizeable Market share which has been growing every year and rated as one of the global leaders. Most importantly, tyre, paint, ink & rubber production/consumption is increasing year after year particularly in Southern India, more specifically at Tamil Nadu as the level of industrialization is high. As the demand for carbon black is rated high, the present production is not able to meet the demand, as Chennai is called as Detroit of India owing to existence of more auto manufacturing and auto industries which consumes extensively carbon black for tyre, paints & rubber industries products.

1.5 Brief Description and Nature of the Project

M/s. PCBL (TN) Limited Petrochemical based industry processes other than cracking & reformation and not covered under the complexes as per MoEF&CC notification has proposed to expand the existing unit at Plot No. A-7 & A-13, SIPCOT Industrial Park, Thervoy Kandigai village, Gummidiyoor Taluk, Tiruvallur District, Tamil Nadu - 601202, India. The required land area is 62.46 Acres (252767 Sq.m). The lease deed is attached as **Annexure – IX**.

The existing plant capacity is 550 MTPD (1,92,500 MTPA) of different grades of carbon black with waste heat recovery-based cogeneration captive power plant with the capacity of 36 MW, the EC has been obtained for existing plant from MoEF&CC and attached as **Annexure - I**. It is planned to expand the present production capacity to 675 MTPD (2,36,250 MTPA) of different grades of carbon black but the existing capacity of Captive power plant (36 MW) will remain unaltered as per the mass balance.

1.6 Statutory Clearances

The list of statutory clearances as obtained are given in **Table 1.1**.

Table 1.1 List of statutory clearances obtained

Approvals	Reference & Date of Approval
MoEF&CC – Environment Clearance	
Terms of Reference – Proposed Expansion of PCBL (TN) Limited from 550 to 675 TPD of Different grades of Carbon Black.	File no: IA-J-11011/95/2024-IA-II(I) dated 14.03.2024 with exemption of Public Hearing
TNPCB - Consent to Establish & Consent to Operate	
Consent order under Air & Water act from TNPCB	Consent order No.2304253503806 dated 10.08.2023 under Air act & Consent order



Approvals		Reference & Date of Approval
		No. 2304153503806 dated 10.08.2023 under Water act.
Certified Compliance of Consent to Operate under Air & Water act.		File No. EP/12.1/2023-24/4/TN/494 dated 09.04.2024
Hazardous Waste Authorization		Attached as Annexure X
Additional Clearances		
PESO Clearance		P/SC/TN/15/5273 (P523215) dated 14.02.2023
Inspectorate of Boilers		Attached as Annexure XI
Fire license by Tamil Nadu Fire Service		L.DIS.No.TN-3520240206127/B/2024 dated 09.02.2024
Additional land handed over by SIPCOT		Land document as an Annexure XII
Water supply permission from SIPCOT		Enclosed as Annexure XIII

1.7 Size and location of the project

In the view of meeting the growing market requirement of carbon black, PCBL (TN) Limited is proposing to expand the capacity of 2,36,250 MTPA in 62.46 acres of land which is located at Plot No. A-7 & A-13 at SIPCOT Industrial Park, Thervoy Kandigai village of Tamil Nadu. The existing and proposed product capacity are given in **Table 1.2**. The site coordinates are given in **Table 1.3**. The index map showing the site location, google imagery of site, Topo Sheet and Eco sensitive map are given as **Figure 1.1, Figure 1.2, Figure 1.3 & Figure 1.4** respectively. The environmental setting in 10 km radius are given in **Table 1.4**.

Table 1.2 List of Existing and Proposed Product Capacity

Sl.No.	Products	CAS No.	Existing capacity	Proposed capacity	Total Capacity
1.	Different grades of Carbon Black	1333-86-4	550 MTPD	125 MTPD	675 MTPD
2.	Cogeneration Captive Power Plant	-	36 MW	-	36 MW

Table 1.3 Site coordinates

Sl.No.	Latitude	Longitude
1.	13°21'49.06"N	79°58'42.93"E
2.	13°21'49.01"N	79°58'59.24"E
3.	13°21'53.45"N	79°58'59.27"E
4.	13°21'53.34"N	79°59'7.54"E
5.	13°21'39.40"N	79°59'7.60"E
6.	13°21'39.17"N	79°58'43.00"E

Table 1.4 Environmental setting for the proposed project site

Sl.No	Particulars	Details
1.	Elevation	~62 to 66m AMSL
2.	Present land use	SIPCOT Industrial Complex, Thervoy Kandigai



Sl.No	Particulars	Details		
3.	Nearest Highway	<ul style="list-style-type: none"> ➤ National Highway (716A) - (Thirupathi road) - 5.31 km - S ➤ State Highway-52 - (Uttukottai - Gummidipoondi) - 7.58 km - NE 		
4.	Interstate Boundary	Tamil Nadu- Andhra Pradesh interstate boundary at a distance of ~ 2.67 Km (W) as per SOI Topo map.		
5.	Nearest railway Station	Gummidipoondi railway station \approx 16.34 km (ENE)		
6.	Nearest Airport	Chennai International Airport \approx 46.5 km (SSE)		
7.	Port	Chennai port \approx 43.75km (SE)		
8.	Nearest village	Name	~Dist.(km)	Dire.
		Thervoy Kandigai	1.34	NE
		Gopalareddikandigai	0.92	NW
		Karadipettur	1.17	W
		Tambunaidupalaiyam	2.70	SSE
		Aramani	2.93	E
9.	Water bodies	Name	~Dist.(km)	Dire.
		Arani River	7.13	SSE
		Telugu Ganga/Satya Sai Ganga Canal	4.86	W
		Canal near Sengarai	2.12	SSE
		KTK Reservoir	0.89	N
		Lake near Teruvai	0.91	NE
		Uttukottai Eri	6.67	WSW
		Poovilambedu Pond	6.79	NE
		Sulameni Eri	3.15	S
		Kakkavakkam Lake	5.82	S
		Lake near Palikuppam	3.61	SSW
		Lake near Madarpakkam	8.58	N
		Lake near Edakandigai	8.25	E
		Lake near Serpedu	6.57	E
		Lake near Attupakkam	5.81	SE
		Lake near Pudukuppam	3.04	SE
		Lake near Teruvi	1.71	ENE
		Lake near Karadipettur	1.16	WSW
		Lake near Balakrishnapuram	2.41	NNW
		Lake near Karambedu	8.62	NE
10.	Reserved / Protected Forest	Name	~Dist.(km)	Dire.
		Ambakkam RF	6.75	WNW
		Satyavedu RF	7.96	NNW
		Nemalur RF	5.39	NNE
		Siruvedu RF	3.58	N
		Panchali RF	3.84	NNE
		Palavakkam RF	0.80	S
		Manali RF	3.19	E
		Rajugunta RF	6.81	WNW
		Senjiyagaram RF	5.06	WSW



Sl.No	Particulars	Details		
		Pallavakkam RF	3.32	E
11.	Eco sensitive zone and wild life sanctuary	Nil within 10 km radius		
12.	Population of Gummidipoondi	Total – 1,90,548 Male - 95,833 Female - 94,715 (census 2011)		
13.	Population of Uthukkottai	Total -12,740 of which 6,260 are male while 6,480 female		
14.	Population of nearest village - Thervoy Kandigai	Total -3,122 of which 1,558 are male while 1,564 female		

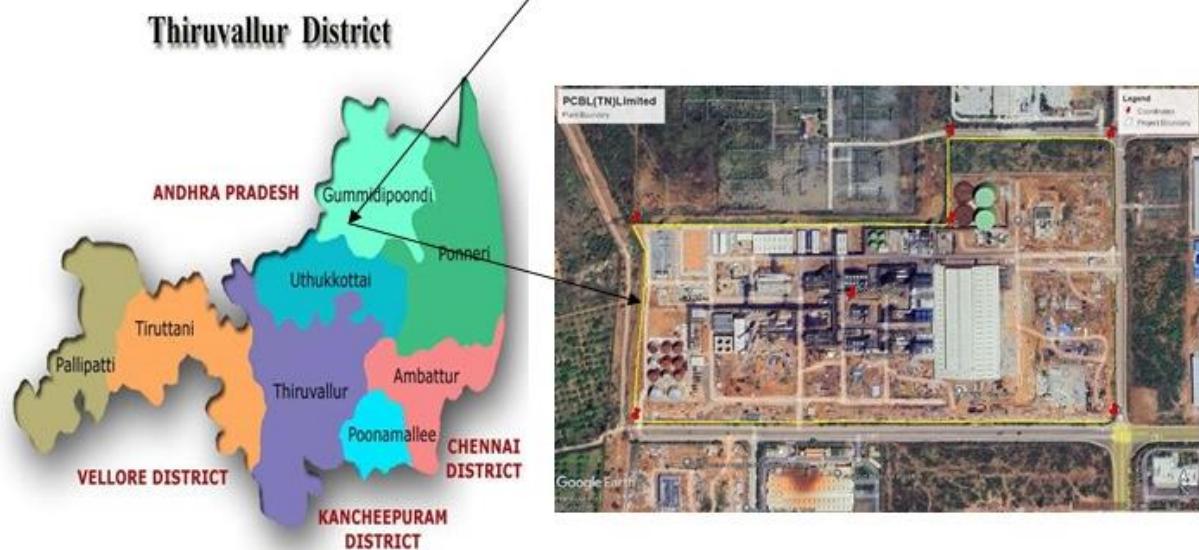
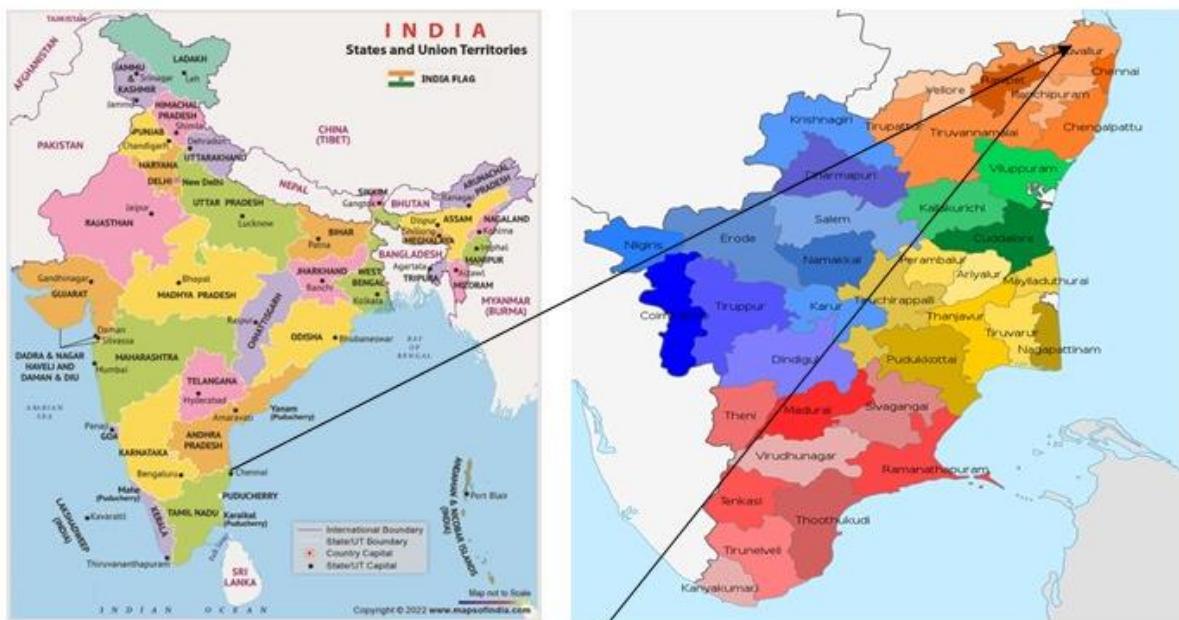
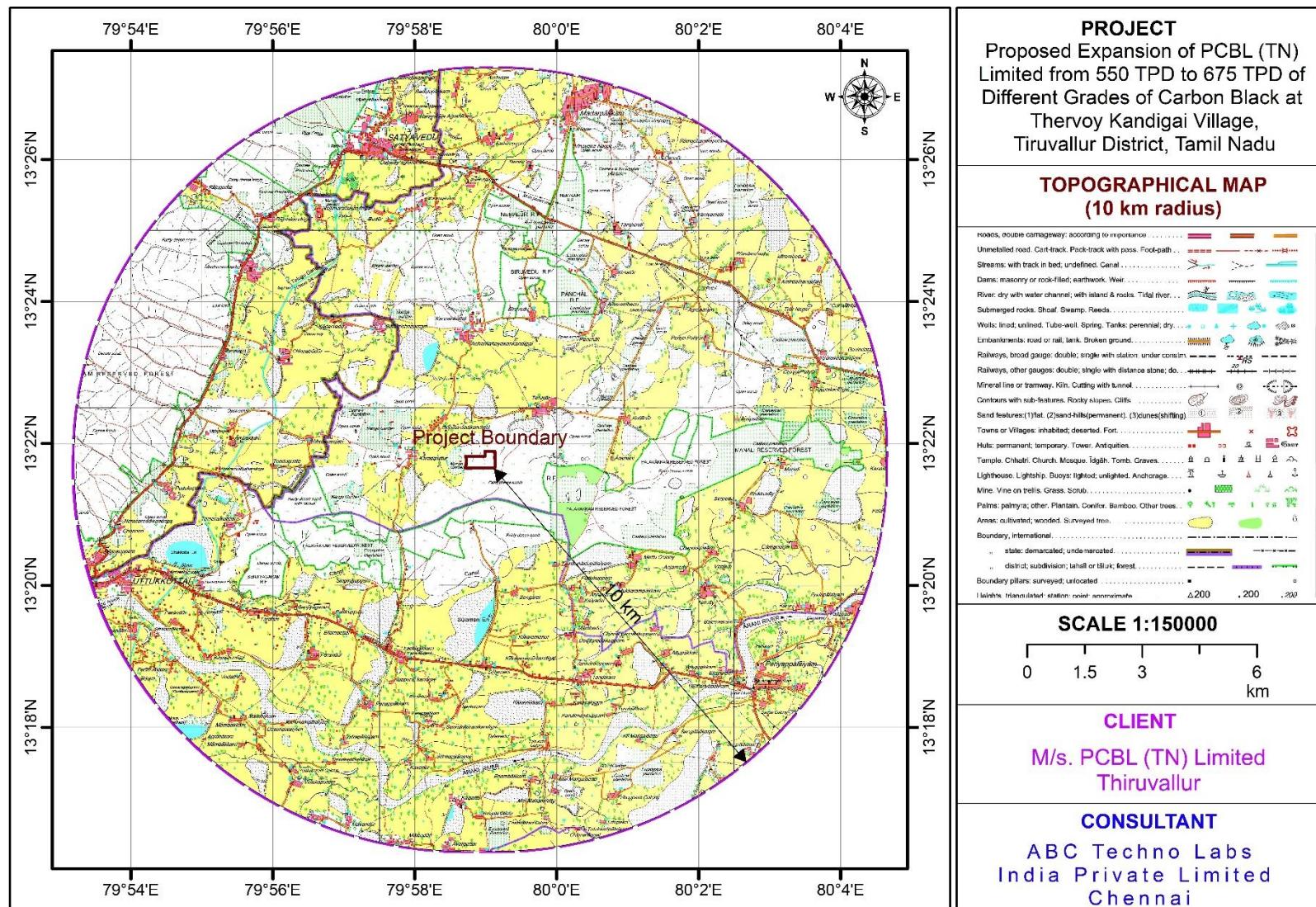


Figure 1.1 Location Map of Project Site

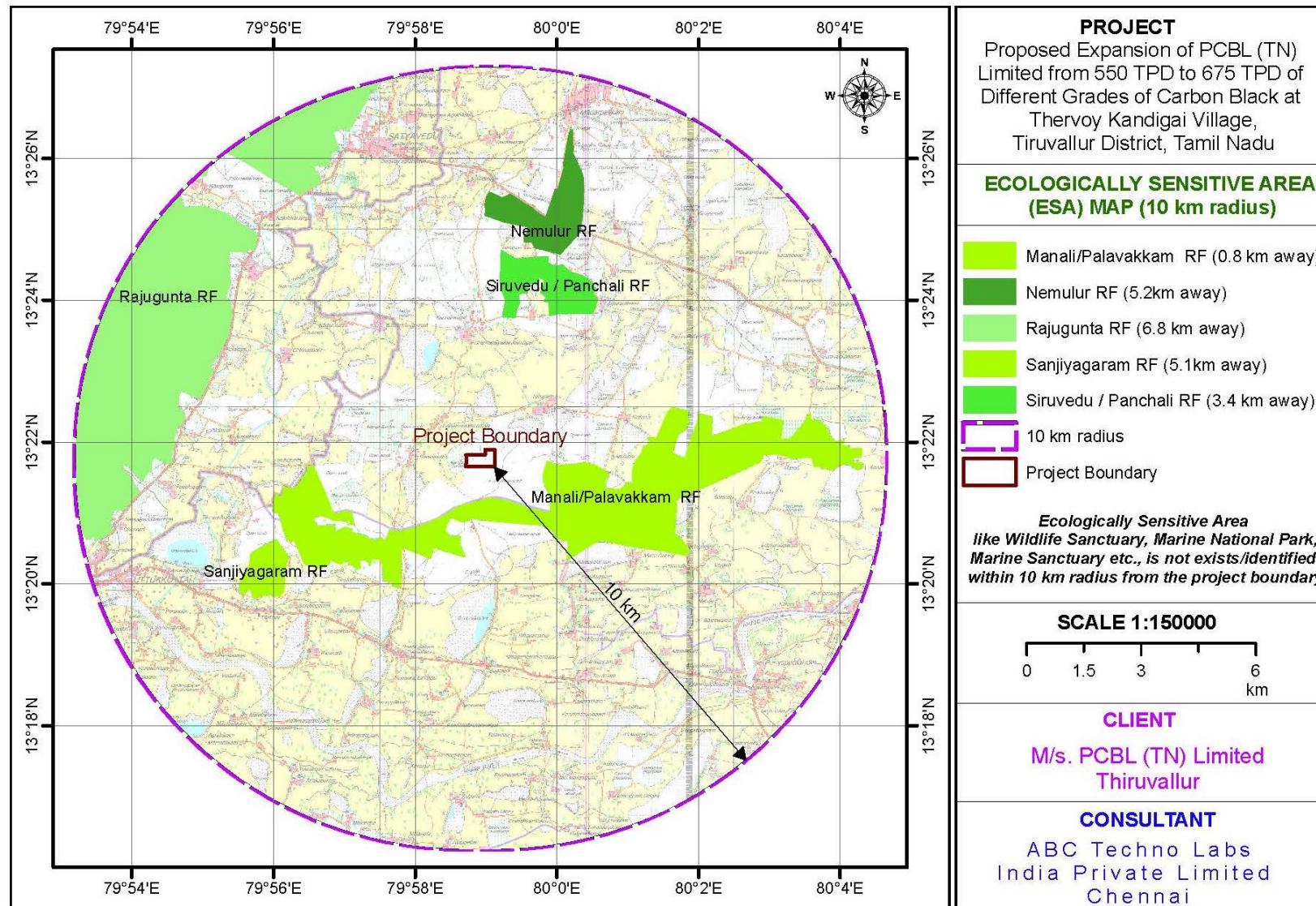


Figure 1.2 Google earth imagery of project site



Source: Survey of India Toposheet no. 57O/15 & 66C/3

Figure 1.3 Topo Map covering 10 km radius from the project site



Source: Wildlife Institute of India, Dehradun, MoEF&CC and Survey of India toposheet

Figure 1.4 Eco Sensitive Map



1.8 Importance to the country and region

The growth of tyre, paint, ink & rubber industries in this region is very positive and future demand is likely to grow further to the tune of 5.56% during the forecast year till 2031. Hence, M/s. PCBL (TN) Limited expansion is important to the country and reduces the import burden. The export of the carbon grades generates revenue through foreign exchange.

1.8.1 Domestic/Export Markets

International Market Analysis Research Consulting (IMARC) Group, a leading market research company, has recently released a report titled "India Carbon Black Market: Industry trends, share, size, growth, opportunity and forecast 2023-2028." It states that the India's carbon black market size had reached INR 79.65 Billion in 2022 (0.45MMT of carbon black). Looking forward, IMARC Group expects that the market to reach INR 133.32 Billion by 2028 (0.98MMT of carbon black), exhibiting CAGR a growth rate of 9.20% during 2023-2028. Thus, it is expected that a huge demand in domestic and export market for carbon black.

After expansion, the available carbon black will be 675 MTPD against 550 MTPD. The excess product from expansion first will meet the domestic market. Parallelly, the export markets for other countries will be tapped to export the surplus products.

1.9 Objective and Scope of EIA

M/s. PCBL (TN) Limited has entrusted the services of M/s. ABC Techno Labs India Pvt. Ltd, Chennai to carry out EIA study and preparation of Environmental Impact Assessment (EIA) report to assess the anticipated impacts of the proposed expansion project on the environment and suggest suitable mitigation measures for likely adverse impacts due to the expansion activities. The EIA/EMP report has been prepared for the expansion project following the generic structure specified in the EIA Notification, 2006.

M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for 25 sectors including Sector-20 (Petrochemical Based Processing) for Category 'A' by the National Accreditation Board for Education & Training (NABET), Quality Council of India (QCI) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with a validity till 16.11.2025(Sl. No. 4 of QCI/NABET List dated 26.04.2024). M/s. ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.05.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (MoEF&CC) vide letter F.No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

An EIA study is useful to understand and mitigate the impact of the proposed expansion project on various parameters of environment. Therefore, the scope of the EIA study includes detailed characterization of the existing status of the land, water, air, biological and socio-economic environment in the project area. It also includes identification of the potential environmental impacts of the project and formulation of an effective Environmental Management Plan (EMP) and monitoring plan. The scope of EIA study includes,

- Literature review and collection of data relevant to the study area.
- Collection of baseline data related to the project activities.
- Establish the baseline environmental aspects in and around the proposed project.



- Collection of secondary data including socio-economic from published literature/government publications.
- Identify various existing pollution loads due to the proposed expansion activities.
- Predict incremental levels of pollutants in the study area due to the proposed expansion operations;
- Evaluate the predicted impacts on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies;
- Preparation of cost effective and appropriate Environmental Management Plan (EMP) encompassing strategies for minimization of potential adverse impacts on various environmental components along with budgetary provisions for implementation of pollution control measures and CER activities;
- To delineate measures for human health and safety during operational of proposed expansion project; and
- Delineation of post-study environmental quality monitoring programme.

The scope also includes all the conditions given in ToR prescribed by MoEF&CC for the expansion of PCBL (TN) Limited. Baseline studies were carried out for the period of three months from March 2021 to May 2021, representing summer season. Field studies have also been conducted to determine existing conditions of various environmental attributes for a month (February 2024) as outlined in **Table 1.5**.

Table 1.5 Environmental attributes and frequency of monitoring

Sl. No.	Environmental Component	Sampling Locations	Sampling Parameters	Sampling Period	Sampling Frequency
1	Meteorology	One location	Temperature, Relative Humidity, Wind Speed, Wind Direction & Rain fall	3 months + 1 Month	Hourly / Rainfall – Daily
2	Ambient Air Quality	8 Locations	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , CO, O ₃ , VOC, NMHC	Two days per week for 12 weeks	24 hourly
3	Water Quality	GW 8 + SW 8 Locations	As per IS:10500 – 2012 & Designated Best of Use Criteria by CPCB	Grab sampling	Once during study period
4	Noise	8 Locations	L _{eq} day & L _{eq} night	24 hourly	Once during study period
5	Soil	8 Locations	Soil profile & Chemical constituents	Composite sample	Once during study period
6	Terrestrial Ecology	Study area	Flora and fauna	Field observations	Once in study period



Sl. No.	Environmental Component	Sampling Locations	Sampling Parameters	Sampling Period	Sampling Frequency
7	Land Use	Study area	Land use data based on recent satellite data	Jan- Feb 2024	Once in study period
8	Demography aspects	Study area	Demographic profile	Based on data collected from secondary sources	
9	Geology & Hydrogeology	Study area	Geological history, Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas.	Based on data collected from secondary sources	
10	Traffic Studies	Project Area	Vehicle Counts IRC 106 -1990 Guideline capacity of urban roads	Once during monitoring period Feb. 2024	
11	Risk analysis	Project petroleum product storage area	As per risk analysis criteria with the help of Phast software	Once during the preparation of EIA/EMP report	

Since, ABC Techno Labs has been carrying out the EIA studies for the similar projects earlier, the points mentioned in the ToR were contemplated beforehand and the same were included in the study. Even though the ToR letter was at the stage of consideration, the additional baseline data generation for this project was initiated inline to the MoEF&CC guidelines for a month.

1.10 Methodology

Environment Impact Assessment report has been prepared with the following steps:

1.10.1 Establishment of Baseline Environmental Status

A comprehensive database on the baseline environmental status of the study area has been established through review, compilation & analysis of

- Existing EIA/EMP and published secondary data/literature/information, and
- Primary data generated/collected through site surveys and field study

The field monitoring has been carried out as per the guidelines of CPCB and requirement of the MoEF&CC for one complete season. Field study/monitoring has been carried for:

- Ambient Air Quality.
- Ambient Noise Quality.
- Surface and ground Water Quality.
- Soil Quality.
- Ecological studies.
- Land Use Pattern and
- Socio- Economic status.



1.10.2 Environmental Impact Assessment

The project data/activities has been analyzed & linked with the existing baseline environmental conditions in order to list out the affected environmental parameters and assess the likely impacts on such parameters. Compliance of the project with national standards has been duly checked.

1.10.3 Preparation of Environmental Management Plan

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures existing in the project may not be obtained without a management plan in order to assure its proper implementation & function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. EMP has been prepared addressing issues such as:

- Details of management plan.
- Pollution control/mitigation measures for abatement of the undesirable impacts caused during operational activities.
- Optimization of water resources and water quality.
- Identification of Environmental cell for implementation of the EMP.
- Post project environmental monitoring programme.

1.11 Structure of Environmental Impact Assessment Report

Environment Impact Assessment report has been prepared as per format described in the EIA Notification, 2006. The report has been divided into 12 chapters, the structure & the contents of each chapters are given below:

Compliance of ToR conditions

Executive summary

Chapter 1: Introduction

This chapter provides background information, details of the existing environmental clearance, CTE, CTO & Certified Compliance, brief details and location of the project, geographical and environmental settings of the area and details of the consultant along with structure of the report.

Chapter 2: Description of the Project

This chapter deals with project location, project layout, list of equipments, detailed land use breakup, process description details like raw material balance/chemicals, utilities and services, power & water requirement, water balance and sources, drainage and sewage disposal system, storm water drainage system, horticulture and landscaping, energy conservation measures, brief pollution details like hazardous waste, emissions and effluent, implementation schedule, estimated cost of the project, etc.

Chapter 3: Description of the Environment

This chapter presents existing environmental status of the 10 km radius study area around the site including topography, geology, drainage pattern, water environment, climate & meteorology, ambient air quality with stack emissions, noise levels, flora & fauna, socio-economic conditions, traffic volume etc.



Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This chapter describes the anticipated impact on the environment and mitigation measures for project. It gives the details of the impact on the baseline parameters, both during the construction and operational phases and suggests the mitigation measures planned to be implemented.

Chapter 5: Analysis of Alternatives

This chapter involves description of existing plant site, summary of adverse impacts of each alternative, mitigation measures proposed for each alternative and selection of best alternative during the early stage of project before expansion.

Chapter 6: Environmental Monitoring Programme

This chapter describes environmental monitoring programme (EMP) for the project during construction and operation phases.

Chapter 7: Additional Studies

This chapter spelt out hazard identification, risk analysis and disaster management plan for an unlikely event of emergency.

Chapter 8: Project benefits

This chapter includes the benefits in terms of improvement in physical infrastructure, social infrastructure, employment potential, etc.

Chapter 9: Cost Benefit Analysis

It involves Environmental Cost analysis. EMP cost included as Environmental cost analysis is not warranted in ToR.

Chapter 10: Environmental Management Plan (EMP)

This chapter describes Environmental Management Plan to mitigate adverse environmental impacts and to strengthen beneficial impacts.

Chapter 11: Summary & Conclusion

This chapter includes the entire summary and gives a clear conclusion of the EIA study report.

Chapter 12: Disclosure of the Consultant engaged

This chapter comprises the name of consultants engaged with their brief resume and nature of consultancy rendered.

1.12 Litigation/Court Cases

There is no litigation or court cases against the existing and proposed project as on date of preparation of report.

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2.0 Project Description

2.1 General

This chapter provides an overview of the proposed expansion of PCBL (TN) Limited, indicating the scale of operations, and covering briefly the basic plant existing facilities and its proposed expansion. The description also highlights the quantum of waste generated from the operations and the schemes devised for their management. Engineering design details of the plant with respect to environmental protection measures are included in this chapter. General information like raw materials and material balance, utilities like water, power, manpower requirements and brief note on pollution load etc., are also covered in this chapter. The project information is mainly drawn from the Detailed Project Report (DPR) prepared by M/s. PCBL (TN) Limited. The generic information as provided in the DPR are extracted and included in this chapter. The information pertaining to the environmental issues are given importance to cover all the information as required by MoEF&CC.

The proposed expansion project involves construction of additional line to enhance the production capacity to 675 TPD from existing capacity of 550 TPD. The total land extent of 62.46 acres (25.2767 Ha.) which includes additional land of 2.44 acres has been allotted by SIPCOT for the purpose of expansion of PCBL (TN) Limited.

2.2 Project Location

The proposed expansion project has planned to be setup within the SIPCOT Industrial Complex, Thervoy Kandigai Village, Gummidiyoor Taluk, Tiruvallur District, of Tamil Nadu State covering an area of 62.46 acres. The site is located about ~5.06 km away from SH-51 in S direction. The nearest railway station is Gummidiyoor railway station (~15.73 km – ENE). The Industrial Complex layout and Layout of the plant with future expansion area is shown in **Figure 2.1 & 2.2** respectively. The site connectivity map is shown in **Figure 2.3**.

2.3 Land Use Breakup

The existing land use and after expansion of the PCBL (TN) Limited is given in **Table 2.1**.

Table 2.1 Existing and Proposed Land use break up

Sl.No.	Land Area Break up	Existing Area (Sq.m)	After Expansion Area (Sq.m)	Percentage (%)
1	Plant Built area (Process & Non-process area)	1,11,214	69,310	27
2	Driveway & Parking area	36,237	42,409	17
3	Greenbelt area	81,315	83,589	33
4	Vacant Land (Open & Future expansion)	0	25,595	10
5	Packing & Storage Area	14,126	31,864	13
Total Area		2,42,892	2,52,767	100

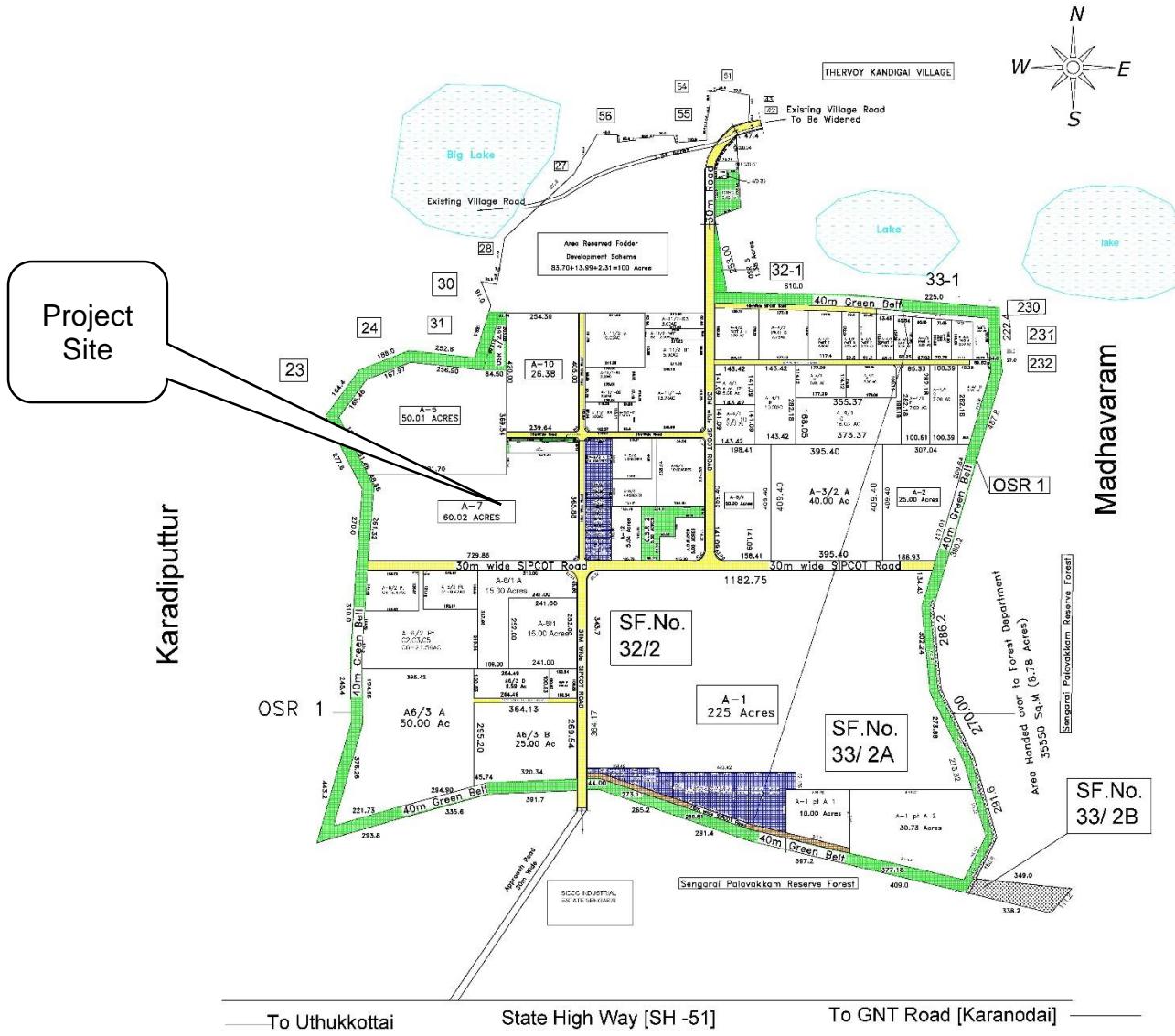


Figure 2.1 Industrial Complex layout

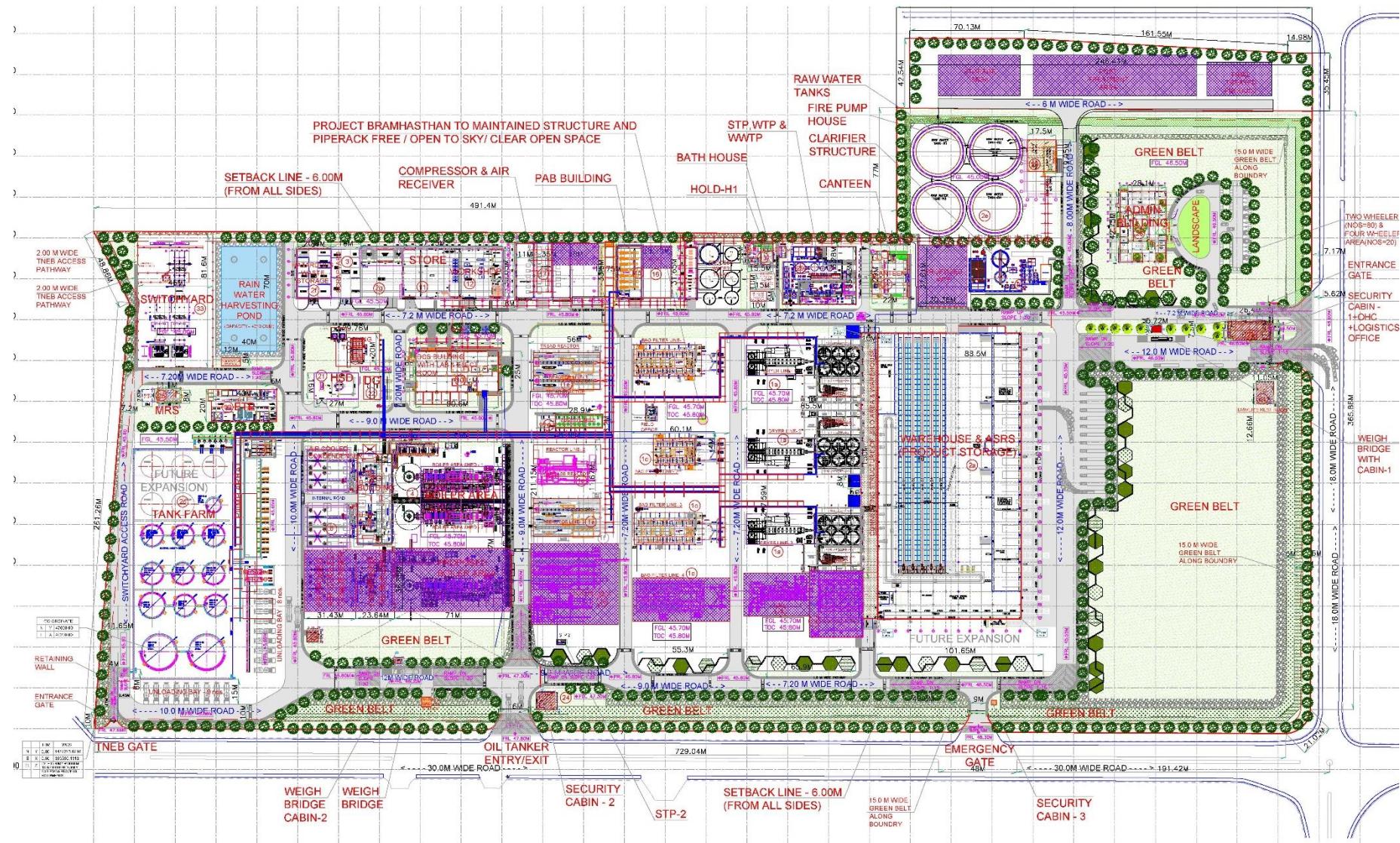


Figure 2.2 Layout of the plant with future expansion area

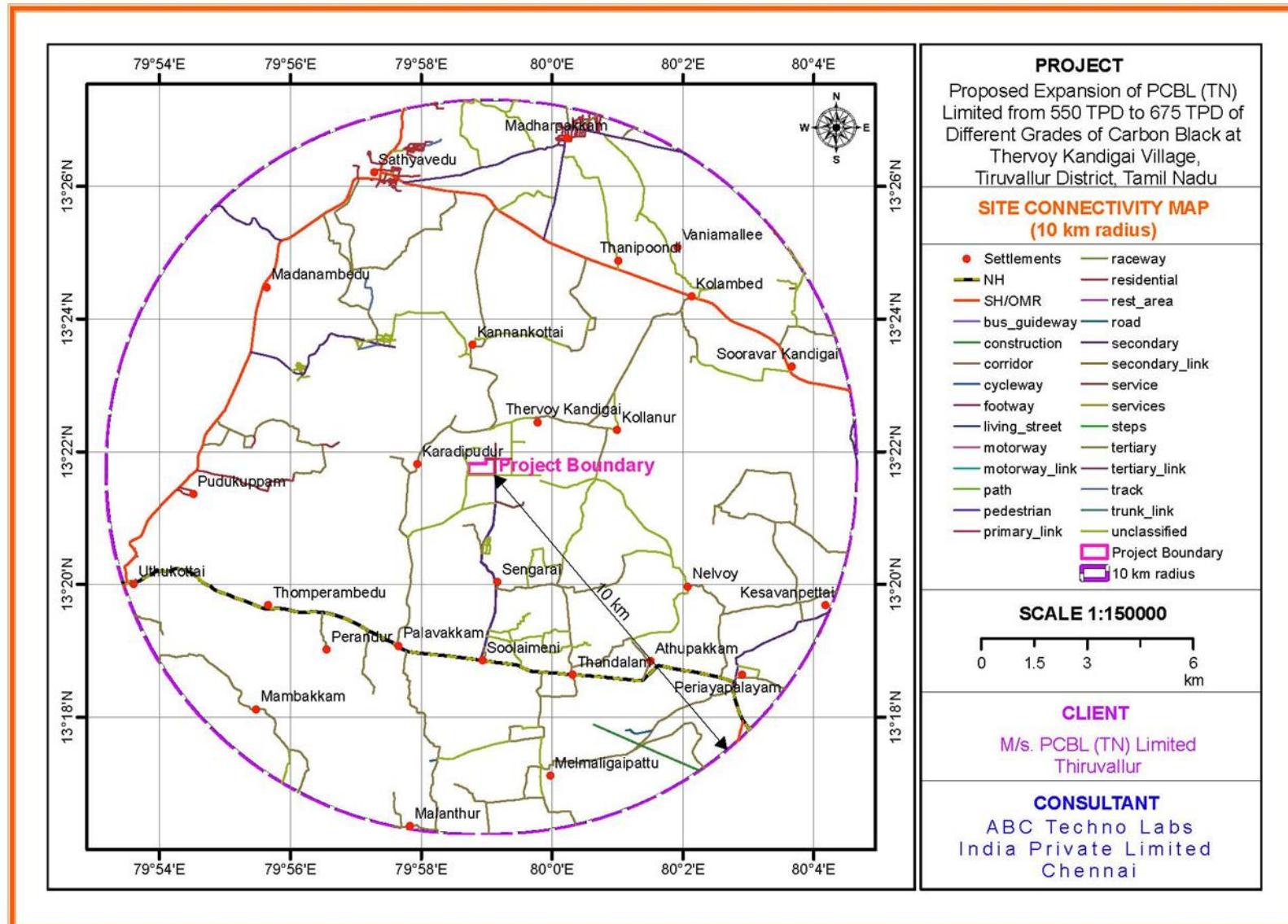


Figure 2.3 Site Connectivity map covering 10 km radius



2.4 Product details before and after expansion

PCBL (TN) Limited is proposed to expand the capacity of 2,36,250 MTPA in 62.46 acres of land which is located at Plot No. A-7 & A-13 at SIPCOT Industrial Park, Thervoy Kandigai village of Tamil Nadu. The end products are given in **Table 2.2**.

Table 2.2 Products details after expansion

Sl.No.	Products	Existing capacity		Proposed capacity		Total Capacity	
1.	Different grades of Carbon Black	550 MTPD	1,92,500 MTPA	125 MTPD	43,750 MTPA	675 MTPD	2,36,250 MTPA
2.	Cogeneration Captive Power Plant	36 MW		-		36 MW	

2.5 Process Details

2.5.1 Equipment

The list of equipments after expansion of the plant is given in **Table 2.3**.

Table 2.3 List of Existing and Proposed Equipment for Expansion of the Plant

Utility	Existing Equipment			Proposed Equipment after Expansion			Purpose
	Unit Configuration	Nos	Capacity	Nos	Capacity	Unit Configuration	
Reactor (Nos)	-	6	550 TPD	7	675 TPD	-	Process, Thermal Cracking of Hydrocarbon oils for formation of Carbon Black
Boiler	3 x 54	3	54 TPH	3	54 TPH	3 x 54	For generation of Steam
Air Cooled Condenser for CPP	3 x 12	3	To suit 36 MW Power Generation	3	To suit 36 MW Power Generation	3	For condensing exhaust steam from Turbines
Cooling Tower	2 x 1250 m ³ /hr	2	Circulation Rate: 1250 m ³ /hr.	2	Circulation Rate: 1250 M ³ /hr.	2 x 1250 m ³ /hr	Generator Cooling
Diesel Generator	2 x 1250 kVA	2	1250 kVA	2	1250 kVA	2 x 1250 kVA	Emergency power

2.5.2 Manufacturing Process Details

Carbon Black is manufactured from highly aromatic hydrocarbon oils, which are thermally cracked at high temperature in specially designed reactor. The heat for this endothermic thermal cracking is supplied by either burning of partial Carbon Black feedstock oil or auxiliary fuel oil with process air inside the reactor itself or both. Carbon Black particles



formed are recovered and converted into pellets for ease of storage, handling and transportation.

The manufacturing process of carbon black has the following sections:

- Feedstock storage and pumping
- Reactor
- Process Bag Collector
- Palletization and drying
- Vapor Bag Collector
- Conveying and storage
- Packing and dispatch system
- Captive Cogeneration Power Plant
- Utility

A brief description of each section is given below.

2.5.2.1 Feedstock Storage and Pumping

Carbon Black feedstock/auxiliary fuel received from the refineries or from coal tar distillation units by road tankers are unloaded into the feedstock or auxiliary fuel storage tanks separately. Since, the feedstock is quite viscous in nature, special type of pumps and steam heating of the fluid is required for ease of handling and pumping.

Feedstock is stored in large cylindrical steel (CS) fixed roof tanks and maintained at about 60-80 °C. temp. in the tank through external steam heating or hot feedstock return from the plant.

Feedstock or auxiliary fuel is supplied to the plant at high pressure through pumps suitable for handling high viscosity fluids. The feedstock is filtered through a line mesh strainers / filters to remove extraneous materials.

2.5.2.2 Reactor Section

Since various types of Carbon Black (CB) can be produced in the oil furnace under varying reaction conditions, two different designs of reactors are employed for manufacturing of all grades of CB, which are required by rubber, plastic and pigment industries.

Hard Black Reactors are used to produce the following grades of Carbon Black conforming to ASTM Standards/Customer Specifications.

N115, N121, N134, N220, N326, N330, N339, N375, P824, P1201

All these grades of CB are used in the treads of tyres as these are highly abrasion resistant.

Soft Black Reactors are used to produce the following grades of Carbon Black conforming to ASTM Standards/Customer Specifications.

N550, P435, N650, N660, N774, N762, N772, N765

All these grades of CB are used in carcass of tyres and for making tubes etc.

Preheated feedstock of about 250-350 °C. is atomized and sprayed inside the reactor through specially designed nozzles made up of special material. The reaction chamber which is lined with high temperature special refractory is at a temp. of approx. 2000 °C - 2500 °C. at a pressure of 0.5kg/sq.cm.



Burning of auxiliary fuel and partial burning of feedstock oil in case of HB reactor in presence of air inside the reactor raise the temp. to 2000 - 2500 °C and provide the endothermic heat for thermal cracking reaction. The reaction products moving at very high velocities are quenched with water sprays at predetermined locations inside the reactor to about 900 to 1100 °C. Sufficient length of refractory lined tunnel downstream of the reactors is provided for complete vaporization of quench water. Energy from this hot stream is recovered by heat transfer from gases laden with carbon black particles to cold air in a specially designed air pre-heater. The hot air at 800-950 °C. is used in the reactor thereby making substantial savings in the fuel requirements in the reactor operation. Feedstock oil is heated in SS heat exchangers for raising its temp. to 250-350 degree centigrade for better atomization and hence increasing the process efficiency.

Product gases laden with Carbon Black particles (now hereafter referred as smoke) are cooled down to 240-260 degree centigrade in a SS venturi cooler and they enter the PBC section for separation of Carbon Black from gaseous products (a mixture of CO, CO₂, CH₄, C₂H₂, N₂, H₂, Air and water vapors).

2.5.2.3 Process Bag Collector Section

Process bag collector is Pulse Jet Filter and comprises of number of modular compartments. Compartments are housed with very special type of filter bags made of fiber glass/Huy glass/membrane coated fiber glass. The bags have only top opening and are fixed securely to the cell plate along with venturi.

Smoke coming from reactor section at 240-260 °C. enters the process bag collectors, CB particles are deposited outside the bags and Clean gas filters off and goes to “off gas header”.

Cleaning of filter bag is done by high pressure air pulse. The deposited CB particles outside the filter bags drop down into the hopper.

CB material collected in hoppers is conveyed through pneumatic conveying fans and Dense Bag Collector to a surge tank for pelletizing and drying section. Before conveying, the material passes through a micro pulverizer, which crushes some hard-carbonaceous particles to – 325 mesh size.

Off gases collected in the off-gas header are sent to pelletizing and drying section and energy conservation section (CPP) for their 100% utilization and thus eliminate the risk of atmospheric pollution.

2.5.2.4 Pelletizing and Drying Section

Carbon Black material collected in a large SS 316 L surge tank is sent to a pelletizer at a constant rate through a variable speed rotary valve where it is mixed with water and molasses solution to form strong wet pellets.

Pelletizer is specially designed equipment and is equipped with a rotating shaft fixed with sharp edge pins in a double / triple helix configuration. The close gap between the pins and the inner smooth surface of pelletizer accompanied by the conveying and rotating action of pins converts the mixture of CB particles and water in to wet and strong spherical pellets.

These wet pellets are fed into a long rotary SS dryer. Pellets are dried inside the hot rotating dryer by slow tumbling, agitating and falling action without damaging the pellets. Dryer shell is enclosed in a refractory / Ceramic lined box all along its length and the heat



is supplied by burning of off gases received from the PBC section in a specially designed refractory lined combustion furnace. Dry pellets with moisture less than 0.5% exit at the other end of the dryer for storage in the silos.

Modern techniques and reliable electronic instruments are used in this section to give a dried pelleted product of consistent quality at all times and make the process smooth and efficient.

2.5.2.5 Vapor Bag Collector Section

Water evaporated due to drying of wet pellets in the dryer along with some powdered material is removed by a Vapor Fan at the feed end of the dryer. These hot gases are sent to a cylindrical bag filter house called Vapor Bag Collector to remove and collect the CB particles and let out into the atmosphere very clean, purge gases. Vapor Bag Collector is also equipped with special bags for filtration of CB particles.

Carbon Black collected in the conical hopper is fed to the conveying line which gets mixed with the main stream.

2.5.2.6 Conveying and Storage Section

Dried pellets coming out at the exit end of the dryer are fed into a bucket elevator made of SS buckets to carry the material to the top of the silos. The material can be fed into any of the silos via SS screw conveyors located on the top of silos. These silos are made of MS but epoxy / SS lined from inside to prevent contamination of product during storage.

2.5.2.7 Packing & Dispatch Section

Material stored in the silos is packed in 25kg. paper bags / Bulk Bags through automatic packing machines. The portable packing machines can be connected to any of the storage silos. Fully automatic packing machine along with the moving roller conveyors and bag shapers make the handling of paper bags very fast, convenient, and clean. Packed bags are stacked on wooden pallets in warehouse for storage and subsequent dispatch in trucks to the consumers.

2.5.2.8 Energy Conservation Section

Low Btu off gases generated in the manufacturing process of CB in the reactor section and separated from accompanying CB particles in PBC section are collected in the off-gas header. Inspite of their low calorific value, these gases can be utilized to recover their calorific value in a specially designed boiler system to generate high pressure steam and in a specially designed dryer combustor furnace to supply the heat energy requirements in the pelletizing and drying section.

The quantum of high-pressure steam which can be generated through burning of these off gases meets the plant requirement of steam and power. Excess power generated is sent to the Grid.

So, the benefit of above scheme is being fully taken care of by installing the following system:

- High pressure boiler system
- Turbo Generators
- Power Export

High pressure boiler which can be run on a combination of off gases and fuel oil or Off gas alone generates high pressure super-heated steam at approx. 85 kg/sq.cm.



This high-pressure steam is used to generate sufficient power required for plant consumption through turbo generator system and excess power is sent to the Grid. The scheme also helps in eliminating the atmospheric pollution problem which would have been caused had complete utilization of off gas were not made.

2.5.3 Utilities Section

Utilities section has following major systems which meet the requirement of various sections at different locations:

- Process Air System
- Compressed Air systems for Instrument, Plant and Atomizing Air
- Raw water
- Firefighting system
- Cooling water system
- Water Treatment Plant
- Effluent Treatment Plant

These systems are provided with necessary equipment e.g. Pumps, blowers, compressors, tanks, towers etc. as necessary. The process block diagram is shown in **Figure 2.4** and process flow diagram is shown in **Figure 2.5**. The PFD with mass balance is shown in **Figure 2.6**.

2.6 Raw Materials

The list of raw materials given in **Table 2.4** and the MSDS of raw materials is given in **Annexure - III**.

2.7 Resource optimization/Recycling and reuse

On expansion, the industrial wastewater generation is estimated to be about 683 KLD. The entire amount of 683 KLD of wastewater being recirculated into system after primary treatment with the help of RO and the plant is comprising to ZLD.

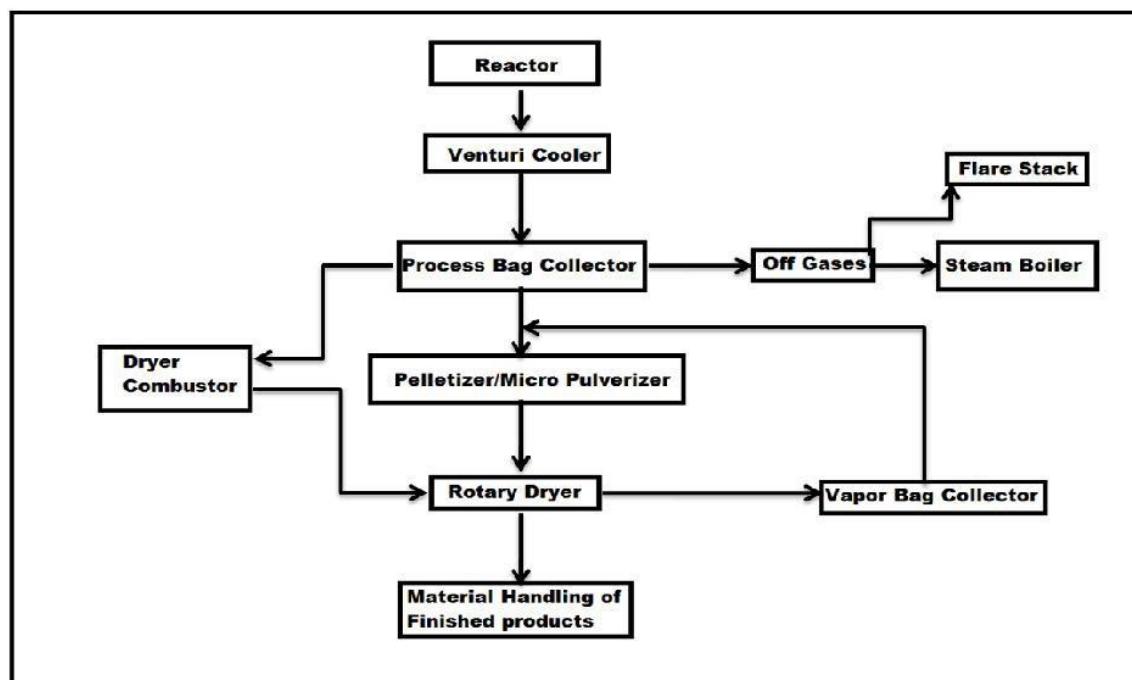


Figure 2.4 Process block diagram

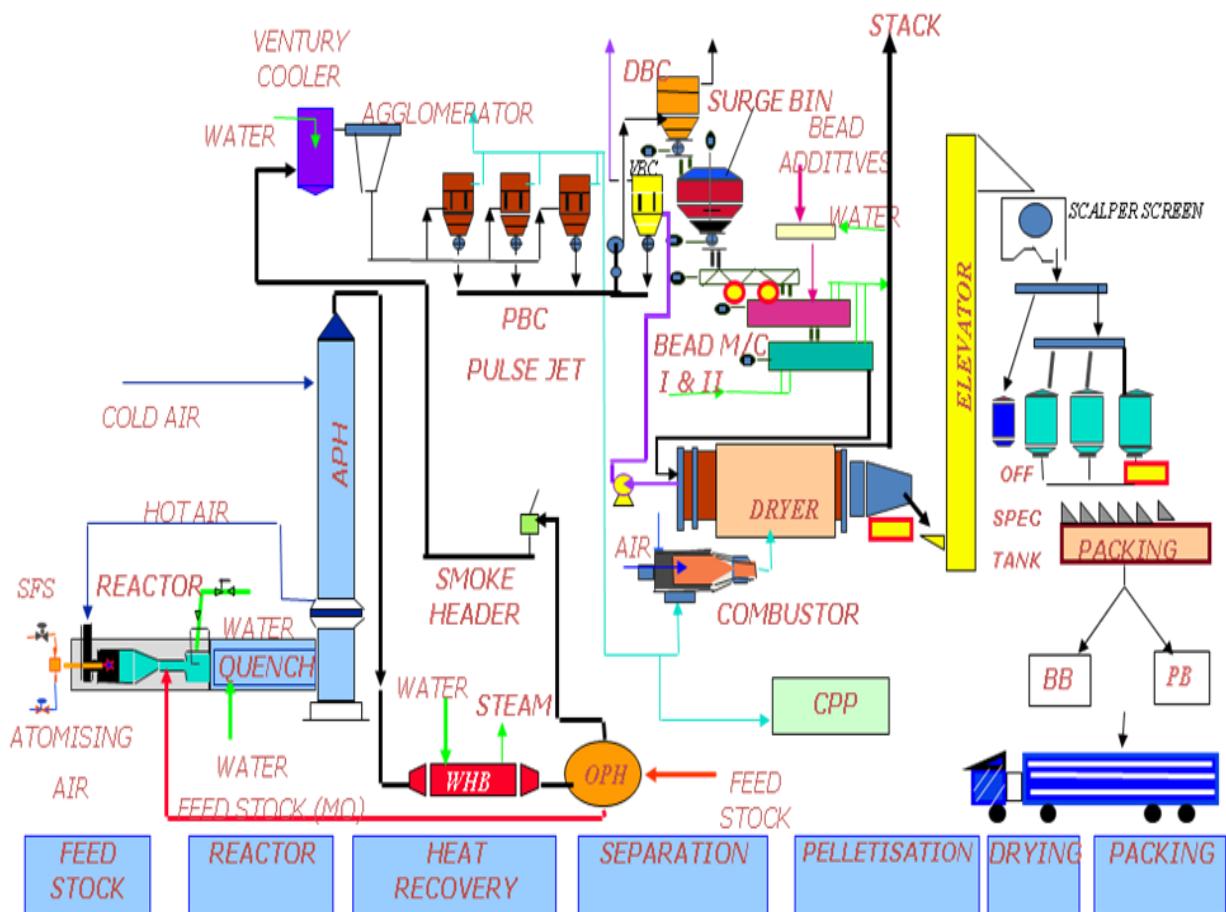


Figure 2.5 Process flow diagram



Table 2.4 List of raw materials

Sl.No.	Raw materials	CAS no	Quantity (MT/Month)			Physical State	Sourcing	Mode of storage	Storage Quantity (MT)	Mode of Transport	Finished Products
			Existing	Proposed	Total						
1	Carbon black Feed Stock/ Dehydrated Coal Tar / Anthracene	71-43-2 / 90640-80-5	25,879	8,325	34,204	Thick Liquid	Imported	CS Fixed Roof Cylindrical Tanks	34204	Cargo Vessels / Road Tankers	Carbon Black
							Indigenous				
2	Molasses	68476-78-8	54	18	72 KL	Thick Liquid	Indigenous	Epoxy Coated CS Cylindrical Tanks	80 KL	Road Tankers	Carbon Black
3	Potassium Nitrate / Potassium Carbonate	7757-79-1 / 584-08-7	10	5	15	Powder	Indigenous	Bags	15	Truck	Carbon Black
4	Hydrochloric acid	7647-01-0	31	10	41	Liquid	Indigenous	Rubber Lined CS / FRP Vessels	41	Road Tankers	Power
5	Caustic soda	1310-73-2	15	5	20	Powder	Indigenous	Rubber Lined CS / FRP Vessels	20	Road Tankers	Power
6	Water Treatment Chemicals	-	57	18	75	Solid Powder	Indigenous	Plastic Bags in enclosed rooms	75	Truck	Power
7	Light Diesel Oil/ High Speed Diesel	-	45	15	60 KL	Liquid	Indigenous	CS Fixed Roof Cylindrical Tanks	100 KL	Road Tankers	Carbon Black

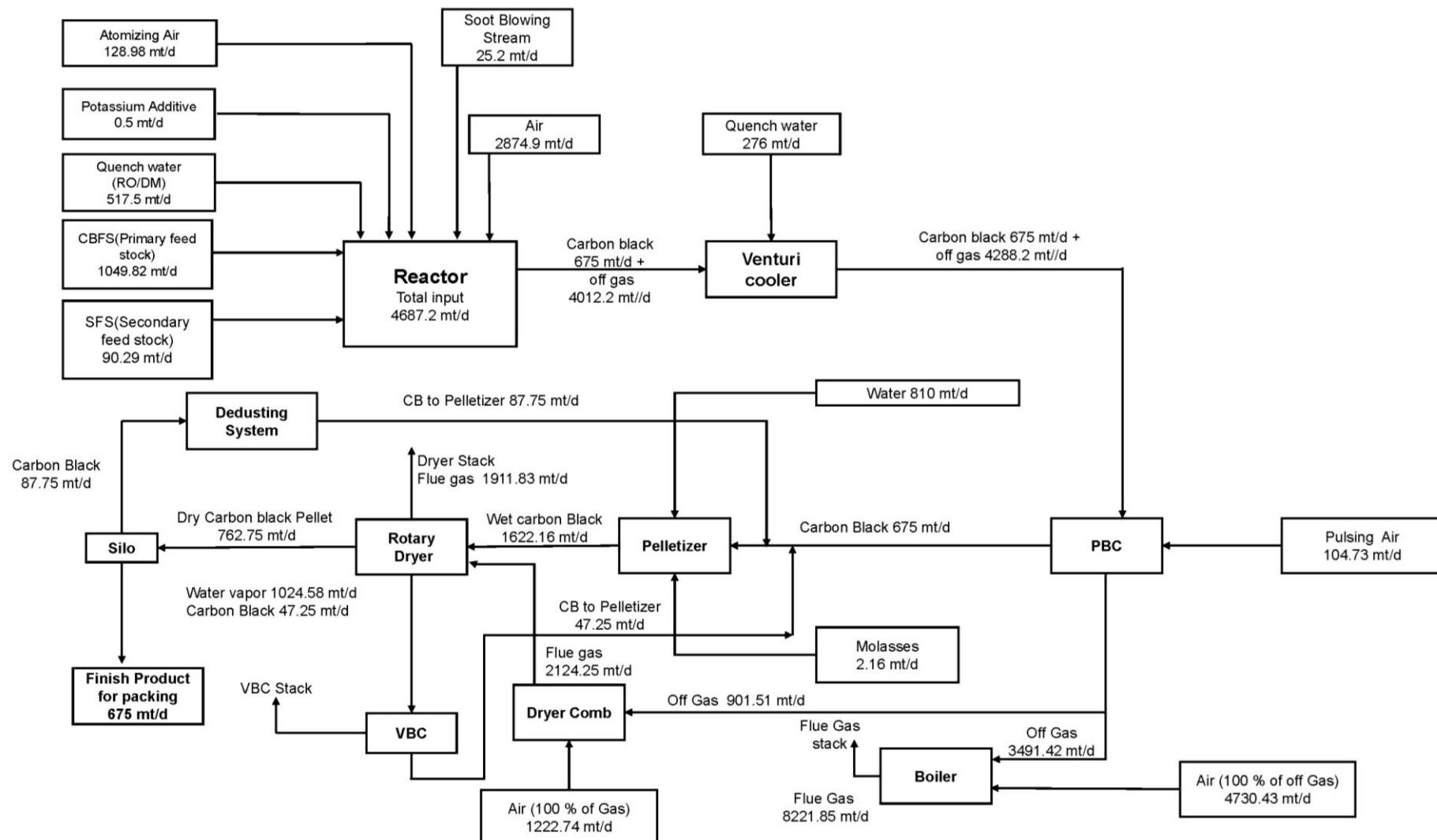


Figure 2.6 Mass Balance for the proposed expansion



2.8 Water Requirement

The total requirement of water after proposed expansion is about 3953 KLD. Out of this, about 683 KLD will be recycled within the process. The estimated domestic water requirement is to be about 57 KLD. The approval obtained for fresh water requirement is about 3737 KLD which will be met from SIPCOT. Details of water requirement for the proposed project are given in **Table 2.5** and the existing and after expansion water balance diagram is given in **Figure 2.7** and **Figure 2.8** respectively.

Table 2.5 Water Requirement for the proposed project in KLD

	Existing	Additional	Total	Effluent	Effluent recycled/ Blow down Existing	Effluent recycled/ Blow down proposed	Condensate recovery existing	Condensate recovery proposed	Fresh requirement existing	Fresh requirement proposed
Domestic	57		57	48					57	57
Greenbelt development	207	0	207		42	42			165	165
Industrial										
Process	2006	300	2306		0	0			1796	2164
CT Make up	572	0	572		172	172			572	572
Boiler	191	0	191		162	162				
Inline Boiler	355	70	425		7	9	239	289		
Floor Wash	195	0	195	176	171	171			195	195
Total Industrial	3319	370	3689		512	514	239	289	2563	2931
Total	3583		3953		554	556	239	289	2785	3153

2.9 Power and fuel requirement

The existing power requirement is ~10 MW and the estimated power requirement for expansion is ~1.8 MW. The total power requirement is ~11.8 MW. The power requirement is detailed in **Table 2.6**. The CPP power generation from the plant is about 36 MW.

Table 2.6 Power requirement

Details	Power and fuel	Source
Operation Phase		
Power Requirement during Operation Phase	~11.8 MW	CPP / TANGEDCO
Initial Heating – LDO / HSD	0.894 MT/day	IOCL/HP
HSD for DG sets	400 LPD	IOCL/HP
Construction Phase		
Power Requirement	0.400 MW	DG Set / TANGEDCO

2.10 Air Pollution Control System and Management

The various air pollution control measures as envisaged for the project are suitable stack height for the Boilers and DG emissions, Bag filters, Venturi scrubbers. The process off gases after recovering the heat with the help of heat exchangers will be passed through bag filters. The cleaned gas as a fuel will be used in the power plant. During emergency situation related to process (during startup or change of fuel), the process gas will be scrubbed by Venturi scrubbers and the cleaned gas will be released into atmosphere with the help of stack attached with Venturi scrubbers. Hence, the pollution load from these stacks is not considered for air modelling as the emission is not continuous. The existing and proposed stack details with source of emission and APC measures are given in **Table 2.7**.



Table 2.7 Existing and Proposed Stack Details

Emission source	APC measure proposed	Stack height, m	Top Dia. (m)	Flow rate* Nm ³ /h		Exit vel. (m/s)	Temp. °C	Existing No.of. stacks	Proposed No. of stacks	Type of Pollutants	Concentration of pollutant designed (mg/Nm ³)			Mode of Operation
				Existing	Proposed						PM	SOx	NOx	
DG set: 2 x 1250 kVA	Adequate stack height as per TNPCB Norms	30 AGL	0.3	5000		10	529	2	-	PM, SO _x , NO _x	150	600	600	During Power failure
Waste gas-based Boilers: 3 x 54 TPH.	Adequate stack height as per TNPCB Norms	90 AGL	2.5	76,623.90	100169	15.58	205	3	-	PM, SO _x , NO _x	30**	100**	100**	Continuous
2 Nos. of Flare Stacks	Adequate stack height as per TNPCB Norms	50 AGL	-	-		-	-	2	-	PM, SO _x , NO _x	-	-	-	Emergency
Vapor Bag Collectors – 4 Stacks	Bag Collectors	60 AGL	0.7	10190	12506	10.74	205	4	-	PM, SO _x , NO _x	150	600	600	Continuous
Dryer – 4 Stacks	Bag Collectors	60 AGL	1.2	29694	36,442	12.76	300	4	-	PM, SO _x , NO _x	150	600	600	Continuous
Process Bag Collectors – 2 Stacks	Bag Collectors	50 AGL	1.5	48899	60012	13.45	300	2	-	PM, SO _x , NO _x	150	600	600	During Startup
Venturi Scrubbers – 2 Stacks	Adequate stack height as per TNPCB Norms	50 AGL	-	-		-	-	2	-	PM, SO _x , NO _x	-	-	-	During Startup/shutdown
Dedusting & Rerun Bag Collectors – 8 Nos.	Adequate stack height as per TNPCB Norms	20 m	0.5	13200	16200	11.29	90	8	-	PM, SO _x , NO _x	30	-	-	Continuous

* - Flow rate per stack

** - TPP norms are considered

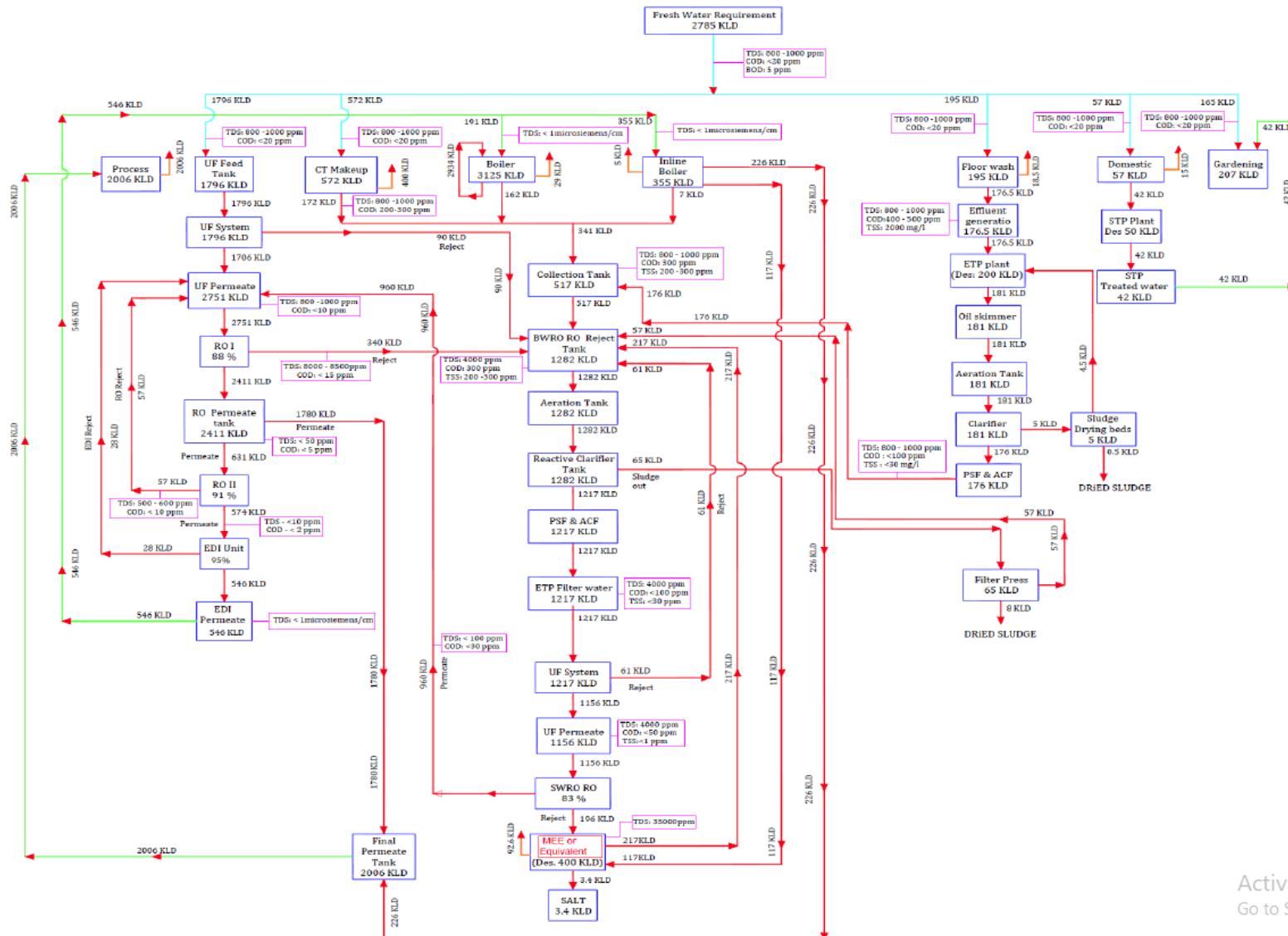


Figure 2.7 Existing Water Balance chart

Activate
Go to Sett

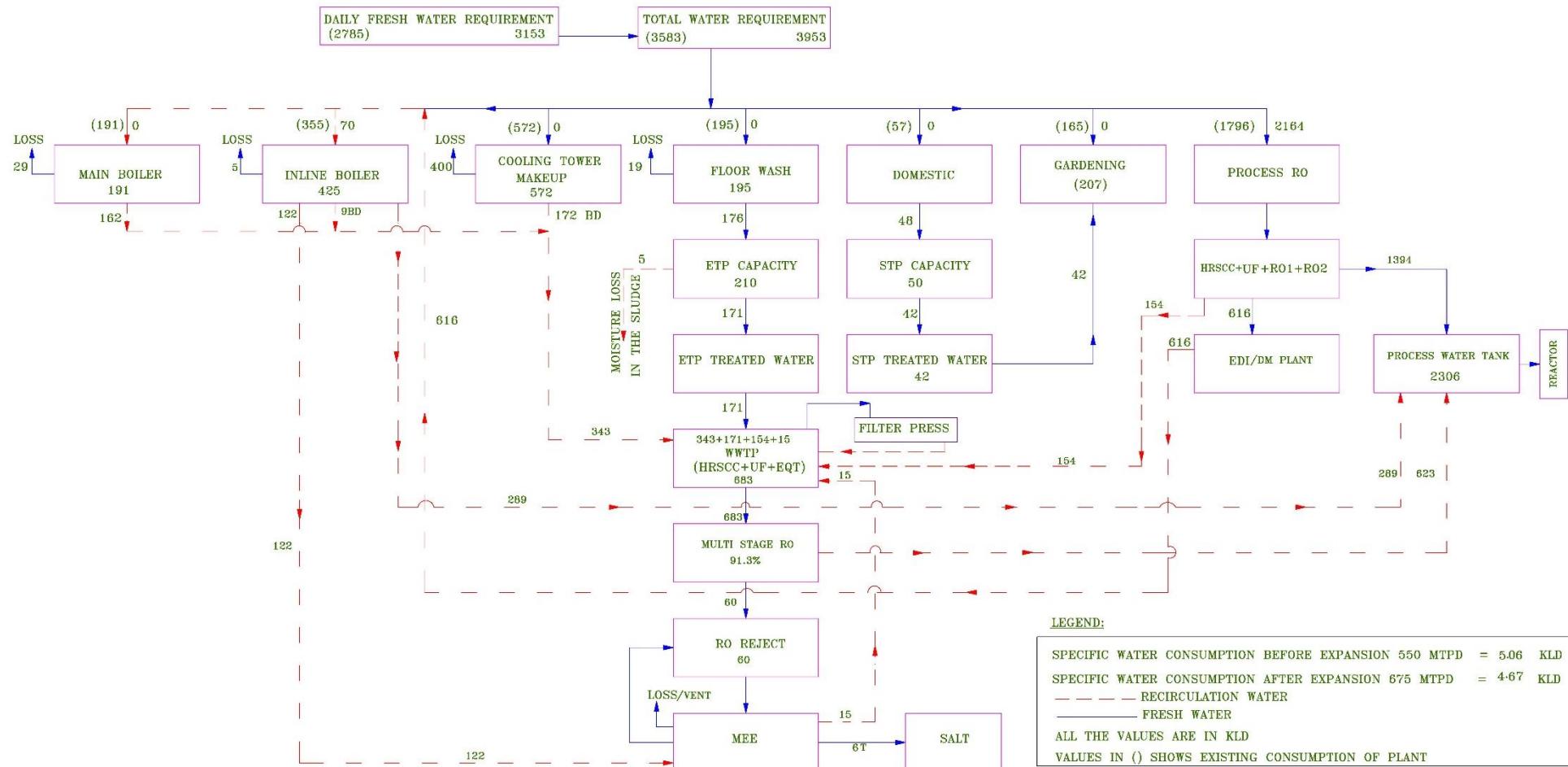


Figure 2.8 Proposed water balance chart



2.11 Waste Management and Disposal Method

2.11.1 Liquid Waste Management

The Sewage generated of approx. 42 KLD will be treated disposed through Membrane based STP (50 KLD). The existing capacity of STP is 50 KLD would be sufficient for expansion also. STP treated water will be used for greenbelt development. Similarly, Effluent generated from the floor washing is 176 KLD which will be treated through ETP capacity of 210 KLD. The process water of about 683 KLD will be treated in Ultra filtration, RO with MEE. The process block diagram of STP and ETP is shown in **Figure 2.9 & 2.10**.

2.11.2 Hazardous and Solid Waste Management

The hazardous waste will be disposed through authorized agency. The existing agreements are attached as **Annexure - IV**. The details of hazardous waste are given in **Table 2.8**.

Table 2.8 Details of Hazardous waste

Details of Waste	Scheduled as per HWM rules	Existing Quantity TPA	Proposed Quantity TPA	Total quantity TPA	Storage and Disposal
Used or Spent Oil	5.1	6.0	2.0	8.0	TNPCB Authorized Recyclers
WTP, ETP Sludge & MEE Salt	35.3	4165	950	5115	Collection, Storage, Transportation and disposal at TSDF- Gummidipoondi.
Empty Container/ bags	33.1	12	3	15	TNPCB Authorized Recyclers
Used Filter cloth	3.3	2.0	0.5	2.5	TNPCB Authorized Recyclers
Used Oily cotton waste/weather hand gloves/ cotton hand gloves	33.2	2.0	0.5	2.5	Collection, Storage, Transportation and disposal at TSDF- Gummidipoondi.
Discarded filter medium (bag filter)	36.2	12.0	3.0	15	Collection, Storage, Transportation and disposal at TSDF- Gummidipoondi.
Ceramic wool/ waste insulation material	-	12.0	3.0	15	Collection, Storage, Transportation and disposal at TSDF
Spent Ion exchange resins	35.2	1.0	0.3	1.3	Collection, Storage, Transportation and disposal at TSDF
Oily sludge emulsion	I – 4.1	15.0	3.41	18.41	Collection, Storage, Transportation and disposal at TSDF
Used batteries		0.1	0.02	0.12	Collection, Storage, Transportation and disposal at TSDF
Spent acid batteries	I – 36.2	0.024	0.005	0.029	Collection, Storage, Transportation and disposal at TSDF

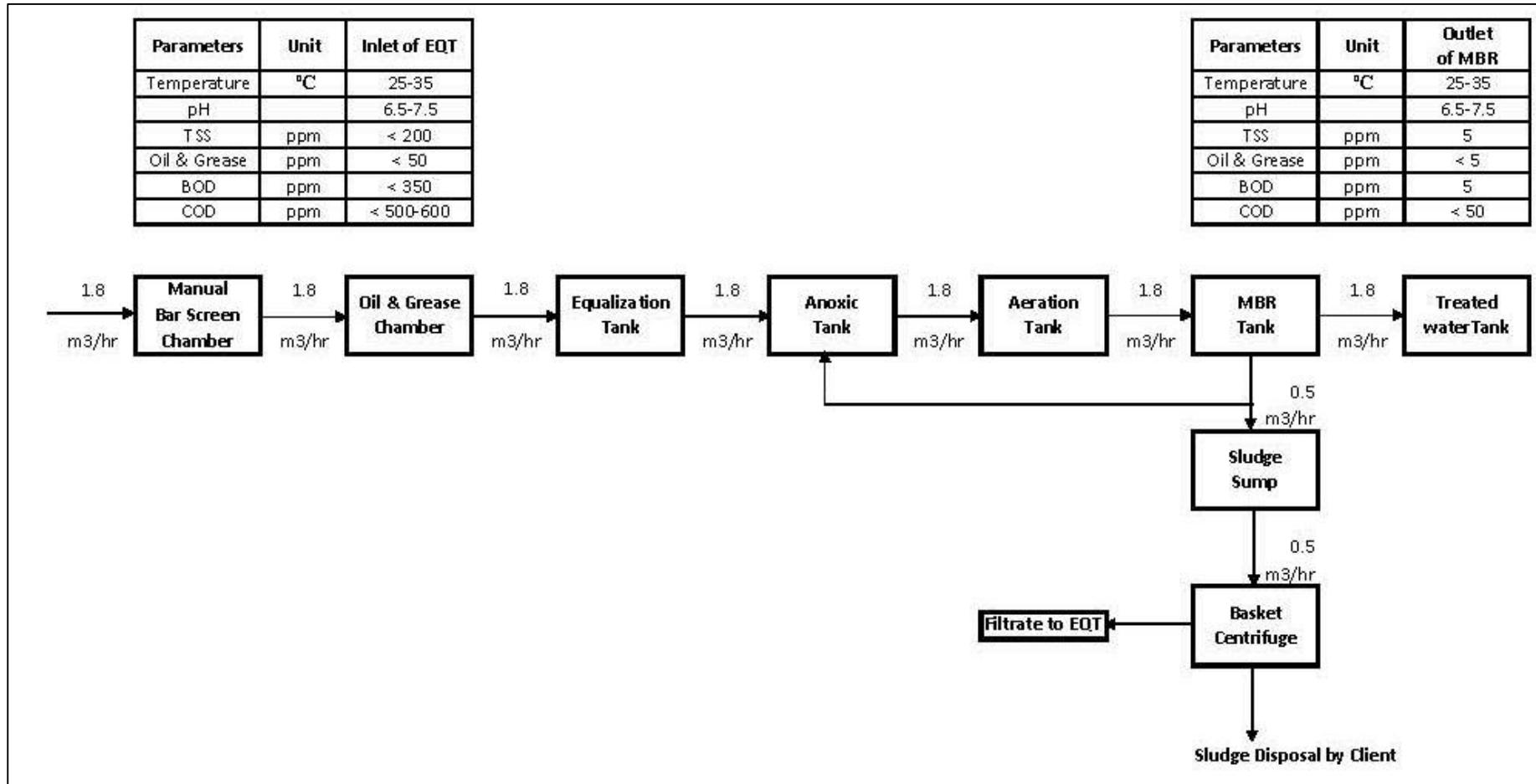


Figure 2.9 Process block diagram of Membrane based STP

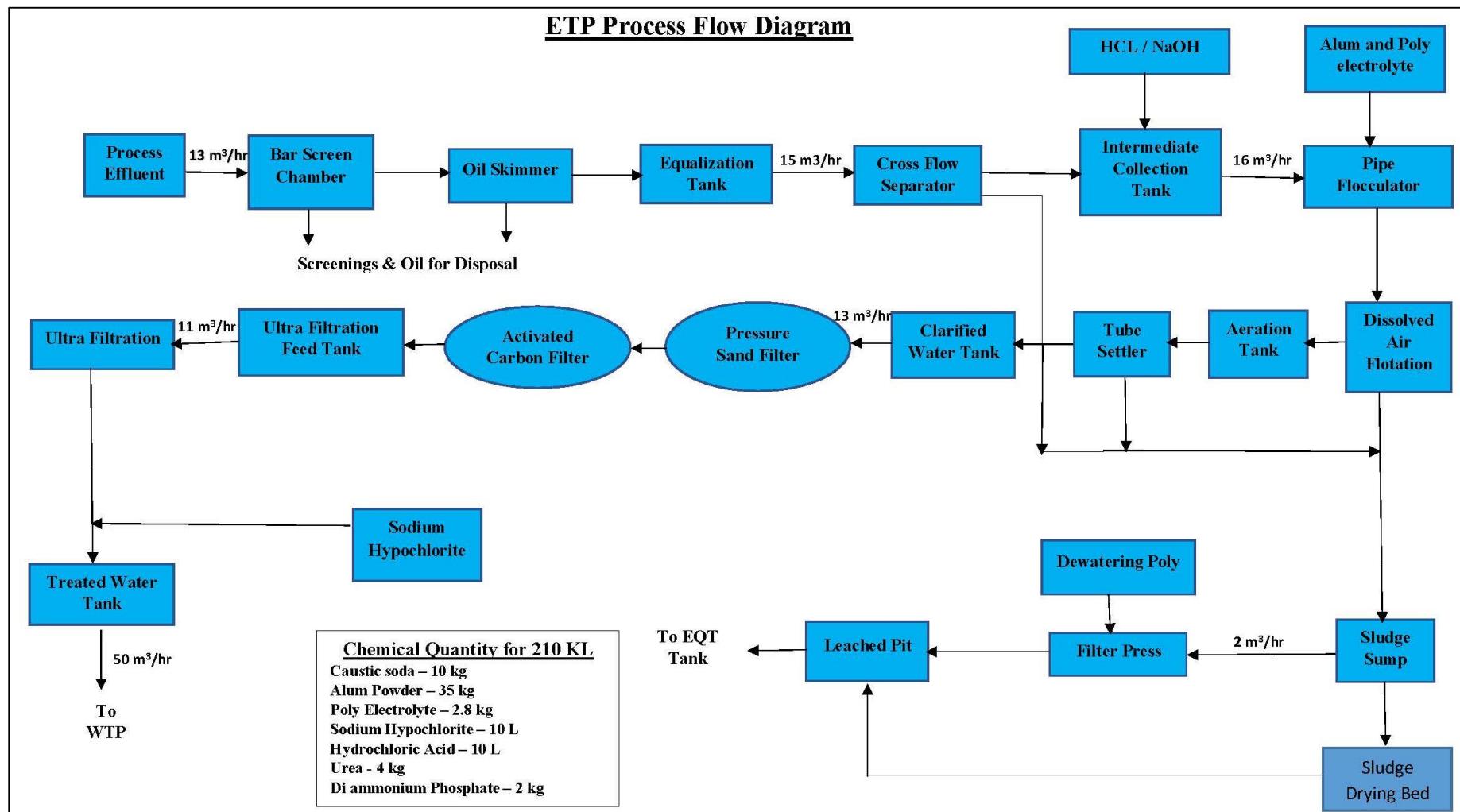


Figure 2.10 Process block diagram for ETP



The details of municipal solid waste are given in **Table 2.9**.

Table 2.9 Details of Solid waste

S. No	Description	Existing Quantity (Kg/day)	Proposed expansion Quantity (Kg/day)	Total Quantity (Kg/day)	Method of Disposal
Operation phase:					
1	Organic	114.75	28.8	143.55	Disposed through local bins / convert to manure
2	Inorganic	76.5	43.2	119.7	Send to TNPCB authorized vendors
3	STP Sludge	5.0	-	5	Used as a manure for Greenbelt
Construction Phase: 100 kg/day (Disposed through Local Panchayat bins)					

Paper/Card Board, Dust bin collection, dry leaves, grass are being disposed through local panchayat. Metal scrap & wooden scrap will be recycled/sent to authorize dealer.

2.12 Manpower requirement

The proposed expansion will create direct employment of 60 in addition to that 300 manpower in the existing plant to suffice the day to day operations and maintenance of the plant. During the construction phase approx. 500 persons will be engaged through contractor.

Sl.No.	Particulars	Permanent	Contract
A.	Operation Phase		
1.	Existing employment	210	90
2.	Additional Employment	20	40
	Total	230	130
B.	Construction Phase		500

2.13 Greenbelt Development

Greenbelt will be developed in the factory premises and will occupy a total area of about – 83,589 Sq.m. (i.e. 33 % of the total plot area). The species and plantation norms will be as per directives of CPCB guidelines in consultation with local forest department. The native species will be predominantly planted. Existing green belt photographs are shown in **Figure 2.11**.



Figure 2.11 Greenbelt Photographs

The saplings of native species have been provided by Forest Department and around 1300 saplings have been planted in the project site. The species planted is given in **Table 2.10**.

Table 2.10 Plants species of Greenbelt

Sl.No.	Local Name	Botanical Name
1.	Teak Saplings	<i>Tectona Grandis</i>
2.	Mahogani	<i>Swietania Mahogani</i>
3.	Iluppai	<i>Madhuca longifolia</i>
4.	Pungai	<i>Pongamia pinnata</i>
5.	NeerMaruthu	<i>Terminalia arjuna</i>
6.	Naval	<i>Syzygium cumini</i>

2.14 Project cost and Schedule

The Project Cost for expansion is estimated to be about Rs. 360.00 Crore. The project is planned to be completed within 18 months.



3.0 Description of the Environment

3.1 General

Environmental Impact Assessment Study includes an assessment of the various environmental impacts likely to be caused on the surrounding nature in and around the proposed project. It will also incorporate the appropriate control measures required to be adopted or implemented in order to minimize the adverse effects thereof. In order to carry out such assessment study, it is first necessary to delineate and define the existing environmental factors in the vicinity of the proposed project on the existing environmental scenario which will include various environment matrix like ecology, flora-fauna, socio economic profiles, environmental quality with respect to air, water, noise & soil etc.

3.2 Study Area, study period and validation of baseline data

This section incorporates the description of the existing environmental settings within the area encompassed by a circle of 10 km radius around the project site. The base line study was conducted during the pre-monsoon season from the month of March 2021 to May 2021 and secondary data collected from various Government & Semi-Government when the EC was applied for the project. Since, the validity of the baseline data is for 3 years it is planned to use the same data for this expansion of PCBL. However, considering the timeline period of the expiry of the present baseline data and considering surrounding development at the project site, one-month additional baseline data have also been collected from the same monitoring location during the period of February 2024 and these data are corroborated with the 2021 data in sequel.

3.3 Meteorology

The meteorological data recorded during the study period is very useful for proper interpretation of the baseline information as well as for input to prediction models for air quality dispersion. On site monitoring was undertaken for various meteorological parameters in order to generate the site-specific data. The Automatic Weather Station (AWS), equipped with continuous monitoring equipment to record wind speed, wind direction, temperature, humidity and rainfall was set up at the top of the office building at a height of ~ 4.0 m above the ground level. The methodology adopted for monitoring surface observations was as per the standard norms laid down by the Bureau of Indian Standards (IS: 8829) and IMD. Baseline data for a month i.e. February 2024 was generated by M/s. ABC Techno Labs India Pvt. Ltd. in-house facilities which is a NABL approved laboratory.

3.3.1 Meteorological data recorded at site

The meteorological parameters were recorded at site on hourly basis during the study period and consists of parameters like wind speed, wind direction, humidity and temperature. The total rainfall was recorded daily once at 08:30 hrs. The maximum and minimum values for all the parameters except wind speed and wind direction are presented in **Table 3.1**.



Table 3.1 Summary of the meteorological data generated at site

Month	Temperature °C			Relative Humidity (%)			Wind Speed (km/h)			Rainfall (mm)
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	
Existing baseline data during March 2021- May 2021										
March	34	23	29	78	62	69	8	0	5	0
April	36	26	30	71	56	63	12	0	8	0
May	39	28	32	79	52	70	14	0	11	0
Revalidated baseline data during February 2024										
Feb	34	20.7	28	91	44	74	4.1	0	1.6	0

The summary of the wind pattern for study period (March 2021- May 2021) season is given in **Table-3.2**. The windrose of the same is shown in **Figure 3.1**.

Table 3.2 Summary of wind pattern in the study area

Existing baseline data during March 2021- May 2021				
Month / Season	First Predominant Wind Direction	Second Predominant Wind Direction	Average Wind Speed (m/s)	Calm (%)
Mar to May	WSW	SW	2.42	0.32

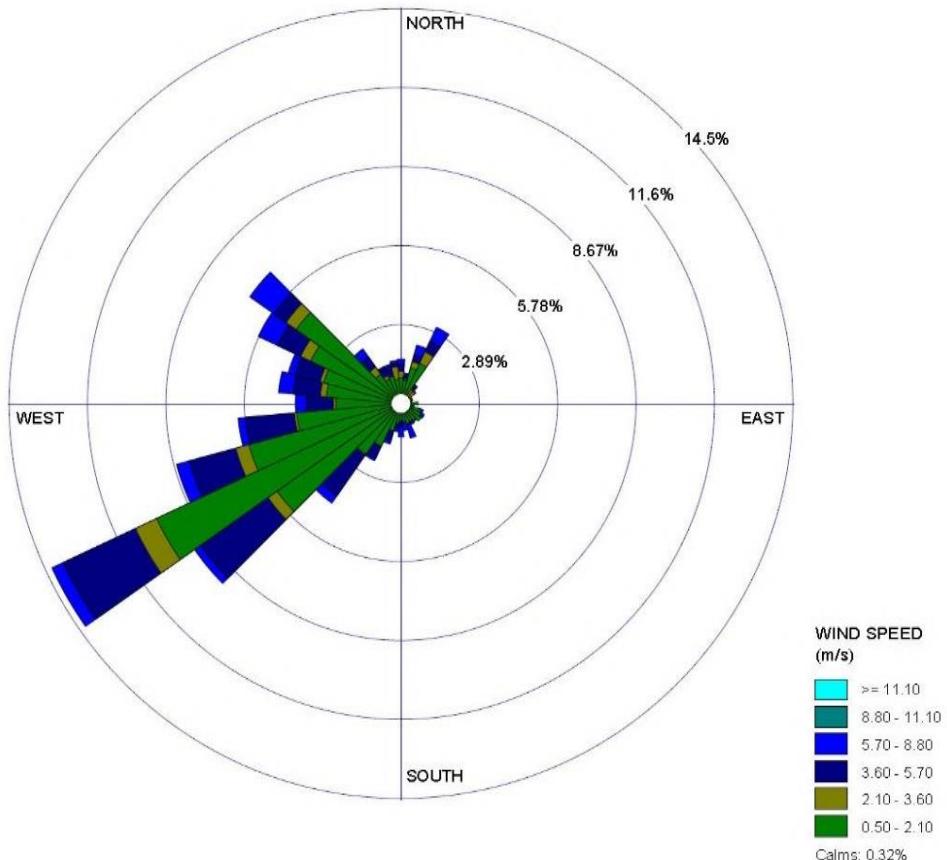


Figure 3.1 Wind Rose (March 2021- May 2021)

The summary of the wind pattern for study period (February 2024) season is given in **Table-3.3**. The graphical presentation of the same is shown in **Figure 3.2**.



Table 3.3 Summary of wind pattern in the study area

Revalidated baseline data during February 2024				
Month / Season	First Predominant Wind Direction	Second Predominant Wind Direction	Average Wind Speed (m/s)	Calm (%)
February 2024	E	ENE	1.63	7.90

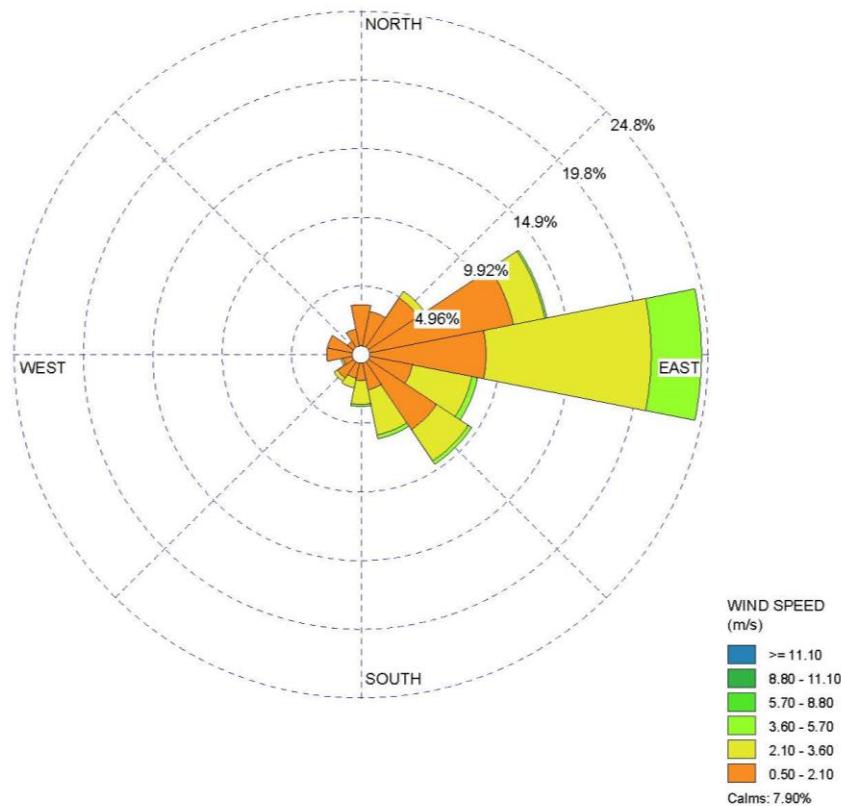


Figure 3.2 Windrose for February 2024

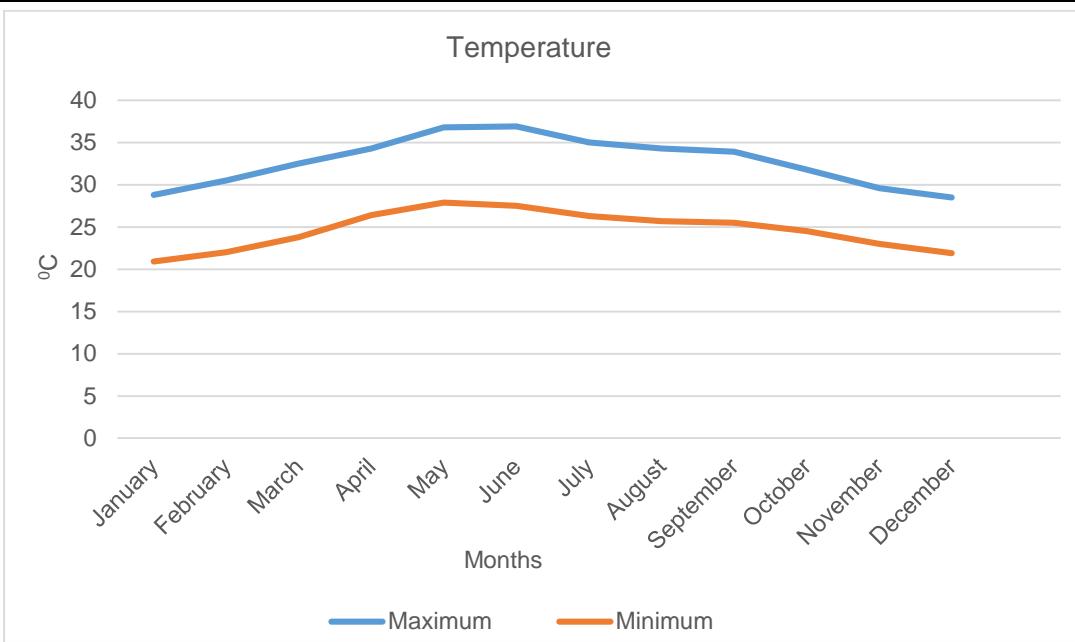
3.3.2 Secondary data from Indian Meteorological Department

Station: (IMD) Nungambakkam

The nearby India Meteorological Department station that is generating meteorological data is 58 km from the site i.e. IMD, Nungambakkam, Chennai. Hence, secondary information on meteorological conditions have been collected from IMD station. Indian Meteorological Department regularly monitors wind direction, wind speed, relative humidity, temperature, rainfall, evaporation and pressure at 08.30 hours and 17.30 hours every day. Wind rose diagrams are collected from IMD for the period 1971 – 2000 and are shown in **Figure 3.3.**

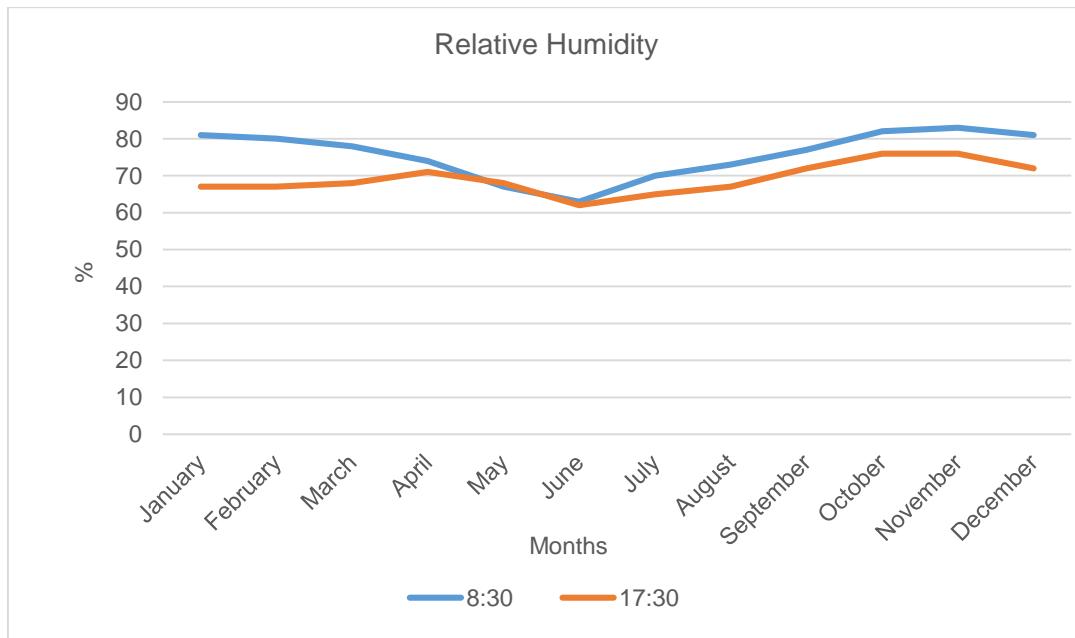
3.3.2.1 Temperature

The monthly mean maximum temperature varied from 28.5°C to 36.9°C while monthly mean minimum varied from 20.9°C to 27.9°C indicating January & December as the coldest month while May & June as hottest month.



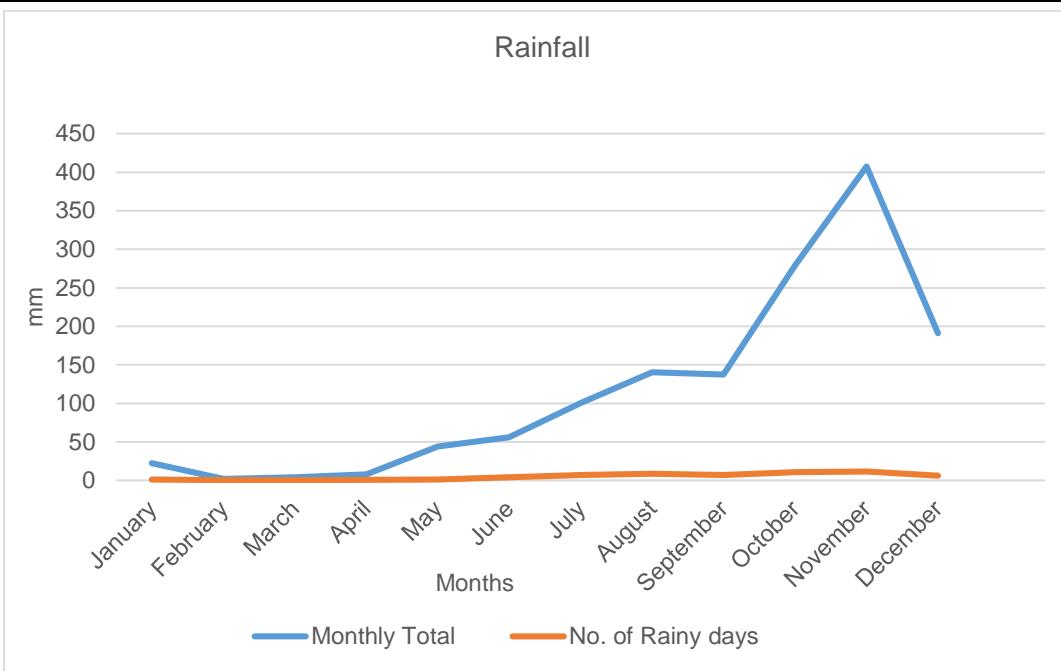
3.3.2.2 Relative Humidity

During the month of November, the relative humidity was highest (83%). The annual average Relative humidity is 76% (at 08:30 Hours) and 69% (at 17:30 Hours). Generally, the weather during other seasons was observed to be humid.



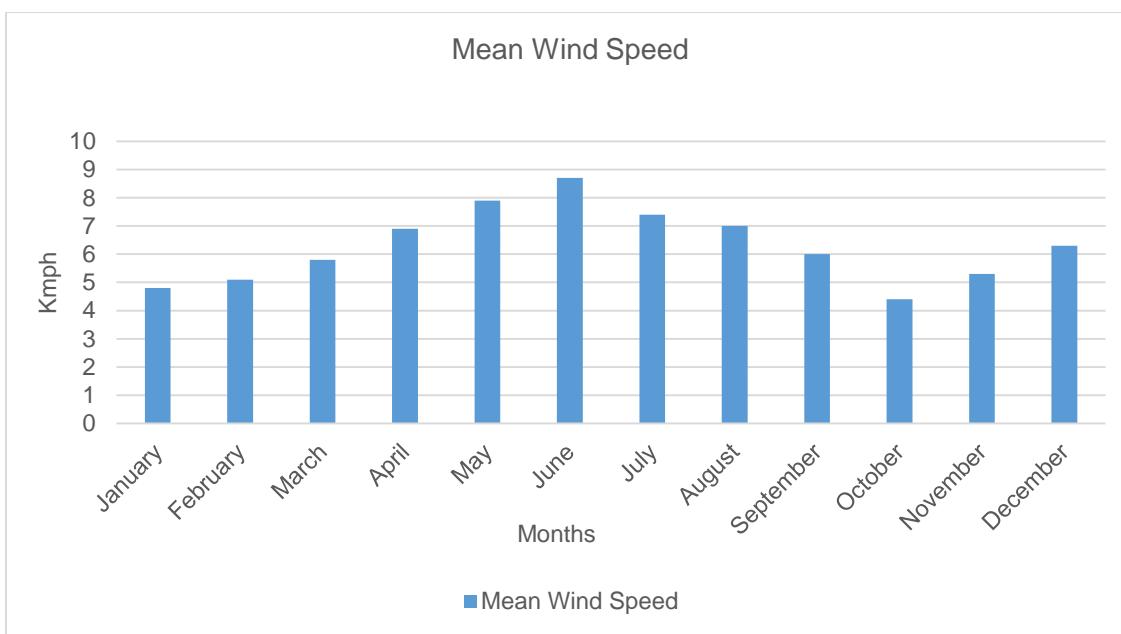
3.3.2.3 Rainfall

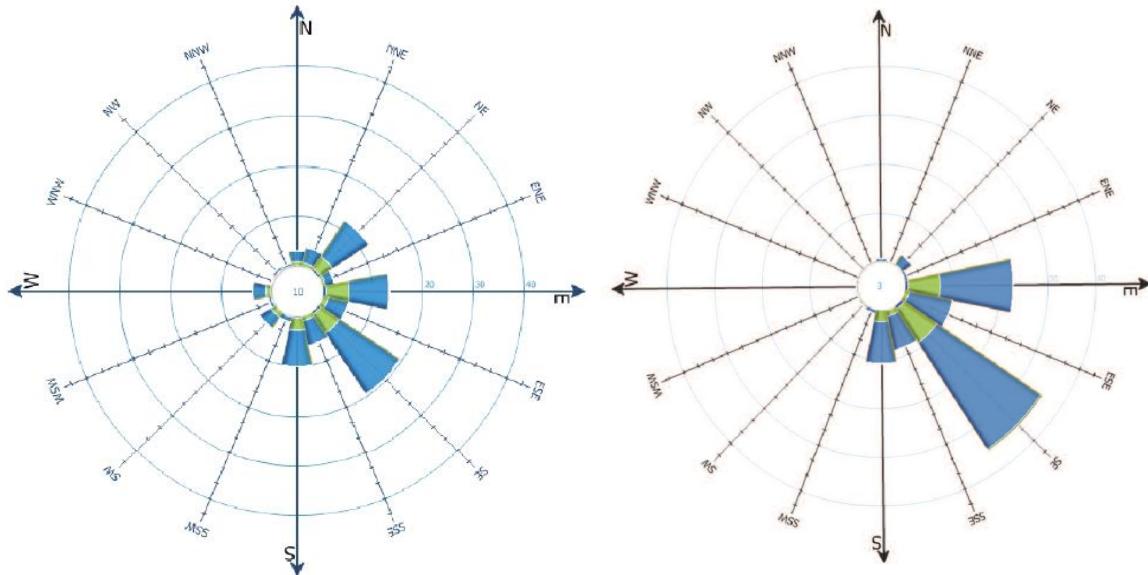
The rainfall occurred maximum in the month of November (407.4 mm). The total rainfall received in the year is about 1391.5 mm. Total rainy days observed was about 59.1 days. The SW monsoon sets in the month of July and NE continues from October 15th till end of December.



3.3.2.4 Wind Speed/Direction

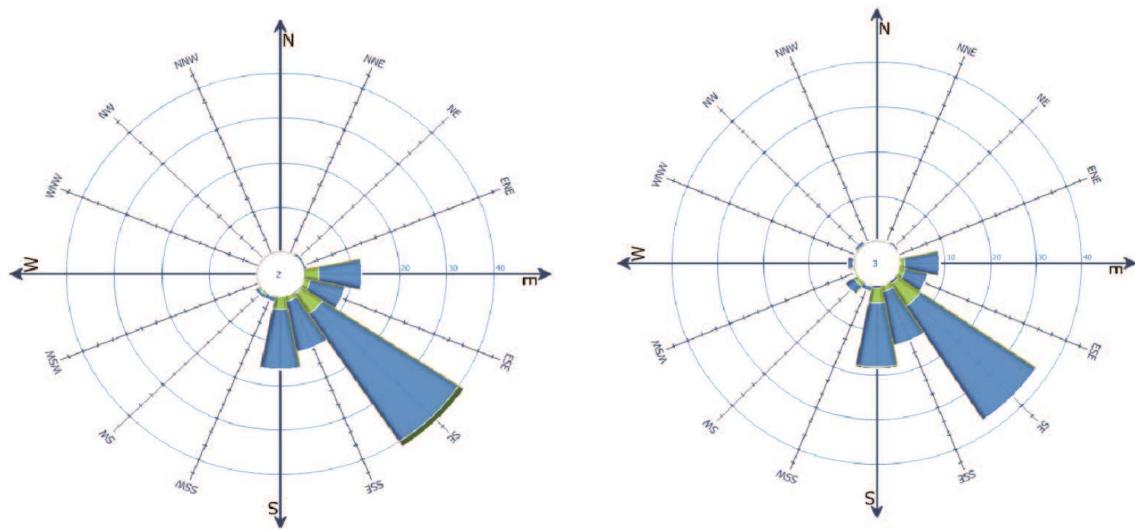
The maximum wind speed observed during the month of June is 8.7 kmph and minimum wind speed observed during the month of October is 4.4 kmph. The annual average wind speed calculated is 6.3 kmph. The predominant winds are mostly from SE directions.





Annual Windrose

March



April

May

Figure 3.3 Windrose (IMD, Nungambakkam)



Table 3.4 Historical Meteorological Data at IMD Nungambakkam (1971-2000)

Month	Daily mean Temp. (0C)		Relative Humidity (%)		Rainfall (mm)		Mean Wind Speed (KMPH)
	Max	Min	08:30	17:30	Monthly Total	No. of Rainy days	
January	28.8	20.9	81	67	22.5	1.3	4.8
February	30.5	22.0	80	67	2.2	0.4	5.1
March	32.5	23.8	78	68	4.0	0.3	5.8
April	34.3	26.4	74	71	7.7	0.6	6.9
May	36.8	27.9	67	68	43.9	1.4	7.9
June	36.9	27.5	63	62	55.9	4.0	8.7
July	35.0	26.3	70	65	100.3	6.9	7.4
August	34.3	25.7	73	67	140.4	8.5	7.0
September	33.9	25.5	77	72	137.3	7.1	6.0
October	31.8	24.5	82	76	278.8	10.6	4.4
November	29.6	23.0	83	76	407.4	11.7	5.3
December	28.5	21.9	81	72	191.1	6.3	6.3
Annual or Mean	32.8	24.6	76	69	1391.5	59.1	6.3

3.3.2.5 Special Phenomenon

Special weather phenomena are given in **Table 3.5** for the area. Thunder occurs on an average 28.8 day in a year. Fog occurs on an average 0.7 day in a year. Hail, dust storm and squalls are rare in the region. More than 0.3 mm precipitation is occurred on 87.2 days in a year.

Table 3.5 Special Weather Phenomena in the area

Months	PPT 0.3 mm or more	Hail	Thunder	Fog	Dust Storm	Squall
January	2.6	0.0	0.0	0.3	0.0	0.0
February	1.0	0.0	0.1	0.2	0.0	0.0
March	0.6	0.0	0.2	0.1	0.0	0.0
April	1.0	0.0	0.7	0.0	0.0	0.0
May	2.5	0.0	1.8	0.0	0.0	0.1
June	7.3	0.0	3.3	0.0	0.1	0.2
July	11.8	0.0	3.3	0.0	0.0	0.1
August	13.4	0.0	4.6	0.0	0.0	0.1
September	10.6	0.0	5.4	0.0	0.0	0.0
October	14.1	0.0	5.9	0.0	0.0	0.0
November	13.9	0.0	2.8	0.0	0.0	0.0
December	8.4	0.0	0.7	0.0	0.0	0.0
Annual	87.2	0.0	28.8	0.7	0.1	0.5

*PPT - Precipitation



From the above table, it is evident that the area is not prone to any special weather phenomena like dust storm, hail, cloud burst etc.,

3.3.2.6 Atmospheric Inversion Level

Inversions are a result of the vertical temperature profile of atmosphere. Temperature normally decreases as altitude increases in the troposphere. However, an increase of temperature may occur after certain altitude. This zone is termed as inversion which plays a major role in dispersion. Thus, the colder air layer which is below the warmer air results in a stable temperature profile that restricts vertical mixing. Because of the restricted mixing volumes of air due to the inversion, pollution becomes stagnant and does not dissipate. The mixing height is the height of vertical mixing of air and suspended particles above the ground.

This height is determined by the observation of the atmospheric temperature profile. A parcel of air rising from the surface of the earth will rise at a given rate (called the dry-adiabatic lapse rate). As long as the parcel of air is warmer than the ambient temperature, it will continue to rise. However, once it becomes colder than the temperature of the environment, it will slow down and eventually stops. It is at this junction, where the temperature of the parcel crosses the curve denoting the vertical environmental temperature profile determines the mixing height. The spatial distribution of mixing height during winter, pre-monsoon and post monsoon season for 0800 and 1700 IST is shown in **Figure 3.4, 3.5 and 3.6** respectively.

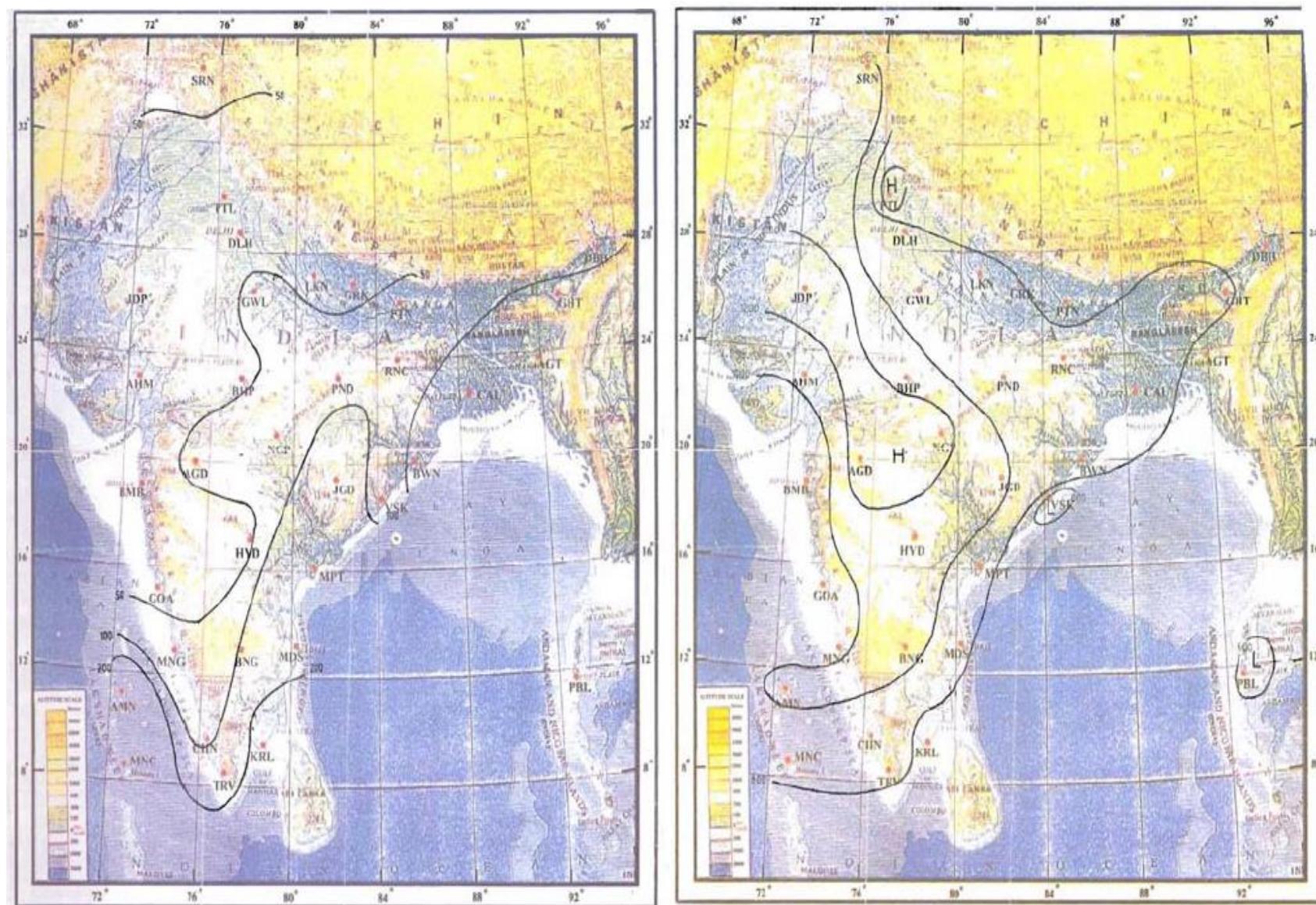


Figure 3.4 Spatial distribution of mixing height in winter season- 0800 IST and 1700 IST

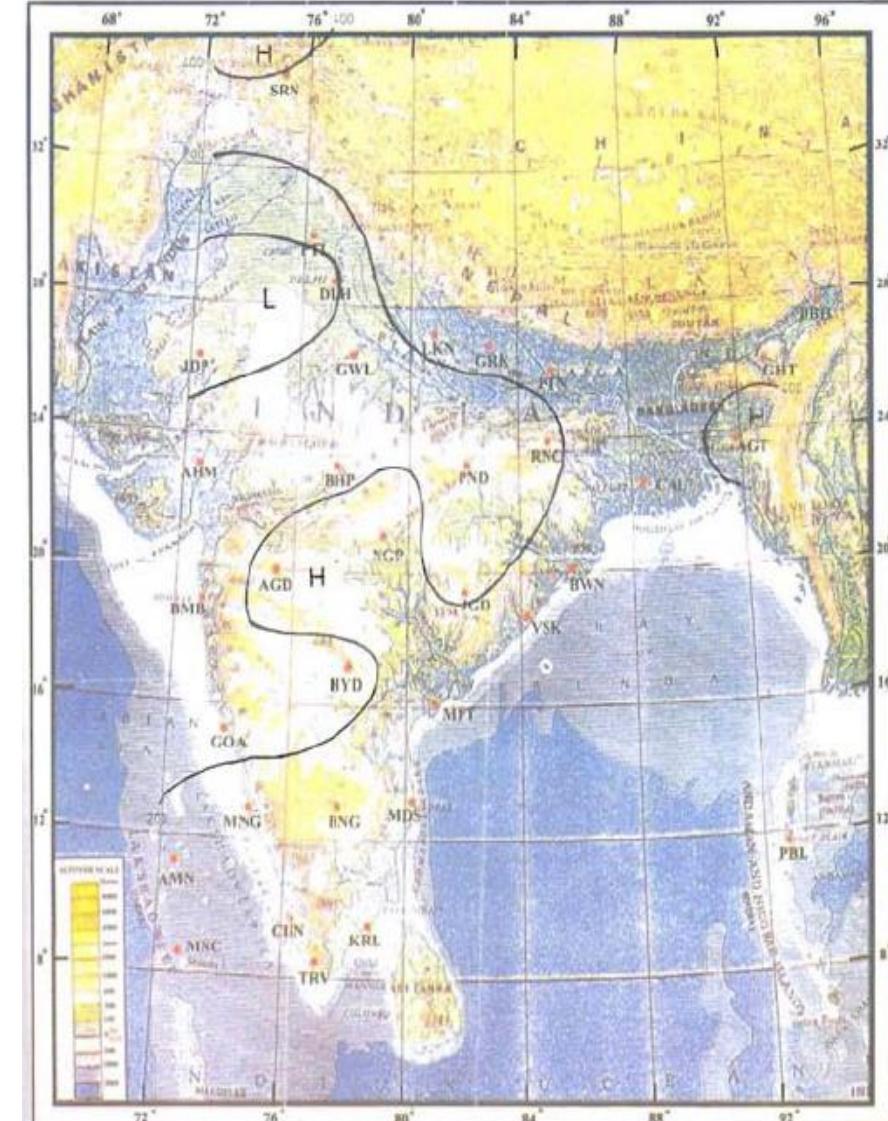
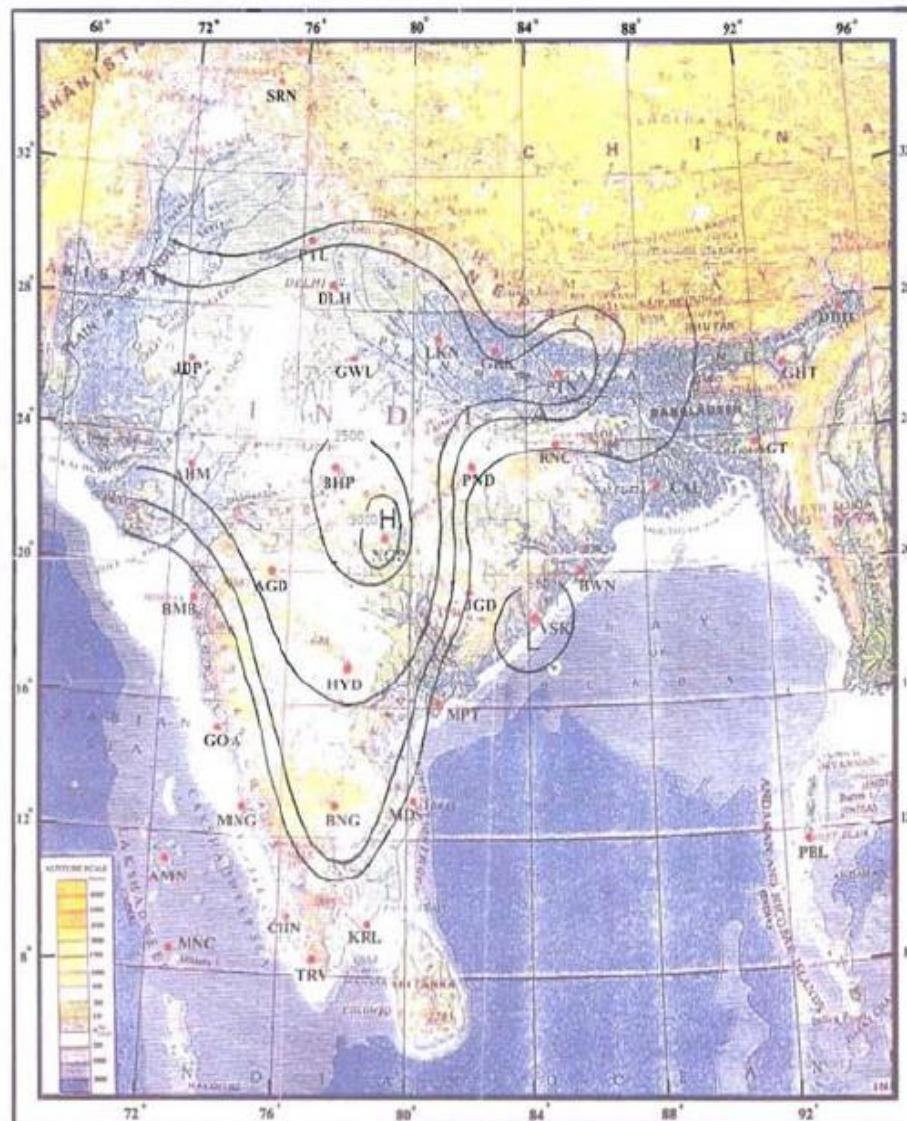


Figure 3.5 Spatial distribution of mixing height in pre-monsoon season- 0800 IST and 1700 IST

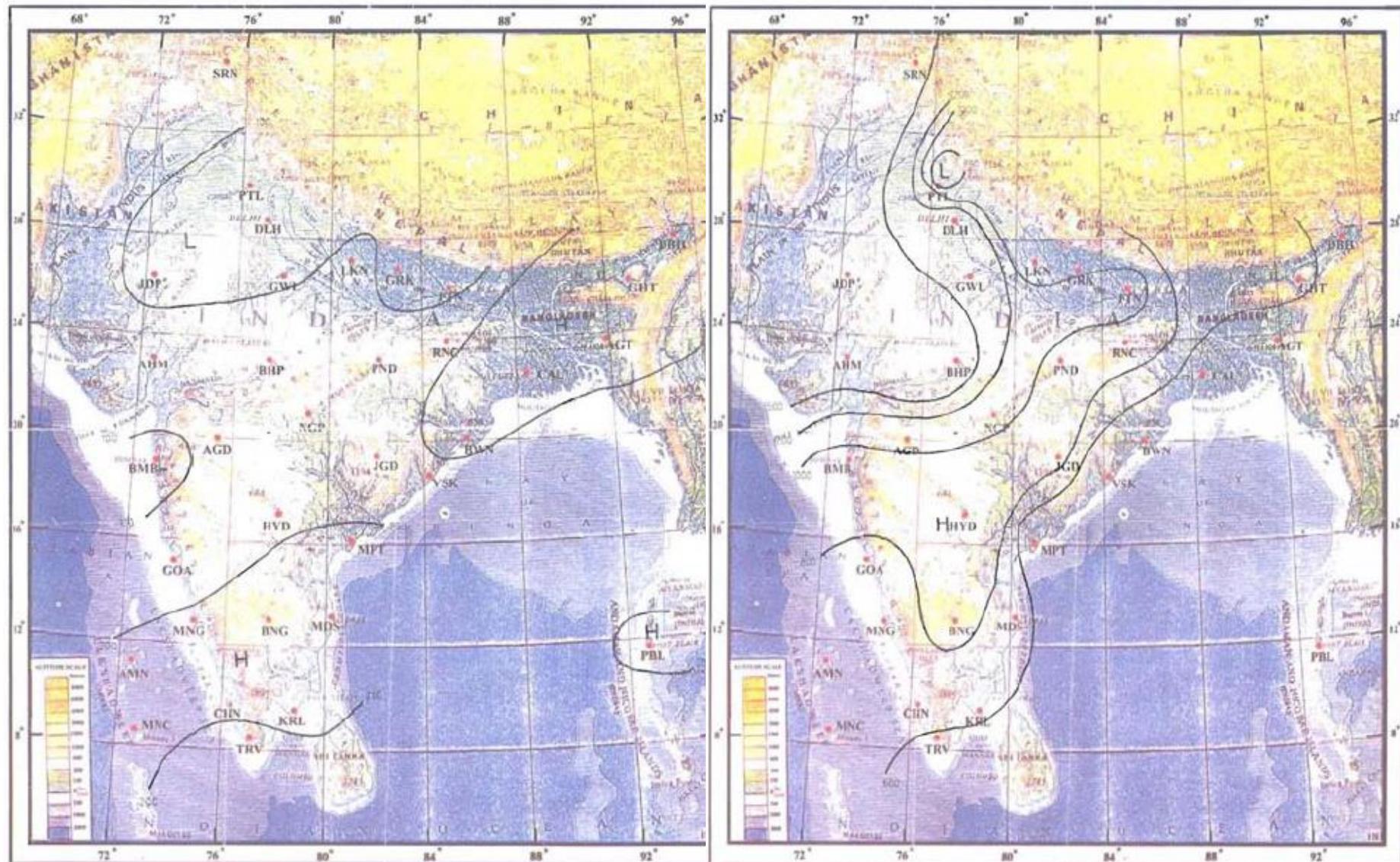


Figure 3.6 Spatial distribution of mixing height in post-monsoon season- 0800 IST and 1700 IST



3.4 Geology and Hydrogeological Aspects

3.4.1 Geology

The Thiruvallur district rock type can be geologically classified into sedimentary rock 80% and hard rock 20%. The geological formation of the district is principally made up of Charnockite, Gneiss, Conglomerate, Sandstone, Shale, Laterite, Alluvium and Marine deposits. (Source: TWAD Thiruvallur district)

3.4.2 Geomorphology

The prominent geomorphic units identified in the Thiruvallur district through interpretation of satellite imagery are alluvial plain, old river courses, coastal plains, shallow & deep buried pediments, pediments and structural hills. The elevation of the area ranges from 183m AMSL in the west to sea level. Four cycles of erosion gave rise to a complex assemblage of fluvial, estuarine and marine deposits. The major part of the area is characterized by an undulating topography with innumerable depressions which are used as irrigation tanks. The coastal tract is marked by three beach terraces with broad inter-terrace depressions. The coastal plains display a fairly lower level or gently rolling surface and only slightly elevated above the local water surfaces or rivers. The straight trend of the coastal tract is resultant of development of vast alluvial plains. There are a number of dunes in the coastal tract.

3.5 Soil

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

3.6 Hydrogeology

Thiruvallur district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by unconsolidated & semi-consolidated formations and weathered, fissured & fractured crystalline rocks. The porous formations in the district include sandstones and clays of Jurassic age (Upper Gondwana), marine sediments of Cretaceous age, Sandstones of Tertiary age and Recent alluvial formations. As the Gondwana formations are well-compacted and poorly jointed, the movement of ground water in these formations is mostly restricted to shallow levels. Ground water occurs under phreatic to semi-confined conditions in the inter-granular pore spaces in sands and sandstones and the bedding planes and thin fractures in shales. In the area underlain by Cretaceous sediments, ground water development is rather poor due to the rugged nature of the terrain and the poor quality of the formation water. Quaternary formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district.

The maximum thickness of alluvium is 30m. whereas the average thickness is about 15m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Alluvium, which forms a good aquifer system along the Araniyar and Korattalaiyar river bed which is one of the major sources of water supply to suburban areas of nearby towns and also to the industrial units.



Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fissured and fractured zones at deeper levels. The thickness of weathered zone in the district is in the range of 2 to 12m. The depth of the wells ranged from 8.00 to 15.00m bgl. The yield of large diameter wells tapping the weathered mantle of crystalline rocks ranges from 100 to 500 lpm and are able to sustain pumping for 2 to 6 hours per day. The yield of bore wells drilled down to a depth of 50 to 60m ranges from 20 to 400 lpm. The yield of successful bore wells drilled down to a depth of 150m bgl. The depth to water level in the district varied between 2.38 – 7.36m bgl during pre-monsoon and 0.79 – 5.30m bgl during post monsoon. The seasonal fluctuation shows a rise between 0.28 and 4.80m bgl. The piezometric head varied between 2.20 to 10.30 m bgl during premonsoon and 2.72 to 8.55m bgl during post monsoon. CGWB measures ground water table at 18 nos of dug wells with 3 nos. of piezometers and the data have been collected for the groundwater concentrations.



ADMINISTRATIVE SETUP			GROUND WATER HYDROLOGY		
— STATE BOUNDARY	— DISTRICT BOUNDARY	— BLOCK BOUNDARY	● EXPLORATORY BORE WELL [CGWB]	◆ HIGH YIELDING BORE WELL [CGWB]	
■ HILLY AREA					
▲ TRIANGULATION HEIGHT [elevation in m.m.s.l]			— ISOCONS [Sp ELECTRICAL CONDUCTANCE [$\mu\text{S}/\text{Cms}$ at 25° C]		
■ CREEK					
HYDROCHEMISTRY			STRUCTURE		
			— TRACE OF LINEAMENT		
AQUIFER	AGE	LITHOLOGY	GROUND WATER CONDITIONS	YIELD PROSPECTS (CLM/D)	GROUND WATER DEVELOPMENT STRATEGIES
UNCONSOLIDATED	RECENT	RIVER ALLUVIUM, FLOOD PLAIN-DEPOSITS	DISCONTINUOUS, THIN, UNCONFINED TO SEMI-CONFINED	> 200	DEVELOPMENT THROUGH LARGE DIAMETER DUG WELLS AND SHALLOW TUBE WELLS.
CONSOLIDATED	ARCHAIC	GRANITES, GNEISSES, CHARNOCKITE	DISCONTINUOUS, UNCONFINED TO SEMI-CONFINED AQUIFERS, RESTRICTED TO WEATHERED RESIDUAL AND FRACTURES	+ SO NEAR WATERSHED DIVIDES & HIGH GROUND S. SO - 200 NEAR THIRD ORDER STREAMS AND LOW GROUND S.	SUITABLE FOR DEVELOPMENT THROUGH DUG WELLS BOREWELLS FEASIBLE IN FRACTURE ZONES, BEST LOCATIONS BEING INTERSECTION OF FRACTURES

(Source: CGWB, Thiruvallur district)

Figure 3.7 Hydrogeological map of Thiruvallur district



3.7 Drainage

Araniyar, Korattalayar, Cooum, Nagari and Nandhi are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. Korattalaiar river water is supplied to Cholavaram and Red Hill tanks by constructing an Anicut at Vellore Tambarambakkam. After filling a number of tanks on its further course, the river empties into the Ennore creek a few kilometres north of Chennai. The Cooum river, flowing across the southern part of the district, has its origin in the surplus waters of the Cooum tank in Tiruvallur taluk and also receives the surplus waters of a number of tanks. It feeds the Chembarambakkam tank through a channel. It finally drains into the Bay of Bengal. The study area is demarcated by dendritic pattern with lakes at low lying area of drainage system. The drainage map of the study area is shown in **Figure. 3.8.**

From the figure, it is evident that the streams are categorized upto 5 orders and the project area drains partially to the north and east, finally joins into Thervoy kandigai lake.

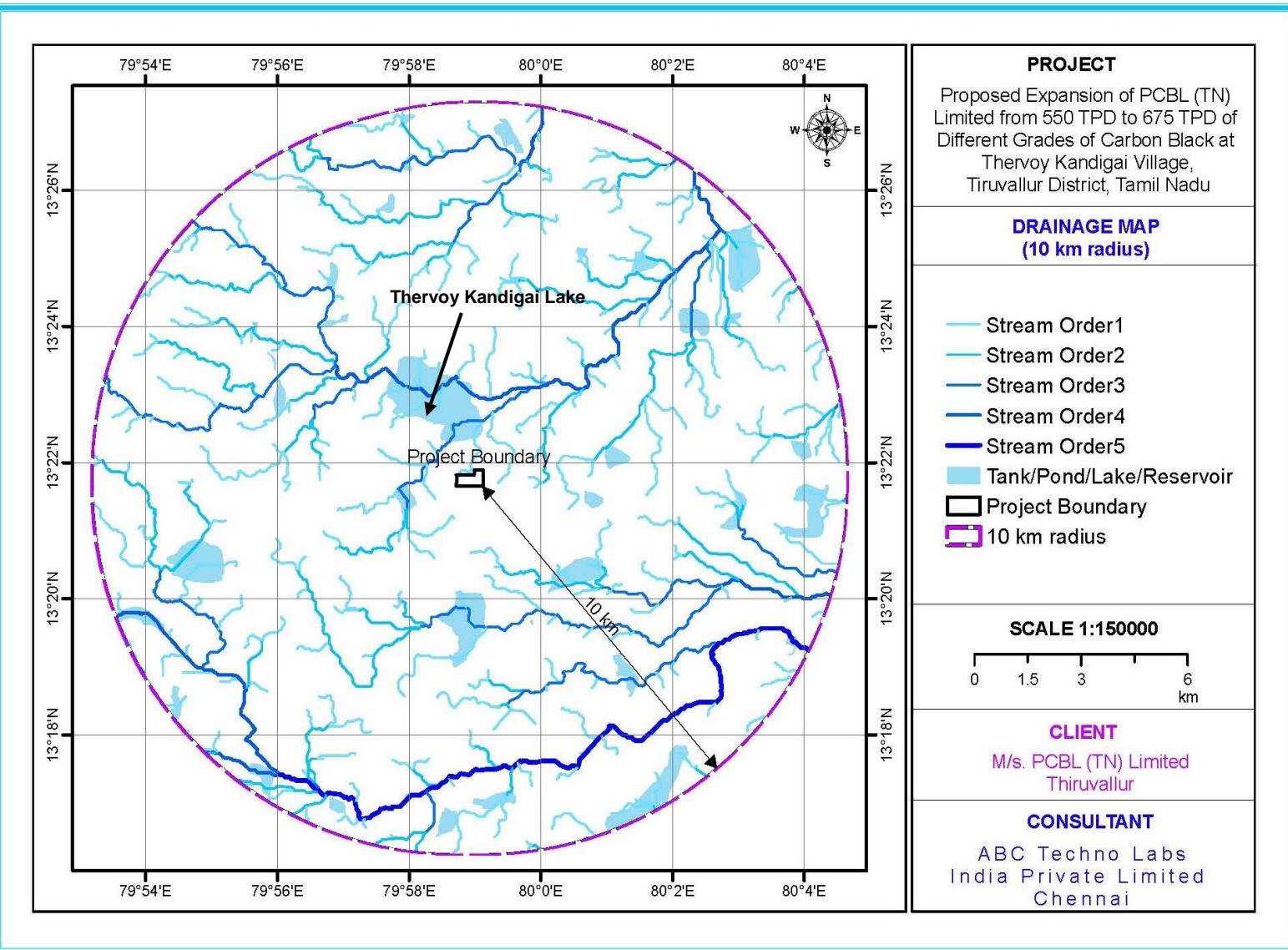


Figure 3.8 Drainage pattern of the study covering 10km Radius



3.8 Land Use Studies

The land use pattern is studied for 10km radius area from the project site to determine the present land use pattern and to analyze the impacts on land use due to the proposed plant and to give recommendations for optimizing the future land use pattern.

3.8.1 Land Use pattern based on Remote Sensing data

Remote sensing satellite imageries were collected and interpreted for the 10-km radius study area for analyzing the land use pattern of the study area. Based on the satellite data IRS-P6 Geo-Coded FCC on 1:50000 scale of LISS III was acquired March 2023; Land use/Land cover maps have been prepared.

3.8.2 Land Use/Land Cover Classification System

The present land use/land cover maps were prepared based on the classification system of National standards. For explanation for each of the land use category, the details as given in **Table 3.6** were considered.

3.8.3 Data Requirements

IRS-P6 Geo-Coded FCC on 1:50000 scale of LISS III was acquired March 2023 and was used for the mapping and interpretation. Besides, other collateral data as available in the form of maps, charts and census records other reports and especially topographical survey of India maps on 1:50000 scale are used. In addition to this, ground truth survey was also conducted to verify and confirm the ground features.

Table 3.6 Land Use Categories

SI.No.	Level – 1	Level - 2
1	Built – up Land	Town/Cities
		Villages
		Institution/Industry/Godown etc.,
		Plotted Area/Layout
2	Agriculture Land	Double Crop Land/Irrigated Area
		Plantation
		Fallow
3	Forest	Evergreen/Semi evergreen
		Deciduous
		Forest Plantation
4	Wastelands	Rocky/Stony waste
		Land with / without scrubs
		Saline/sandy & Marshy/swampy
5	Water Bodies	River/Stream
		Lake/Reservoir/Tanks
6	Others	Orchard/Other Plantation
		Shifting cultivation
		Salt Pans, Snow covered/Glacial
		Barren/Vacant Land

3.8.4 Methodology

The methodology adopted for preparation of Land use/land cover thematic map is monoscopic visual interpretation of geo coded scenes of IRS-P6 Satellite LISS-III and



field observations are taken. The various steps involved in the study are preparatory field work, field survey and post field work.

3.8.5 Pre Field-Interpretation of Satellite Data

The False Color Composite (FCC) of IRS-P6 satellite data at 1:50000 scale are used for pre field interpretation work. Drawing the help of toposheets, geology, and geomorphology by using the image elements the features are identified and delineated the boundaries roughly. Each feature is identified on image by their image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of Land Use/Land cover, Physiography and erosion was formulated. The sample areas for field check are selected covering all the physiography, land use / land cover feature cum image characteristics.

3.8.6 Ground Truth Collection

Both topo sheets and imagery were taken for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as many representative sample areas as possible to observe the broad Land use features and to adjust the sample areas according to field conditions. Detailed field observations and investigations were carried out and noted the land use features on the imagery.

3.8.7 Post Field Work

The final interpreted and classified thematic map was cartographed. The cartographic map was colored with standard color coding and detailed description of feature with standard symbols. All the classes noted and marked by the standard legend on the map.

3.8.8 Final Output

The final output would be the land use/land cover map on 1:50000 scale, numerals were given different color code for each category as shown in map. Area estimation of all features of land use/land cover categories was noted.

3.8.9 Observations

The following are the main interpreted land use / land cover classes of the study area and their respective areas are given in Sq.km in **Table 3.7**. The land use pattern within 10-km radius based on IRS-P6 is shown in **Figure 3.9**. The satellite imagery of the project site within 10-km radius is shown in **Figure 3.10**.

Table 3.7 Land Use Pattern of Study Area

Sl. No.	Particulars of Land use	Area in Sq.km	Percentage
1	Built up	22.2	7.06
2	Industrial Area	4.3	1.368
3	Agriculture Land	166.7	53.03
4	Reserve Forest	52.3	16.64
5	Scrub Land	22.4	7.12
6	Barren Land/Wasteland	11.0	3.50
7	Tank/Pond/Reservoir	27.9	8.87
8	River/Canal/Stream	7.5	2.38
	Total Area	314.2	100.00

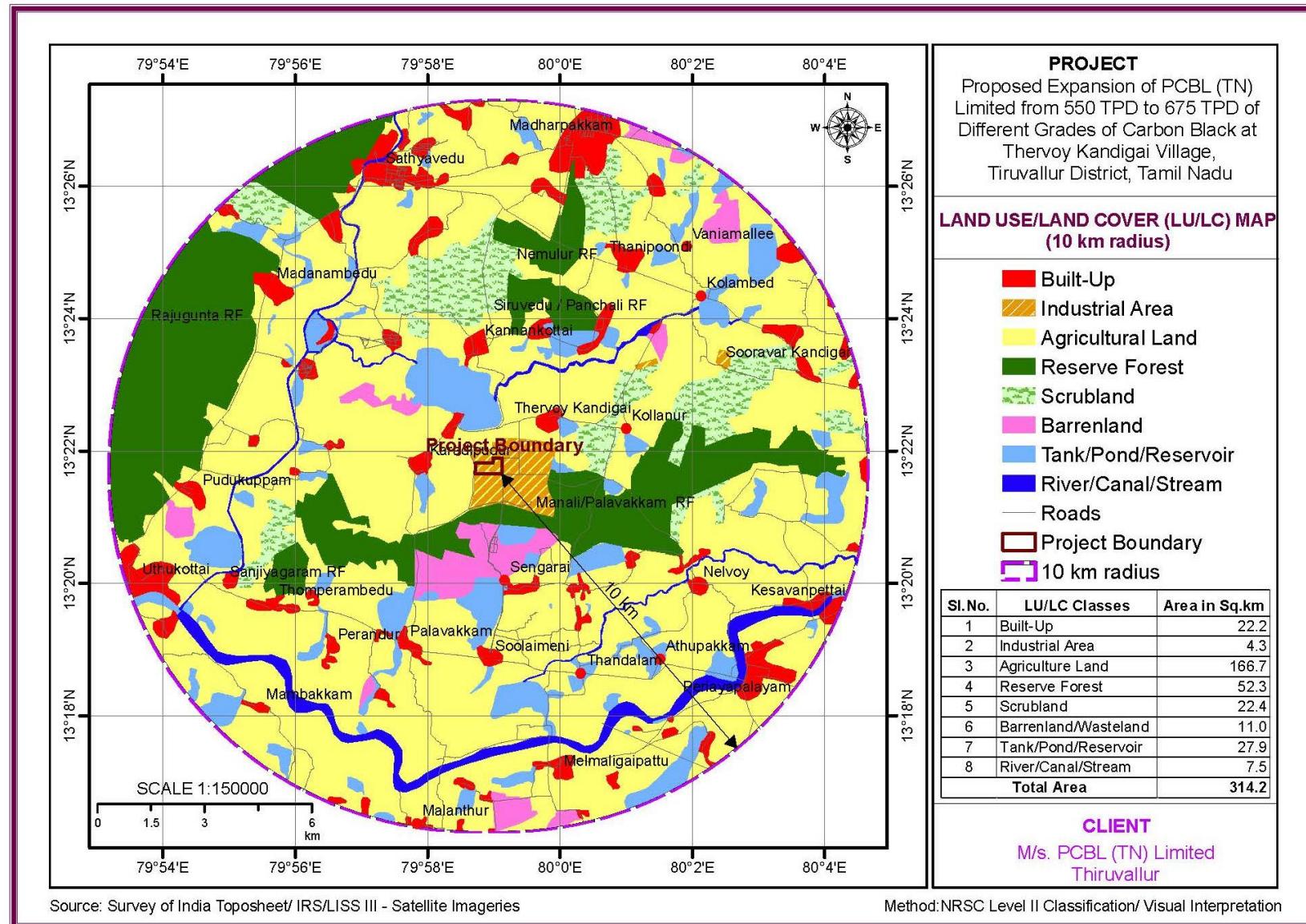


Figure 3.9 The land use pattern within 10-km radius based on IRS-P6

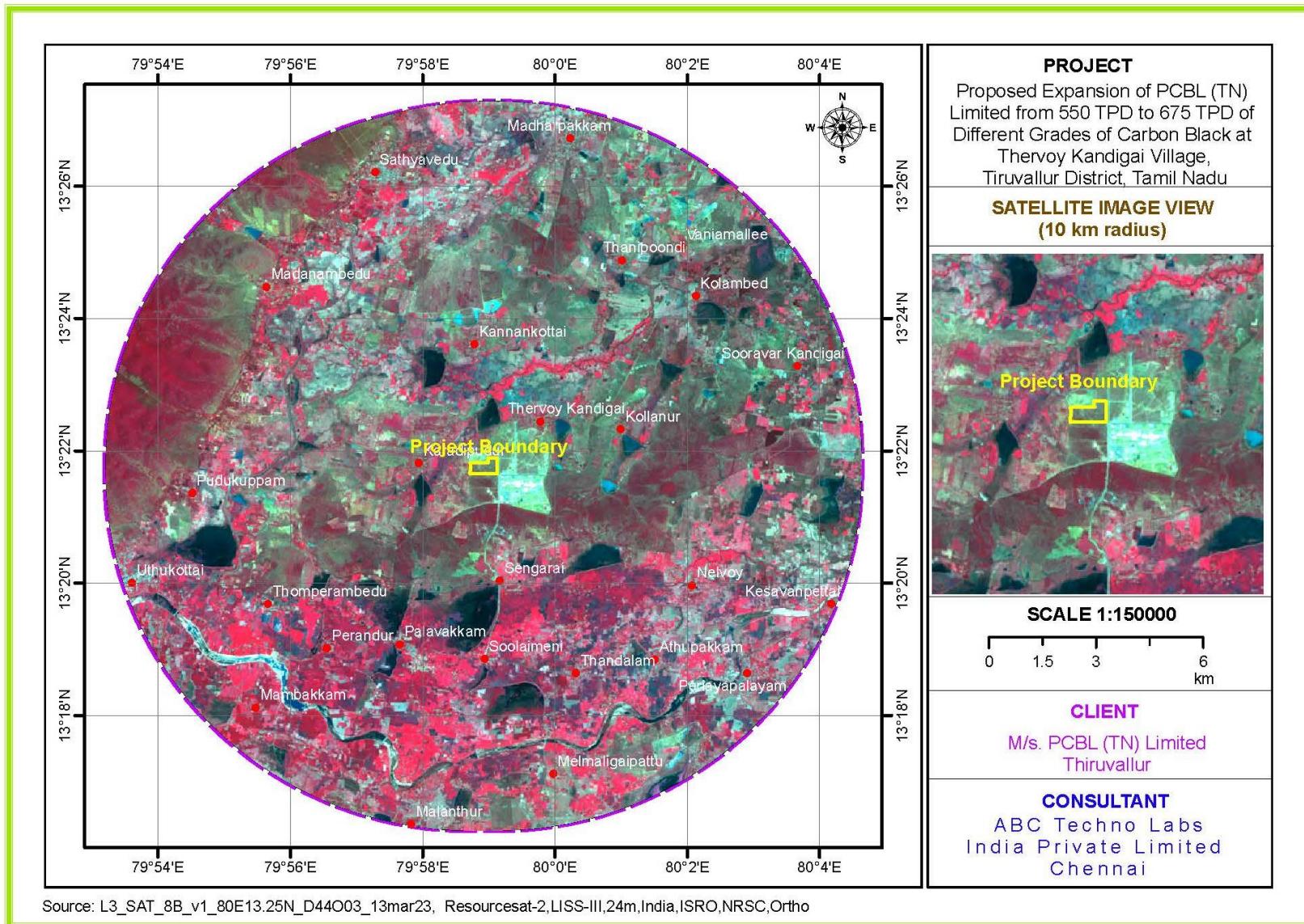


Figure 3.10 Satellite imagery map around 10 km radius



3.9 Air Environment

The prime objective of the baseline air monitoring is to evaluate the existing air quality of the project area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the expansion project. This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling.

3.9.1 Selection of Sampling Locations

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

- Topography / Terrain of the study area
- Human Settlements
- Health status
- Accessibility of monitoring site
- Resource Availability
- Representativeness of the region for establishing baseline status
- Representativeness with respect to likely impact areas

Ambient Air Quality Monitoring (AAQM) stations were set up at eight (8) locations with due consideration to the above-mentioned points. The Ambient Air Quality monitoring locations are given in the **Table 3.8** and shown in the **Figure 3.11**.

Table 3.8 Ambient air quality monitoring locations (March 2021 to May 2021)

Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant	Environmental Setting
AAQ1	Project Site	13°21'45.24"N 79°58'54.13"E	-	-	Industrial
AAQ2	Sathyavedu	13°26'12.43"N 79°57'23.51"E	8.57	NNW	Residential
AAQ3	Madanamjeri	13°22'22.45"N 79°56'34.97"E	3.60	NW	Residential
AAQ4	Uthukkottai	13°19'57.51"N 79°53'44.60"E	8.75	SW	Residential
AAQ5	Nelvoy	13°19'54.26"N 80° 2'4.67"E	5.90	SE	Residential
AAQ6	Lachivakkam	13°18'55.45"N 79°57'53.30"E	5.00	SW	Residential
AAQ7	Siruvada	13°23'57.25"N 79°59'41.29"E	3.60	NE	Residential
AAQ8	Thervoy	13°22'24.16"N 79°59'49.00"E	1.84	NE	Residential



Figure 3.11 Air quality sampling locations

3.9.2 Frequency and Parameters for Sampling

Ambient air quality monitoring was carried out at a frequency of two days per week at each location for three months. The baseline data of air environment was generated for the following parameters:

- Particulate Matter size less than 10 μm (PM_{10});
- Particulate Matter size less than 2.5 μm ($\text{PM}_{2.5}$);
- Sulphur oxides (SO_2);
- Nitrogen oxides (NO_x);
- Carbon Monoixde (CO);
- Ozone (O_3);
- Lead (Pb);
- Ammonia (NH_3);
- Benzene (C_6H_6);
- Benzo (a) pyrene (BaP);
- Arsenic (As);
- Nickel (Ni);
- Hydro Carbon (HC) & Non-Methane Hydro Carbon (NMHC)
- Volatile Organic Compound (VOC)

3.9.3 Instruments used for sampling

Respirable Dust Samplers APM 460 BL of Envirotech was used for monitoring Particulate matter (PM_{10}) and Fine Particulate Samplers APM 550 of Envirotech was used for monitoring ($\text{PM}_{2.5}$). For gaseous pollutants APM 411 has been used along with APM-460.



3.9.4 Sampling and Analytical Techniques

The sampling and analytical techniques used for the monitoring of Ambient Air quality (AAQ) is given in **Table 3.9**.

Table 3.9 Techniques used for Ambient Air Quality monitoring

Sl. No.	Parameter	Technique	Detectable Limit
1	Suspended Particulate Matter (SPM)	IS 5182: Pt 4	2.0 µg/m ³
2	Particulate Matter (PM ₁₀)	IS 5182: Pt 23	2.0 µg/m ³
3	Particulate Matter (PM _{2.5})	EPA 40 CFR P 50	2.0 µg/m ³
4	Sulphur Dioxide (SO ₂)	IS: 5182 P2	5.0 µg/m ³
5	Nitrogen Dioxide (NO _X)	IS: 5182 P6	5.0 µg/m ³
6	Carbon Monoxide (CO)	IS: 5182 P10	0.1 mg/m ³
7	Ozone (O ₃)	ABCTL/SOP/A/07	5.0 µg/m ³
8	Lead (Pb)	IS: 5182 P22	0.1 µg/m ³
9	Ammonia (NH ₃)	ABCTL/SOP/A/05	5.0 µg/m ³
10	Benzene (C ₆ H ₆)	IS: 5182 Part 11	0.01 ng/m ³
11	Benzo (a) pyrene – Particulate Phase	IS: 5182 Part 12	0.1 ng/m ³
12	Arsenic (As);	ABCTL/ SOP/A10	1.0 ng/m ³
13	Nickel (Ni):	USEPA Method IO- 3.2	1.0 ng/m ³
14	Hydro Carbon (HC)	EPA TO 12	1 ppm
15	Non Methane Hydro carbon (NMHC)	EPA TO 12	1 µg/m ³
16	Total Volatile organic compound (TVOC)	ABCTL/ SOP/A13	0.1 ppm

3.9.5 Presentation of Results

The summary of those results for each location with 98 percentile value is presented in **Table 3.10**. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) norms.



Existing baseline data during **March 2021- May 2021**

Table 3.10 Ambient Air Quality Results

Code	Location	PM 10 $\mu\text{g}/\text{m}^3$				PM 2.5 $\mu\text{g}/\text{m}^3$			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	42.3	51.5	46.54	51.45	19	25	21.88	24.54
AAQ2	Sathyavedu	43	63	54.63	62.54	21	30	25.67	29.54
AAQ3	Madanamjeri	43	60	50.42	59.08	20	29	24.00	28.54
AAQ4	Uthukkottai	43	61	51.13	61.00	19	28	23.88	28.00
AAQ5	Nelvoy	43	55	46.25	55.00	18	26	21.75	26.00
AAQ6	Lachivakkam	43	60	48.92	59.08	19	28	22.92	27.54
AAQ7	Siruvada	47	64	53.92	63.54	22	32	25.83	31.54
AAQ8	Thervoy	44	61	52.38	60.08	20	29	24.79	29.00
CPCB Standards		100				60			

Code	Location	SO₂ $\mu\text{g}/\text{m}^3$				NO_x $\mu\text{g}/\text{m}^3$				CO mg/m³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	5.5	7.7	6.55	7.61	12.2	15.5	13.42	15.32	0.11	0.18	0.15	0.18
AAQ2	Sathyavedu	6.4	8.4	7.39	8.35	13.7	17.9	15.45	17.67	0.11	0.19	0.15	0.19
AAQ3	Madanamjeri	5.5	7.9	6.65	7.90	13.1	16.8	14.74	16.57	0.14	0.23	0.18	0.22
AAQ4	Uthukkottai	5.8	8.4	7.10	8.31	14.8	17.4	16.70	17.40	0.14	0.23	0.18	0.23
AAQ5	Nelvoy	5.3	7.7	6.61	7.65	12.5	15.3	13.86	15.25	0.11	0.15	0.13	0.15
AAQ6	Lachivakkam	5.1	7.9	6.58	7.67	13.5	16.9	14.85	16.90	0.14	0.25	0.20	0.25
AAQ7	Siruvada	6.9	9.3	8.11	9.30	14.9	21.6	17.45	21.51	0.13	0.29	0.20	0.28
AAQ8	Thervoy	5.4	8.4	6.87	8.22	13.6	18.2	15.57	18.11	0.11	0.18	0.15	0.18
CPCB Standards#		80				80				2			



Code	Location	O ₃ µg/m ³				NH ₃ µg/m ³				Lead µg/m ³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	9.1	12.6	10.67	12.60		BDL(<5)					BDL(<0.1)	
AAQ2	Sathyavedu	10.6	15.2	12.89	14.92		BDL(<5)					BDL(<0.1)	
AAQ3	Madanamjeri	10.5	14.4	12.24	14.03		BDL(<5)					BDL(<0.1)	
AAQ4	Uthukkottai	11	14.6	13.04	14.37		BDL(<5)					BDL(<0.1)	
AAQ5	Nelvoy	9.1	13.6	11.30	13.28		BDL(<5)					BDL(<0.1)	
AAQ6	Lachivakkam	9.8	13.9	12.13	13.90		BDL(<5)					BDL(<0.1)	
AAQ7	Siruvada	12.4	16.2	13.70	15.60		BDL(<5)					BDL(<0.1)	
AAQ8	Thervoy	11.1	14.2	12.67	14.06		BDL(<5)					BDL(<0.1)	
CPCB Standards#		100				400				1			

Code	Location	Benzene µg/m ³				B[a]P ng/m ³				Ni ng/m ³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ2	Sathyavedu		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ3	Madanamjeri		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ4	Uthukkottai		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ5	Nelvoy		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ6	Lachivakkam		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ7	Siruvada		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
AAQ8	Thervoy		BDL(<0.1)				BDL(<0.01)					BDL(<1)	
CPCB Standards#		5				1				20			

Code	Location	As ng/m ³				HC µg/m ³				TVOC µg/m ³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ2	Sathyavedu		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ3	Madanamjeri		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ4	Uthukkottai		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ5	Nelvoy		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ6	Lachivakkam		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ7	Siruvada		BDL(<1)				BDL(<1)					BDL(<1)	
AAQ8	Thervoy		BDL(<1)				BDL(<1)					BDL(<1)	
CPCB Standards#		6				-				-			



Revalidated data during February 2024

Code	Location	PM 10 $\mu\text{g}/\text{m}^3$				PM 2.5 $\mu\text{g}/\text{m}^3$				$\text{SO}_2 \mu\text{g}/\text{m}^3$			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	41.00	56.00	48.13	56.00	20.00	26.00	22.63	26.00	6.40	8.10	7.44	8.10
AAQ2	Sathyavedu	51.00	62.00	55.88	61.58	24.00	28.00	26.00	27.86	6.90	8.40	7.91	8.40
AAQ3	Madanamjeri	48.00	57.00	52.50	56.72	22.00	26.00	24.88	26.00	5.90	7.50	6.81	7.49
AAQ4	Uthukkottai	47.00	58.00	53.00	57.72	23.00	28.00	25.38	27.86	6.80	8.30	7.65	8.29
AAQ5	Nelvoy	44.00	51.00	47.63	51.00	21.00	25.00	22.75	25.00	6.80	8.30	7.58	8.29
AAQ6	Lachivakkam	47.00	57.00	51.50	56.86	22.00	27.00	24.38	26.86	6.50	8.20	7.25	8.12
AAQ7	Siruvada	49.00	63.00	55.00	62.30	23.00	30.00	26.13	29.58	7.80	9.10	8.41	9.04
AAQ8	Thervoy	49.00	58.00	53.25	57.86	22.00	28.00	25.25	27.86	6.30	8.40	7.53	8.37
CPCB Standards#		100				60				80			

Code	Location	$\text{NO}_x \mu\text{g}/\text{m}^3$				$\text{CO mg}/\text{m}^3$				$\text{O}_3 \mu\text{g}/\text{m}^3$			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	13.90	16.20	14.98	16.13	0.14	0.23	0.19	0.23	11.80	13.50	12.45	13.44
AAQ2	Sathyavedu	14.90	17.90	16.60	17.80	0.16	0.26	0.21	0.26	12.10	14.60	13.65	14.54
AAQ3	Madanamjeri	14.30	17.30	15.73	17.24	0.19	0.27	0.24	0.27	12.20	14.60	13.36	14.53
AAQ4	Uthukkottai	15.60	18.40	17.01	18.37	0.17	0.26	0.22	0.26	12.90	15.20	13.95	15.16
AAQ5	Nelvoy	13.80	16.40	14.90	16.33	0.12	0.17	0.14	0.17	11.50	13.50	12.51	13.44
AAQ6	Lachivakkam	14.30	16.90	15.56	16.89	0.19	0.27	0.23	0.27	11.90	14.10	12.89	14.03
AAQ7	Siruvada	16.90	18.80	17.84	18.74	0.18	0.25	0.22	0.25	13.10	15.10	14.30	15.06
AAQ8	Thervoy	15.30	17.90	16.44	17.86	0.16	0.23	0.20	0.23	12.40	14.80	13.56	14.77
CPCB Standards#		80				2				100			

Code	Location	$\text{NH}_3 \mu\text{g}/\text{m}^3$				$\text{Lead } \mu\text{g}/\text{m}^3$				Benzene $\mu\text{g}/\text{m}^3$			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ2	Sathyavedu	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ3	Madanamjeri	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ4	Uthukkottai	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ5	Nelvoy	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ6	Lachivakkam	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ7	Siruvada	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
AAQ8	Thervoy	BDL(<5)				BDL(<0.1)				BDL(<0.1)			
CPCB Standards#		400				1				5			



Code	Location	B[a]P ng/m ³				Ni ng/m ³				As ng/m ³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ2	Sathyavedu	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ3	Madanamjeri	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ4	Uthukkottai	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ5	Nelvoy	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ6	Lachivakkam	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ7	Siruvada	BDL(<0.01)				BDL(<1)				BDL(<1)			
AAQ8	Thervoy	BDL(<0.01)				BDL(<1)				BDL(<1)			
CPCB Standards#		1				20				6			

Code	Location	NMHC µg/m ³				TVOC µg/m ³			
		Min.	Max.	Avg.	98%ile	Min.	Max.	Avg.	98%ile
AAQ1	Project Site	BDL(<1)				BDL(<1)			
AAQ2	Sathyavedu	BDL(<1)				BDL(<1)			
AAQ3	Madanamjeri	BDL(<1)				BDL(<1)			
AAQ4	Uthukkottai	BDL(<1)				BDL(<1)			
AAQ5	Nelvoy	BDL(<1)				BDL(<1)			
AAQ6	Lachivakkam	BDL(<1)				BDL(<1)			
AAQ7	Siruvada	BDL(<1)				BDL(<1)			
AAQ8	Thervoy	BDL(<1)				BDL(<1)			
CPCB Standards#		-				-			



3.9.6 Observations

Existing baseline data during March 2021- May 2021

PM₁₀: The maximum and minimum concentrations for PM₁₀ were recorded as 64 µg/m³ and 42.3 µg/m³ respectively. The maximum concentration was recorded at Siruvada and the minimum concentration was recorded at project site. The average values were observed to be in the range of 46.25 to 54.63 µg/m³.

PM_{2.5}: The maximum and minimum concentrations for PM_{2.5} were recorded as 32 µg/m³ and 18 µg/m³ respectively. The maximum concentration was recorded at the Siruvada and the minimum concentration was recorded at Nelvoy. The average values were observed to be in the range of 21.75 to 25.83 µg/m³.

SO₂: The maximum SO₂ concentrations were recorded as 8.4 µg/m³ and minimum is found to be 5.1µg/m³. The maximum concentration was recorded at Sathyavedu, Uthukkottai & Thervoy and the minimum concentration was recorded at Lachivakkam. The average values were recorded to be in the range of 6.55 to 8.11 µg/m³.

NO_x: The maximum and minimum NO_x concentrations were recorded as 21.6 µg/m³ and 12.2 µg/m³. The maximum concentration was recorded at Siruvada and the minimum concentration was recorded at Project Site. The average values were noted to be in the range of 13.42 to 17.45 µg/m³.

CO: The maximum CO concentrations were recorded as 0.29 mg/m³ and minimum recorded is 0.11 mg/m³. The maximum concentration was recorded at Siruvada and the minimum concentration was recorded at project Site, Sathyavedu, Nelvoy & Thervoy. The average values were observed in the range of 0.13 to 0.2 mg/m³.

O₃: The maximum and minimum O₃ concentrations were recorded as 16.2 µg/m³ and 9.1 µg/m³. The maximum concentration was recorded at Project Site & Nelvoy and the minimum concentration was recorded at Siruvada. The average values were observed to be in the range of 10.67 to 13.7 µg/m³.

The concentrations of NH₃, C₆H₆, BaP, Pb, As, HC, TVOC and Ni were observed below detection limit and all the parameters were observed well within the standards prescribed by Central Pollution Control Board (CPCB) for Industrial, Rural, Residential and other area.

Revalidated data during February 2024

PM₁₀: The maximum and minimum concentrations for PM₁₀ were recorded as 63 µg/m³ and 41 µg/m³ respectively. The maximum concentration was recorded at the Siruvada and the minimum concentration was recorded at project site. The average values were observed to be in the range of 47.63 to 55.88 µg/m³.

PM_{2.5}: The maximum and minimum concentrations for PM_{2.5} were recorded as 30 µg/m³ and 20 µg/m³ respectively. The maximum concentration was recorded at the Siruvada and the minimum concentration was recorded at Project Site. The average values were observed to be in the range of 22.63 to 26.13 µg/m³.

SO₂: The maximum SO₂ concentrations were recorded as 9.1 µg/m³ and minimum is found to be 5.9 µg/m³. The maximum concentration was recorded at Siruvada and the minimum concentration was recorded at Madanamjeri. The average values were recorded to be in the range of 6.81 to 8.41 µg/m³.



NO_x: The maximum and minimum NO_x concentrations were recorded as 18.8 µg/m³ and 13.8 µg/m³. The maximum concentration was recorded at Siruvada and the minimum concentration was recorded at Nelvoy. The average values were noted to be in the range of 14.9 to 17.84 µg/m³.

CO: The maximum CO concentrations were recorded as 0.27 mg/m³ and minimum recorded is 0.12 mg/m³. The maximum concentration was recorded at Madanamjeri & Lachivakkam and the minimum concentration was recorded at Nelvoy. The average values were observed in the range of 0.14 to 0.24 mg/m³.

O₃: The maximum and minimum O₃ concentrations were recorded as 15.2 µg/m³ and 11.5 µg/m³. The maximum concentration was recorded at Uthukkottai and the minimum concentration was recorded at Nelvoy. The average values were observed to be in the range of 12.45 to 14.3 µg/m³.

The concentrations of NH₃, C₆H₆, BaP, Pb, As, HC, TVOC and Ni were observed below detection limit and all the parameters were observed well within the standards prescribed by Central Pollution Control Board (CPCB) for Industrial, Rural, Residential and other area. When we compare with 2021 baseline data, it is observed that very marginal decrease in the revalidated baseline data which could be attributable due to completion of construction activity and mitigation measures already adopted in the project site.

3.9.7 Stack Emission Monitoring

Online Continuous Emission System is installed in the process stacks and connectivity enabled to TNPCB server through authorized connectivity partners. Unit is following all National Emission Standards for Petrochemical (Basic & Intermediates) issued by the Ministry vide G.S.R 820 (E) dated 9th November 2012 as amended time to time. All the parameters are within the prescribed limit. The recent monitored results are given in **Table 3.11**.

Table 3.11 Stack Emission Monitored results

Stack details	Parameters								
	SO ₂ mg/m ³			NO _x mg/m ³			PM mg/m ³		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
DG Set – 1300 kVA	0.11	0.78	0.50	0	14.8	1	0	0	0
Dryer Stack – 1	6.27	11.11	8.62	4.7	16.25	9.33	9.75	10	9.93
Dryer Stack – 2	114.45	195	148.60	0	129.54	51.35	30.27	31.33	30.83
Dryer Stack – 3	0	0	0	0	0	0	0	0	0
VBC Stack – 1	0	5	1	0	1	0	1	4.33	1.23
VBC Stack – 2	0	0	0	0.67	1.42	1.16	59.25	64.92	62.19
VBC Stack – 3	11.75	12.55	12.08	7.17	8.08	7.67	49	49	49
Permissible norms	600 mg/m ³			600 mg/m ³			150 mg/m ³		



3.10 Noise Environment

Noise survey has been conducted in the study area to assess the background noise levels in different zones viz., Residential, Industrial, Commercial and Silence zones. The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise expected to be generated in the surrounding areas.

3.10.1 Methodology

Identification of sampling location

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise monitoring has been conducted at eight (8) locations in the study area. The physical location of noise monitoring stations is given in **Table 3.12**. The map showing Noise Quality Monitoring Locations is enclosed as **Figure 3.12**.

Table 3.12 Details of Noise Monitoring Locations

Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant	Environmental Setting
N1	Project Site	13°21'45.24"N 79°58'54.13"E	-	-	Industrial
N2	Sathyavedu	13°26'12.43"N 79°57'23.51"E	8.57	NNW	Residential
N3	Madanamjeri	13°22'22.45"N 79°56'34.97"E	3.60	NW	Residential
N4	Uthukkottai	13°19'57.51"N 79°53'44.60"E	8.75	SW	Residential
N5	Nelvoy	13°19'54.26"N 80° 2'4.67"E	5.90	SE	Residential
N6	Lachivakkam	13°18'55.45"N 79°57'53.30"E	5.00	SW	Residential
N7	Siruvada	13°23'57.25"N 79°59'41.29"E	3.60	NE	Residential
N8	Thervoy	13°22'24.16"N 79°59'49.00"E	1.84	NE	Residential

As the proposed site is within the industrial area, no nearby silence zone is identified.

3.10.2 Instrument used for monitoring

Noise levels were measured using a Sound Level Meter. The sound level meter measures the Sound Pressure Level (SPL), the Maximum Sound Pressure Level (max) and the equivalent continuous noise level (L_{eq}) by switching on the corresponding functional modes.

3.10.3 Method of monitoring

Sound Pressure Level (SPL) measurements were taken at the specified locations, with an interval of 1 minute over a period of one hour for 24 hours. The noise levels during day time have been monitored between 6 am to 10 pm and night noise levels during 10 pm to 6 am at all the locations covered in the study area. Noise levels were recorded



every one minute in the following manner. To obtain noise levels at 8 am, noise readings, with setting at 'A' response – slow mode, were recorded continuously for 60 minutes. All the readings were obtained for 24 hours.

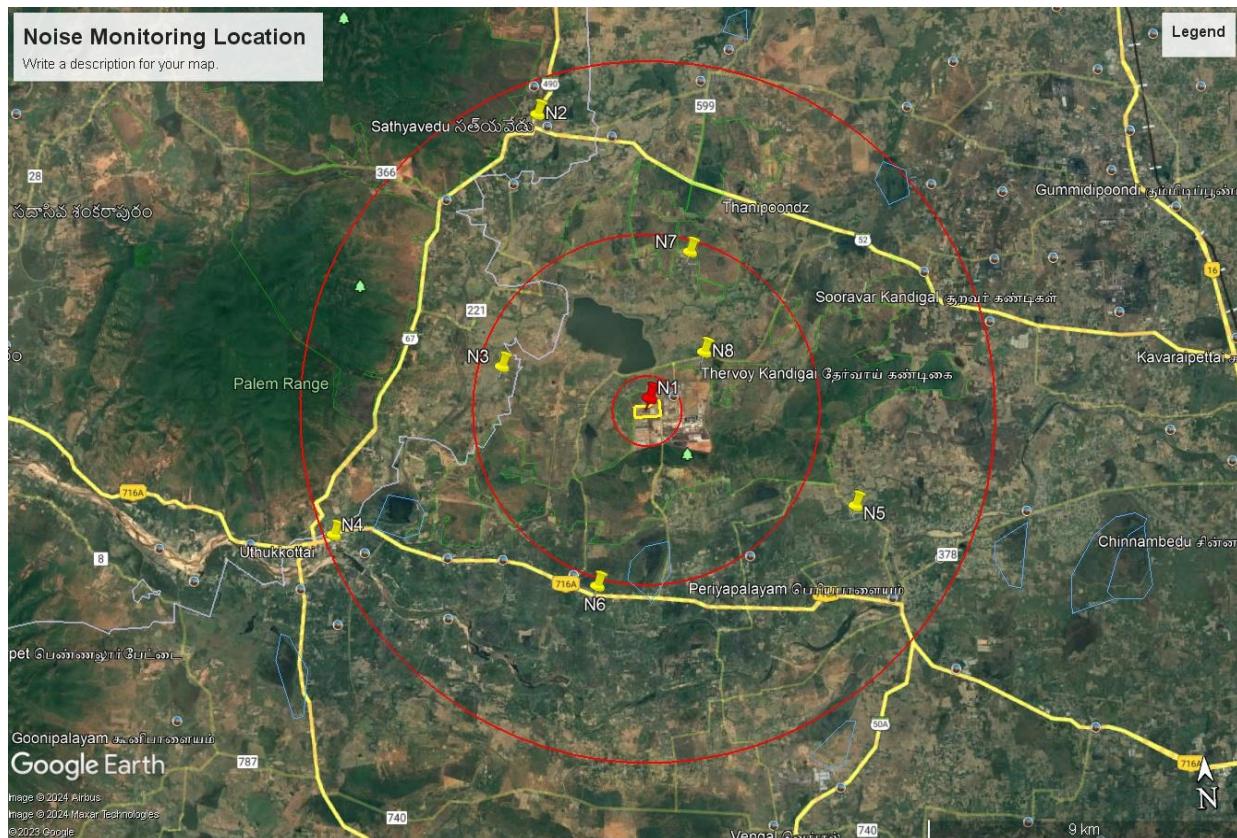


Figure 3.12 Noise Monitoring Locations

3.10.4 Parameters Measured during monitoring

For noise levels measured over a given period of time interval, it is possible to derive important features of noise using statistical methods.

- Leq_{day} Average noise levels between 06.00 hours to 22.00 hours.
- $\text{Leq}_{\text{night}}$ Average noise levels between 22.00 hours to 06.00 hours.

3.10.5 Presentation of Results

The summary of computed ambient noise level parameters like Leq_{day} and $\text{Leq}_{\text{night}}$ for all the sampling locations are presented in **Table 3.13** and compared to the standards specified by CPCB has given below in **Table 3.14**.

Table 3.13 Ambient Noise Levels recorded in the Study Area

Existing baseline data during March 2021- May 2021

Code	Location	Leq_{day} [dB(A)]	$\text{Leq}_{\text{night}}$ [dB(A)]	Leq [dB(A)]
N1	Project Site	49.3	42.9	48.0
N2	Sathyavedu	54.5	45.8	53.0
N3	Madanamjeri	51.5	43.7	50.1
N4	Uthukkottai	53.8	45.1	52.3



Code	Location	Leq_{day} [dB(A)]	Leq_{night} [dB(A)]	Leq [dB(A)]
N5	Nelvoy	48.2	43.5	47.1
N6	Lachivakkam	50.1	43.9	48.8
N7	Siruvada	53.9	44.2	52.4
N8	Thervoy	53.4	44.8	51.9

Revalidated data during February 2024

Code	Location	Leq_{day} [dB(A)]	Leq_{night} [dB(A)]	Leq [dB(A)]
N1	Project Site	52.8	44.1	51.3
N2	Sathyavedu	54.4	44.8	52.1
N3	Madanamjeri	52.6	44.2	51.1
N4	Uthukkottai	53.9	44.2	52
N5	Nelvoy	49.1	44.1	48.0
N6	Lachivakkam	51.5	43.5	50.1
N7	Siruvada	54	44.7	52.5
N8	Thervoy	53.6	44.6	51.7

Table 3.14 Ambient Noise Standards

Sl.No.	Land use	Leq_{day}	Leq_{night}
1.	Industrial Area	75	70
2.	Commercial Area	65	55
3.	Residential Area	55	45
4.	Silence Zone	50	40

3.10.6 Observations

Existing Baseline Data March 2021- May 2021

Day time Noise Levels

The day time noise level at industrial zone was observed to be 49.3 dB(A) which is within the prescribed limit of 75 dB(A). The day time noise level at all rural & residential zone was observed to be 48.2 to 54.5 dB(A) which is within the prescribed limit of 55 dB(A).

Night time Noise levels

The night time noise level at industrial zone was observed to be 42.9 dB(A) which is within the prescribed limit of 70 dB(A). The night time noise levels at residential locations were found to be 43.5 to 45.8 dB(A) within the prescribed limit of 45 dB(A).

Revalidated data during February 2024

Day time Noise Levels

The day time noise level at industrial zone was observed to be 52.8 dB(A) which is within the prescribed limit of 75 dB(A). The day time noise level at all rural & residential zone was observed to be 49.1 to 54.4 dB(A) which is within the prescribed limit of 55 dB(A).

Night time Noise levels



The night time noise level at industrial zone was observed to be 44.1 dB(A) which is within the prescribed limit of 70 dB(A). The night time noise levels at residential locations were found to be 43.5 to 44.8 dB(A) within the prescribed limit of 45 dB(A).

From the revalidated data, it is observed that the noise level is increasing by 1dB(A) when compared with existing baseline data this could be attributable due to increased activity of the industrial area.

3.11 Water Environment

Water sampling has been conducted to establish baseline water quality in the area. Water analysis was carried out for physical and chemical parameters as per the methods prescribed in IS and "Standard Methods for the Examination of Water and Wastewater (American Public Health Association)". Water samples were examined to assess the effect of industrial and other activities on ground water. Samples for chemical analysis were collected in polyethylene carboys. Samples collected for metal content were acidified with 1 ml HNO₃. Samples for bacteriological analysis were collected in sterilized glass bottles.

3.11.1 Water Sampling Locations

Five (5) surface water and Eight (8) ground water samples were collected as grab samples and were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500:2012 for groundwater and Class C norms were followed for surface water. The water sampling locations are identified in **Table 3.15** and shown in **Figure 3.13**.

3.11.2 Presentation of results

The water quality results of the ground water and surface water samples are tabulated in **Table 3.16 & Table 3.17** respectively

Table 3.15 Ground Water and Surface Water Sampling Locations

Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant
GW1	Project Site	13°21'45.24"N 79°58'54.13"E	-	-
GW2	Sathyavedu	13°26'12.43"N 79°57'23.51"E	8.57	NNW
GW3	Madanamjeri	13°22'22.45"N 79°56'34.97"E	3.60	NW
GW4	Uthukkottai	13°19'57.51"N 79°53'44.60"E	8.75	SW
GW5	Nelvoy	13°19'54.26"N 80° 2'4.67"E	5.90	SE
GW6	Village: Lachivakkam	13°18'55.45"N 79°57'53.30"E	5.00	SW
GW7	Village: Siruvada	13°23'57.25"N 79°59'41.29"E	3.60	NE
GW8	Village: Thervoy	13°22'24.16"N 79°59'49.00"E	1.84	NE
SW1	Kannakottai Reservoir	13°23'12.92"N 79°58'11.33"E	2.54	SSW



Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant
SW2	Thervoykandigai Reservoir	13°22'24.60"N 80° 0'4.78"E	1.76	NE
SW3	Telungu Ganaga Canal Near Uthukkottai	13°19'37.91"N 79°54'10.17"E	8.55	SW
SW4	Arani River upstream	13°18'30.01"N 80° 2'29.27"E	8.06	SE
SW5	Arani River Downstream	13°17'18.55"N 79°58'35.07"E	7.45	S

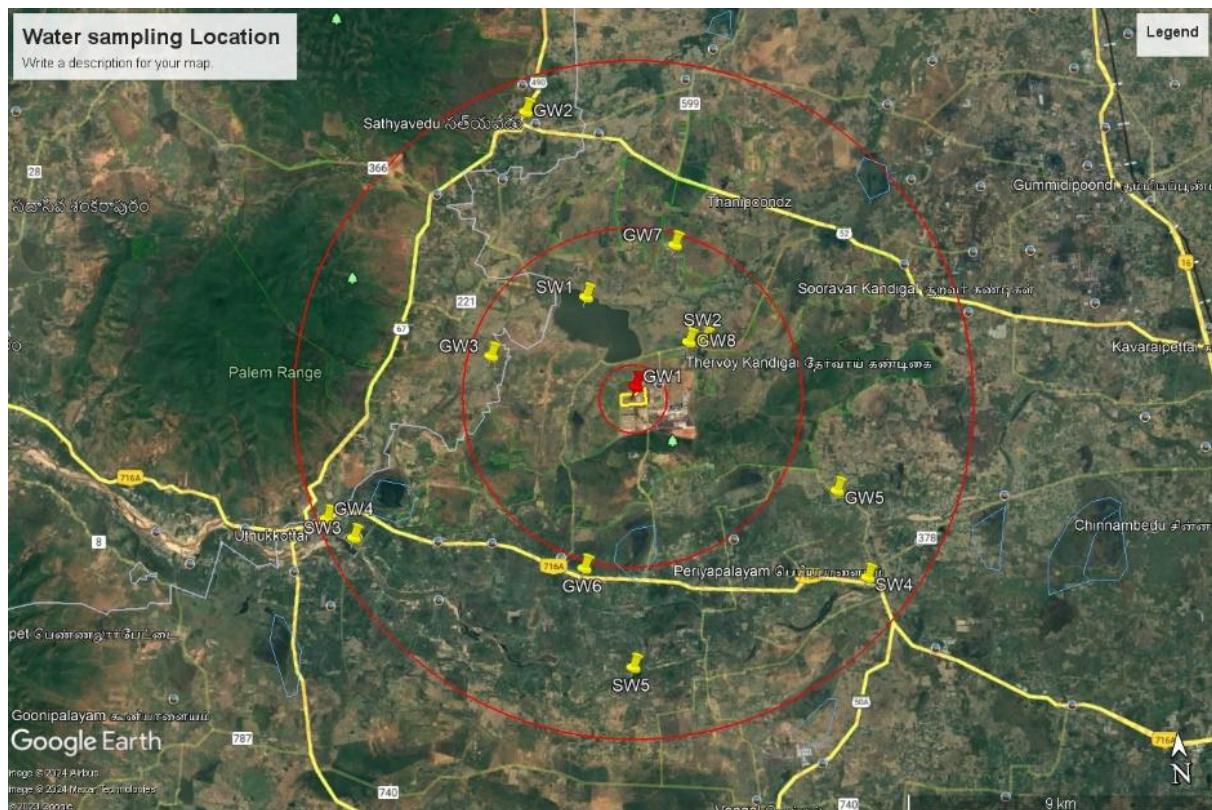


Figure 3.13 Ground and surface water sampling locations .

Table 3.16 Groundwater Sample Result
Existing baseline data during March 2021- May 2021

Sl. No .	Parameter	Unit	Results								Standards as per IS 10500 : 2012	
			GW1	GW2	GW3	GW4	GW 5	GW6	GW7	GW8	Acceptable limit	Permissible Limits
1.	Colour	Hazen	<1	<1	<1	<1	<1	1	<1	<1	5	15
2.	Odour	-	No Odour Observed								Agreeable	
3.	Turbidity	NTU	0.7	0.6	0.8	BDL(<0.5)	1	0.7	BDL(<0.5)		1	5
4.	pH at 25 °C	-	7.96	7.68	7.65	7.56	7.84	7.98	7.58	7.74	6.5-8.5	6.5-8.5
5.	Conductivity at 25 °C	µS/cm	1575	1088	1398	1515	978	910	417	1615	Not Specified	
6.	Total dissolved solids	mg/l	936	611	751	811	594	537	245	915	500	2000
7.	Total Suspended solids	mg/l	<2	<2	<2	<2	<2	<2	<2	<2	Not Specified	
8.	Total Alkalinity as CaCO ₃	mg/l	354	210	310	374	206	325	118	482	200	600
9.	Total Hardness as CaCO ₃	mg/l	727	240	420	556	321	353	120	406	200	600
10.	Calcium as Ca	mg/l	141	71	96	145	73	86	26	101	75	200
11.	Magnesium as Mg	mg/l	91	15	44	41	34	34	13.3	37	30	100
12.	Chloride as Cl-	mg/l	137	157	214	188	132	96	45	292	250	1000
13.	Sulphate as SO ₄	mg/l	296	62	80	83	139	39	43	66	200	400
14.	Nitrate as NO ₃	mg/l	26	5	11	13	11	12	2	10	45	45
15.	Iron as Fe	mg/l	0.05	0.11	0.05	BDL(<0.05)	0.10	BDL(<0.05)	0.05	1	1	
16.	Manganese as Mn	mg/l	BDL(<0.01)								0.10	0.3
17.	Fluoride as F	mg/l	0.27	0.17	0.38	0.41	0.42	0.29	0.31	0.41	1.00	1.5
18.	Sodium as Na	mg/l	80	110	152	102	96	72	38	122	Not Specified	
19.	Potassium as K	mg/l	5	2.4	5.5	3.6	3.7	1.8	1	2.7	Not Specified	
20.	Barium as Ba	mg/l	BDL(<0.1)								0.7	0.7
21.	Residual Free Chlorine	mg/l	BDL(<0.1)								0.20	1
22.	Aluminium as Al	mg/l	BDL(<0.03)								0.03	0.2
23.	Cadmium as Cd	mg/l	BDL(<0.003)								0.003	0.003
24.	Lead as Pb	mg/l	BDL(<0.01)								0.01	0.01
25.	Copper as Cu	mg/l	BDL(<0.03)								0.05	1.5
26.	Zinc as Zn	mg/l	0.06	0.11	0.10	0.15	0.10	0.05	0.06	0.17	5.00	15
27.	Total Chromium as Cr	mg/l	BDL(<0.03)								0.05	0.05
28.	Arsenic as As	mg/l	BDL(<0.01)								0.01	0.05



Sl. No .	Parameter	Unit	Results								Standards as per IS 10500 : 2012	
			GW1	GW2	GW3	GW4	GW 5	GW6	GW7	GW8	Acceptable limit	Permissible Limits
29.	Cyanide as CN	mg/l	BDL(<0.02)								0.05	0.05
30.	Selenium as Se	mg/l	BDL(<0.01)								0.01	0.01
31.	Mercury as Hg	mg/l	BDL(<0.001)								0.001	0.001
32.	Anionic Surfactants as MBAS	mg/l	BDL(<0.025)								0.20	1.0
33.	Phenolic Compounds as Phenol	mg/l	BDL(<0.001)								0.001	0.002
34.	Pesticides	mg/l	Absent								Absent	Absent
35.	Total Coliforms	MPN/ 100ml	<2	2	2	<2	<2	<2	<2	<2	Absent/100ml	
36.	E.coli						<2					

Revalidated data during February 2024

Sl. No.	Parameter	Unit	Results								Standards as per IS 10500 : 2012	
			GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Acceptable limit	Permissible Limits
1.	Colour	Hazen	<1	<1	<1	<1	<1	1	<1	<1	5	15
2.	Odour	-	No Odour Observed								Agreeable	
3.	Turbidity	NTU	0.7	0.6	0.5	BDL(<0.5)	0.5	0.8	BDL(<0.5)		1	5
4.	pH at 25 °C	-	7.11	7.32	7.78	7.56	7.64	7.57	7.64	7.13	6.5-8.5	6.5-8.5
5.	Conductivity at 25 °C	µS/cm	371	606	1076	1208	830	732	367	398	Not Specified	
6.	Total dissolved solids	mg/l	206	345	640	701	474	403	194	217	500	2000
7.	Total suspended solids	mg/l	<2	<2	<2	<2	<2	<2	<2	<2	Not Specified	
8.	Total Alkalinity as CaCO ₃	mg/l	96	170	270	310	220	180	94	98	200	600
9.	Total Hardness as CaCO ₃	mg/l	110	190	350	400	270	230	106	108	200	600
10.	Calcium as Ca	mg/l	32	55	81	112	63	52	23	35	75	200
11.	Magnesium as Mg	mg/l	7.3	12.7	35	29	27	24.3	12	3	30	100
12.	Chloride as Cl-	mg/l	56	87	177	196	101	90	48	57	250	1000
13.	Sulphate as SO ₄	mg/l	18	20	72	56	72	52	25	18	200	400
14.	Nitrate as	mg/l	2	1	7	3	4	7	2.6	2	45	45



Sl. No.	Parameter	Unit	Results								Standards as per IS 10500 : 2012	
			GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Acceptable limit	Permissible Limits
	NO3											
15.	Iron as Fe	mg/l	0.07	0.19	0.06	BDL (<0.05)	0.16	0.10	BDL(<0.05)	0.05	1	1
16.	Manganese as Mn	mg/l				BDL(<0.01)					0.10	0.3
17.	Fluoride as F	mg/l	0.22	0.17	0.38	0.41	0.33	0.29	0.15	0.19	1.00	1.5
18.	Sodium as Na	mg/l	32	65	104	116	74	68	31	40	Not Specified	
19.	Potassium as K	mg/l	1.1	2.9	3.6	3.1	1.6	2.1	1.3	3.1	Not Specified	
20.	Barium as Ba	mg/l				BDL(<0.1)					0.7	0.7
21.	Residual Free Chlorine	mg/l				BDL(<0.1)					0.20	1
22.	Aluminium as Al	mg/l				BDL(<0.03)					0.03	0.2
23.	Cadmium as Cd	mg/l				BDL(<0.003)					0.003	0.003
24.	Lead as Pb	mg/l				BDL(<0.01)					0.01	0.01
25.	Copper as Cu	mg/l				BDL(<0.03)					0.05	1.5
26.	Zinc as Zn	mg/l	0.06	0.15	0.12	0.10	0.08	0.14	0.05	0.08	5.00	15
27.	Total Chromium as Cr	mg/l				BDL(<0.03)					0.05	0.05
28.	Arsenic as As	mg/l				BDL(<0.01)					0.01	0.05
29.	Cyanide as CN	mg/l				BDL(<0.02)					0.05	0.05
30.	Selenium as Se	mg/l				BDL(<0.01)					0.01	0.01
31.	Mercury as Hg	mg/l				BDL(<0.001)					0.001	0.001
32.	Anionic Surfactants as MBAS	mg/l				BDL(<0.025)					0.20	1.0
33.	Phenolic Compounds as Phenol	mg/l				BDL(<0.001)					0.001	0.002
34.	Pesticides	mg/l				Absent					Absent	Absent
35.	Total Coliforms	MPN/ 100ml				<2					Absent/100ml	
36.	E.coli											

Table 3.17 Surface water sample results

Existing baseline data during March 2021- May 2021

Sl. No.	Parameter	Unit	Results					Test procedure
			SW1	SW2	SW3	SW4	SW5	
1.	Temperature	0C	26.5	25.6	27.1	25.5	25.5	APHA 23rd EDN -2550B
2.	Colour	Hazen	15	8	20	25	25	APHA 23rd EDN -2120 C
3.	Odour	-	No Odour Observed					APHA 23rd EDN -2150 B
4.	pH at 25°C	-	7.94	8.04	8.07	7.62	7.62	IS : 3025 Part 11- 1983 (Reaff: 2017)
5.	Electrical Conductivity	µS/cm	390	472	365	298	312	IS : 3025 Part 14- 1984 (Reaff: 2019)
6.	Turbidity	NTU	1.9	2.1	4.6	4.1	4.1	IS : 3025 Part 10-1984 (Reaff: 2017)
7.	Total Dissolved Solids	mg/l	215	266	225	158	168	IS : 3025 Part 16-1984 (Reaff: 2017)
8.	Total Hardness as CaCO ₃	mg/l	124	140	110	75	82	IS : 3025 Part 21-1983 (Reaff: 2019)
9.	Total Alkalinity as CaCO ₃	mg/l	116	113	96	68	70	IS : 3025 Part 23 1986 (Reaff: 2019)
10.	Chloride as Cl	mg/l	44	70	63	41	47	IS : 3025 Part 32-1988 (Reaff: 2019)
11.	Sulphate as SO ₄	mg/l	18	20	15	8	11	APHA 23rd EDN - 4500- SO42- E
12.	Fluoride as F	mg/l	0.10	0.21	0.10	0.10	0.12	APHA 23rd EDN - 4500-F B&D
13.	Nitrate as NO ₃	mg/l	4	7	1	5	3	APHA 23rd EDN - 4500- NO3- B
14.	Ammonia as NH ₃	mg/l	0.05	0.05	0.17	0.08	0.11	APHA 23rd EDN - 4500- NH3 B&C
15.	Phosphate as PO ₄	mg/l	0.14	0.02	0.22	0.05	0.07	IS : 3025 Part 31-1988 (Reaff: 2019)
16.	Sodium as Na	mg/l	35	40	42	26	28	IS:3025 Part 45 1993(Reaff: 2019)
17.	Potassium as K	mg/l	1.6	3	3.9	2.2	3	IS:3025 Part 45-1993(Reaff: 2019)
18.	Calcium as Ca	mg/l	27	27	21	17	19	IS:3025 Part 40-1991(Reaff: 2019)
19.	Magnesium as Mg	mg/l	13	17	14	7.89	8.3	APHA 23rd EDN 3500 Mg B
20.	Iron as Fe	mg/l	0.10	0.15	0.18	0.12	0.14	IS : 3025 Part 53- 2003(Reaff: 2019)
21.	Manganese as Mn	mg/l	BDL(<0.02)	0.01	BDL(<0.02)			APHA 23rd EDN -3111 B
22.	Anionic Surfactants as MBAS	mg/l	BDL(<0.025)		BDL(<0.025)			APHA 23rd EDN -5540 C
23.	Total Suspended Solids	mg/l	3	4	8	7	8	IS:3025 Part 17- 1984(Reaff: 2017)
24.	DO as O ₂	mg/l	6.1	5.9	5.2	6.2	6.1	IS:3025:Part- 38:1989(Reaff: 2019)
25.	Chemical Oxygen Demand	mg/l	12	14	22	17	19	IS:3025:Part- 58:2006(Reaff: 2017)
26.	Bio-Chemical Oxygen Demand @ 27°C for 3 days	mg/l	<2	<2	3.1	2.3	2.6	IS:3025:Part- 44:1993(Reaff: 2019)
27.	Phenolic compounds as C ₆ H ₅ OH	mg/l	BDL(<0.001)				APHA 23rd EDN 5530 B,C,D	
28.	Copper as Cu	mg/l	BDL(<0.03)				APHA 23rd EDN -3111 B	



Sl. No.	Parameter	Unit	Results					Test procedure
			SW1	SW2	SW3	SW4	SW5	
29.	Mercury as Hg	mg/l	BDL(<0.001)					APHA 23rd EDN -3112 B
30.	Cadmium as Cd	mg/l	BDL(<0.003)					APHA 23rd EDN -3111 B
31.	Selenium as Se	mg/l	BDL(<0.01)					APHA 23rd EDN -3113 B
32.	Total Arsenic as As	mg/l	BDL(<0.01)					APHA 23rd EDN -3111 B
33.	Cyanide as CN	mg/l	BDL(<0.02)					APHA 23rd EDN-4500-CN E
34.	Lead as Pb	mg/l	BDL(<0.01)					APHA 23rd EDN -3111 B
35.	Zinc as Zn	mg/l	0.12	0.08	0.09	0.11	0.15	APHA 23rd EDN -3111 B
36.	Total Chromium as Cr	mg/l	BDL(<0.03)					APHA 23rd EDN -3111 B
37.	Nickel as Ni	mg/l	BDL(<0.02)					APHA 23rd EDN -3111 B
38.	Oil & Grease	mg/l	BDL(<1)					IS:3025:Part- 39:1991(Reaff: 2019)
39.	Mineral oil	mg/l	BDL(<0.5)					IS:3025:Part- 39:1991(Reaff: 2019)
40.	Poly Chlorinated Biphenyls (PCBs)	mg/l	BDL (<0.0001)					APHA 23rd EDN -6630 B
41.	Poly Nuclear AromaticHydrocarbon as PAH	mg/l	BDL (<0.0001)					APHA 23rd EDN -6440 B
42.	Total Coliform	MPN/100ml	1100	700	>1600			IS – 1622 -1981 (Reaff – 2019)
43.	Fecal Coliform	MPN/100ml	80	40	240	110	170	IS – 1622-1981(Reaff – 2019)

Revalidated data during February 2024

Sl. No.	Parameter	Unit	Results								Test procedure
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
1.	Temperature	0C	27.1	25.6	26.6	26.4	25.7	26.6	26.6	25.8	APHA 23rd EDN -2550B
2.	Colour	Hazen	3	6	15	10	12	4	15	20	APHA 23rd EDN -2120 C
3.	Odour	-	No Odour Observed								APHA 23rd EDN -2150 B
4.	pH at 25°C	-	7.82	7.96	7.96	7.56	7.71	7.69	7.58	7.66	IS : 3025 Part 11- 1983 (Reaff: 2017)
5.	Electrical Conductivity	µS/cm	456	478	404	336	374	433	612	716	IS : 3025 Part 14- 1984 (Reaff: 2019)
6.	Turbidity	NTU	1.2	1.8	3.3	4.6	5.1	2.8	4.7	5.6	IS : 3025 Part 10-1984 (Reaff: 2017)



Sl. No.	Parameter	Unit	Results								Test procedure
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
7.	Total Dissolved Solids	mg/l	274	297	262	177	203	247	339	398	IS : 3025 Part 16-1984 (Reaff: 2017)
8.	Total Hardness as CaCO ₃	mg/l	134	142	124	80	90	110	140	160	IS : 3025 Part 21-1983 (Reaff: 2019)
9.	Total Alkalinity as CaCO ₃	mg/l	120	114	102	72	82	94	118	140	IS : 3025 Part 23 1986 (Reaff: 2019)
10.	Chloride as Cl	mg/l	78	86	78	52	56	77	107	118	IS : 3025 Part 32-1988 (Reaff: 2019)
11.	Sulphate as SO ₄	mg/l	20	26	23	10	14	18	24	30	APHA 23rd EDN - 4500- SO ₄₂₋ E
12.	Fluoride as F	mg/l	0.11	0.17	0.10	0.14	0.13	0.13	0.17	0.21	APHA 23rd EDN - 4500-F B&D
13.	Nitrate as NO ₃	mg/l	2	3	8	6	5	4	11	16	APHA 23rd EDN - 4500- NO _{3-B}
14.	Ammonia as NH ₃	mg/l	0.06	0.10	0.10	0.05	0.16	0.54	0.78	0.98	APHA 23rd EDN - 4500- NH ₃ B&C
15.	Phosphate as PO ₄	mg/l	0.11	0.18	0.29	0.18	0.26	0.24	0.41	0.52	IS : 3025 Part 31-1988 (Reaff: 2019)
16.	Sodium as Na	mg/l	46	61	47	36	40	45	68	77	IS:3025 Part 45 1993(Reaff:2019)
17.	Potassium as K	mg/l	2.3	3.9	2.2	2	3.3	2.2	3.9	4.1	IS:3025 Part 45-1993(Reaff: 2019)
18.	Calcium as Ca	mg/l	31	35	26	22	25	25	30	36	IS:3025 Part 40-1991(Reaff: 2019)
19.	Magnesium as Mg	mg/l	14	13	14.3	6	7	11.5	15.7	17	APHA 23 rd EDN 3500 Mg B
20.	Iron as Fe	mg/l	0.08	0.15	0.21	0.17	0.14	0.17	0.28	0.33	IS : 3025 Part 53- 2003(Reaff: 2019)
21.	Manganese as Mn	mg/l	BDL(<0.02)	0.01	BDL(<0.02)				0.07	0.14	APHA 23 rd EDN -3111 B
22.	Anionic Surfactants as MBAS	mg/l	BDL(<0.025)								APHA 23 rd EDN -5540 C
23.	Total Suspended Solids	mg/l	2	4	5	6	7	4	7	9	IS:3025 Part 17- 1984(Reaff: 2017)
24.	Dissolved Oxygen as O ₂	mg/l	6.4	5.7	5.9	6.3	6.1	6.1	5.4	4.8	IS:3025:Part- 38:1989(Reaff: 2019)



Sl. No.	Parameter	Unit	Results								Test procedure	
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8		
25.	Chemical Oxygen Demand	mg/l	14	16	20	14	22	17	24	32	IS:3025:Part- 58:2006(Reaff: 2017)	
26.	Bio-Chemical Oxygen Demand @ 27°C for 3 days	mg/l	<2	2	2.4	2	3	<2	2.8	3.7	IS:3025:Part- 44:1993(Reaff: 2019)	
27.	Phenolic compounds as C ₆ H ₅ OH	mg/l	BDL(<0.001)								APHA 23 rd EDN 5530 B,C,D	
28.	Copper as Cu	mg/l	BDL(<0.03)								APHA 23 rd EDN -3111 B	
29.	Mercury as Hg	mg/l	BDL(<0.001)								APHA 23 rd EDN -3112 B	
30.	Cadmium as Cd	mg/l	BDL(<0.003)								APHA 23 rd EDN -3111 B	
31.	Selenium as Se	mg/l	BDL(<0.01)								APHA 23 rd EDN -3113 B	
32.	Total Arsenic as As	mg/l	BDL(<0.01)								APHA 23 rd EDN -3111 B	
33.	Cyanide as CN	mg/l	BDL(<0.02)								APHA 23 rd EDN-4500-CN E	
34.	Lead as Pb	mg/l	BDL(<0.01)								APHA 23 rd EDN -3111 B	
35.	Zinc as Zn	mg/l	0.10	0.08	0.09	0.12	0.19	0.05	0.10	0.18	APHA 23 rd EDN -3111 B	
36.	Total Chromium as Cr	mg/l	BDL(<0.03)								APHA 23 rd EDN -3111 B	
37.	Nickel as Ni	mg/l	BDL(<0.02)								APHA 23 rd EDN -3111 B	
38.	Oil & Grease	mg/l	BDL(<1)								IS:3025:Part- 39:1991(Reaff: 2019)	
39.	Mineral oil	mg/l	BDL(<0.5)								IS:3025:Part- 39:1991(Reaff: 2019)	
40.	Poly Chlorinated Biphenyls (PCBs)	mg/l	BDL (<0.0001)								APHA 23 rd EDN -6630 B	
41.	Poly Nuclear Aromatic Hydrocarbon as PAH	mg/l	BDL (<0.0001)								APHA 23 rd EDN -6440 B	
42.	Total Coliform	MPN/100ml	1600	>1600			1600	>1600		IS – 1622 -1981 (Reaff – 2019)		
43.	Fecal Coliform		170	280	170	900	1100	110	>1600	>1600	IS – 1622-1981(Reaff – 2019)	



3.11.3 Observations

Existing data during the March 2021- May 2021

3.11.3.1 Ground water

The pH value of the collected ground water in the study area varies from 7.56 to 7.98 and meets the acceptable limit for drinking water standards. The conductivity varies from 417 to 1615 $\mu\text{S}/\text{cm}$. TDS values were found to be in the range of 245 to 936 mg/l and meets permissible limit of 2000 mg/l in all locations. Total alkalinity varies from 118 to 482 mg/l and meets permissible limit of 600 mg/l in all the locations. Total Hardness varied from 120 to 727 mg/l and meets permissible limit of 600 mg/l expect GW1 location (Project site). The reason could be attributable due to aquifer host rock mineral composition. The chloride values were found to be in the range 45 mg/l to 292 mg/l and meets permissible limit of 1000 mg/l in all the locations. Sulphate values varies from 39 to 296 mg/l and meets permissible limit of 400 mg/l in all the locations. The calcium values range from 26 to 145 mg/l and meets permissible limit of 200 mg/l in all the locations. Magnesium values range from 13.3 to 91 mg/l meets permissible limit of 100 mg/l in all the locations. Iron content ranges from less than 0.05 mg/l to maximum upto 0.11 mg/l and meets permissible limit of 0.3 mg/l in all the locations. Zinc values found in the range from less than 0.05 to maximum of 0.17 mg/l and meets permissible limit of 15 mg/l in all the locations. Metals such as copper, lead, cadmium, chromium, arsenic, selenium, and mercury were observed to be below detection limit in the ground water samples.

3.11.3.2 Surface water

The pH value of the collected surface water in the study area varies from 7.62 to 8.07 and meets the acceptable limit for drinking water standards. The total hardness varies from 75 to 140 mg/l and meets acceptable limit of 200 mg/l. The chloride concentrations were found to be in the range of 41 to 70 mg/l and meets acceptable limit of 250 mg/l. Similarly, the fluoride concentration was found to be in the range of 0.1 to 0.21 mg/l and meets acceptable limit of 1.0 mg/l. The calcium concentrations varies from 17 to 27 mg/l which meets acceptable limit of 75 mg/l and magnesium concentrations were found to be 7.89 to 17 mg/l respectively which meets acceptable limit of 30 mg/l. Total dissolved solids (TDS) concentration is found to be 158 to 266 mg/l and meets acceptable limit of 500 mg/l. Metals such as copper, lead, cadmium, chromium, arsenic, selenium, and mercury were observed to be below detection limit in the surface water samples.

Revalidated data during February 2024

3.11.3.3 Ground water

The pH value of the collected ground water in the study area varies from 7.11 to 7.78 and meets the acceptable limit for drinking water standards. The conductivity varies from 367 to 1208 $\mu\text{S}/\text{cm}$. TDS values were found to be in the range of 194 to 701 mg/l and meets permissible limit of 2000 mg/l in all locations. Total alkalinity varies from 96 to 310 mg/l and meets permissible limit of 600 mg/l in all the locations. Total Hardness varied from 106 to 400 mg/l and meets permissible limit of 600 mg/l. The chloride values were found to be in the range 48 mg/l to 196 mg/l and meets permissible limit of 1000 mg/l in all the locations. Sulphate values varies from 18 to 72 mg/l and meets permissible limit of 400 mg/l in all the locations. The calcium values range from 23 to 112 mg/l and meets permissible limit of 200 mg/l in all the locations. Magnesium values range from 3 to 35 mg/l meets permissible limit of 100 mg/l in all the locations. Iron content ranges from less



than 0.05 mg/l to maximum upto 0.19 mg/l and meets permissible limit of 0.3 mg/l in all the locations. Zinc values found in the range from less than 0.05 to maximum of 0.15 mg/l and meets permissible limit of 15 mg/l in all the locations. Metals such as copper, lead, cadmium, chromium, arsenic, selenium, and mercury were observed to be below detection limit in the ground water samples.

3.11.3.4 Surface water

The pH value of the collected surface water in the study area varies from 7.56 to 7.96 and meets the acceptable limit for drinking water standards. The total hardness varies from 72 to 120 mg/l and meets acceptable limit of 200 mg/l. The chloride concentrations were found to be in the range of 52 to 118 mg/l and meets acceptable limit of 250 mg/l. Similarly, the fluoride concentration was found to be in the range of 0.1 to 0.17 mg/l and meets acceptable limit of 1.0 mg/l. The calcium concentrations varies from 22 to 35 mg/l which meets acceptable limit of 75 mg/l and magnesium concentrations were found to be 6 to 14.3mg/l respectively which meets acceptable limit of 30 mg/l. Total dissolved solids (TDS) concentration is found to be 177 to 297 mg/l and meets acceptable limit of 500 mg/l. Metals such as copper, lead, cadmium, chromium, arsenic, selenium, and mercury were observed to be below detection limit in the surface water samples.

From the revalidated data of surface and groundwater samples, it is evident that there is no change in the chemical parameters and hence, it can be concluded the operation of plant does not have any impact on surface and ground water.

3.12 Soil Environment

The present study of the soil quality establishes the baseline characteristics and this will help in future in identifying the incremental concentrations if any, due to the operation of the PCBL plant. The sampling locations have been identified to determine the baseline soil characteristics of the study area and to determine the impact of proposed project on soil characteristics.

3.12.1 Data Generation

For studying soil quality of the region, eight (8) sampling locations were selected to assess the soil conditions in and vicinity of the project area based on various land use conditions. The physical and chemical concentrations were determined. The samples were collected from different specified depths viz., 30 cm, 60 cm and 90 cm. The samples were analyzed for physical and chemical characteristics. The samples have been analyzed as per the established scientific methods for physio-chemical parameters.

3.12.2 Soil Sampling Locations

The details of the sampling locations selected for soil sampling are given in **Table 3.18** and shown in **Figure 3.14**.

Table 3.18 Details of soil sampling locations

Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant	Environmental Setting
S1	Project Site	13°21'45.24"N 79°58'54.13"E	-	-	Industrial
S2	Sathyavedu	13°26'12.43"N 79°57'23.51"E	8.57	NNW	Residential



Code	Location	Latitude & Longitude	Distance w.r.t. plant (km)	Direction w.r.t. plant	Environmental Setting
S3	Madanamjeri	13°22'22.45"N 79°56'34.97"E	3.60	NW	Residential
S4	Uthukkottai	13°19'57.51"N 79°53'44.60"E	8.75	SW	Residential
S5	Nelvoy	13°19'54.26"N 80° 2'4.67"E	5.90	SE	Residential
S6	Lachivakkam	13°18'55.45"N 79°57'53.30"E	5.00	SW	Residential
S7	Siruvada	13°23'57.25"N 79°59'41.29"E	3.60	NE	Residential
S8	Thervoy	13°22'24.16"N 79°59'49.00"E	1.84	NE	Residential

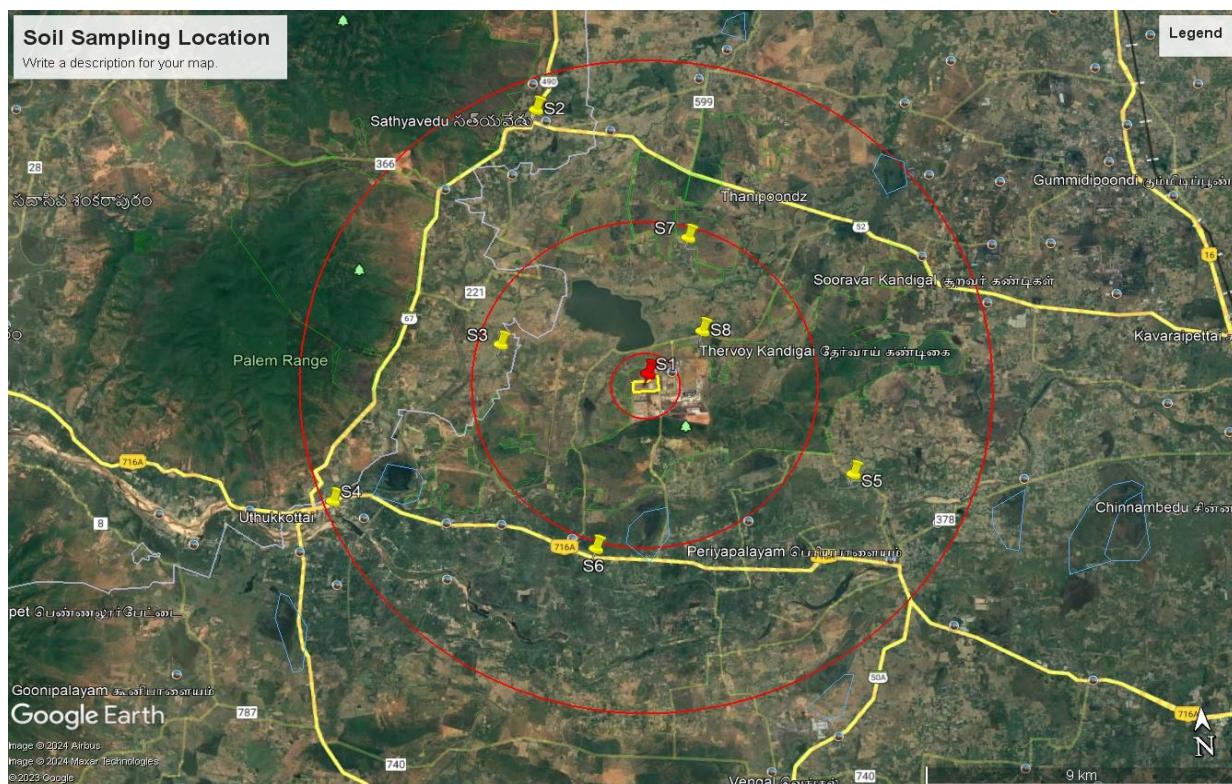


Figure 3.14 Soil sampling locations

3.12.3 Baseline Soil Status

The soil quality at all the locations during the study period is tabulated in **Table 3.19**. The results are compared with “Standard Soil Classification” given in **Table 3.20**.



Table 3.19 Analytical results of Soil samples
Existing baseline data during March 2021- May 2021

Sl. No.	Parameters	Test Methods	S1	S2	S3	S4	S5	S6	S7	S8
1.	pH	IS -2720(Part 26) 1987(RA 2011)	7.85	8.11	7.98	8.25	8.34	8.04	8.25	7.74
2.	Bulk Density, g/cc	FAO Chapter 3, ABCTL/SOIL/SOP 1	1.41	1.32	1.42	1.29	1.21	1.38	1.33	1.42
3.	Electrical Conductivity, mS/cm	IS -14767:2000 (RA 2010)	0.096	0.134	0.071	0.116	0.178	0.105	0.151	0.088
4.	Total Nitrogen, kg/ha	IS -14684:1999, Reaff:2008	184	235	178	203	295	181	224	182
5.	Available Phosphorous, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 2	32.8	21.5	19.8	38.5	41	32.8	36	21.9
6.	Available Potassium, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 7	265	352	274	390	348	266	384	331
7.	Exchangeable Calcium as Ca,m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 4	12.2	14.8	11.5	15.1	19.6	12	15.1	11.3
8.	Exchangeable Magnesium as Mg, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 5	3.71	4.53	3.91	4.66	5.05	3.98	4.33	3.15
9.	Exchangeable Sodium as Na, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 6	0.85	1.41	0.96	1.29	1.48	1.09	1.67	1.18
10.	Organic matter (%)	IS 2720 (Part 22):1972, Reaff:2010	1.12	1.47	1.09	1.52	1.37	0.97	1.15	1.32
11.	Texture Classification	Robinson Pipette Method	Loam	Clay Loam	Loam	Clay Loam	Clay	Loam	Clay Loam	Loam
12.	Sand (%)		39.6	38.6	40.5	41	28.7	36.6	35.4	42.8
13.	Clay (%)		25	33.5	26	32.8	51.4	25.3	36.1	27.1
14.	Silt (%)		35.4	27.9	33.5	26.2	19.9	38.1	28.5	30.1



Revalidated data during February 2024

Sl. No.	Parameters	Test Methods	S1	S2	S3	S4	S5	S6	S7	S8
1.	pH	IS -2720(Part 26) 1987(RA 2011)	7.78	7.96	7.57	8.06	7.98	8.11	8.18	7.82
2.	Bulk Density, g/cc	FAO Chapter 3, ABCTL/SOIL/SOP 1	1.41	1.32	1.42	1.29	1.26	1.35	1.34	1.39
3.	Electrical Conductivity, mS/cm	IS -14767:2000 (RA 2010)	0.112	0.156	0.096	0.174	0.133	0.103	0.142	0.097
4.	Total Nitrogen, kg/ha	IS -14684:1999, Reaff:2008	89	120	68	104	178	117	151	94
5.	Available Phosphorous, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 2	18.9	44.7	31.8	41.6	47.7	31.8	46.6	26.6
6.	Available Potassium, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 7	312	298	254	351	284	238	332	302
7.	Exchangeable Calcium as Ca,m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 4	16.6	17.7	13.6	15.8	21.6	15.1	18.5	16.4
8.	Exchangeable Magnesium as Mg, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 5	3.69	4.98	5.11	3.78	5.67	4.78	5.06	4.78
9.	Exchangeable Sodium as Na, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 6	1.24	1.33	1.02	1.47	1.33	0.98	1.29	1.03
10.	Organic matter (%)	IS 2720 (Part 22):1972, Reaff:2010	0.94	0.81	1.03	0.56	0.79	0.52	0.47	1.13
11.	Texture Classification	Robinson Pipette Method	Loam	Clay Loam	Loam		Clay	Loam	Clay Loam	Loam
12.	Sand (%)		37.8	40.4	40.5	38	23.6	37.7	34.9	40.2
13.	Clay (%)		25.5	33.9	27	24.5	60.6	25.1	36.3	26.7
14.	Silt (%)		36.7	25.7	32.5	37.5	15.8	37.2	28.8	33.1



Table 3.20 Standard Soil Classification

Sl. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Electrical Conductivity (mS/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops
3	Organic Carbon (%)	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better > 300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient > 80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better > 360 more than sufficient

3.12.4 Observations

Existing baseline data during March 2021- May 2021

From the tested results the following conclusions are derived.

- The pH of the soil was ranging from 7.74 to 8.34 indicating the soils are moderately alkaline in nature.
- Conductivity of the soil ranges from 0.071 to 0.178 mS/cm indicating the soil in the study area is non-saline in nature.
- Texture of the soil sample is predominantly loamy in nature.



- Soil organic content varied from 0.97 to 1.52 % which indicates sufficient level of organic matter.
- The nitrogen content ranges between 178 to 295 kg/ha, indicates the soil have better quantity of nitrogen in the locality.
- The value of phosphorus content varies between 19.8 to 41 kg/ha indicates that the soil has less to medium quantities of phosphorus.
- The potassium content varies from 265 to 390 kg/ha which indicates that the soils have average to sufficient quantities of potassium.

Revalidated data during February 2024

- It has been observed that the pH of the soil was ranging from 7.57 to 8.18 indicating the soils are moderately alkaline in nature.
- Conductivity of the soil ranges from 0.096 to 0.174 mS/cm indicating the soil in the study area is non-saline in nature.
- Texture of the soil sample is predominantly loamy in nature.
- Soil organic content varied from 0.47 to 1.13 % which indicates medium to more than sufficient quantities of organic matter.
- The nitrogen content ranges between 68 to 178 kg/ha, indicates less to better quantities of nitrogen in the locality.
- The value of phosphorus content varies between 18.9 to 47.7 kg/ha indicates that the soil has less to medium quantities of phosphorus.
- The potassium content varies from 238 to 351 kg/ha which indicates that the soils have medium to better quantities of potassium.

From the results, it is evident that there is no apparent variation in the tested parameters of soil and thereby it can be concluded the proposed project does not contribute any pollutant to the soil.

3.13 Ecological Environment

3.13.1 Terrestrial Ecology

3.13.1.1 Introduction

An ecosystem is composed of plant and animal populations, and it differs from natural community designation in that it involves the total nutrient and energy economics of the system as well as the organisms involved. Ecosystems are self-maintained and self-contained. Natural ecosystems are invariably richer in species and more stable than those of artificially developed, due to their many inter-dependencies and inter-relationships.

The plant and animal populations in an area form recognizable associations called Natural communities. These are characterized by a few species called dominants. Natural communities have structure based on the life forms (e.g. grass) of the species that make them up. A hardwood forest has a given structure by virtue of the trees and shrubs that compose it. The species composition refers to the kinds of species making up to the community. The variety of species and their relative numbers are referred to as species diversity. A community composed of few species is called simple or one of Low diversity. A community composed of many species is called complex or one of high diversity. The greater the biotic diversity, the greater the number and kind of habitats for the inhabitants of the community. Based on the physical setting and the kind of



distribution of flora and fauna, the study area can be classified into crop, terrestrial and aquatic ecosystems.

Ecosystem shows complex inter-relationships between biotic and abiotic components leading to dependence, competition and mutualism. Biotic components comprise both plant and animal communities, interacting not only within and between themselves but also with the abiotic components of the environment. Generally, biological communities are good indicators of climatic and edaphic factors because of their strong relationships with them. The studies on the biological aspects of the ecosystem are important in Environment Impact Assessment studies for the suitability of natural flora and fauna. Information on the impact of environment stress on the community structure serves as an inexpensive and efficient early warning system to check the damage on a particular ecosystem.

A change in the composition of biotic communities under stress is reflected through a change in the distribution pattern, density, diversity, frequency, dominance and abundance of natural species of fauna and flora existing in the ecosystem. These changes over a span of times can be quantified and related to the existing environment.

3.13.1.2 Objectives

The objectives of ecological study during the study period of EIA study period may be outlined as follows:

- To characterize the environmental components like land, water, flora and fauna;
- To understand their present status;
- To understand carrying capacity of the ecosystem;
- To assess present bio-diversity; and
- To identify susceptible and sensitive areas.

3.13.1.3 Regional Biodiversity

Tamil Nadu has a total land area of 1,30,060 km² which constitute of about 3.96% of the total geographical area of the country. Physiographically, the State can be divided into four major regions viz Coastal Plains, Eastern Ghats, Central Plateau and Western Ghats. The main rivers of the State are Cauvery, Bhavani, Palar, Vaigai etc. which drain into the Bay of Bengal. Tamil Nadu has a Humid Tropical Climate. Tamil Nadu shares the Western Ghats Biodiversity (one of the 12 Global mega biodiversity Hotspots) with Western Ghats States of Kerala, Karnataka, Maharashtra and Goa. It shares the Eastern Ghats with the States of Andhra Pradesh and Orissa. It also shares the East-coast with the States of Andhra Pradesh, Orissa and West Bengal.

The State is endowed with rich biodiversity, from marine coastal systems in the Gulf of Munnar to the terrestrial evergreen forests in the Western Ghats and temperate forests in the hilly regions. As per the Champion & Seth Classification of Forest Types (1968), the forests in Tamil Nadu belong to nine Forest Type Groups, which are further divided into 39 Forest Types. The Nilgiri Biosphere Reserve represents a unique and threatened ecosystem in the tropics inside the Western Ghats Mountain system and is one of the biodiversity hotspots. Tamil Nadu has been a pioneer State in the biodiversity conservation, particularly in Protected Area management, including conservation of marine fauna. Tamil Nadu is famous for its Teak and Sandalwood forests.

Forest Biodiversity in the State is mainly confined to Western Ghats and Eastern Ghats. Forest Cover of the State is 26,364 km² which is 20.27% of the State's geographical area



(GA). In terms of forest canopy density classes, the State has 3,605 km² (2.77% of GA) very dense forest, 11,030 km² (8.48% of GA) moderately dense forest and open forest and 11,729 km² (9.02 % of GA) respectively. There is an increase of 83.02 km² in the forest cover of the state as compared to 2017 assessment (Source: www.forests.tn.gov.in).

The mangrove cover in the State is 44.83 km², which is 0.035% of the State total geographical area. The Very Dense mangrove comprises 1.04 km² of the mangrove cover, Moderately Dense mangrove is 27.24 km² while open mangroves constitute an area of 16.55 km².

Recorded Forest Area (RFA) in the State is 22,877 km² which constitute of about 17.59% and 2.99% of the total geographical area of the State and Country respectively, of which 20,293 km² is Reserved Forest, 1,782 km² is Protected Forest and 802 km² is Unclassed Forests. The RFA covers 17.59% of geographical area of the State. The reserved, protected and unclassed forests are 88.70%, 7.79% and 3.51% of the recorded forest area in the State respectively. In Tamil Nadu, during the period 1st January 2015 to 5th February 2019, a total of 542.40 hectares of forest land was diverted for non-forestry purposes under the Forest Conservation Act, 1980 (MoEF&CC, 2019). As per the information received from the State during the last two years, 74,030 ha of plantations were raised in the State.

Five National Parks, 29 Wildlife Sanctuaries and two Conservation Reserves constitute the Protected Area network of the State covering 4.97% of its geographical area (India State Forest Report, 2019). There are about 3,072 hamlets bordering the forest areas of the state.

Tropical dry Deciduous Forest covers an area of 12.23 lakh ha constituting 54.30%, Tropical Thorn Forest covers an area of 5 lakh ha constituting 22.10%, Tropical Moist Deciduous Forest covers an area of 2.60 lakh ha constituting a percentage of 11.10%. The Biodiversity rich forest types are the Tropical Wet Evergreen Forest covering an area of 0.60 lakh ha constituting 2.67%, Tropical Semi Evergreen Forest covering an area of 0.23 lakh ha constituting 1.01%, Subtropical Broad leaved Hill Forest covers an area of 1.14 lakh ha constituting 5.04%, the Tropical Dry Evergreen Forest which is a unique type of Tamil Nadu covers an area of 0.26 lakh ha constituting 1.16%, the mangrove forest covers an area of approximately 0.23 lakh ha constituting 1.01%.

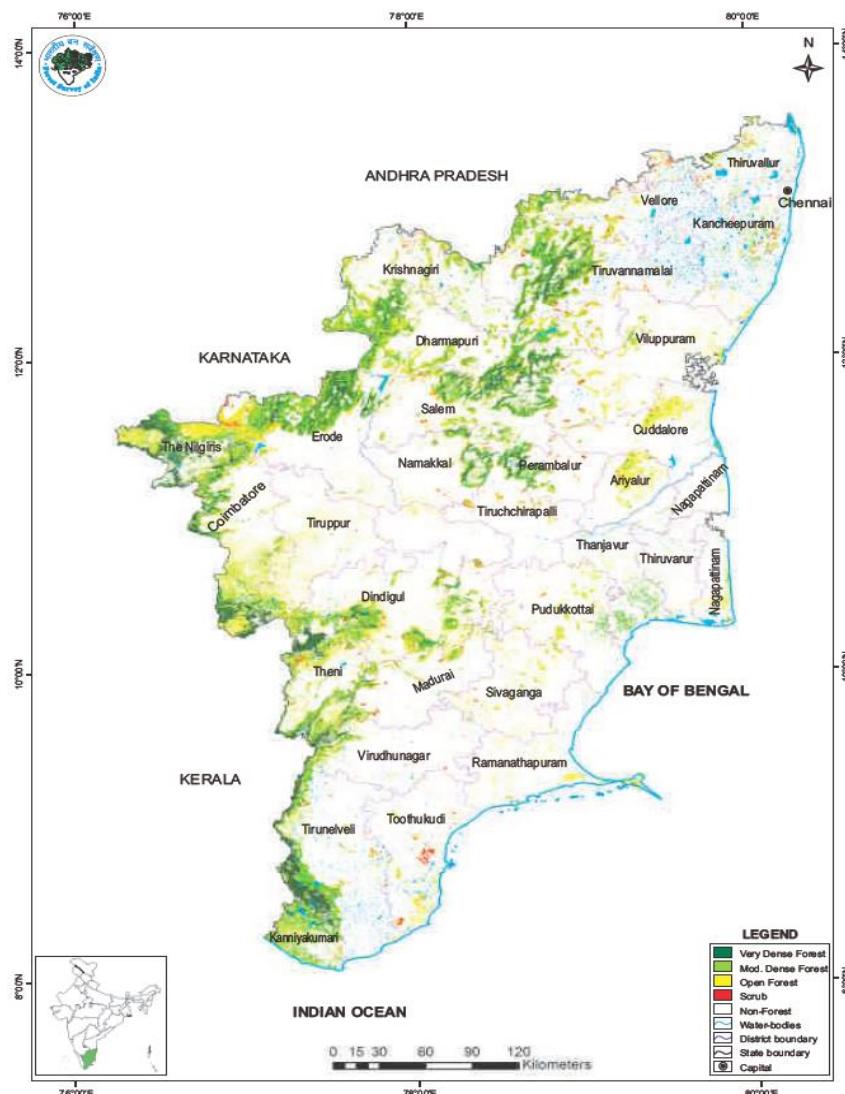


Figure 3.15 Forest Map of Tamil Nadu (Source: Forest Survey of India, 2019)

Habitat fragmentation is the process by which habitats which were once continuous become divided into separate fragments. This mainly happens due to human activities such as agriculture, rural development and urbanization. As cities and civilization grow in size, the fragmentation of habitats causes extinction of many plant and animal species and is the largest threat to biodiversity on earth. Designing with nature can improve the quality of cities for people, plants and animals. In doing so, ecosystem services can be enhanced.

The state's rich biodiversity and the natural resources are facing a serious threat from the growing human encroachments, cattle grazing, collection of fire wood, man-animal conflict, poaching, illicit felling, mass tourism and pilgrimage etc. and also from various developmental activities. Biodiversity Conservation has been structured covering the Ecosystem Diversity, Species Diversity and Genetic Diversity. Species Diversity has been structured separately for plants and animals. Wild plant diversity has been structured on the lines of Red-listed plants, Endemic plants, Medicinal plants, Wild relatives of cultivated plants, allied species of cultivated species and others.



Wild Animal diversity has been structured on the lines of Red listed animals, Endemic animals, Flagship species, Keystone species, Pollinators and others. Domesticated species diversity has been structured on the lines of Cultivated Plants and Domesticated animals.

Tiruvallur District

Tiruvallur District has a geographical area of 3,423 km². The district is surrounded by Kancheepuram district in the south, Vellore District in the west, Bay of Bengal in the east and Andhra Pradesh in the north. The coastal region is mostly flat while certain areas in Tiruttani and Pallipet taluks are undulated and even hilly. However, there are not many hills of any considerable height in this district. There are a few conical hills or ridges of small elevation, like the St. Thomas Mount. Most of the hills and hillocks are rocky and no verdant vegetation is seen in the slopes of these hills.

The area under forests is 19,736 km², which is only 5.8 % of the total geographical area of the district. The soil of the district is mostly sandy, mixed with soda or other alkali or stony. Rocks found in and near the surface are in detached masses. Hence, the soil can't be termed as very fertile. The soil found nearer the sea coast is of the inferior erinaceous type which is most suited for raising casuarinas plants. No mineral of any importance is available in the district.

Most of the agricultural activity is dominated by Paddy, Pulses, oil seeds, Tapiaco, Greengram, fruit crops and vegetables. The major cash crops are Coconut, Groundnut and Banana are also cultivated in considerable area.

3.13.1.4 Biogeographic zone, province and Forest type

This study has been carried out during the month of April 2021 for the purpose of providing an independent and comprehensive baseline assessment of the flora, terrestrial vertebrate, aquatic fauna and associated habitat values of the site and within 10 km radius area around the project site at Thervoy Kandigai Village, Gummidiyondi Taluk, Tiruvallur District, Tamil Nadu and a subsequent assessment of potential ecological impacts.

Thervoy Kandigai Village located in Gummidiyondi Taluk, Tiruvallur District with the total geographical area of 13.51 km². The study area falls under semi-arid category as far as the Indian biogeographical zones (Rodger, Panwar, Mathur 2000) are concerned. Under the biogeographical provinces, the study area falls under the category of **6E-Deccan Peninsula-Deccan South**.

The field investigation and satellite imagery data show that the study area is a flat terrain and includes water bodies such as Arani River located about 7.13 km towards South-Southeast, Telugu Ganga/SatyaSai Ganga Canal located about 4.86 km towards West, Canal near Sengarai located about 2.12 km towards South-Southeast, KTK Reservoir located about 0.89 km towards North, Lake near Teruvai located about 0.91 km towards Northeast, Uttukkottai Eri located about 6.67 km towards West-Southwest, Poovilambedu Pond located about 6.79 km towards Northeast, Sulameni Eri located about 3.15 km towards South, Kakkavakkam Lake located about 5.82 km towards South, Lake near Palikuppam located about 3.61 km towards South-Southwest, Lake near Madarpakkam located about 8.58 km towards North, Lake near Edakandigai located about 8.25 km towards East, Lake near Serpedu located about 6.57 km towards East, Lake near Attupakkam located about 5.81 km towards Southeast, Lake near Pudukuppam located



about 3.04 km towards Southeast, Lake near Teruvoi located about 1.71 km towards East-Northeast, Lake near Karadiputtur located about 1.16 km towards West-Southwest, Lake near Balakrishnapuram located about 2.41 km towards North-Northwest, Lake near Karambedu located about 8.62 km towards Northeast from the study area. There were agricultural fields in the study area that get irrigated by the canals.

During the field study, it was observed the dominance of herbs and grasses like *Tridax procumbens*, *Cynodon dactylon* and *Euphorbia hirta*. From the primary observations, the tree species recorded in the forest were *Cocos nucifera*, *Azadirachta indica*, *Acacia auriculiformis*, *Acacia nilotica*, etc. The terrestrial flora in the study area consisting of various under shrubs and herbs is conspicuous during and after the rainy season only. Some of the common shrub species are *Prosopis juliflora*, *Lantana camara*, *Achyranthes aspera*, *Datura metel* etc. and *Euphorbia hirta*, *Aerva lanata*, *Ageratum conyzoides*, *Boerhavia diffusa*, *Eclipta prostrata* etc. among herbaceous species.

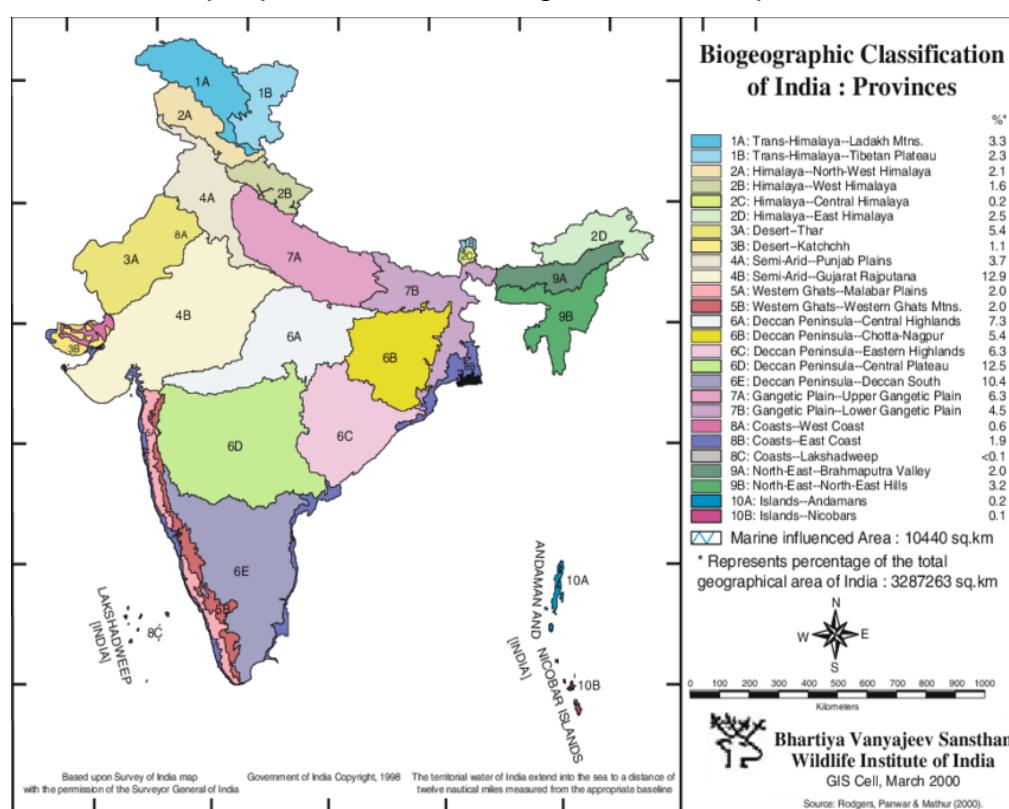


Figure 3.16 Map showing the Bio-geographic Provinces of India

The detailed ecological assessment of the study area has been carried out with the following objectives:

- To establish the present status of ecological conditions surrounding the project location;
- To study the existing anthropogenic stresses on the prevailing ecosystem.
- To identify and predict the likely impacts on the local ecosystem from the proposed activities;
- To list out floral species, terrestrial vertebrate and aquatic flora and fauna present within the study area, and significance status under The Wildlife (Protection) Act, 1972;



- To define ecological/conservation status of each species as per IUCN categories (Red Data List).
- To formulate migratory measures and a sustainable Environmental Management Plan (EMP) basing upon the likely impacts.

During survey, following aspects were considered for ecological studies:

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

3.13.1.5 Methodology

Terrestrial investigations for flora and fauna records were collected by random field survey and a checklist was prepared. During field survey, discussions with the local people were carried-out to collect information related to local biodiversity in and around the villages. The ecological status of the study area has been assessed based on the following methodology:

- Primary field surveys to establish primary baseline of the study area;
- Compilation of secondary information available in published literatures/ forest working plans etc.
- Site Verification and finalization in consultation with Project proponent, local inhabitants.

A. Floral Study

The assessment of the flora of the study area is done by an extensive field survey of the area of 10 km radius.

- Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral, other related literature.
- Besides the identification of plant species, information was collected on the vernacular names and uses of plants made by local inhabitants.
- Qualitative analysis of vegetation is made by two different methods such as floristic (by simple studying various genera and species of various plant groups i.e. herbs, shrubs, trees etc).

B. Faunal Study

Ground surveys are carried out by trekking the study area for identification of important animal groups such as birds, mammals and reptiles for sampling of animals through the following methods.

- For sampling birds/ avifauna ‘point sampling’ along the fixed transects (foot trails) were done to record all the species of birds with the help of binoculars; field guides and photography for more than 1 hour on each transect ($n=4$).
- For sampling mammals, ‘direct count on open width (20 m) transect’ were used on the same transects. Besides, information on recent sightings/records of mammals by the locals are also collected from the study areas.
- ‘Reptiles’ mainly lizards were sampled by ‘direct count on open width transects’.
- Secondary information collected from local villagers, published government data etc.
- **List of the endangered and endemic species as per the schedule of The Wildlife Protection Act, 1972**



Emphasis is given to identify avifauna and mammals to determine the presence and absence of Schedule-1 species, listed in The Wildlife Protection Act 1972, as well as in Red List of IUCN. Various methods used for study animals are as follows:

- A. **Point Survey Method:** Observations were made at each site for 15-20 min duration.
- B. **Road Side Counts:** The observer travelled by motor vehicles from site to site and all sightings were recorded.

3.13.1.6 Floristic composition within the study area

The ecology and diversity survey were conducted in the 10 km radius in the study area and the surrounding area. It is observed that human settlements present in and around the project site and within the study area of 10 km radius and many of villages/ colonies have moderate ranges of plantations. Most of the vegetation observed in the study area are natural vegetation and in agricultural fields. During site assessment several floral species encountered within the 10 km radius area.

The study area doesn't have any forest land or permanent natural vegetation and the main land use feature of the study area is comprised of habitation and cultivating lands. From the primary observation, the tree species recorded in the study area in the plantation area were *Cocos nucifera*, *Azadirachta indica*, *Acacia auriculiformis*, *Acacia nilotica*, etc. The survey was conducted in the 10 km radius from the study area and its surroundings.

The project area covering 10 km radial distance reveal that there are Ambakkam Reserved Forest (RF) located about 6.75 km towards West-Northwest, Satyavedu RF located about 7.96 km towards North-Northwest, Nemalur RF located about 5.39 km towards North-Northeast, Siruvedu RF located about 3.58 km towards North, Panchali RF located about 3.84 km towards North-Northeast, Palavakkam RF located about 0.80 km towards South, Manali RF located about 3.19 km towards East, Mylapur RF located about 11.13 km towards South-Southwest, Malandur RF located about 10.12 km towards South-Southwest, Vembedu RF located about 10.40 km towards South, Irulkulam RF located about 12.71 km towards North, Nadanam RF located about 10.63 km towards West, Rajugunta RF located about 6.81 km towards West-Northwest, Senjiyagaram RF located about 5.06 km towards West-Southwest, Pallavakkam RF located about 3.32 km towards East from the study area. There are no notified/ protected ecologically sensitive area including national park, wildlife sanctuary, Elephant and Tiger reserves. However, the vegetation within the study area is sparse, with the existence of some weeds as per the survey conducted within 10 km radius of the site. The results of survey exhibited sparsy vegetation with the existence of 97 terrestrial flora. However, Neem, Acacia and Tamarind trees are abundant widely distributed in and away from the study area.

The following species were encountered from the study area during the field visits as given in **Table 3.21**.



Table 3.21 Details of Flora within Core area

S. No.	Scientific Name	Common Name	Family	IUCN Conservation Status
Tree				
1	<i>Tamarindus indica</i>	Puli	Caesalpiniaceae	Not assessed
2	<i>Syzygium cumini</i>	Naval	Myrtaceae	Not assessed
3	<i>Acacia auriculiformis</i>	Pencil maram	Fabaceae	Least Concern
4	<i>Leucaena leucocephala</i>	Peru-n-takarai	Fabaceae	Not assessed
5	<i>Acacia nilotica</i>	Karuvel	Fabaceae	Least Concern
6	<i>Mangifera indica</i>	Mamaram	Anacardiaceae	Data Deficient
7	<i>Pongamia pinnata</i>	Pungai	Fabaceae	Least Concern
8	<i>Diospyros melanoxylon</i>	Karundumbi	Ebenaceae	Not assessed
9	<i>Cocos nucifera</i>	Tengu	Arecaceae	Not assessed
10	<i>Bauhinia racemosa</i>	Tataki	Fabaceae	Not assessed
11	<i>Delonix regia</i>	Cemmayir-konrai	Fabaceae	Least Concern
12	<i>Saraca asoca</i>	Asogam	Fabaceae	Vulnerable
13	<i>Azadirachta indica</i>	Veppai	Meliaceae	Not assessed
14	<i>Melia azadirachta</i>	Kattu vembhu	Meliaceae	Least Concern
15	<i>Polyalthia longifolia</i>	Nettilinkam	Annonaceae	Not assessed
16	<i>Ziziphus mauritiana</i>	Elandhai	Rhamnaceae	Least Concern
17	<i>Emblica officinalis</i>	Nelli	Euphorbiaceae	Not assessed
18	<i>Ficus religiosa</i>	Araca-maram	Moraceae	Not assessed
19	<i>Annona squamosal</i>	Sitapalam	Annonaceae	Not assessed
20	<i>Casuarina equisetifolia</i>	Savukku	Fabaceae	Not assessed
21	<i>Odina wodier</i>	Oti	Anacardiaceae	Not assessed
22	<i>Phoenix sylvestris</i>	Paereechem	Arecaceae	Not assessed
23	<i>Psidium guajava</i>	Segappu koyyaa	Myrtaceae	Not assessed
24	<i>Ficus benghalensis</i>	Alai	Moraceae	Not assessed
25	<i>Musa paradise</i>	Vaazha	Musaceae	Not assessed
26	<i>Carica papaya</i>	Pappali	Caricaceae	Data Deficient
27	<i>Borassus flabellifer</i>	Panai	Arecaceae	Endangered
28	<i>Terminalia catappa</i>	Nattuvadumai	Combretaceae	Not assessed
29	<i>Gmelina arborea</i>	Kumalaamaram	Lamiaceae	Least Concern
30	<i>Manilkara zapota</i>	Sapota	Sapotaceae	Least Concern
31	<i>Murraya koenigii</i>	Karivepillai	Rutaceae	Least Concern
32	<i>Butea monosperma</i>	Palasam	Fabaceae	Least Concern
33	<i>Citrus medica</i>	Elumiccai	Rutaceae	Not assessed
34	<i>Aegle marmelos</i>	Vilvam	Rutaceae	Not assessed
35	<i>Tectona grandis</i>	Tekku	Lamiaceae	Not assessed
36	<i>Vitex negundo</i>	Nocchi	Lamiaceae	Not assessed
37	<i>Albizia lebbeck</i>	Siridam	Fabaceae	Least Concern
38	<i>Cassia fistula</i>	Appai	Fabaceae	Least Concern
Shrubs				
1	<i>Sida cordifolia</i>	Mayir-manikham	Malvaceae	Not assessed



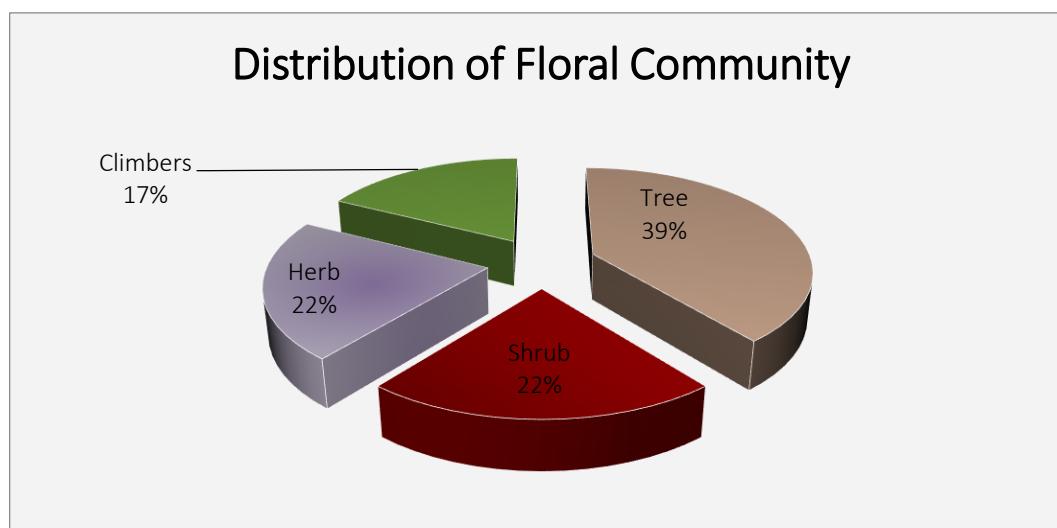
S. No.	Scientific Name	Common Name	Family	IUCN Conservation Status
2	<i>Jasminum sessiliflorum</i>	Kuruvilaangkodi	Oleaceae	Not assessed
3	<i>Morinda pubescens</i>	Mannanunai	Rubiaceae	Not assessed
4	<i>Ziziphus nummularia</i>	Narielandai	Rhamnaceae	Not assessed
5	<i>Solanum pubescens</i>	Sundaikkai	Solanaceae	Not assessed
6	<i>Hibiscus rosa sinensis</i>	Ampurukam	Malvaceae	Not assessed
7	<i>Euphorbia geniculata</i>	Amman-paccarici	Euphorbiaceae	Not assessed
8	<i>Lantana camara</i>	Unnichedi	Verbenaceae	Not assessed
9	<i>Calotropis gigantean</i>	Erukku	Apocynaceae	Not assessed
10	<i>Achyranthes aspera</i>	Akatam	Amaranthaceae	Not assessed
11	<i>Agave tomentosa</i>	Malai-k-koyya	Agavaceae	Not assessed
12	<i>Prosopis juliflora</i>	Vaelikaruvali	Fabaceae	Not assessed
13	<i>Tecoma stans</i>	Manjarali	Bignoniaceae	Least Concern
14	<i>Calotropis procera</i>	Vellai Erukku	Apocynaceae	Not assessed
15	<i>Lawsonia inermis</i>	Maruthani	Lythraceae	Least Concern
16	<i>Tarennia asiatica</i>	Tharani	Rubiaceae	Not assessed
17	<i>Euphorbia tirucalli</i>	Cakkalavi	Euphorbiaceae	Least Concern
18	<i>Datura metel</i>	Ummattangani	Solanaceae	Not assessed
19	<i>Phyllanthus reticulatus</i>	Civappu-p-pula	Phyllanthaceae	Not assessed
20	<i>Commelina benghalensis</i>	Kanang-karai	Commelinaceae	Least Concern
21	<i>Bambusa arundinacea</i>	Lulay-munkil	Poaceae	Not assessed
Herbs				
1	<i>Vernonia cinerea</i>	Puvamkuruntal	Asteraceae	Not assessed
2	<i>Parthenium hysterophorus</i>	Gajar ghas	Asteraceae	Not assessed
3	<i>Plumbago zeylanica</i>	Chittiramoolam	Plumbaginaceae	Not assessed
4	<i>Mimosa pudica</i>	Thottaccurungi	Fabaceae	Least Concern
5	<i>Amaranthus viridis</i>	Kuppaikkirai	Amaranthaceae	Not assessed
6	<i>Cynodon dactylon</i>	Arugu	Poaceae	Not assessed
7	<i>Tridax procumbens</i>	Vettukkaaya-thalai	Asteraceae	Not assessed
8	<i>Helicteres isora</i>	Valampuri	Sterculiaceae	Not assessed
9	<i>Eclipta prostrata</i>	Karisalanganni	Asteraceae	Least Concern
10	<i>Cassia tora</i>	Taghrai	Fabaceae	Not assessed
11	<i>Cyperus rotundus</i>	Panni-korai	Cyperaceae	Least Concern
12	<i>Sida rhombifolia</i>	Chitramutti	Malvaceae	Not assessed
13	<i>Ocimum sanctum</i>	Thulasi	Lamiaceae	Not assessed
14	<i>Tribulus lanuginosus</i>	Nerungi	Zygophyllaceae	Least Concern
15	<i>Aerva lanata</i>	ciru-pulai	Amaranthaceae	Not assessed
16	<i>Ageratum conyzoides</i>	Aappakkoti	Asteraceae	Not assessed
17	<i>Boerhavia diffusa</i>	Mukaratte kirai	Nyctaginaceae	Not assessed
18	<i>Sporobolus fertilis</i>	Giant Parramatta Grass	Poaceae	Not assessed
19	<i>Euphorbia hirta</i>	Ammam Paccharisi	Euphorbiaceae	Not assessed
20	<i>Ipomoea dissecta</i>	Kakkattan	Convolvulaceae	Not assessed
21	<i>Sida cordifolia</i>	Mayir-manikham	Malvaceae	Not assessed



S. No.	Scientific Name	Common Name	Family	IUCN Conservation Status
Climbers				
1	<i>Bougainvillea spectabilis</i>	Kakitha poo	Nyctaginaceae	Not assessed
2	<i>Ichnocarpus frutescens</i>	Utar-koti	Apocynaceae	Not assessed
3	<i>Basella rubra</i>	Pasalakkirai	Basellaceae	Not assessed
4	<i>Luffa cylindrical</i>	Peerankai	Cucurbitaceae	Not assessed
5	<i>Ipomoea nil</i>	Kotikkakkattan	Convolvulaceae	Not assessed
6	<i>Cardiospermum halicacabum</i>	Balloon Vine	Sapindaceae	Not assessed
7	<i>Coccinia grandis</i>	Kovaikkaai	Cucurbitaceae	Not assessed
8	<i>Abrus precatorius</i>	Kundumani	Fabaceae	Not assessed
9	<i>Clitoria ternatea</i>	Kannikkodi	Fabaceae	Not assessed
10	<i>Coccinia indica</i>	Kundru	Cucurbitaceae	Not assessed
11	<i>Pergularia daemia</i>	Velipparuthi	Apocynaceae	Least Concern
12	<i>Pueraria tuberosa</i>	Nilapoosani	Fabaceae	Not assessed
13	<i>Cissampelos pareira</i>	Abutua	Menispermaceae	Not assessed
14	<i>Cissus quadrangularis</i>	Perandai	Vitaceae	Not assessed
15	<i>Trichosanthes cucumerina</i>	Pudalankaai	Cucurbitaceae	Not assessed
16	<i>Tylophora asthmatica</i>	Kalutai-p-palai	Asclepidaceae	Not assessed
17	<i>Solena amplexicaulis</i>	Pulivanci	Cucurbitaceae	Not assessed

Source: ABC Techno Labs India Pvt. Ltd.

The detailed study revealed dominance of *Cocos nucifera*, *Azadirachta indica*, *Acacia auriculiformis*, *Acacia nilotica*, etc. Totally 38 species of trees found in the study area along with 21 shrub species, 21 herb species and 17 climber species. *Prosopis juliflora*, *Lantana camara*, *Achyranthes aspera*, *Datura metel* were found to be the predominant species among shrub. Among the herbaceous species *Euphorbia hirta*, *Aerva lanata*, *Ageratum conyzoides*, *Boerhavia diffusa*, *Eclipta prostrata* etc. found to be abundant.



3.13.1.7 Economically important Flora of the study area

Agricultural crops: The major crops cultivated in Tiruvallur District are Paddy, Maize, Black gram and green gram. In canal fed areas paddy occupies the largest area of



cultivation followed by green gram and black gram. Other crops grown in the region are pulses, groundnut and coconut. Different fruits like banana, papaya, mangoes, sapota, guava and vegetables like brinjal, tomato, lady's finger, drumsticks, coriander and chilies also grown by the local people.

Medicinal plant species: The nearby area is also endowed with the several medicinal plants which are commonly available in the shrub forest and waste lands. The common medicinal plants of the region is *Azadirachta indica* (Neem).

Fuel wood plant species: Local villagers use to collect dry leaves, stems and log to fulfill their daily need for fuel wood requirement. *Azadirachta indica* (Neem), *Mangifera indica* etc. are the species used for fuel wood collection from the surrounding forest area.

Rare and endangered floral species: During the vegetation survey in the study area did not encounter any such species which are endangered or threatened under IUCN (International Union for Conservation of Nature and Natural resources) guidelines.

3.13.1.8 Faunal Communities

Both direct (sighting) and indirect (evidences) observations methods were used to survey the faunal species around the study area. Additionally, reference of relevant literatures (published/ unpublished) and conversations with local villagers were also carried out to consolidate the presence of faunal distribution in the area (*Smith 1933-43, Ali and Ripley 1983, Daniel 1983, Prater 1993, Murthy and Chandrasekhar 1988*).

Mammals: No wild mammalian species was directly sighted during the field survey. Conversation with local villagers around the study area also could not confirm presence of any wild animal in that area. Common Indian hare, Bonnet monkey, Common Indian mongoose, Palm squirrel, House mouse, Indian porcupine, Lesser mouse-tailed Bat, etc. were observed during primary survey.

Avifauna: Since birds are considered to be the indicators for monitoring and understanding human impacts on ecological systems (*Lawton, 1996*) attempt was made to gather quantitative data on the avifauna by walk through survey within the entire study area and surrounding areas. From the primary survey, a total of 39 species of avifauna were identified and recorded in the study area. The diversity of avifauna from this region was found to be quite high and encouraging. The list of avifauna species found in the study area is mentioned in **Table 3.22**.

The tree lizard, common garden lizards and common toads are also seen. Variety of butterflies (like Common crow, Common lime, Common Mormon, Southern birdwing, Lime butterfly, Common bushbrown, Crimson rose, Small Grass Yellow, Common sailor, Common tiger, Plain Tiger, Great Eggfly) is spotted in abundance in the study zone.

Table 3.22 Fauna Recorded from the Primary Survey in the Study Area and their Conservation Status

S. No.	Scientific Name	English Name	Schedule of Wildlife Protection Act	IUCN Conservation Status	Method
Mammals					
1	<i>Bandicota bengalensis</i>	Indian mole rat	--	Least Concern	DS
2	<i>Rattus rattus</i>	Indian rat	--	Least Concern	DS



S. No.	Scientific Name	English Name	Schedule of Wildlife Protection Act	IUCN Conservation Status	Method
3	<i>Bandicota indica</i>	Rat	--	Least Concern	DS
4	<i>Felis catus</i>	Cat	--	Not assessed	DS
5	<i>Lepus nigricollis</i>	Indian Hare	II	Least Concern	DS
6	<i>Rattus norvegicus</i>	Field mouse	--	Least Concern	DS
7	<i>Funambulus pennanti</i>	Palm-Squirrel	--	Least Concern	DS
8	<i>Mus musculus</i>	Common Mouse	--	Least Concern	DS
9	<i>Herpestes edwardsii</i>	Common Mongoose	Appendix III	Least Concern	DS
Birds					
1	<i>Argya striata</i>	Jungle Babbler	II	Least Concern	DS
2	<i>Merops orientalis</i>	Green bee eater	II	Least Concern	DS
3	<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	II	Least Concern	DS
4	<i>Ceryle rudis</i>	Pied Kingfisher	II	Least Concern	DS
5	<i>Nectarinia asiatica</i>	Purple sunbird	II	Least Concern	DS
6	<i>Coracias benghalensis</i>	Indian roller	II	Least Concern	DS
7	<i>Corvus macrorhynchos</i>	Indian jungle crow	II	Least Concern	DS
8	<i>Eudynamys scolopaceus</i>	Indian koel	II	Least Concern	DS
9	<i>Gallinula chloropus</i>	Common Moorhen	II	Least Concern	DS
10	<i>Pavo cristatus</i>	Indian Peafowl	I	Least Concern	DS
11	<i>Nycticorax nycticorax</i>	Night heron	II	Least Concern	DS
12	<i>Oriolus oriolus</i>	Golden oriole	II	Least Concern	DS
13	<i>Pitta brachyura</i>	Indian pitta	II	Least Concern	DS
14	<i>Ardea alba</i>	Large egret	II	Least Concern	DS
15	<i>Ardeola grayii</i>	Pond heron	II	Least Concern	DS
16	<i>Saxicoloides fulicata</i>	Indian robin	II	Least Concern	DS
17	<i>Athene brama</i>	Spotted owlet	II	Least Concern	DS
18	<i>Apus apus</i>	Common swift	II	Least Concern	DS
19	<i>Phalacrocorax niger</i>	Little cormorant	II	Least Concern	DS
20	<i>Perdicula asiatica</i>	Bush Quail	II	Least Concern	DS
21	<i>Alcedo atthis</i>	Small Blue Kingfisher	II	Least Concern	DS
22	<i>Dicrurus macrocercus</i>	Black drongo	II	Least Concern	DS
23	<i>Milvus migrans</i>	Black kite	II	Least Concern	DS
24	<i>Dendrocitta leucogastra</i>	Southern tree pie	II	Least Concern	DS
25	<i>Acridotheres tristis</i>	Common Myna	II	Least Concern	DS
26	<i>Halcyon smyrnensis</i>	White-breasted kingfisher	II	Least Concern	DS
27	<i>Psittacula krameri</i>	Rose ringed parakeet	II	Least Concern	DS
28	<i>Centropus sinensis</i>	Greater coucal	II	Least Concern	DS



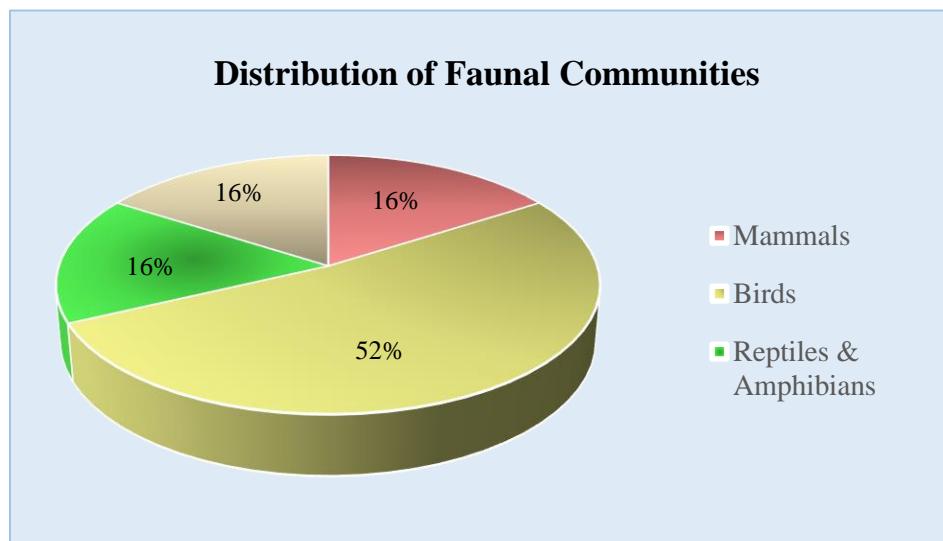
S. No.	Scientific Name	English Name	Schedule of Wildlife Protection Act	IUCN Conservation Status	Method
29	<i>Columba livia</i>	Rock pigeon	--	Least Concern	DS
30	<i>Corvus splendens</i>	House crow	--	Least Concern	DS
31	<i>Cuculus canorus</i>	Common cuckoo	II	Least Concern	DS
32	<i>Pycnonotus cafer</i>	Red Vented Bulbul	II	Least Concern	DS
33	<i>Vanellus indicus</i>	Red-wattled lapwing	II	Least Concern	DS
34	<i>Ardeola grayii</i>	Pond Heron	II	Least Concern	DS
35	<i>Bubulcus ibis</i>	Cattle Egret	II	Least Concern	DS
36	<i>Egretta garzetta</i>	Little Egret	II	Least Concern	DS
37	<i>Tringa hypoleucus</i>	Common sandpiper	II	Least Concern	DS
38	<i>Turdoides caudatus</i>	Common babbler	II	Least Concern	DS
39	<i>Elanus caeruleus</i>	Black-winged Kite	II	Least Concern	DS
40	<i>Pernis ptilorhynchus</i>	Oriental Honey – buzzard	I	Least Concern	DS
41	<i>Accipiter badius</i>	Shikra	I	Least Concern	DS
Reptiles & Amphibians					
1	<i>Hemidactylus frenatus</i>	House lizard	--	Least Concern	DS
2	<i>Eutropis macularia</i>	Common skink	--	Least Concern	DS
3	<i>Lissemys punctata</i>	Indian soft-shelled turtle	I	Least Concern	NS
4	<i>Bungarus caeruleus</i>	Common Krait	--	Least Concern	NS
5	<i>Naja naja</i>	Indian cobra	Appendix II	Least Concern	NS
6	<i>Rana tigrina</i>	Common yellow frog	--	Least Concern	DS
7	<i>Calotes versicolor</i>	Common Garden Lizard	--	Least Concern	DS
8	<i>Polypedates maculatus</i>	Tree frog	--	Least Concern	DS
9	<i>Euphyctis cyanophlyctis</i>	Indian Skipper Frog	II	Least Concern	DS
10	<i>Bufo melanostictus</i>	Toad	--	Least Concern	DS
Butterflies					
1	<i>Euploea core</i>	Common crow	--	Least Concern	DS
2	<i>Papilio demoleus</i>	Common lime	--	Not assessed	DS
3	<i>Papilio polytes</i>	Common mormon	--	Not assessed	DS
4	<i>Troides minos</i>	Southern birdwing	--	Least Concern	DS
5	<i>Papilio demoleus</i>	Lime butterfly	--	Not assessed	DS
6	<i>Mycalesis perseus</i>	Common bushbrown	--	Not assessed	DS
7	<i>Pachliopta hector</i>	Crimson rose	--	Not assessed	DS



S. No.	Scientific Name	English Name	Schedule of Wildlife Protection Act	IUCN Conservation Status	Method
8	<i>Eurema brigitta</i>	Small Grass Yellow	--	Least Concern	DS
9	<i>Neptis hylas</i>	Common sailor	--	Least Concern	DS
10	<i>Danaus genutia</i>	Common tiger	--	Not assessed	DS
11	<i>Danaus chrysippus</i>	Plain Tiger	--	Not assessed	DS
12	<i>Hypolimnas bolina</i>	Great Eggfly	--	Not assessed	DS

N.B: DS- Direct Sighting, NS- Notsighted

Source: ABC Techno Labs India Pvt. Ltd.



Livestock like cattle, buffalo, goat, poultry, duck and pig are reared for dairy products, meat, egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area; however, some commercial poultry farms are also recorded in the study area.

The study area is marked with moderate population of flora and fauna. With reference to the Wildlife Protection Act 1972 (Last Updated 1-4-2023) total number of wildlife tabulated in this study can be characterized as given in the **Table 3.23**.

**Table 3.23 Characterization of Fauna In The Study Area
(As Per W.P Act, 1972; (Last Updated 1-4-2023)**

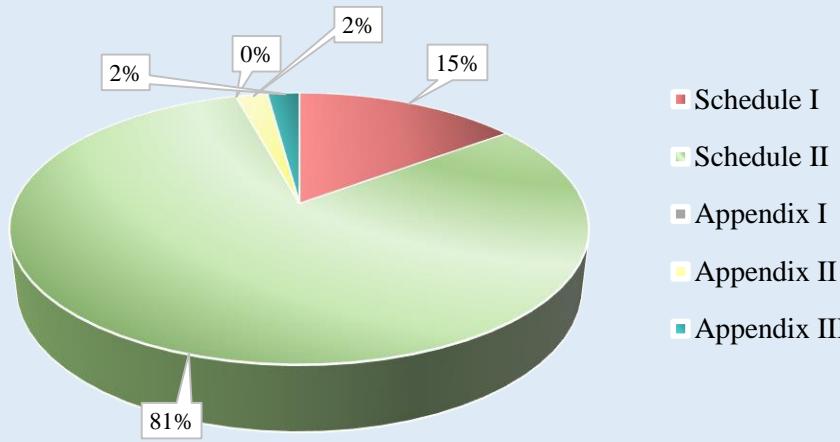
Sl.No.	Schedule of Wildlife Protection Act 1972	No. of species	Remark
1	Schedule I	5	-
2	Schedule II	38	-
3	Appendix I	0	-
4	Appendix II	1	-
5	Appendix III	1	-

Source: ABC Techno Labs India Pvt. Ltd.

The suitable conservation plans for Schedule I category are dealt in the mitigation measure chapter.



Schedule of Wildlife Protection Act 1972



The detailed interpretation of flora and fauna identified within 10 km radius of the project site are tabulated in **Table 3.24**.

Table 3.24 Description of Flora & Fauna

S. No.	Type of Species	Scientific Name	Common Name
Flora			
1	Endangered species	<i>Borassus flabellifer</i>	Panai
2	Threatened species	None	None
3	Near Threatened species	None	None
4	Vulnerable species	<i>Saraca asoca</i>	Asogam
Fauna			
1	Endangered species	None	None
2	Threatened species	None	None
3	Near Threatened species	None	None
4	Vulnerable species	<i>Macaca radiata</i>	Bonnet monkey
5	Migratory Corridors & Flight Paths	No corridors & flight paths	None
6	Breeding & Spawning grounds	None	None

Source: ABC Techno Labs India Pvt. Ltd.

A comprehensive Central Legislation namely, Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals. Schedule-I of this act contains the list of rare and endangered species, which are completely protected throughout the country. The list of wild animals and their conservation status as per Wild Life Act (1972) (Last Updated 1-4-2023) are presented in **Table 3.23** species recorded/reported from the study area, out of which 5 species belongs to Schedule-I, 38 species belong to schedule-II, 1 species belongs to Appendix-II and 1 species belongs to Appendix-III, and there are no endangered, threatened wild animal species in the study area.

3.14 Aquatic Ecology

3.14.1 Introduction

Evaluation of the biological impulses on study area is an integral part of an environmental impact assessment as the consequences of perturbations in the environment ultimately



may affect the habitat. Project activity area devoid of any intense breeding/nursery grounds of economically important living resources. Though organisms have evolved to withstand the change within certain limits, they may not be well adapted to manmade stresses. Thus, the monitoring programme should sufficiently target the entire potential at risk.

An essential pre-requisite for the successful solution to these problems is to evaluate ecological impacts from the baseline information and undertake effective management plan. So, the objective of aquatic ecological study may be outlined as follows:

- To characterize water bodies like fresh waters;
- To understand their present biological status;
- To characterize water bodies with the help of biota;
- To understand the impact of industrial and urbanization activities; and
- To suggest recommendations to counter adverse impacts, if any on the ecosystem.

To meet these objectives following methods were followed:

- Generating data by actual field sampling and analysis in these areas through field visits during study period; and
- Discussion with local people to get the information for aquatic plants and aquatic animals.

A number of samples were investigated for enumeration of aquatic fauna. In order to study aquatic flora and faunal life one-time survey was conducted during the summer season. Major component of the aquatic life under the study area are listed below.

- *Aquatic macrophytes*
- *Phytoplankton and zooplankton*
- *Other community.*

While considering assessment of aquatic pollution and its implications, it must be realized that, despite many changes in the physico-chemical properties of the water body, the ultimate consequences of pollutants may be reflected inevitably on the biological system. Hence, the investigations of an ecosystem and particularly of its communities constitute an integral part of any ecological assessment. This can be achieved by selecting a few reliable parameters from a complex community structure. The parameters considered have phytoplankton, zooplankton and status of fishery. The first two reflects the productivity of a water column at the primary and secondary levels, respectively. Ultimate commercial interest being fisheries, the status of the exploitable fishery resources was assessed. Information on larval stages of fishes and decapods was used to evaluate probable occurrence of spawning and breeding grounds of economically important species.

To assess the planktonic profile of Phytoplankton and Zooplankton, 3 water samples from Kakkavakkam Lake, Arani Lake and Uttukkottai Eri which are located about 5.82 km, 7.13 km and 6.67 km respectively from the study were collected at sub-surface level. The aquatic ecological study was conducted in different water bodies of the study area and the flora and fauna was recorded.

3.14.2 Macrophytes

The macrophytes observed within the study area are tabulated in **Table 3.25**.



Table 3.25 Description of Macrophytes

S. No.	Scientific Name	Common Name	Type
1	<i>Salvinia molesta</i>	Kariba weed	Free floating hydrophytes
2	<i>Nelumbo nucifera</i>	Lotus	Floating hydrophytes
3	<i>Enhydra fluctuans</i>	Water Cress	Marshy amphibious hydrophytes
4	<i>Marsilea minuta</i>	Dwarf Water Clover	Marshy amphibious hydrophytes
5	<i>Lemna sp.</i>	Common duckweed	Free floating hydrophytes
6	<i>Hygrophila auriculata</i>	Marsh Barbel	Marshy amphibious hydrophytes
7	<i>Azolla pinnata</i>	Mosquito Fern	Free floating pteridophyte
8	<i>Vallisneria spiralis</i>	Tapegrass	Submerged hydrophytes
9	<i>Hydrilla verticillata</i>	Hydrilla	Submerged hydrophytes
10	<i>Ipomea aquatica</i>	Water Morning Glory	Marshy amphibious hydrophytes
11	<i>Potamogeton crispus</i>	Curled pondweed	Submerged hydrophytes
12	<i>Eichhornia crassipes</i>	Common water hyacinth	Free floating hydrophytes
13	<i>Nymphoides cristata</i>	Crested Floatingheart	Floating Hydrophytes
14	<i>Nymphaea nouchali</i>	Star lotus	Floating Hydrophytes
15	<i>Polygonum barbatum</i>	Knot gras	Marshy amphibious hydrophytes
16	<i>Pistia stratiotes</i>	Water lettuce	Free floating hydrophytes
17	<i>Cyperus articulates</i>	Jointed flatsedge	Emergent Hydrophytes
18	<i>Ipomoea carnea</i>	Bush Morning Glory	Marginal Hydrophytes
19	<i>Najas indica</i>	Waternymph	Submerged hydrophytes
20	<i>Typha angustifolia</i>	Lesser Bulrush	Emergent hydrophytes

Source: ABC Techno Labs India Pvt. Ltd.

3.14.3 Plankton

Planktons can be broadly grouped into two categories those with plant origin are called 'Phytoplankton' and those with animal origin are called 'Zooplankton'.

A. Phytoplankton

Phytoplankton is the major primary producers of organic matter in the aquatic ecosystem and especially oceans whose 90% productivity is from the planktons. Phytoplankton samples were collected without filtering the water. To preserve, 0.3 mL lugol's solution was added to 100 ml sample. Subsequently, phytoplankton were concentrated by centrifugation and analysed microscopically in laboratory. Identification of phytoplankton was done using standard taxonomic keys.

The Lackey Drop (microtransect) method (Lackey 1938) is a simple method for obtaining counts of considerable accuracy (APHA 2017).

Chemicals/reagents used: Lugol's iodine

Equipments used: Centrifuge tubes of 15ml capacity, cover slips, glass slides, dropper, plastic bottles (100 ml capacity)

Instruments used: Centrifuge and Microscope.



Table 3.26 Phytoplankton Species

S. No.	Species	Family
1	<i>Ankistrodesmus falcatus</i>	Selenastraceae
2	<i>Cyclotella</i> sp.	Stephanodiscaceae
3	<i>Anacystis</i> sp.	Microcystaceae
4	<i>Zygnema</i> sp.	Chlorophyceae
5	<i>Volvox</i> sp.	Volvocaceae
6	<i>Achanthes affinis</i>	Achnanthaceae
7	<i>Ulothrix</i> sp.	Ulotrichaceae
8	<i>Anabaena</i> sp.	Nostocaceae
9	<i>Gracilaria</i> sp.	Gracilariaeae
10	<i>Chlorella vulgaris</i>	Chlorellaceae
11	<i>Rhizosolenia</i> sp.	Rhizosoleniaceae
12	<i>Synedra</i> sp.	Fragilariaeae
13	<i>Oocystis</i> sp.	Oocystaceae
14	<i>Pediastrum simplex</i>	Hydrodictyaceae
15	<i>Diatoma</i> sp.	Bacillariophyceae
16	<i>Azolla</i> sp.	Salviniaceae
17	<i>Melosira granulate</i>	Melosiraceae
18	<i>Microcystis</i> sp.	Microcystaceae
19	<i>Navicula gracilis</i>	Naviculaceae
20	<i>Chlamydomonas</i> sp.	Chlorophyceae
21	<i>Spirodelta</i> sp.	Araceae

Source: ABC Techno Labs India Pvt. Ltd.

B. Zooplankton

The significance of zooplanktons is found in their role in transferring biological production from phytoplankton to larger organisms in the food web. Sample collection was carried out in the similar method as that of phytoplankton. The result of the zooplankton analysis is tabulated in **Table 3.27**.

Table 3.27 Zooplankton Species

S. No.	Species	Family
1	<i>Aspidisca</i> sp.	Aspidiscidae
2	<i>Brachionus</i> sp.	Brachionidae
3	<i>Alona pulchella</i>	Chydoridae
4	<i>Euglena</i> sp.	Euglenaceae
5	<i>Daphnia</i> sp.	Daphniidae
6	<i>Cerocomonas</i> sp.	Flagellate
7	<i>Moina</i> sp.	Moinidae
8	<i>Naegleria</i> sp.	Protozoa
9	<i>Cyclops</i> sp.	Cyclopidae
10	<i>Diaptomus</i> sp.	Rotifera
11	<i>Pleuronanema</i> sp.	Ciliates
12	<i>Monostyla</i> sp.	Lecanidae
13	<i>Philodina</i> sp.	Philodinidae



S. No.	Species	Family
14	<i>Biapertura karua</i>	Chydoridae
15	<i>Dinomonas</i> sp.	Flagellate

Source: ABC Techno Labs India Pvt. Ltd.

3.14.4 Fish Community

The fish species reported from the study area are tabulated in **Table 3.28**.

Table 3.28 List of fish species reported

Sl.No.	Scientific Name	Common Name	Family
1	<i>Gambusia affinis</i>	Western mosquitofish	Poeciliidae
2	<i>Channa gachua</i>	Dwarf snakehead	Channidae
3	<i>Channa punctata</i>	Green snakehead	Channidae
4	<i>Etroplus maculatus</i>	Orange chromide	Cichlidae
5	<i>Mystus vittatus</i>	Striped Dwarf Catfish	Bagridae
6	<i>Garra mULLya</i>	MULLya garra	Cyprinidae
7	<i>Heteropneustes fossilis</i>	Stinging catfish	Heteropneustidae
8	<i>Lepturacanthus savala</i>	Ribbon fish	Trichiuridae
9	<i>Lepidocephalichthys guntea</i>	GunTea loach	Cobitidae
10	<i>Platycephalus biomacula</i>	Flat head fish	Platycephalidae
11	<i>Notopterus notopterus</i>	Asiatic knifefish	Notopteridae
12	<i>Oreochromis mossambicus</i>	Mozambique tilapia	Cichlidae
13	<i>Osphronemus goramy</i>	Giant gourami	Osphronemidae
14	<i>Puntius amphibius</i>	Scarlet-banded barb	Cyprinidae
15	<i>Salmostoma bacaila</i>	Large razorbelly minnow	Cyprinidae
16	<i>Puntius arenatus</i>	Arenatus barb	Cyprinidae
17	<i>Puntius conchonius</i>	Rosy barb	Cyprinidae
18	<i>Puntius sophore</i>	Pool barb	Cyprinidae
19	<i>Puntius ticto</i>	Ticto Barb	Cyprinidae
20	<i>Puntius vittatus</i>	Greenstripe barb	Cyprinidae
21	<i>Rasbora daniconius</i>	Black-line rasbora	Cyprinidae

Source: ABC Techno Labs India Pvt. Ltd.

3.15 Traffic Density during the study period March 2021 - May 2021

The traffic studies have been conducted to know the prevailing traffic volumes on the existing roads. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project. The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at one location for 24 hours.



3.15.1 Methodology

3.15.1.1 Vehicle Count

The vehicles passing through the road (in both ways) were counted separately for 24 hours at the two selected locations from 06.00 AM to 06.00 AM hrs. next day continuously. Category-wise vehicle counting has been done continuously and recorded in the traffic volume count on hourly basis under respective categories.

3.15.1.2 Categorization of Traffic

The engine driven vehicles were categorized into various heads viz. Motor Cycles or Scooters, Three Wheelers or Auto Rickshaw, Four Wheelers or Cars, Truck or Bus, Agricultural Tractor and Light Commercial Vehicle.

3.15.1.3 Sampling Locations

One traffic location is represented in **Table 3.29**.

Table 3.29 Details of Traffic Monitoring Locations

Location Code	Location Details
T-1	SH- 51 (Korthalaiyar Bridge - Palavakkam - Puthur Road)

3.15.1.4 Existing Traffic Scenario

The hourly vehicular traffic densities for continuous normal day at the location observed during the study period and the same are presented in **Table 3.30**. The Level of Service (LOS) and the capacity of the Roadway segments computed is based on the Indian Roads Congress (IRC) standards sourced from Guidelines for Capacity of Urban Roads in Plain Areas IRC 106-1990. Following table provides the LOS standards adopted based on the volume to capacity (V/C) ratios at the intersections and its performance.

Location Number : T-1 – SH - 51 (Korthalaiyar Bridge - Palavakkam - Puthur Road)

Table 3.30 Vehicular traffic densities per Hour

Sl.No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1.	Motor Cycles or Scooters etc.	156	117.0	56	42.0	212	0.75	159.0
2.	Three Wheelers/ Auto Rickshaw	36	72.0	0	0	36	2.0	72.0
3.	Four Wheelers/Cars	97	97.0	27	27.0	124	1.0	124.0
4.	Truck/Bus	74	273.8	21	77.7	95	3.7	351.5
5.	Agricultural Tractor	16	64.0	0	0	16	4.0	64.0
6.	Light Commercial Vehicle	14	19.6	4	5.6	18	1.4	25.2
	Total	393	643.4	108	152.3	501	--	795.7



Table 3.31 Hourly Existing Traffic Load on the Road

S. No.	Type of Vehicles	No. of Vehicles/day	Equivalent PCU	PCU/day
		SH- 51		SH- 51
1.	2-wheeler	3744	0.75	2808
2.	3-wheeler	864	2.0	1728
3.	Car	2328	1.0	2328
4.	Agriculture tractor	384	4.0	1536
5.	LCV	336	1.4	470.4
6.	Truck	1776	3.7	6571.2
Total PCU/day				15,441.6

Table 3.32 Existing Traffic Scenario and LOS

Type of Road	Existing Volume (PCU/day)	Capacity in (PCU/day)	V/C Ratio	LOS
SH-51	15,441.6	36000	0.42	A

Proposed vehicular movement during operation phase/day	No. of Vehicles/day	Volume PCU/day
No. of Two-wheeler Parking	1344	1008
Four Wheelers/Car	648	648
Light Commercial Vehicle	96	134.4
Truck/Bus	504	1864.8
Total	2592	3655.2

Table 3.33 LOS Standards

LOS	V/C	Performance
A	0.60 or less	Excellent, free flow
B	0.70 or less	High, stable flow
C	0.80 or less	Good, Stable flow
D	0.90 or less	Adequate approaching unstable flow
E	1.0 or near about	Inadequate, unstable flow
F	Exceeding 1.0	Unacceptable, forced flow

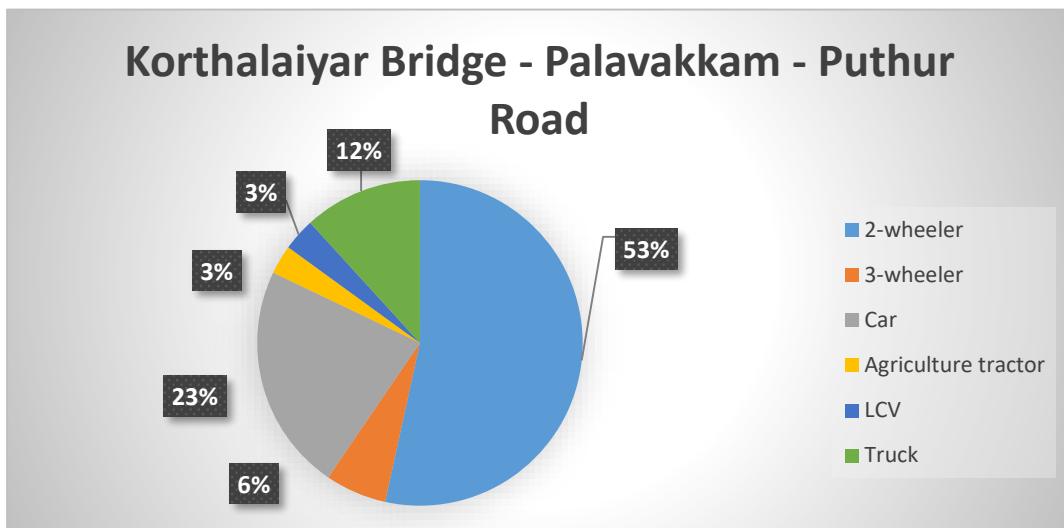


Figure 3.17 Chart Representations for Total Vehicular Data



100% traffic load has been calculated on Korthalaiyar Bridge - Palavakkam - Puthur Road. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period March 2021 - May 2021. Increase in PCU/day due to proposed project is given below in **Table 3.34**.

Table 3.34 Existing and Increase in PCU/day

Road	Existing	Proposed Volume (V)	Capacity (C)	Modified V/C Ratio	LOS
SH-51	15,441.6	$15,441.6 + 3655.2 = 19096.8$	36000	0.53	A

3.15.1.5 Interpretation

The density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period March 2021 – May 2021. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed PCBL (TN) Ltd. of plant, the traffic density will be negligible increase and there will be no change in V/C ratio.

3.16 Traffic Density during the study period February 2024

The traffic studies have been conducted to know the prevailing traffic volumes on the existing roads. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project. The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at one locations for 24 hours.

3.16.1 Methodology

3.16.1.1 Vehicle Count

The vehicles passing through the road (in both ways) were counted separately for 24 hours at the two selected locations from 06.00 AM to 06.00 AM hrs. next day continuously. Category-wise vehicle counting has been done continuously and recorded in the traffic volume count on hourly basis under respective categories.

3.16.1.2 Categorization of Traffic

The engine driven vehicles were categorized into various heads viz. Motor Cycles or Scooters, Three Wheelers or Auto Rickshaw, Four Wheelers or Cars, Truck or Bus, Agricultural Tractor and Light Commercial Vehicle.

3.16.1.3 Sampling Locations

One traffic location is represented in **Table 3.35**.

Table 3.35 Details of Traffic Monitoring Locations

Location Code	Location Details
T-1	SH- 51 (Korthalaiyar Bridge - Palavakkam - Puthur Road)



3.16.1.4 Existing Traffic Scenario

The Level of Service (LOS) and the capacity of the roadway segments computed is based on the Indian Roads Congress (IRC) standards sourced from Guidelines for Capacity of Urban Roads in Plain Areas IRC 106-1990. Following table provides the LOS standards adopted based on the volume to capacity (V/C) ratios at the intersections and its performance. The traffic study is carried out in the same location to revalidated data for the expansion project which is given in **Table 3-36**.

Table 3.36 Revalidated Data during February 2024

Time	Motor Cycles or Scooters	Three Wheeler s/ Auto Rickshaw	Four Wheelers/ Cars	Truck/Bus	Agricultural Tractor	Light Commercial Vehicle
06 -07	303	15	59	29	6	10
07 - 08	272	22	56	27	7	14
08 - 09	193	45	94	31	8	16
09 - 10	254	64	105	58	12	28
10 - 11	265	39	165	79	14	27
11 - 12	301	37	143	71	25	34
12 - 13	231	43	129	45	21	41
13 - 14	281	39	131	53	14	17
14 - 15	232	28	104	33	17	18
15 - 16	313	17	94	58	11	9
16 - 17	196	38	84	44	9	18
17 - 18	257	45	97	43	19	21
18 - 19	112	59	158	38	9	22
19 - 20	254	63	128	37	8	23
20 - 21	266	25	87	25	7	19
21 - 22	233	31	69	28	9	18
22 - 23	198	26	58	57	5	6
23 - 24	58	18	49	28	8	11
24 - 01	56	8	39	34	10	16
01 - 02	48	6	19	30	7	6
02 - 03	33	7	23	46	7	9
03 - 04	31	9	22	55	9	7
04 - 05	96	12	20	35	2	4
05 - 06	120	16	49	11	3	9
	4603	712	1982	995	247	403
Total No. of Vehicles/day = 8942						

Table 3.37 Hourly Existing Traffic Load on the Road

S. No.	Type of Vehicles	No. of Vehicles/day	Equivalent PCU	PCU/day SH- 51
		SH- 51		
1.	2-wheeler	4603	0.75	3452.25
2.	3-wheeler	712	1.2	854.4
3.	Car	1982	1.0	1982
4.	Agriculture tractor	247	4.0	988
5.	LCV	403	1.4	564.2
6.	Truck	995	3.7	3681.5
Total PCU/day				11,522



Table 3.38 Existing Traffic Scenario and LOS

Type of Road	Existing Volume (PCU/day)	Capacity in (PCU/day)	V/C Ratio	LOS
SH-51	11,522	36000	0.32	A

Proposed vehicular movement during operation phase/day	No. of Vehicles/day	Volume PCU/day
No. of Two-wheeler Parking	10	7.5
Four Wheelers/Car	10	10
Truck/Bus	33	122.1
Total	53	139.6

Table 3.39 LOS Standards

LOS	V/C	Performance
A	0.60 or less	Excellent, free flow
B	0.70 or less	High, stable flow
C	0.80 or less	Good, Stable flow
D	0.90 or less	Adequate approaching unstable flow
E	1.0 or near about	Inadequate, unstable flow
F	Exceeding 1.0	Unacceptable, forced flow

100% traffic load has been calculated on Korthalaiyar Bridge - Palavakkam - Puthur Road. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period February 2024. Increase in PCU/day due to proposed project is given below in **Table 3.40**.

Table 3.40 Existing and Increase in PCU/day

Road	Existing	Proposed Volume (V)	Capacity (C)	Modified V/C Ratio	LOS
SH-51	11,522	$11,522 + 139.6 = 11,661.6$	36000	0.32	A

3.16.1.5 Interpretation

The density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period **February 2024**. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed expansion of PCBL plant, the traffic density will have negligible increase and there will be no change in V/C ratio.

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4.0 Anticipated Impacts and Mitigation Measures

4.1 General

The purpose of this chapter is to predict the potential environmental impacts that could result from construction and operation of the proposed expansion of PCBL (TN) Limited. Both beneficial (positive) and potentially adverse (negative) impacts are considered in this analysis. The impacts due to off normal operations and environmental disaster scenarios are considered and detailed in Chapter 07. In this chapter, various impacts during the regular operation of the plant and mitigation measures envisaged along with the design have been discussed.

Impact prediction is a way of mapping the environmental consequences along the phases of activities of the proposed expansion of the plant. The impact assessment will broadly cover the following information and components:

- Assessment of physical effects for all phases including location, design, construction, operation and possible accidents
- Prediction of impacts of the various facilities envisaged in PCBL (TN) Limited due to pollutants during construction and operation
- Estimation by type and quantity of expected contaminants and emissions (air, water, noise, solid wastes) resulting from the operation of the proposed plant
- Assessment of any significant irreversible impacts

The anticipated environmental impacts & mitigations of the proposed expansion are discussed below under the following categories as the plant is already designed and in operation. The details regarding siting and design are already dealt in Chapter 2.

- Impacts and mitigation measures during construction
- Impacts and mitigation measures during operation

4.2 Impact and Mitigation Measures During Construction Phase

This is the first phase of activity in the project and involves:

- Site clearing and leveling
- Construction of access roads
- Construction of the plant, fabrication and erection of equipment
- Plantation development and others

As the project site (total area 62.46 acre) is under possession of PCBL (TN) Limited and already approachable through a well laid RCC road. The internal access roads (7m and 4m wide) for the plant site of about 4 km in length is also paved. Site clearing activities like removal of bushes and leveling are also not expected as the site is cleared, levelled and kept ready for 675 TPD. Hence, the impacts on air, water, noise and soil within close proximity of the project site is not expected. The direct and indirect impacts due to construction activities are discussed in this section.

4.2.1 Site clearing and leveling

As the site is almost plain, cutting and filling is not involved which will minimize the dust and traffic hazards due to less material handling and transportation of the same. The drainage network to meet the surface run-off is already carried out which is suffice to meet the expansion activities. The construction impact with respect to erection and fabrication of plant is expected to be temporary in nature, for a short duration and restricted within the plant site. Hence, it can be stated that the impacts if any, will be



insignificant and the remedial measures likely to be taken at the time of construction are discussed in subsequent paragraph.

To minimize the impact, the foundation activity will be carried out with all due care in order to avoid any discharge of soil or silt to nearby surface water bodies. However, it is planned to start the excavation operation after monsoon shower which will help in reducing fugitive dust generation. The plant site will be prepared in such a way so as to avoid surface discharge of soil or silt (run off). As, the site is almost barren and levelled, there will not be any impact on flora, fauna and aquatic system.

4.2.2 Impact on physiography and drainage

As described in Chapter - 3, under geology and hydrogeology, the plant area falls under semipermeable zone. The project site is mainly governed by simple dendritic drainage system. The surface run-off water from the project site is naturally diverted into surface water drainage system which is constructed already on either side of the road and all along the boundary wall and finally diverted to rainwater harvesting pond. The plant is located on an elevated area with height ranging from 43 in West to 49 in East AMSL and away from any potential flooding water bodies. Hence, flooding of the area is not anticipated.

The drainage density of project site is 1.15 km/sq.km and the top soil layer is unsaturated with low infiltration capacity of lateritic soil. The existing ground slope with respect to project site is towards west which facilitates the run-off into surface water drainage system and finally leads to rainwater harvesting pond and the overflow of rainwater harvesting pond will be connected to canal. The storm water drainage system along with existing Rainwater Harvesting system is shown in **Figure 4.1**.

The outlet locations of the storm water channel were maintained inline with ground slopes. It is expected that the increase in built-up area leads to higher run-off. To mitigate that the storm water drains are planned in such a way to collect the surface run-off and diverted to rainwater harvesting pond. Rain water harvesting is also provided to contain the flow which is dealt in subsequent sections.

Estimation of change in peak flood discharges in pre and post construction scenarios for project site

To estimate the run-off in pre and post construction scenarios for the site a value of 0.4 and 0.9 run-off coefficients are considered respectively. The annual average rainfall of Chennai district for the past thirty years (IMD data) is computed to be 1391.5 mm. **Table 4.1** shows the estimated run-off volume for pre and post construction scenarios for project site. The annual average run-off volume increases from 1,40,690.11m³ to 3,05,365.79 m³, showing an increase of 1,64,675.68 m³ of run-off about 53.9% in post construction scenario of PCBL (TN) Limited plant expansion. The present capacity of RHP is about 4200m³ which can withstand of 24 mm rainfall of a day.



NORTH

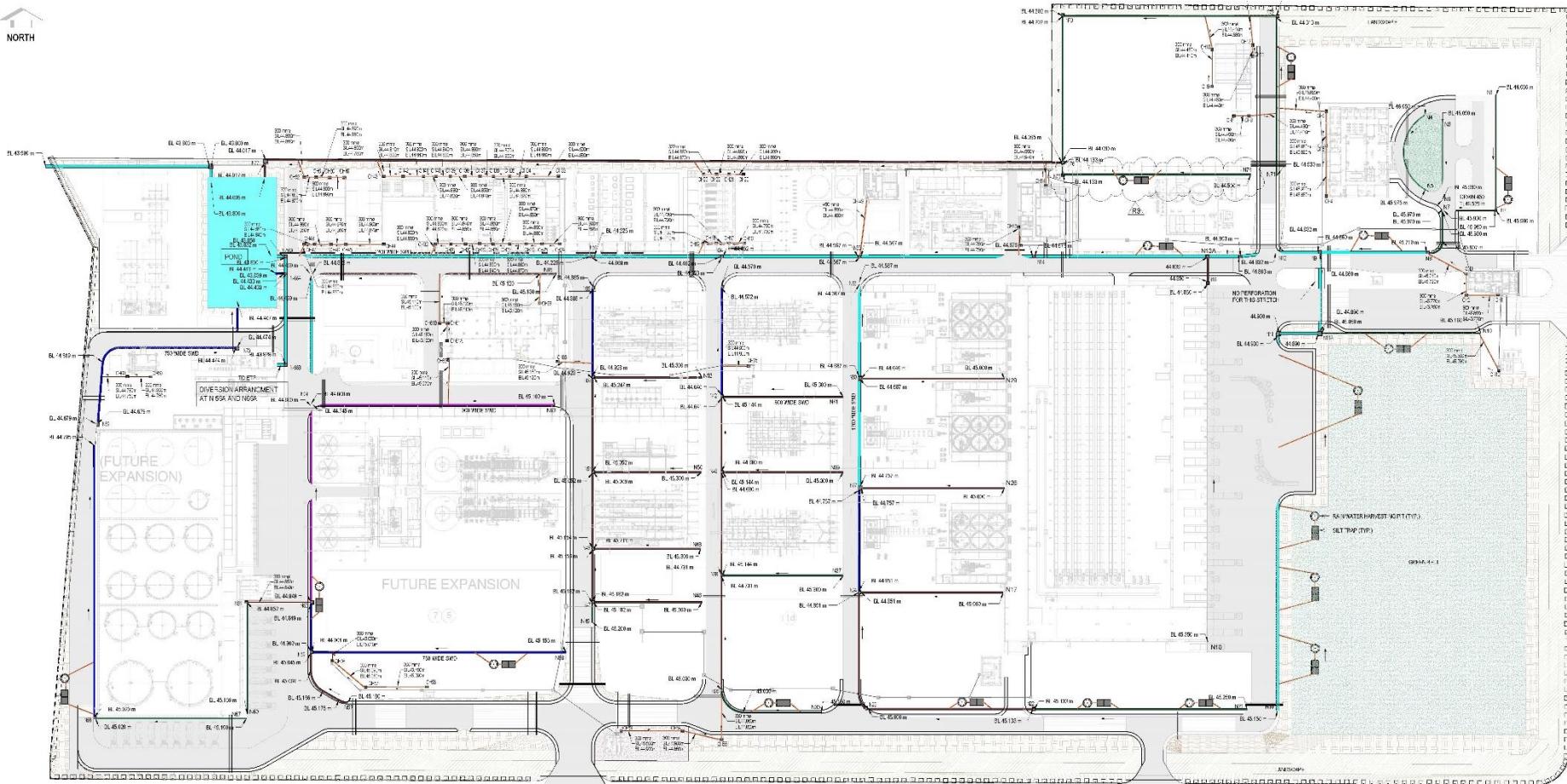


Figure 4.1 Storm water drain layout



Table 4.1 Estimated run-off volume for pre and post construction scenarios for project site

Sl. No	Description	Run-off coefficient considered	Total area in m²	Run-off volume (m³/yr)
I	Pre-construction			
1	Total area	0.4	2,52,767	1,40,690.11
2	Total run-off			1,40,690.11
II	Post construction			
3	Proposed PCBL (TN) Limited footprints	0.9	1,95,308	2,44,593.97
4	Green belt	0.4	83,589	46,525.64
5	Vacant Land	0.4	25,595	14,246.18
6	Total run-off-post construction(3+4+5)			3,05,365.79
	Increase in run-off (6-2)			1,64,675.68

From the above table, it can be concluded that there is an increase in surface run –off due to construction of PCBL (TN) Limited. The increase runoff will be directed to rainwater storage pond. The excess runoff (i.e., pre-construction stage quantity) will be drained into canal which is having sufficient carrying capacity. The harvested water will be used for plant purposes.

4.2.3 Erosion and sediment control

Impacts

The present project does not involve land disturbance as the land is almost plain. Hence, soil erosion is not expected. However, a minor amount of erosion may occur due to foundation activities, Soil removed by erosion may become airborne and create dust problem or be carried by water into natural waterways and pollute them.

Mitigation measures

The following mitigation measures will be adopted to minimise erosion:

- Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage
- Keep vehicles to well-defined haul roads
- Rehabilitate cleared areas promptly

4.2.4 Dust control

To ensure that there is no health risk or damage to amenity due to dust emission, many measures taken to reduce dust problems are the same as those taken to minimize erosion and sediment run-off. Additional measures are:

- Implementing a dust prevention strategy, developed at the project planning stage
- Implementing dust suppression measures, such as wetting of exposed areas when visible dust is observed
- Erection of wind curtains around the plant erection site



4.2.5 Contaminated storm-water

Impacts

Soil/construction material eroded during construction can wash away and contaminate the storm-water emanating from the construction site. If contaminated storm-water enters a drainage line or storm-water drainage system, it will eventually discharge/seep into an adjacent waterway/groundwater aquifers and pollute the same.

Mitigation measures

The construction planning will be done in such a manner that major excavation will be done during non-monsoon season and all loose material is lifted to earmarked site so that there are no chances of soil flowing through with run-off and clogging the storm system.

- During construction phase, strict administrative measures will be enforced to store all materials such as aggregate, sand, bricks in earmarked zones. Material like cement will be stored under covered sheds/silos
- Minimize the generation of contaminated storm-water
- Minimize the quantity of uncontaminated storm-water entering cleared areas
- Establish cut-off or intercept drains to redirect storm-water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations
- Reduce water velocities by providing mild slopes in the drains

4.2.6 Influx of labors

The construction of any development activities is undertaken by segregating the total project into various independent packages. In the tender specification for various packages, the requirements related to environmental aspects and applicable mitigation measures to be adopted in the package are specified. The inspection/monitoring of the same are built-in within the quality assurance procedures/plans of the package.

The supply of manpower for different packages, is contractor's/sub-contractor's responsibility including providing residential facilities for those personnel's being brought from outside. The contractor's laborer's will be accommodated by the contractor in the surrounding villages. As the plant is in operation, labor camps are not permitted inside the plant.

Impacts and mitigation measures

It has been envisaged that during construction phase maximum of 500 persons may be temporarily deployed.

For prediction of impact of manpower influx, the peak construction phase has been considered. Out of the total 500 construction man-power, 10% will be engineers, supervisors, skilled & semiskilled manpower and 90% will be labors. Thus, making the break-up of manpower during peak construction stage as given in **Table 4.2**.

Table 4.2 Break-up of manpower during peak construction stage

Sl. No.	Type of construction manpower	Number
1	Engineers, Supervisors, Skilled & Semi-skilled	50
2	Labors	450
	Total	500



4.2.7 Air Quality

Impacts

The construction and other associated activities will lead to emission of different pollutants, viz. particulate matter and gaseous pollutants (SO_2 and NO_x) from machineries and vehicles. Particulate matter is not expected as the plant is already paved.

In order to estimate emissions associated with the construction activities, following are considered.

- The peak daily number of material delivery trips associated with construction of each component.
- The total number of material delivery trips associated with construction of each project component.

Table 4.3 Types, number of equipment and vehicles expected during construction

Sl. No.	Type of vehicle	Numbers plying per day	Type of impact plying
1	Trucks	15	In the region
2	Cars/Jeeps	5	In the region
3	Oversized consignment	1	In the region
4	Air compressors	500 Cubic Foot per Minute (CFM)	Construction site only
5	Drifter	1	Construction site only
6	Front end loader JCB	1	Construction site only
7	Tractor mounted water tanker & sprinkler for dust control	5000 liters capacity 1 numbers	Construction site only
8	Remix/transit cars 6 cum capacity3 cum capacity	1	Construction site only

The emission factors applied in the analysis were taken from the US EPA's *Compilation of Air Pollutant Emission Factors* (AP- 42). Estimated emissions from various vehicles used during construction are given in **Table 4.4**.

Table 4.4 Estimated emission from various vehicles used during construction

Sl. No.	Activity	Emission factor	Emission rate (g/s)
1	HMV vehicular traffic	3.3	g/VKT
2	LMV vehicular traffic	1.1	g/VKT
3	Fine screening	0.001	Kg/T

Based on above peak daily emissions anticipated are estimated and considering the emission and period of construction further analysis is not required as the emissions are insignificant.

Mitigation measures

The following mitigation measures are suggested:

- Proper and prior planning, sequencing and scheduling of all major construction activities will be done, and timely availability of infrastructure supports needed for



- construction will be ensured to shorten the construction period in turn to reduce pollution
- Construction materials will be stored in covered go-down or enclosed spaces to prevent the windblown fugitive emissions
 - Wet suppression and wind speed reduction barriers will be used to control open dust sources at construction sites
 - Stringent construction material handling/overhauling procedures will be followed.
 - Truck carrying soil, sand, stone dust, and stone will be duly covered to avoid spilling and fugitive emissions
 - Adequate dust suppression measures such as regular water sprinkling at vulnerable areas of construction sites will be undertaken to control fugitive dust during material handling and hauling activities in dry seasons
 - The construction material delivering vehicles will be covered in order to reduce spills
 - It will be ensured that all construction equipment and vehicles are in good working condition, properly tuned and regularly maintained to keep emission within the permissible limits
 - Monitoring of air quality at regular intervals will be conducted during construction phase in line with the requirements of SPCB

4.2.8 Surface water

Impacts

The impacts on surface water quality during construction phase mainly arise due to site clearing, leveling, excavation, storage of construction material etc. A leveling and excavation activity normally increases the level of suspended solids in the surface water run-off.

Mitigation measures

The mitigation measures are:

- Quality of construction wastewater generated from the construction site will be controlled through the drainage system with sediment traps (silting basin as water intercepting ditch) for arresting the silt/sediment load before its disposal
- All the washable construction material will be stored under sheds or enclosed space by fencing it with brick or earth in order to prevent spillage into the drainage network, so that the same does not find its way into the surface water run-off
- The sediment traps and storm water drainage network will be periodically cleaned and especially before monsoon season
- Majority of the water generated will be utilized for dust suppression and plantation within the plant premises
- The vehicle maintenance/washing area will be maintained with proper drainage system having oil trap mechanism to avoid contamination of surface and ground water by oil/lubricants
- Silt settlement tanks will be provided with suitable retention time

4.2.9 Ground water

Impacts

The ground water will not be used for construction work. The construction water source will be drawn from SIPCOT. The existing 3737 KLD agreement with SIPCOT would



suffice. Therefore, it is most unlikely that construction phase will bring any significant modification in the ground water regime of the area. Therefore, the construction phase of the proposed plant will have insignificant impact on the ground water.

Mitigation measures

As the construction mainly structural related work major impact on ground water regime is not anticipated.

4.2.10 Noise levels

Impact and Mitigation Measures

Major sources of noise during the construction phase are fixed machinery within the site, general construction activities and from movements of vehicles servicing the site. Noise on construction site results from machinery used for excavation, levelling and from fixed machineries such as compressors, concrete mixers and dumpers. The damage caused by noise is a function of type as well as loudness.

During construction, noise is generated from different sources. With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths. Based on the above principle a noise model has been developed in house, which has been used to predict the noise. It is predicted that the noise levels in the surrounding environment due to above said noise sources at a distance of 100m will be 92 dB(A) and at 500m will be 78 dB(A). It is also predicted that the noise levels from these sources at 1500m distance will be 66 dB(A). Therefore, background noise levels in the nearest village which is located at a distance of about 2.17 km will not be receiving the impact. The above prediction is for worst scenario case like during construction if all the construction equipment is working together which is not likely to occur. Further, the above prediction is without any attenuation factors like green belt, wind curtains etc. With mitigation measures it will be limited to ambient level.

4.3 Impacts and Mitigation Measures During Operation

The operational activities of the project are likely to have some stress on the environment as mentioned below

- Conventional pollutants generation from the process and dispersion
- Domestic effluent generation
- Raw material and finished material transport

The environmental parameters likely to be affected are quality of air, water, and soil/land due to release of pollutants from process.

4.3.1 Impact of conventional pollutant

4.3.1.1 Air environment

In the upcoming units of PCBL (TN) Limited, air pollutants will be generated at different stages of production. The expected air pollutants are particulate matter, Sulphur dioxide, oxides of nitrogen etc. The pollutants are expected to be released from point sources like stacks, ducts or fugitive emissions.

In Chapter 3, the existing air quality status has been reviewed. It was observed that the maximum of all C98 pollutant concentrations in the study area of PM₁₀, PM_{2.5}, SO₂ and NO_x are 63.54, 31.54, 9.30 and 21.51 µg/m³ respectively. These concentrations are due



to the emissions emitted into the atmosphere from the existing industrial activities in the area, road transport as well as due to urban activity in the study area.

Point source emissions from the proposed expansion

Carbon Black is manufactured from highly aromatic hydrocarbon oils, which are thermally cracked at high temperature in specially designed reactor. The heat for this endothermic thermal cracking is supplied by either burning of partial Carbon Black feedstock oil or auxiliary fuel oil with process air inside the reactor itself or both. Carbon Black particles formed are recovered by Bag filters and converted into pellets for ease of storage, handling and transportation. Hence, there is no PM emission as the raw material in liquid form. The product cleaned gas is having high calorific value and thereby the tail gas is used for generating power to the tune of 36 MW. Hence, from the plant only SO_x, NO_x emission is expected.

For estimation of emission concentrations from upcoming units following methodology has been followed:

- PM₁₀ emissions have been considered based on 30 mg/Nm³ outlet emission concentration after APCs.
- For estimation of PM_{2.5} concentrations from proposed expansion, it is assumed that percentage of PM_{2.5} present in cleaned flue gas after Bag filters contains 61.6% of the total PM.
- SO₂ emissions have been estimated based on 600 mg/Nm³.
- NO_x emissions have been estimated based on 600 mg/Nm³.

Based on the above, the emissions have been anticipated due to the proposed project as given in **Table 4.5**.

Table 4.5 Predicted emissions from the proposed units

Sl.No.	Source	Capacity	Fuel used	Stack Details					Emission (g/s)		
				No of Stack	Height (m) AGL	Dia. (m)	Exit Temp (°C)	Ext Velocity (m/s)	PM	SO ₂	NO _x
1	DG	1250 KVA	HSD	1	30	0.3	529	10	0.016	0.015	0.226
		1250 KVA		1	30	0.3	529	10	0.015	0.014	0.209
2	Boiler	1x 54 TPH	Waste gas based	1	90	2.5	205	15.58	4.37	42.66	2.67
		1 x 54 TPH		1	90	2.5	205	15.58	4.37	42.66	2.67
		1 x 54 TPH		1	90	2.5	205	15.58	4.37	42.66	2.67
		1 x 54 TPH		1	90	2.5	205	15.58	4.37	42.66	2.67
3	Process Stack (Vapor Bag Collector)	12506 Nm ³ /hr.	Water Vapor & Flue gas	1	60	0.7	205	10.74	0.434	0.583	0.024
		12506 Nm ³ /hr.		1	60	0.7	205	10.74	0.434	0.583	0.024
		12506 Nm ³ /hr.		1	60	0.7	205	10.74	0.434	0.583	0.024
		12506 Nm ³ /hr.		1	60	0.7	205	10.74	0.434	0.583	0.024
4	Dryer	36,442 Nm ³ /hr.	Flue gas	1	60	1.2	300	12.76	0.843	5.245	0.517
		36,442 Nm ³ /hr.		1	60	1.2	300	12.76	0.843	5.245	0.517
		36,442 Nm ³ /hr.		1	60	1.2	300	12.76	0.843	5.245	0.517



Sl.No.	Source	Capacity	Fuel used	Stack Details					Emission (g/s)		
				No of Stack	Height (m) AGL	Dia. (m)	Exit Temp (°C)	Ext Velocity (m/s)	PM	SO ₂	NO _x
5	Process Bag Collectors	36,442 Nm ³ /hr.		1	60	1.2	300	12.76	0.843	5.245	0.517
		60012 Nm ³ /hr.		1	50	1.5	300	13.45	1.389	9.117	0.851
		60012 Nm ³ /hr.		1	50	1.5	300	13.45	1.389	9.117	0.851
6	Process Stack (Dedusting & Rerun bag Collector)	16200 Nm ³ /hr.	Air	8	20	0.5	90	11.29	0.306	-	-

The above emissions are expected to be released from the proposed various stack ranging from 20 to 90m. Once the pollutants are emitted into the atmosphere, the dilution and dispersion of the pollutants are controlled by various meteorological parameters like wind speed and direction, ambient temperature, mixing height, etc.

Line source emissions

It is planned to procure and transport the raw material and product through road. The PCBL (TN) Limited plant will be operating with the production capacity of 675 TPD.

Based on the above, the no. of trucks for transporting raw material of 34,204 MT/month is estimated to be 696 trucks/month. The estimates emissions due to transportation of raw material via. roads are given in **Table 4.6**.

Table 4.6 Estimated emission rates due to road transportation

S No.	Type of Vehicle	No. of Vehicle (Based on maximum operation capacity)	PM	SO ₂	NO _x
1	Bike	60	2.8E-06	2.8E-07	1.1E-02
2	Car/Bus	35	3.5E-04	1.4E-07	3.5E-03
3	Raw Material (HSD/LDO)	2	1.1E-05	5.6E-09	1.9E-03
4	Raw Material Truck (Carbon Black Feed Stock / Dehydrate d Coal Tar / Raw Coal Tar/ Carbon Black Oil/Anthracene)	68	2.5E-04	1.3E-07	4.4E-02
5	Product Truck (Carbon Black)	55	2.5E-04	1.3E-07	4.4E-02

Prediction of impacts using AERMOD

In order to study the ground level concentrations in future scenario and to predict the impact on the ambient air quality due to the pollution load from the proposed expansion, air quality impact prediction modelling has been conducted considering site specific meteorological data to estimate the incremental Ground level concentrations. The US Environmental Protection Agency's (EPA's) AERMOD computer code is used to estimate atmospheric dispersion and concentrations of the released emissions in the immediate vicinity of the sources. The modelling is conducted to be inclusive of the weather



conditions that are possible and representative of the sources and transportation of raw materials.

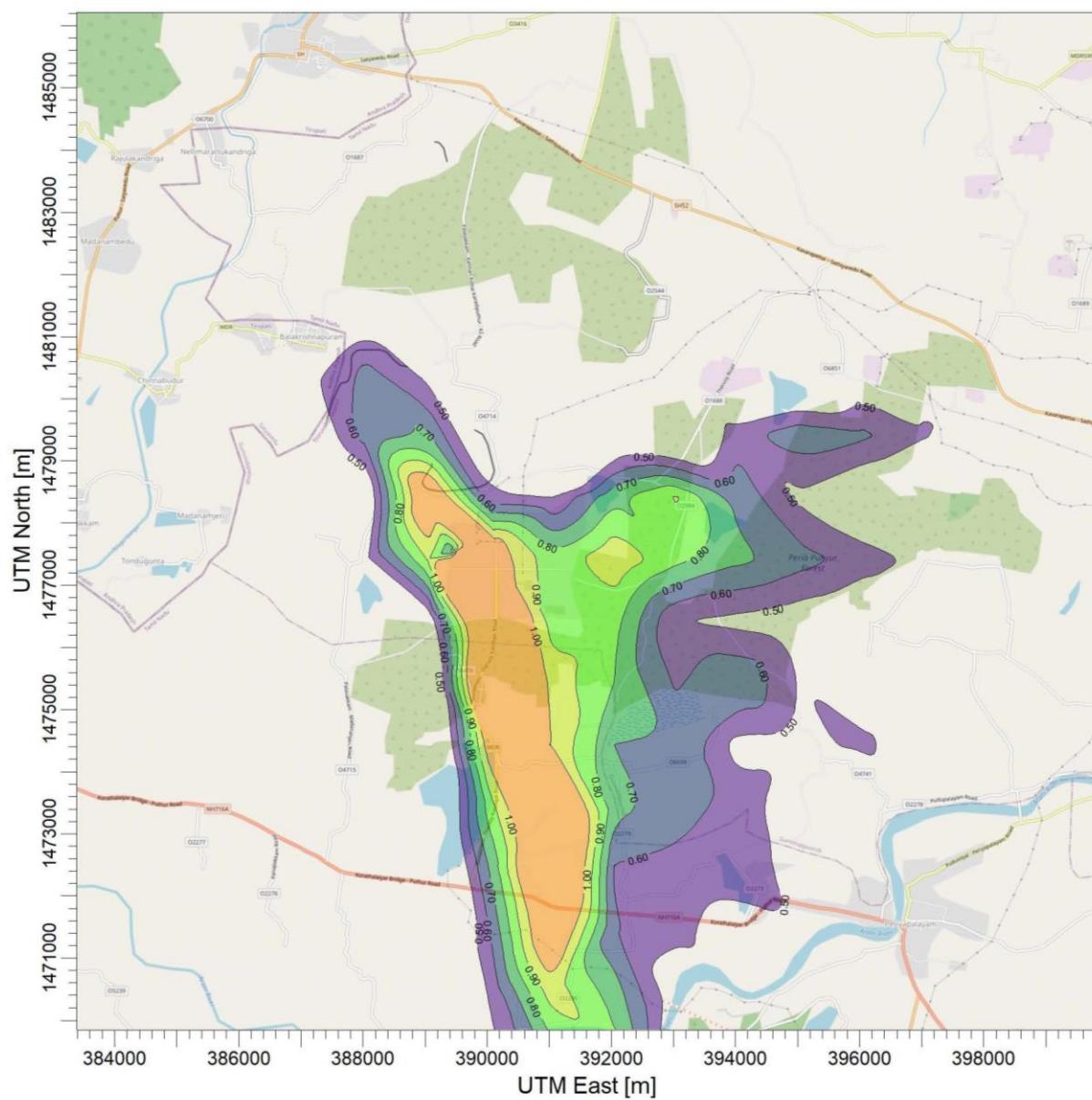
Both airborne and surface concentrations are modelled with AERMOD considering complex terrain. Hourly derived air concentrations (DAC) are modelled for an array of receptors covering the sources and surrounding areas. Peak values of time-integrated air concentrations at these major receptors points are derived from these hourly values, with modelled results reported as total incremental air concentrations in DAC-hours occurring over the selected time period. Total pollutants concentrations over the areas are evaluated with AERMOD using the same array of receptors, with results reported as microgram per m³.

The GLCs has been predicted over a 10 km X 10 km area with the location of the main PCBL (TN) Limited Stack as the center. Meteorological data plays an important role in computation of Ground Level Concentration using AERMOD model. The actual monitored site meteorological data for one full season of summer has been considered. The meteorological data was generated near the plant site for three month's period on hourly basis.

The maximum GLCs for each grid point were predicted with respect to pollutants PM₁₀, PM_{2.5}, SO₂ and NO_x. In order to obtain the impact due to proposed project, Background concentration recorded in the study area are considered and the contribution due to proposed project is added to it. The predicted cumulative GLC values have been predicted and given in **Table 4.7** and the isopleths showing the incremental concentration due to the proposed expansion is shown in **Figure 4.2 to 4.4**.

Table 4.7 Resultant Concentrations due to Incremental GLC's at Project Site

Pollutant	Maximum AAQ Concentrations Recorded During the Study Period in Project site ($\mu\text{g}/ \text{m}^3$)	Incremental Concentration ($\mu\text{g}/\text{m}^3$) – Worst Case	Resultant Concentration ($\mu\text{g}/\text{m}^3$)	Standards (mg/Nm ³)
PM	76.5	1.78	78.28.	150
NOx	15.5	0.421	15.921	600
SOx	7.7	3.94	11.64	600



PLOT FILE OF PERIOD VALUES AVERAGED ACROSS 0 YEARS FOR SOURCE GROUP: ALL

$\mu\text{g}/\text{m}^3$

Max: 1.78 [$\mu\text{g}/\text{m}^3$] at (389885.93, 1477575.07)



Figure 4.2 Predicted GLC of PM

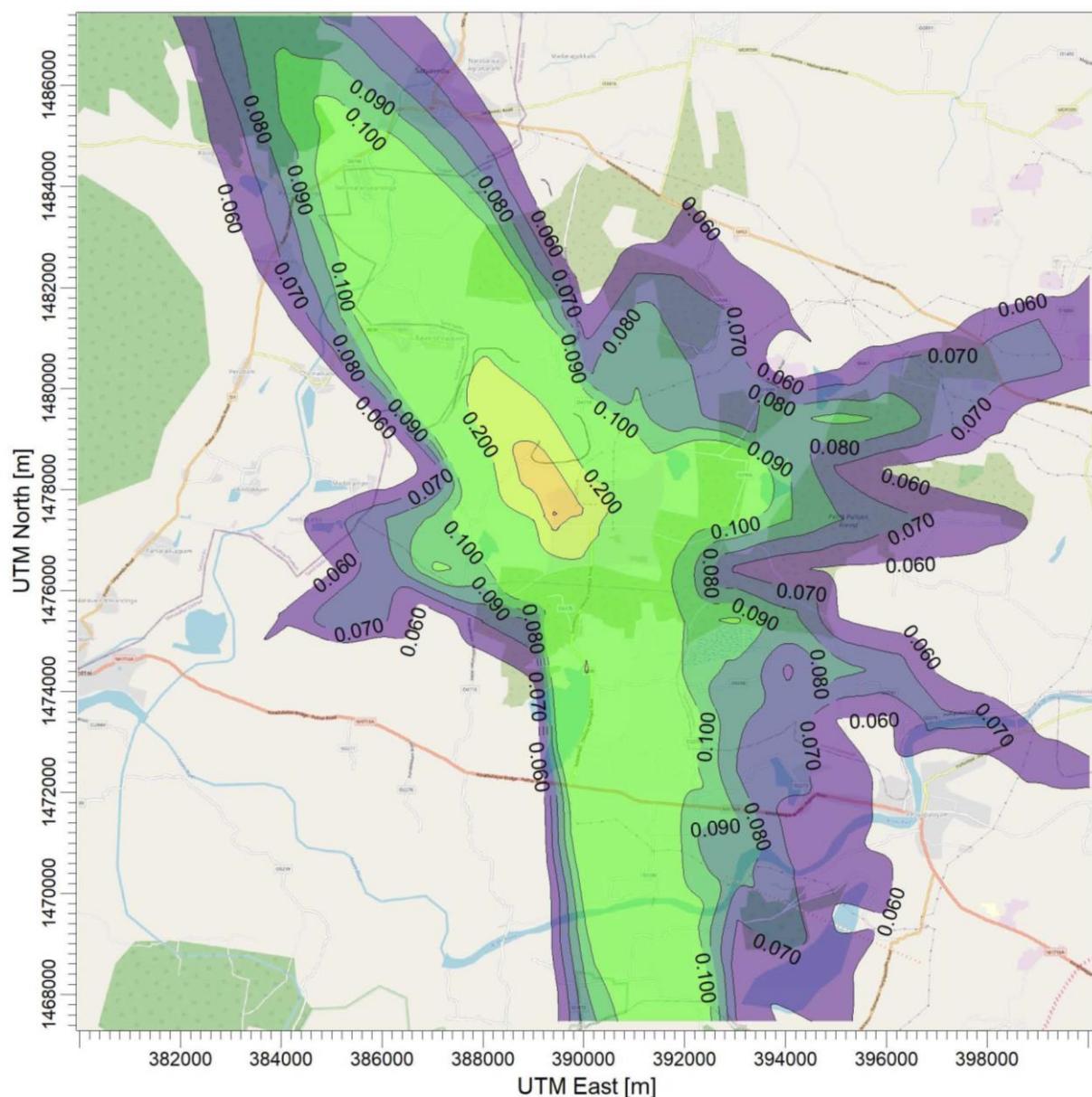


Figure 4.3 Predicted GLC of NO_x

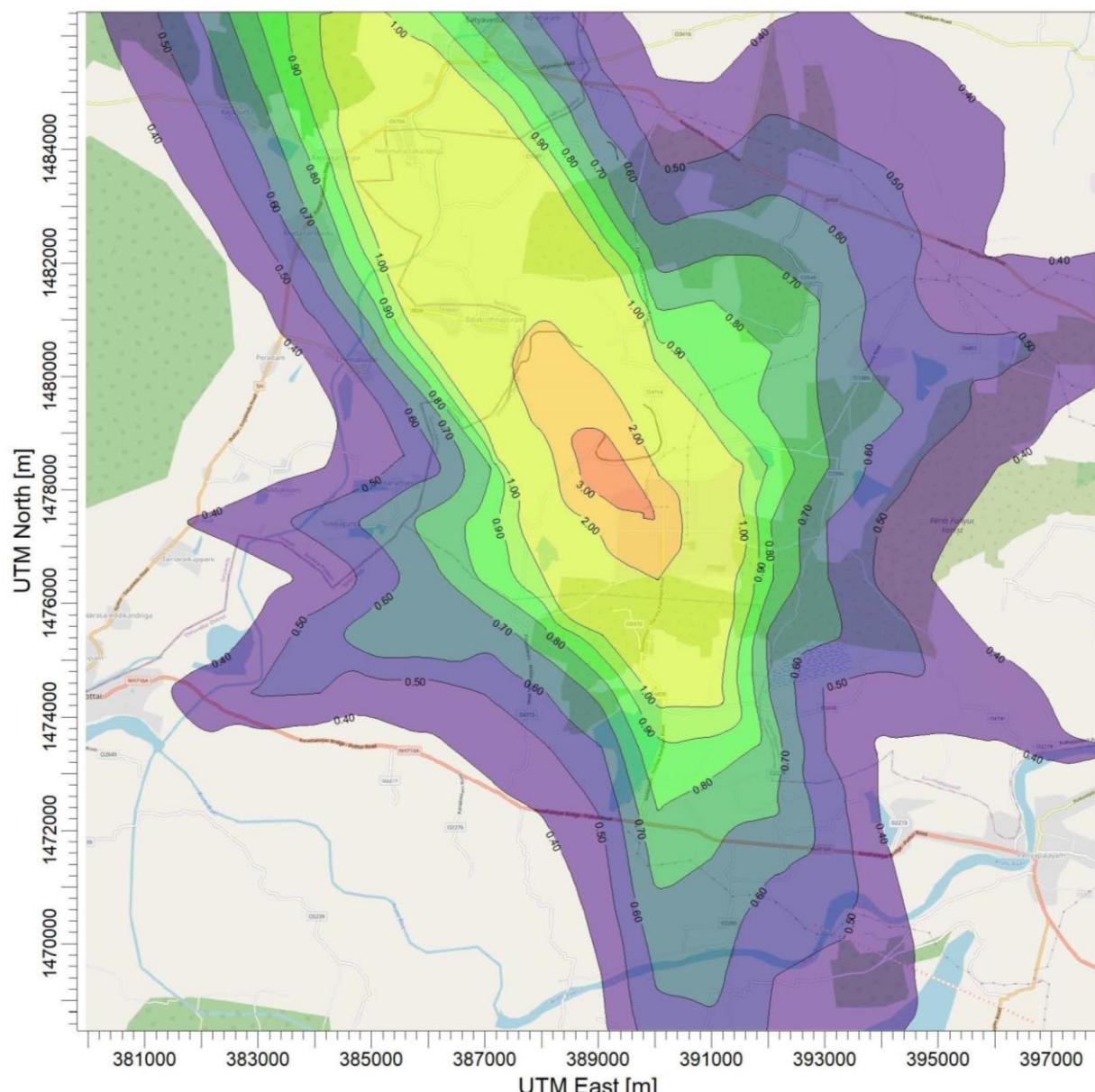


Figure 4.4 Predicted GLC of SO_x

Mitigation Measures

- Closed loop system is adopted for transfer of liquid/solid raw material from storage to processing areas.
- Pneumatic conveying system with bag filters is provided in production area of carbon black plant and packing area.
- Off gas generated is handled in closed loop system and insulated & used as fuel for boilers.



- Adequate stack heights of 60 and 90m is provided for boilers and dryers of carbon black plant.
- Secondary dedusting measures are provided in packing area.
- Attenuation of pollution/protection of receptor through greenbelt/green cover.
- Online monitoring of air pollutant concentrations is implemented which will be extended for expansion.
- All trucks shall be PUC Certified as required by law.
- DG Sets is operated during power failure only.

4.3.1.1.1 Air Pollution Control Devices

Incinerators for Off Gas Generated in the Process

The off gases generated out of burning of fuel like LDO/HSD and Carbon Black Feed Stock (CBFS) are incinerated in combustors of boiler. 100% off gases generated in the process are burnt in these combustors and off-gas is not allowed to escape into the atmosphere and hence there is no air pollution from the gases generated in the process.

Low Btu off gases generated in the manufacturing process of Carbon Black in the reactor section and separated from accompanying Carbon Black particles in Bag Filter section are collected in the off-gas header. Inspite of their low calorific value, these gases are utilized to recover their calorific value in a specially designed boiler system to generate high pressure steam and in a specially designed dryer combustor furnace to supply the heat energy requirements in the pelletizing and drying section. PCBL (TN) Limited has installed specially designed stacks of 90mtr and 60mtr height for Boiler and Dryer respectively for proper dissipation of flue gases emitted from above mentioned incinerators (combustors).

Flare Stack

PCBL(TN) Limited has installed Flare Stack of adequate height to meet any eventuality in the above mentioned incinerators i.e. boiler and dryer so that the gases generated in the process are flared and then vented to the atmosphere to control pollution.

Start Up Vent Stack

PCBL (TN) Limited has installed start up vent stack of adequate height to vent inert gases generated during start up and shut down for proper dissipation of pollutants.

Reactor Vent Scrubbers

To minimize pollution during an emergency plant shut down, company had installed state-of-the-art technology Venturi Scrubbers for individual reactors. Though all the inputs to the reactors get stopped during any emergency shut down, the residuals left in the reactors are vented through these venture scrubbers after scrubbing all the carbon black particles.

Process Bag Collectors

This is a process cum pollution control equipment which is used for separation of carbon black from the off gases. Clean off gas is collected in the off-gas header and is utilized by complete combustion in dryer combustion furnace and boiler furnace to achieve substantial energy conservation as mentioned above. The filter bags are designed for 100% separation efficiency. As mentioned above start vent stack is installed for releasing of inert gases from process bag collectors in to the atmosphere during startup and shutdown of plant.



Vapor Bag Collectors

This is also a process cum pollution control equipment and is used for separation of carbon black from the purge gases (containing water vapor and carbon black particles) generated in the rotary dryer. Filtered and clean gases are released into atmosphere through the stack. Flue gases from this filter at a temperature of approx. 200 deg. C mainly contain water vapor, nitrogen, oxygen & insignificant quantity of CO and SOx. These gases are not harmful and do not cause any air pollution. This filter also contains special fibre glass filter bags to have SPM in the stack well within the norms laid down by the Pollution Control Board.

Fugitive emission control

- Fugitive emission at various locations of the work zone environment is monitored on regular basis. Moreover, following measures will be taken to minimize the fugitive emissions.
- All process will be done in a closed system.
- Raw materials will be pumped from storage tank to process in a closed system.

Fugitive emissions are emissions of gases or vapors from pressurized equipment due to leak or other unintended or irregular releases. Fugitive emission may be contributed from the following sources:

- Leakage from pumps
- Equipment failure
- Spillages from pipelines
- Leakages from reactors
- Vapors venting from process/tanks
- Evaporation losses

Control Measures

Control Measures adopted are:

- Process is in closed system
- Transfer of the material for the plant is through pipeline
- Leak detectors is installed near by the source of leakage
- Regular cleaning of roads and floor washing of workshops.
- Proper monitoring system is established.
- Bitumen roads are laid inside the plant premises to avoid fugitive emissions from movement of vehicles.

There will be a chance of fugitive emission during packing of products which is also in covered glass confined rooms. However, secondary dedusting system with proper bag filters is also provided.

Leak detection and Repair Programme (LDAR)

Leak detection and repair (LDAR) is system of procedure a facility utilizes to locate repair leaking components including valves, pumps, tanks and reactors in order to minimize the emission of fugitive volatile organic components and hazardous air pollutants.

LDAR related sections is considered, checked and maintained regularly to control emissions from leakages. At PCBL (TN) Limited is prepared SOP and implemented.



Identifying the sections: All possible sections of emissions from leakage is recognized & marked.

Monitoring the components: As per the SoP and frequency sections will be monitored to avoid the leakage chances by using the standard detecting systems.

Repairing the components: Repairing the equipment after finding fault will be addressed immediately. After a leak is detected, the component will be altered or replaced to correct the leakage. The component will be considered repaired only after it has been monitored and shows leakage above the thresh-hold limits.

Documented: All the above-mentioned records shall be maintained for further references. PCBL(TN) Limited practicing best technology to control fugitive emission like:

- Closed process flow systems of material transfer
- Detecting systems are in place for any leakages

Air quality will be regularly monitored and data on fugitive emissions will be regularly recorded and proper actions will be taken.

4.3.2 Noise Environment

The proposed expansion related activities will lead to generation of noise that may have minor impact on the surrounding communities in terms of minor increase in noise levels. The potential impacts on noise level may arise out of the following:

Noise from Vehicle /Traffic

Vehicle movement for transportation of materials and work force to the site will cause minor noise emission as the frequency of vehicular movement is few times in a week.

Noise from DG Set, Boiler, Cooling tower, etc.

Noise generated from DG set, boiler, cooling tower, etc. will have a permanent effect to the workers working in the nearby vicinity, if they will work for more hours in a day.

Impacts

The machinery envisaged for the plant operation is a source of noise. Generally, this noise is generated due to continuous operation of machineries like blowers, fans, compressors, cooling tower fans, reactors, vehicular movement etc.

The noise levels likely to be generated by these sources are presented in **Table 4.8**. It is all likely that equipment manufacturers are to adhere the noise norms in design stage which may further reduce the noise levels. Most of the machines will be working continuously round the clock during operation of the proposed facilities. However, these machines would be housed in acoustic enclosures/buildings in such a way that they would not be contributing any additional noise levels in the surrounding environment.

Table 4.8 Main sources of noise from different equipment & their noise levels

Sl. No.	Location of source	Distance from noise source (m)	Noise level in dB (A)
1	Compressor room	2	98 - 105
2	Cooling tower fan	2	95
3	Blowers	2	95-105
4	Pump	2	95
5	Automobile movement	2	85-95



Sl. No.	Location of source	Distance from noise source (m)	Noise level in dB (A)
6	Reactors, Boilers, Turbine	2	95-100

During operation phase, noise is generated from the above sources. Hence, with increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths.

In view of this, the propagation modeling considered for operation and the predicted noise level at source during operation is 104 dB(A).

The results of the noise modelling reveal that the maximum noise level will be 59.6 dB(A) at 1.5km distance due to the proposed plant. The results are predicted without any attenuation factors. It is expected with attenuation factors as given in mitigation measures will reduce the noise level to the extent possible/within the permissible norms. The noise contours are shown in **Figure 4.5**.

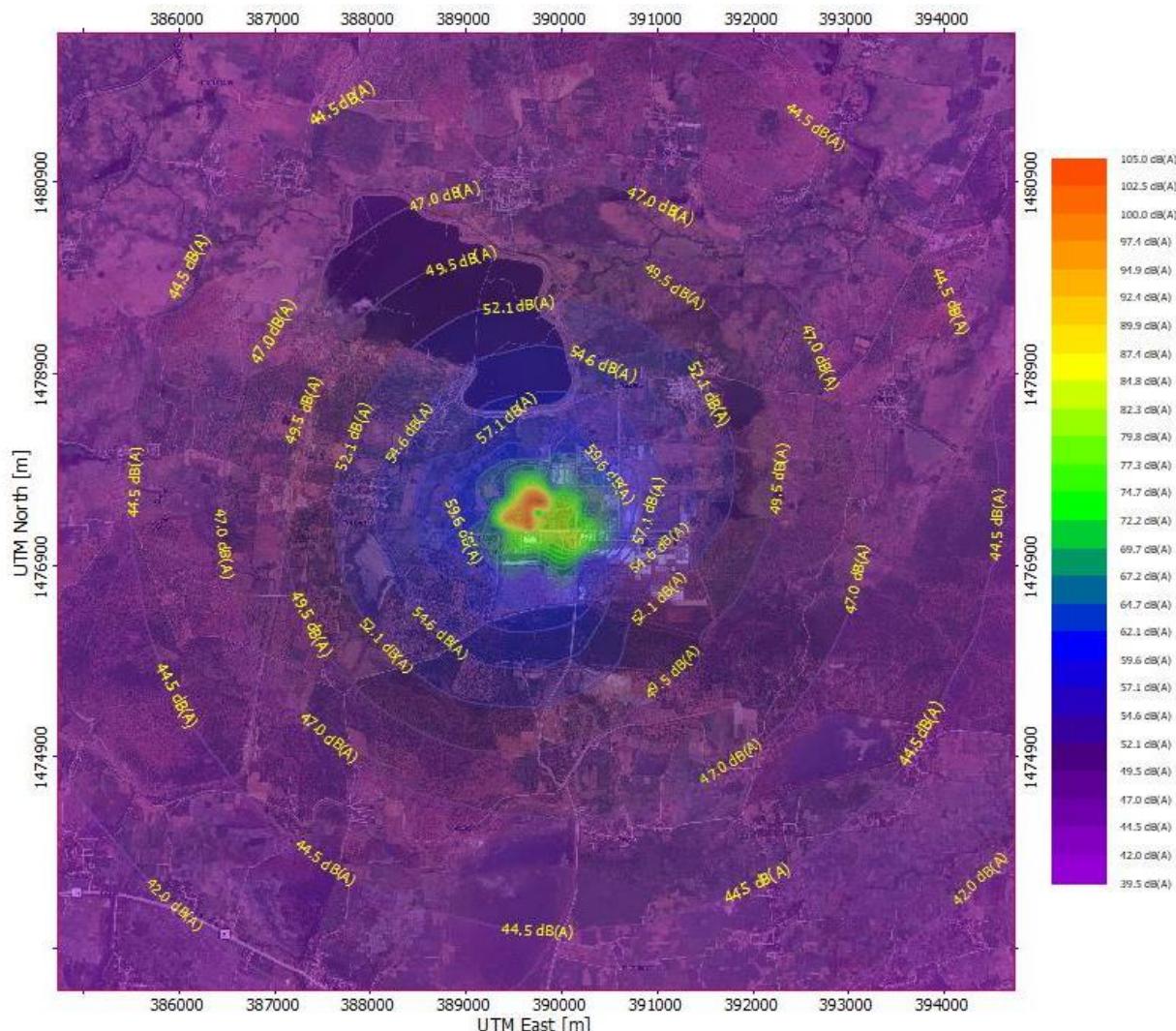


Figure 4.5 Noise contours



Mitigation measures

The following mitigation in order to avoid any permanent noise source to the people working inside the project site.

- Acoustic Enclosures on all major equipment in the plant is provided for noise attenuation.
- Workers are provided with suitable personal protective equipment (PPE) such as earmuffs and earplugs.
- Rotation of workers in the high noise area like turbine area.
- High noise generating areas would be identified and tags marked.
- Green belt will be developed to reduce noise.
- Vehicle trips to be minimized to the extent possible.
- Acoustic mufflers / enclosures to be provided in large engines/machinery.
- Equipment to be maintained in good working order.
- Implement good working practices (equipment selection) to minimize noise and reduce its impacts on human health (earmuffs, safe distances, and enclosures).
- Noise to be monitored in ambient air within the premises.
- All equipment operated within specified design parameters.
- Limits for maximum permissible noise will be incorporated in the technical specifications for the machines (fans, motors & compressors)
- All the machines would be maintained regularly to keep noise pressure levels at designed conditions.
- The silencers and mufflers of the individual machines would be checked regularly.
- Noise proof enclosures will be provided in all the sections which are prone/susceptible to high noise level

4.3.3 Water Environment

The total water requirement after expansion is 3953 KLD. Fresh water requirement is 3737 KLD will be sourced from SIPCOT. On expansion, the industrial wastewater generation is estimated to be about 683 KLD. The entire amount of 683 KLD of wastewater being recirculated into system after treatment with the help of RO.

Impacts

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

- Industrial effluent from process
- Cooling water blow down
- Sewage
- Equipment cleaning and floor washings, etc.
- RO Reject

Disposal of wastewater generated may also affect the surface water quality if they left untreated.

Mitigation Measures

Various mitigation measures are proposed to minimize the impact on the water environment due to the wastewater generation during the operation phase of the project.

The effluent generated from the plant is treated in Membrane Bioreactor (MBR) based ETP capacity of 210 KLD. The flow diagram of 210 KLD of ETP is shown in **Figure 2.9**. The treated water will meet the requirement of TNPCB norms viz. BOD <30 mg/l, TSS



<30 mg/l and pH 5.5-8.5. The MBR plant consists of clarifier, oil and grease removal, closed aeration followed by pressure sand filter and activated carbon filter. The treated water is fed into ultra-filtration and the UF treated water will be passed through Two stage RO. The RO treated water will be used for process. The RO reject will be fed into Multi-Effect Evaporation (MEE) to ensure Zero liquid discharge.

About 48 KLD of sewage will be generated and the same will be treated in MBR based STP of capacity 50 KLD. The flow diagram of 50 KLD of STP is shown in **Figure 2.8**. The treated water from STP will be reused for plantation and green belt to reduce the fresh water consumption. Hence, a major reduction in consumption of fresh water is expected as the RO, ETP and STP is in place. In addition, the efficient rainwater management plan is also adopted for entire plant area according to the topography. Groundwater recharge, storm water management also considered as mitigation measures. The water balance is shown in **Figure 2.7**.

Specific water consumption

The specific water consumption after expansion for PCBL (TN) Limited is 4.67KLD/Tonne against current specific water consumption 5.06KLD/Tonne of product. Effective control measures are implemented such as MBR based STP and ETP.

4.3.4 Land environment

Impacts

Dumping of municipal solid waste & industrial waste on the land will affect the soil quality. Poor garbage management would lead to unsanitary conditions including vermin and fly infestation and odors as well as unsightly aesthetic conditions. A solid waste collection and disposal is already practiced in efficient manner. It is expected that garbage management and good housekeeping will be practiced and that problems arising from the improper storage of solid waste will therefore be avoided. So, the impact on the soil will be insignificant as an organized solid waste collection and disposal practices are followed.

Mitigation Measures

Municipal solid waste management

After expansion, approx. 260 kg per day solid waste will be generated during operation of PCBL (TN) Limited which will be collected, segregated and disposed through local panchayat as per Solid Waste Management Rules, 2016.

Hazardous waste management

Hazardous Wastes are properly handled in containers and stored in hazardous waste storage areas as per rules and also bunding is provided to avoid overflow of spillage waters which can contaminate the surroundings.

Recyclable waste is handed over to authorized recyclers and other hazardous waste will be disposed through approved TSDF facility. The details of hazardous waste are given in **Table 2.7**. All efforts are taken to minimize the hazardous waste generation.

4.3.5 Soil Environment

Impacts

Soil contamination takes place due to movement of vehicles and solid waste generated.



Mitigation measures

Good housekeeping and best practices of waste handling is adopted to eliminate/minimize the risks of soil contamination. Hazardous waste generated due to the proposed expansion is sludge from waste-water treatment plant and wastes like oil and grease from machinery which will be disposed of as per hazardous waste (management and handling) Amendment rule 2000. The wastes generated are stored in temporary storage facility and disposed through TNPCB Authorized vendor for safe disposal.

4.3.6 Biological Environment

Impacts

The impact on terrestrial ecology will be due to emission of gaseous pollutants like PM, NO_x, and SO₂. The gaseous pollutants at a very low dose act as atmospheric fertilizer for the vegetation. However, at higher doses, they are injurious to vegetation.

Mitigation measures

The emissions during the operation phase after expansion will be restricted within the norms. Development of adequate green belt at and around the site will help in reducing the impacts on the flora and fauna as the plant species will act as air and noise pollution sink.

Thus, the impact on the terrestrial ecology of the area would be reduced to some extent during the operational phase of the project.

Conservation plan

During the baseline survey, there is no Schedule-I fauna is identified in the plant area. However, the schedule – I fauna like Oriental Honey Buzzard, Black Kite, Shikra, Indian Peafowl and Indian Flapshell Turtle have been identified in the buffer zone which is about 9.5 km from the proposed site. The conservation plan for the same is prepared and enclosed as **Annexure IV** to this EIA report which will be scrutinized and vetted in consultation with forest department.

4.3.7 Socio economic environment

The proposed expansion will provide additional employment opportunities and improved working conditions for the workers employed at the facility during operation phase. The project will increase the economic activities around the area. The proposed project would enhance the existing infrastructure in the area by providing a cleaner and greener environment through CER activities.

4.3.8 Occupational Health and Risk

Impacts

The plant is handling and storing flammable substances like diesel and CBFS/Anthracene thereby increasing potential risks due to storage of flammables. The exposure of hazardous chemicals and work floor hazards may affect occupational health and safety of the workers. However, PCBL (TN) Limited will adopt necessary control measures through implementation of mitigation measures and provision of proper PPEs to workers operating in aforesaid area to prevent and/or mitigate adverse health related impacts. Hence, any possible occupational health impact from exposure to such fugitive dust is not likely to be of major significance.



General Safety Measures

Considering the various chemicals handled and stored at site; following safety measures are provided at the site.

- Requisite personnel protective equipment is provided. Instruction/Notice to wear the same is displayed. Further, it is insisted to use the same while at work.
- Provision of safety shower with eye washer.
- MSDS of all hazardous chemicals is available at office and with responsible persons.
- Antidotes for all chemicals being used as per MSDS is available at the site.
- Regular training programme for safety awareness.
- Provisions of First Aid Box and trained person in first aid.
- Prohibition on eating, drinking or smoking at work-area.
- Any leakage/spillage of liquid chemical will be immediately attended.
- Work area is monitored to maintain work environment free from any dust/chemicals fumes/vapors and to keep well within below permissible limit.
- Provision of adequate Fire Extinguishers at site and training will be imparted to the workers also.
- Maintaining the Fire-Protection System adequately as per PESO/OSID norms.
- Availability of Self Breathing Apparatus at site.
- Provisions of immediate accident/incident reporting and investigation.
- Instructions on Emergency/Disaster will be displayed.
- Safety Posters and slogans will be exhibited at conspicuous places.
- Arrangement of Periodical Training to workers and supervisors.

Mitigation Measures

- Process is carried out in closed system.
- Medical checkup would be carried out at a regular interval
- During operation, proper care would be taken by PCBL (TN) Limited, appropriate PPEs will be provided to site workers and staff members
- Appropriate personnel protective clothing to be used to prevent skin contact.
- Safety Goggles will be used to prevent eye contact.
- Hand gloves of natural rubber, neoprene, and polyvinyl chloride will be used as and when required
- Acoustic enclosures will be provided to DG sets and other noise generating equipment
- PCBL (TN) Limited will develop and implement a skill management plan to prevent risk of spill which may cause health problem

4.3.9 Impact of Traffic and Transportation

PCBL (TN) Limited is located near to Thervoy kandigai village about 1.53km in the Northeast direction on SH - 51 which is leading to Puthur. Since the plant is located on the isolated path major traffic is not expected. From the study, the density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period February 2024. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed expansion of PCBL (TN) Limited plant, the traffic density will have negligible increase and there will be no change in V/C ratio.

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5.0 Analysis of Alternatives (Technology & Sites)

5.1 General

Analysis of alternatives for project site as well as process technology and their assessment for selection of the most suitable location as well in terms of environmental affability is prime concern of the project. Energy efficient and optimized land utilization with maximum productivity is a good practice in EIA as the project involving large number of human resources, raw material as well as financial investment. The possibilities of analysis of alternative sites and technology is dealt in this section.

5.2 Alternatives in Technology

Manufacturing of carbon black mainly involve various unit operations like heating, cooling and drying. Off gases generated in the manufacturing process of carbon black are utilized in the boiler to generate high pressure steam which utilized for power generation. A carbon black reactor takes in fuel as CBFS is used in the process for thermal cracking of hydrocarbon oils for formation of carbon black. The tread and carcass reactors are used for producing hard and soft black of carbon respectively. The existing 3 production line consists of 2 x 90, 1 x 150, 2 x 90 of reactor TPD and it is proposed to build 1 line to enhance the total capacity of 675 TPD. The existing technology is proved one and it is evident that the plant is running without any eventualities.

5.3 Alternatives in site

The proposed expansion of PCBL (TN) Limited requires additional land area of 2.44 Acres which is adjacent to the existing project site. The project site is located in notified Industrial Estate (SIPCOT) and it is coming under Industrial use zone as per land use classification certificate issued by District Town and Country Planning (DTCP). Hence scrutiny of alternative site is not applicable. However, while selecting the site before siting of the plant all Environmental parameters like settlements and sensitive areas for construction of PCBL(TN) Limited are considered and the present site is meeting the requirement.

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6.0 Environmental Monitoring Program

6.1 General

An Environmental Monitoring Program provides feedback about the difference between actual environmental scenario and the impacts of the project on the environment and helps to judge the adequacy of the mitigation measures in protecting the environment. The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse effects are detected and timely action can be taken.

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board/ Tamil Nadu State Pollution Control Board (TNPCB). The frequency of sampling and location of sampling will be as per the directives of CPCB/TNPCB.

Environmental monitoring will be conducted on regular basis by PCBL (TN) Limited. to assess the pollution level in the area. Usually, as in the case of the environmental monitoring, an impact assessment study was carried over a period of three months and the data cannot bring out all variations induced by the natural or human activities throughout the year. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environment.

This chapter presents the details of environmental monitoring, schedule, arrangements for pollution control, cost for environmental protection measures and details of greenbelt development for the proposed expansion project.

6.2 Objectives of the Environmental Monitoring Program

The basic objective of the environmental monitoring program is as follows.

- To ensure implementation of mitigation measures during project implementation
- To provide feedback to the decision makers about the effectiveness of their actions
- To determine the project's actual environmental impacts so that modifications can be made to mitigate the impacts
- To identify the need for enforcement action before irreversible environmental damage occurs
- To provide scientific information about the response of an ecosystem to a given set of human activities and mitigation measures
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new installations or through the modification in the operation of existing facilities
- To check assumptions made with regard to the development and to detect deviations in order to initiate necessary measures
- To establish a database for future Impact Assessment Studies for expansion projects.

6.3 Types of Environmental Monitoring

The key issues associated with the life cycle of a project are the monitoring of environmental parameters. Three types of environmental monitoring are associated with the project, which includes.

- Baseline monitoring



- Effects/ Impacts monitoring and
- Compliance monitoring.

Baseline monitoring - Baseline monitoring deals with the measurement of environmental variables during a project period to determine existing conditions, ranges of variation and process of change.

Effects/impact monitoring - It involves measurements of environmental variable during construction and operation phase of the project to assess the impact that may have been caused by the expansion of the project.

Compliance Monitoring - It takes the form of periodic sampling and continuous measurements of level of pollutant emissions in the air, waste discharge on land or water, level of noise to ensure that standards are met.

6.4 Environmental Monitoring Plan

The environmental monitoring plan for the proposed expansion project has been developed in view of the institutional, scientific and fiscal issues pertaining to the project. For developing the monitoring plan, appropriate Value Ecosystem Components (VEC's) which are likely to be affected have been identified. For each component, suitable measurable environmental indicators, which are appropriate to the impact mechanism and scale of disturbance and have a low natural variability, broad applicability and an existing data series have been defined.

As per the guidelines of MoEF&CC, environmental monitoring shall be required during construction and operational phases. The schedule for monitoring ambient air quality, ambient noise quality, source emission monitoring, ground water quality and wastewater quality both during the construction and operation phases of the project is given in **Table 6.1**.

Table 6.1 Environmental Monitoring Plan construction and operational phase

Sl. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
1	Air Emissions	All equipment's are operated within specified design parameters	Random checks of equipment logs/ manuals	Periodic checks on the online monitoring results
		Vehicle trips to be optimized to the extent possible	Vehicle logs	Periodic check during site clearance & construction activities
		Maintenance of reactor emissions to meet stipulated standards in the process bag filters stacks	Particulate and Gaseous emissions (SO _x , CO, NO _x , Methane & Non-methane Hydrocarbons and VOC)	Periodic emission check during monitoring period
		Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality shall conform to the standards for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, Methane & Non-methane Hydrocarbons and VOC	As per CPCB / TNPCB requirement or on monthly basis whichever is earlier.
2	Noise	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order	Equipment logs, noise level reading	Regular check during construction and operation period
		Night workings will be minimized.	Working hour records	Daily records
		Generation of vehicular noise.	Maintenance of records of vehicles	Daily records
		Noise to be monitored in ambient air within the plant premises.	Spot noise recording	As per CPCB/ TNPCB requirement or on quarterly basis whichever is earlier
3	Waste Water Discharge	No discharge to be made to surface water, groundwater or soil.	Temperature, pH, TSS, Oil & Grease, BOD & COD	Periodic check during construction activities and operation period



Sl. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
4	Soil Erosion	Protect topsoil stockpile where possible at edges of the site.	Effective cover in place.	Periodic check during construction activities and operation period
5	Drainage and wastewater Management	Ensure drainage system and specific Design measures are working effectively for rainwater harvesting system. The design to incorporate existing drainage pattern and avoid disturbing the same.	Temperature, pH, TSS, Oil & Grease, BOD & COD	Periodic check during construction activities and operation period
6	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste Management Plan should be in place and available for inspection on-site. Compliance with MSW Rules, 2016 and Hazardous Wastes (Management, handling and Trans boundary Movement) Rules, 2016	Periodic check during construction activities and operation period
7	Health	Employees and migrant labor health check ups	All relevant vital parameters including HIV	Regular check ups
8	Loss of flora and fauna	Re-vegetation as per Forest guidelines	No. of plants, species	During site clearance and monitoring existing and proposed green belt for the survival rate.



Table 6.2 Environmental Monitoring Plan construction and operational phase

Sl. No.	Component	Parameter	No. of Locations	Frequency/ Duration
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO _x , NO _x , CO, Methane & Non-methane Hydrocarbons and VOC	8	Two at on site and 6 nos. of AAQ from outside the plant by regular monitoring / Once in a month
2	Fugitive Emission	PM ₁₀ , PM _{2.5} ,	4	Once in a month
3	Stack Emission Monitoring	PM, SO ₂ , NO ₂ , CO & HC	-	Continuous monitoring for PM, SO _x , NO _x / Physical stack monitoring for CO & HC for once in a month.
4	Source Noise	Instantaneous Noise level in dB(A)	8	Once in a month
5	Ambient Noise Quality	Ambient noise level (L _{eq} , L _{eq_{day}} & L _{eq_{night}})	8	Once in a month
6	Ground water Quality	Parameters specified under IS:10500, 1991	8	Once in 3 months
7	Soil Quality	Parameter for soil quality: pH, texture, EC, Organic Matter, N, P, K, Na, Ca & Mg	5	Once in 6 months



6.5 Data Analysis

The monitored data will be analyzed and compared with the baseline levels as established in the EIA study and the regulatory standards specified by different government agencies. The standards against which the different environment components will be compared are as per **Table 6.3**.

Table 6.3 Applicable environmental standards

Sl. No.	Component	Applicable Standards
1	Ambient Air Quality	National Ambient Air Quality standards, CPCB
2	Fugitive Emission	Fugitive emission standards for Petrochemical products and Petrochemical based processing, CPCB
3	Source Emission	Industrial specific standards for Petroleum Industries
4	Source Noise Quality	Standards for workers, Insp. of Factories / OSHA
5	Ambient Noise Quality	Ambient Noise Standards, CPCB
6	Ground water quality	IS: 10500 Standards, BIS
7	Soil quality	Standard Soil Classification, ICAR

6.6 Environmental Policy

The Existing Environmental policy of PCBL(TN) limited is given below:



Environmental Impact Assessment Report for Proposed Expansion of PCBL (TN) Limited from 550 to 675 TPD of Different grades of Carbon Black at Thervoy Kandigai Village, Tiruvallur District, Tamil Nadu



PCBL (TN) Limited



SAFETY, HEALTH AND ENVIRONMENT POLICY

We, at PCBL (TN) Limited, as a part of RP- Sanjiv Goenka Group, are committed to:

- Protecting the SAFETY & OCCUPATIONAL HEALTH of all our Stakeholders
- Protecting the Environment
- Ensuring the Security of our People, Communities and Assets

Organisation shall ensure to achieve the following targets:

- To achieve zero Lost Time Injury Frequency Rate (LTIFR) by March 2025
- To provide safety related training/awareness training to all our employees, including permanent, contract and casual, stationed at all manufacturing sites by March 2024

To Demonstrate our Commitment, PCBL (TN) Limited shall ensure the following:

- Commit to provide safe and healthy working conditions for prevention of work-related injury and ill-health
- Set targets, review objectives and measure the progress to ensure continual improvement in Safety, Occupational Health and Environment (SHE) performance
- Commit to fulfil legal and other requirements of state and country, where we operate
- Commit to eliminate hazards and reduce Occupational Health and Safety risks by demonstrating engineering, administrative controls including training, substitute with less hazardous processes, operations, materials, or equipment and by using adequate Personal Protective Equipment (PPE)
- Commit to consult and ensure participation of workers and their representatives
- Create a Culture of inculcating and practicing Safety, Occupational Health and Environment (SHE) systems and procedures amongst all stakeholders through effective Communications and Training to enhance SHE performance
- Protect the environment by minimising the generation of effluents and waste and continually optimise usage of non-renewable resources, enhancing recycling measures, reduction of specific power consumption and specific water consumption through incorporation of appropriate design, improved manufacturing and distribution practices
- Document, communicate the policy and share progress on our Safety, Occupational Health and Environment performance to our stakeholders

RESPONSIBILITIES:

- The responsibility of adherence to this policy lies with top management
- He/she is responsible for ensuring that this policy is communicated to and is executed at all locations of operations

MONITORING AND REVIEW:

- Compliance with the policy shall be ensured by audit team under the supervision of top management
- The policy will be reviewed at least once in a year
- Any amendments made in the policy at any point of time shall be communicated to all the concerned personnel and will uploaded in the official website

(Rakesh Kumar Nayak)

Whole Time Director

Doc. No: PCBL (TN) - SHE
Rev. No: 001:00
Dated: 01.08.2023



6.7 Environmental Management Cell (EMC)

Apart from having an environmental management plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring effective implementation. In this effect, M/s. PCBL (TN) Ltd. will assign responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures.

An organogram of Environment management cell is shown in **Figure 10.1**. This department shall undertake the monitoring of environment pollution level by measuring stack emissions, Ambient air quality, water and effluent quality, Noise level, etc. either departmentally or by appointing external agency whenever necessary.

M/s. PCBL (TN) Ltd. carried out the regular monitoring which ensures that the pollution is limited below prescribed limits and shall take corrective action by providing new pollution control equipment if required. In case the monitored results of environment pollution are found to exceed the prescribed limits, remedial actions are taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipment of each department is under respective department heads.

The environmental department shall also look after preparation and submission of Water Cess Return, Environmental statement and Consolidated Consent & Authorization application/ renewal under water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Ambient Air Quality as per NAAQS Standards, 2009 and Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 under Environment Protection Act, 1986.

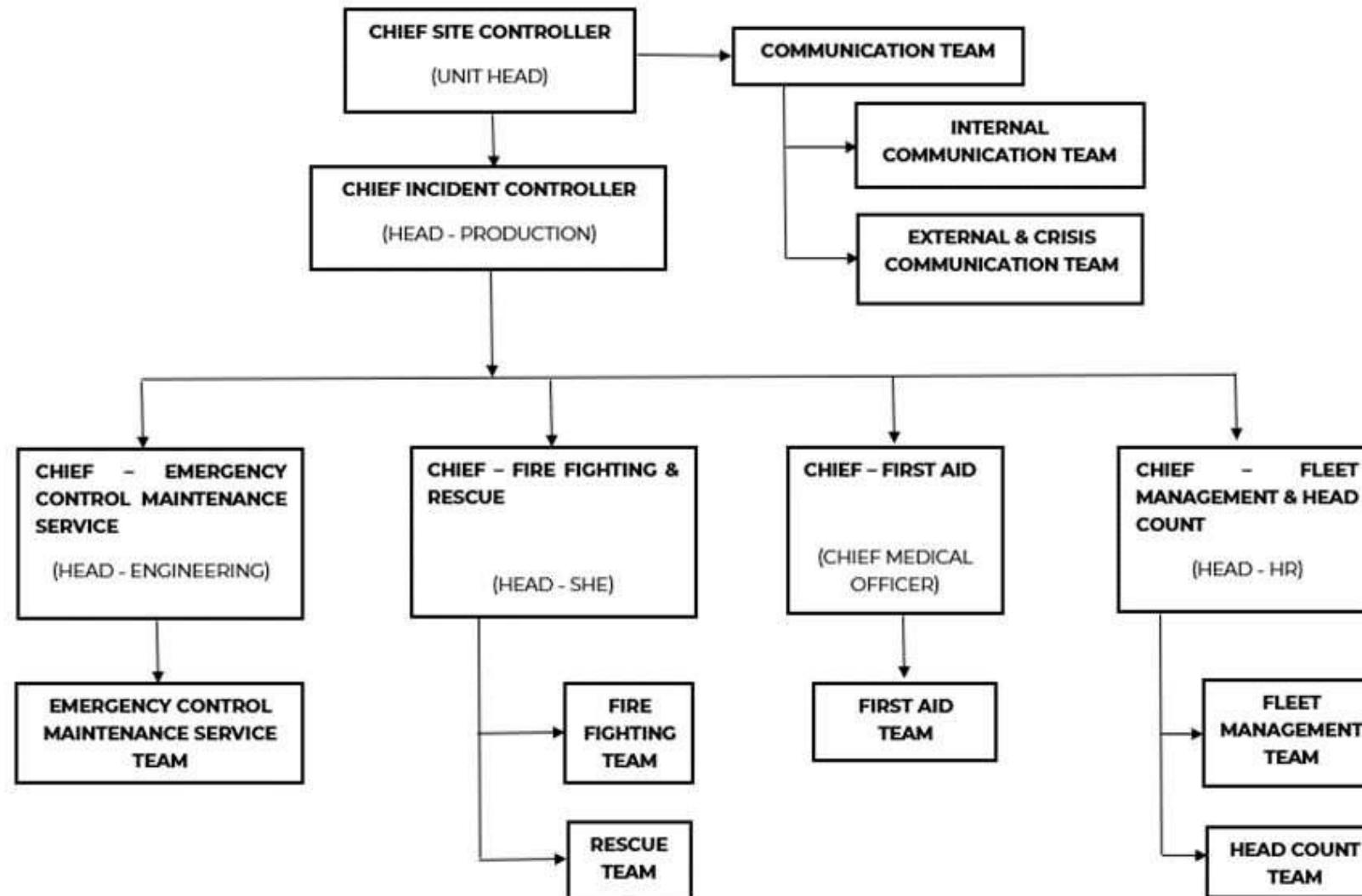


Figure 6.1 Organogram of Emergency Response Plan



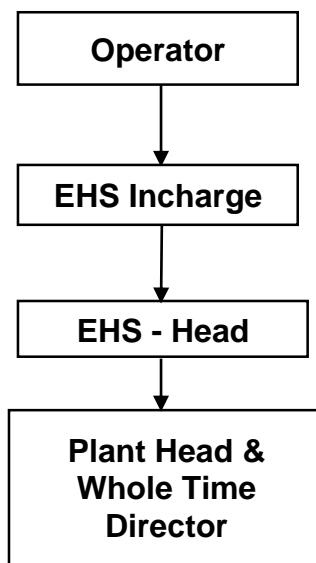
6.7.1 Responsibilities of EMC

The responsibilities of the EMC include the following:

- Environmental monitoring of the surrounding area
- Commissioning of pollution control equipment & its operation with SoP
- Specification and regulation of maintenance schedules for pollution control equipment.
- Ensuring that standards of housekeeping in the plant are maintained.
- Developing the green belt
- Ensuring conservation of water and energy
- Carrying out the Environmental Management Plan
- Organizing meetings of the Environmental Management Committee and reporting to the head of the committee
- Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies from time to time

6.8 Company has a system of reporting of Non-Compliances/Violations of environmental norms to the board of directors of the company and/or shareholders or stakeholders at large

An organogram to report of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders:



6.9 Compliance Reports

As a part of environmental monitoring programme, following compliance report will be submitted to TNPCB and Regional Office of MoEF&CC.

- Half yearly compliance reports of Environmental Clearance terms and conditions on 1st June and 1st December every calendar year.
- Environmental statement (Form-V) for the financial year ending March 31 to TNPCB on or before September 30 every year.
- Format for maintaining records of hazardous waste in Form-3 as per Hazardous and other Wastes (Management and Handling and Transboundary movement) Rules, 2008



- Safety data sheet for hazardous chemicals will be maintained as per schedule-9 of MSIHC rules, 1989 (amended 2000).
- Format for maintaining notification of major accident in schedule-6 as per MISHC rules, 1989 (amended 2000).

6.10 On – Site Mock Drills requirements

On-site mock drills are very important as it helps employees to be aware of the safety procedures and how to react during the time of crisis. Conducting mock drills at regular intervals enhances preparedness and checks the viability of environmental/disaster management plan. Mock drills are essential for the following reasons:

- Helps in revising/improving the environmental/disaster management plan
- Helps to evaluate whether the responsible officials are trained efficiently for the unforeseen event
- Helps in evaluating whether the emergency equipment is being maintained at plant premises

To ensure efficient environmental/disaster management, EHS department/EMP cell shall conduct periodic on-site mock drills in case of occurrence of the following activities:

- Fire, Natural calamities (cyclones, floods, earthquakes)
- Power break down
- Bomb threats; War alerts/terrorist attacks

Mock drills should also involve fire department, police, municipal authorities, hospitals and other department/agencies that are mandated to provide emergency support. Documenting the outcome of mock drills is an important aspect as this helps in revising the existing plan more efficiently. In all safety programmes the right personnel need to be employed and this is of utmost importance.

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7.0 Additional Studies

In order to support the environment impact assessment and environment management plan, following additional studies have been included in the report.

- Risk assessment
- Disaster Management Plan
- On-site and off-site emergency action plan
- Occupational Health and Safety Management System

7.1 Risk Assessment

Risk is defined as the unwanted consequences of a particular activity. The magnitude of risk varies with the total impact area for different scenarios. The risk assessment is basically carried out all the hazardous storages that are present in the premises. The larger the storage, greater is the risk posed by the storage. The impact area increases proportionately with storage.

Risk assessment is a tool that is used to analyze the risk posed by different project activities vis-à-vis the area. The consequence analysis forms part of this assessment and helps in evaluation of different hazards that are to be considered for conducting consequence analysis. The risk assessment basically involves the prediction of the consequence in case there is a fire, explosion or toxic gas release that might occur due to handling, storage or processing of any of the hazardous materials by the industry. The findings of risk assessment are dovetailed into On-site emergency plan also known as Disaster Management Plan.

7.1.1 Methodology

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view;
- Preparation of broad DMP covering On-site and Off-site Emergency Plan.

7.1.2 Hazard Identification

Hazard Identification is a tool that is very useful for conducting a risk assessment as it helps in identification and detailing of hazards that exist in a given plant. The hazard identification is done prior to the consequence analysis in a given plant and serves as the core base of information on which whole risk assessment is based. The basic principle of risk analysis lies in the answer to the questions about risk such as type, causes, consequences and frequency.

The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous material handling/storage area units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); and



- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

7.1.3 Classification of Major Hazardous Units

Hazardous substances may be classified into three main classes' namely flammable substances, unstable substances and toxic substances. The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345 M. The major hazardous materials to be stored, transported, handled and utilized within the facility have been summarized in the **Table 7.1**. The raw material storage details and properties are given in **Table 7.2** and **Table 7.3** respectively.

Table 7.1 Hazardous materials stored, transported and handled

Sl.No	Materials	Hazardous Properties
1.	Carbon black Feed Stock	Flammable
2.	Secondary Feed Stock	Flammable
3.	Light Diesel Oil/ High Speed Diesel	Flammable

Table 7.2 Category wise Capacity of storage tanks

Sl.No.	Material	No. of Storage Tanks	Design Capacity (KL)
1.	Carbon black Feed Stock	2	6000
		1	3000
		8	2000
2.	Secondary Feed Stock	1	600
3.	Light Diesel Oil/ High Speed Diesel	1	100

Table 7.3 Properties of raw material used in the plant

Sl.No.	Chemical	Codes/Label	BP	FP	UEL	LEL
			°C	%		
1.	Carbon black Feed Stock	Flammable	420	110	NA	
2.	Secondary Feed Stock	Flammable	420	110	NA	
3.	Light Diesel Oil/ High Speed Diesel	Flammable	215-376	32	6	0.6

BP : Boiling Point

FP : Flash Point

UEL : Upper Explosive Limit

LEL : Lower Explosive Limit

7.1.4 Hazard Assessment and Evaluation

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environmental factors, proposed operations, facilities, and safeguards.

Preliminary Hazard Analysis (PHA)

A Preliminary Hazard Analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted for which risk



reducing measures are deduced and implemented. Preliminary hazard analysis for storage area and whole plant is given in **Table 7.4** and **Table 7.5**.

Table 7.4 Preliminary hazard analysis for storage areas

Unit	Capacity, KL	Hazard Identified
Carbon black Feed Stock	2X6000	Fire/Explosion
	1X3000	
	8X2000	
Secondary Feed Stock	1X600	Fire/Explosion
Light Diesel Oil/ High Speed Diesel	1X100	Fire/Explosion

Table 7.5 Preliminary hazard analysis for the whole plant in general

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environmental factors	If there is any leakage and eventuality of source of ignition.	--	All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
	Highly inflammable nature of the chemicals may cause fire hazard in the storage facility.	A well designed fire protection including dry powder and CO ₂ extinguisher should be provided.	Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided for the entire plant.

7.1.5 Maximum Credible Accident (MCA) Analysis

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the impact of consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapor cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed. The reason and purpose of consequence analysis are many folds like:

- Part of risk assessment;
- Plant layout/Code requirements;
- Protection of other plants;
- Protection of public;



- Emergency Planning; and
- Design criteria

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

Selected Failure Cases

The purpose of this listing is to examine consequences of such failure individually or in combination. It will be seen from the list that a vast range of failure cases have been identified. The frequency of occurrence of failure also varies widely. Guillotine/catastrophic failure of a pipeline of higher sizes has a low frequency of occurrence.

Damage Criteria

The raw material storage and unloading at the storage facility may lead to fire and explosion hazards. The damage criteria due to accidental release of any hydrocarbon arise from fire and explosion. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

Tank fire would occur if the radiation intensity is high on the peripheral surface of the tank leading to increase in internal tank pressure. Pool fire would occur when fuel collected in the dyke due to leakage gets ignited.

Fire Damage

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire. The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage or process vessel. This will help to decide the location of other storage/process vessels, decide the type of protective clothing the worker's / fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. **Table 7.6** tabulates the damage effect on equipment and people due to thermal radiation intensity.

Table 7.6 Damage due to incident radiation intensities

SI. No.	Incident Radiation (kW/m ²)	Type of Damage Intensity	
		Damage to Equipment	Damage to People
1	37.5	Damage to process equipment	100% lethality in 1 min. 1% lethality in 10 sec.
2	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 min. Significant injury in 10 sec.



Sl. No.	Incident Radiation (kW/m ²)	Type of Damage Intensity	
		Damage to Equipment	Damage to People
3	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	--
4	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5	4.5	--	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6	1.6	--	Causes no discomfort on long exposures

The effect of incident radiation intensity and exposure time on lethality is given in **Table 7.7**.

Table 7.7 Radiation exposure and lethality

Radiation Intensity (kW/m ²)	Exposure Time (seconds)	Lethality (%)	Degree of Burns
1.6	--	0	No Discomfort even after long exposure
4.5	20	0	1 st
4.5	50	0	1 st
8.0	20	0	1 st
8.0	50	<1	3 rd
8.0	60	<1	3 rd
12.0	20	<1	2 nd
12.0	50	8	3 rd
12.5	--	1	--
25.0	--	50	--
37.5	--	100	--

Raw material Storage

The details of raw material storages in the proposed expansion project are given **Table 7.2**. In case of raw material released in the area catches fire, a steady state fire will occur.

Modeling Scenarios

Based on the storage and consumption of raw material, the following failure scenarios for the proposed expansion project have been identified and the scenarios are discussed in **Table 7.9**. The raw material properties considered in modeling are given in **Table 7.8**.



Table 7.8 Properties of raw material Considered for Modeling

Sl. No.	Raw material	Molecular weight (kg/kg mol)	Boiling Point (°F)	Density (kg/m3)
1.	Carbon black Feed Stock	73.8851	420	1.07
2.	Secondary Feed Stock	73.8851	420	1.05
3.	Light Diesel Oil/ High Speed Diesel	198	215-376	15

Table 7.9 Scenarios considered

IS No	Description
IS 01	6000 KL CBFS Tank 1
IS 02	6000 KL CBFS Tank 2
IS 03	3000 KL CBFS Tank
IS 04	2000 KL CBFS Tank 1
IS 05	2000 KL CBFS Tank 2
IS 06	2000 KL CBFS Tank 3
IS 07	2000 KL CBFS Tank 4
IS 08	2000 KL CBFS Tank 5
IS 09	2000 KL CBFS Tank 6
IS 10	2000 KL CBFS Tank 7
IS 11	2000 KL CBFS Tank 8
IS 12	600 KL SFS Tank 1
IS 13	Additional 2000 KL CBFS Tank 1
IS 14	Additional 2000 KL CBFS Tank 2
IS 15	100KL HSD Tank

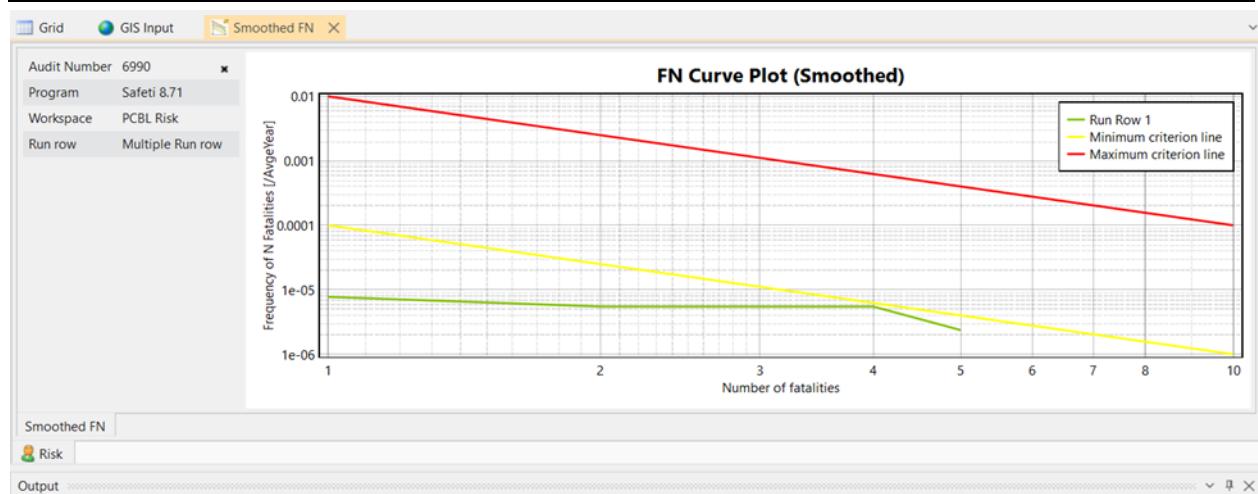
7.1.6 Location Specific Individual Risk (LSIR)

LSIR contour was not generated even for the lowest risk level of 1E-09 per year. The reason behind is that the inventory is far less in quantity (1.2m^3). This is only in terms of risk point of view. Whereas in Consequence point of view, the following factor shall be taken in to consideration even though the risk is governing,

- It is observed that the dyke is constructed around the HSD and Raw material storage tanks
- Diesel and Raw material storage tanks are located in adjacent dykes
- The vent of Diesel tanks is routed outside of vicinity of any ignition source i.e any electrical equipment/circuit as the natural vents are considered to be of primary source of release of flammable mixture and forms a Zone 1 radius upto 1 meter around the vent release as per Energy Institute's Model code of safe practice Part 15, Area classification for installations handling flammable fluids.

7.1.7 F-N Curve

F-N graph was not generated as the consequence effect isn't reaching any offsite population. The worst case consequence contours are presented to support the above assessment.



7.1.8 Consequence Analysis

- Leak Sizes
- Minor Leak
- Small Leak
- Medium Leak
- Full Bore Rupture

Notation Example: IS 01a – Isolable Section 01 “Minor leak”

Results and Discussion

The results of Individual risks are tabulated in **Table 7.10**. The distances computed for various scenarios are from the center of the pool fire are shown in.



Table 7.10 Consequences results

Isolable Section	Scenario	Weather	Jet Fire Downwind Hazard (m)			Flash Fire Downwind hazard (m)		Pool Fire Downwind Hazard (m)		
			4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	LFL	0.5 LFL	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
Study\6000 KL CBFS Tank 1	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	24.1335	24.1933	945.348	684.578	630.36
		Category 5/D	NR	NR	NR	24.2478	24.2494	1002.95	696.613	634.055
Study\6000 KL CBFS Tank 2	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	24.1335	24.1933	945.348	684.578	630.36
		Category 5/D	NR	NR	NR	24.2478	24.2494	1002.95	696.613	634.055
Study\3000 KL CBFS Tank	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	19.8446	19.8935	704.855	496.396	449.307
		Category 5/D	NR	NR	NR	20.1415	20.1507	750.675	506.612	452.365
Study\2000 KL CBFS Tank 1	Leak	Category 2/F	3.32323	6.15815	4.83603	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263



Isolable Section	Scenario	Weather	Jet Fire Downwind Hazard (m)			Flash Fire Downwind hazard (m)		Pool Fire Downwind Hazard (m)		
			4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	LFL	0.5 LFL	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
Catastrophic rupture	Category 2/F	NR	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
	Category 5/D	NR	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 2	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 3	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 4	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635



Isolable Section	Scenario	Weather	Jet Fire Downwind Hazard (m)			Flash Fire Downwind hazard (m)		Pool Fire Downwind Hazard (m)		
			4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	LFL	0.5 LFL	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
Study\2000 KL CBFS Tank 5	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 6	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 7	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\2000 KL CBFS Tank 8	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263



Isolable Section	Scenario	Weather	Jet Fire Downwind Hazard (m)			Flash Fire Downwind hazard (m)		Pool Fire Downwind Hazard (m)		
			4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	LFL	0.5 LFL	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
Catastrophic rupture	Category 2/F	4.75078	3.75186	3.08805	17.7069	17.7508	594.183	412.056	368.661	
	Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635	
Study\600 KL SFS Tank 1	Leak	Category 2/F	4.31131	3.32753	2.72269	4.85977	5.49838	47.1063	28.933	21.8259
		Category 5/D	NR	NR	NR	4.65268	4.97425	48.9094	28.6452	22.3514
	Catastrophic rupture	Category 2/F	NR	NR	NR	12.1861	12.1862	359.078	239.016	206.698
		Category 5/D	NR	NR	NR	12.3818	12.3819	383.553	244.297	209.351
Study\Additional 2000 KL CBFS Tank 1	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635
Study\Additional 2000 KL CBFS Tank 2	Leak	Category 2/F	6.15815	4.83603	3.98093	5.89301	6.67452	50.3063	31.4804	24.1767
		Category 5/D	5.68296	4.34914	3.53889	5.4813	5.88461	52.1028	31.2636	24.8263
	Catastrophic rupture	Category 2/F	NR	NR	NR	17.7069	17.7508	594.183	412.056	368.661
		Category 5/D	NR	NR	NR	18.0087	18.0527	633.61	420.864	372.635



Isolable Section	Scenario	Weather	Jet Fire Downwind Hazard (m)			Flash Fire Downwind hazard (m)		Pool Fire Downwind Hazard (m)		
			4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²	LFL	0.5 LFL	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
Study\100KL HSD Tank	Leak	Category 2/F	4.94994	3.9364	3.22529	4.22233	4.80599	46.3826	28.4533	21.0956
		Category 5/D	4.42073	3.43959	2.83461	4.25017	4.5493	47.2416	27.7451	21.2941
	Catastrophic rupture	Category 2/F	NR	NR	NR	7.8661	7.86623	178.821	114.271	92.0355
		Category 5/D	NR	NR	NR	7.34863	7.3487	188.387	116.006	93.6613

Table 7.11 Explosion results

Isolable Section	Scenario	Weather	Explosion		
			Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\6000 KL CBFS Tank 1	Catastrophic rupture	Category 2/F	0.02068	72.9093	105.819
			0.1379	30.2833	20.5666
	Catastrophic rupture	Category 5/D	0.2068	27.71	15.42
			0.02068	71.4111	102.822
Study\6000 KL CBFS Tank 2	Catastrophic rupture	Category 2/F	0.1379	29.9921	19.9842
			0.2068	27.4917	14.9834
	Catastrophic rupture	Category 5/D	0.02068	72.9093	105.819
			0.1379	30.2833	20.5666
Study\3000 KL CBFS Tank	Catastrophic rupture	Category 2/F	0.2068	27.71	15.42
			0.02068	71.4111	102.822
	Catastrophic rupture	Category 5/D	0.1379	29.9921	19.9842
			0.2068	27.4917	14.9834

Isolable Section	Scenario	Weather	Explosion		
			Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\2000 KL CBFS Tank 1	Catastrophic rupture	Category 5/D	0.02068	15.5314	11.0627
			0.1379	11.0751	2.15012
			0.2068	10.806	1.61208
	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
Study\2000 KL CBFS Tank 2	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
Study\2000 KL CBFS Tank 3	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
Study\2000 KL CBFS Tank 4	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
Study\2000 KL CBFS Tank 5	Catastrophic rupture	Category 2/F	0.02068	12.2887	4.57735
			0.1379	12.6723	5.34465
			0.2068	28.3386	36.6772



Isolable Section	Scenario	Weather	Explosion		
			Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\2000 KL CBFS Tank 6	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
Study\2000 KL CBFS Tank 7	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
Study\2000 KL CBFS Tank 8	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
Study\600 KL SFS Tank 1	Catastrophic rupture	Category 2/F	0.02068	33.7001	47.4003
			0.1379	14.6063	9.21257
			0.2068	13.4536	6.90723
	Catastrophic rupture	Category 5/D	0.02068	33.9301	47.8601
			0.1379	14.651	9.30194
Study\Additional 2000 KL CBFS Tank 1	Catastrophic rupture	Category 2/F	0.02068	13.4871	6.97424
			0.1379	28.3386	36.6772
			0.2068	13.5642	7.12846

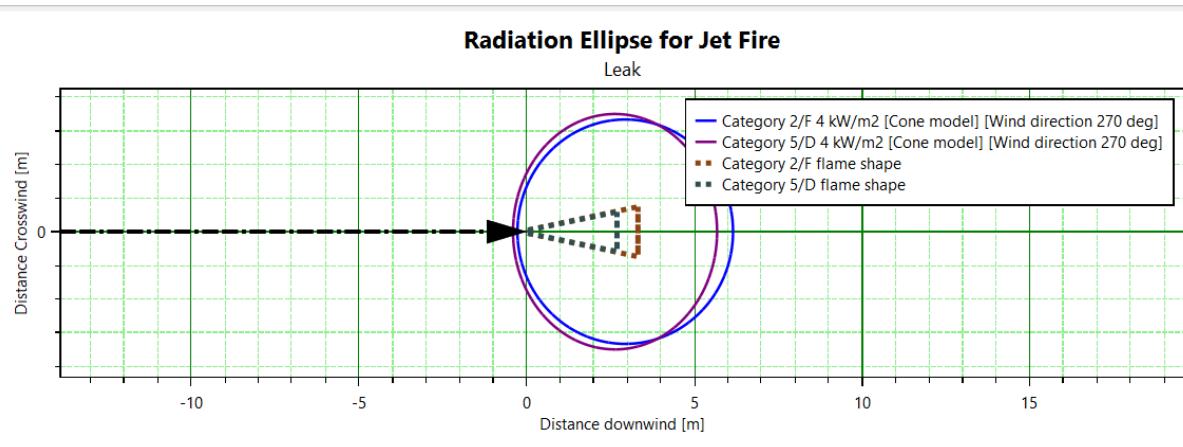
Isolable Section	Scenario	Weather	Explosion		
			Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Additional 2000 KL CBFS Tank 2	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735
	Catastrophic rupture	Category 2/F	0.02068	28.3386	36.6772
			0.1379	13.5642	7.12846
			0.2068	12.6723	5.34465
	Catastrophic rupture	Category 5/D	0.02068	25.7058	31.4117
			0.1379	13.0525	6.10507
			0.2068	12.2887	4.57735



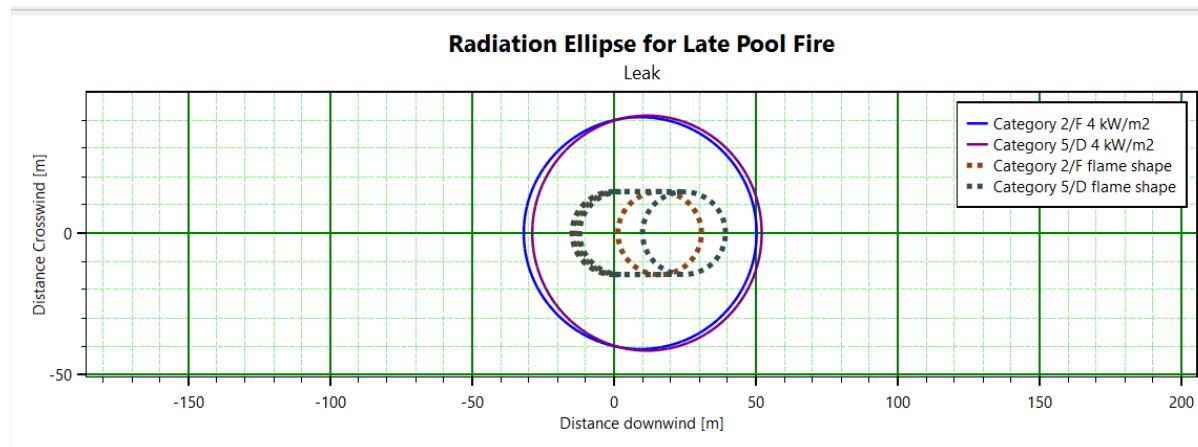
7.1.9 Consequence Contours

6000KL CBFS Tank – 10mm Leak

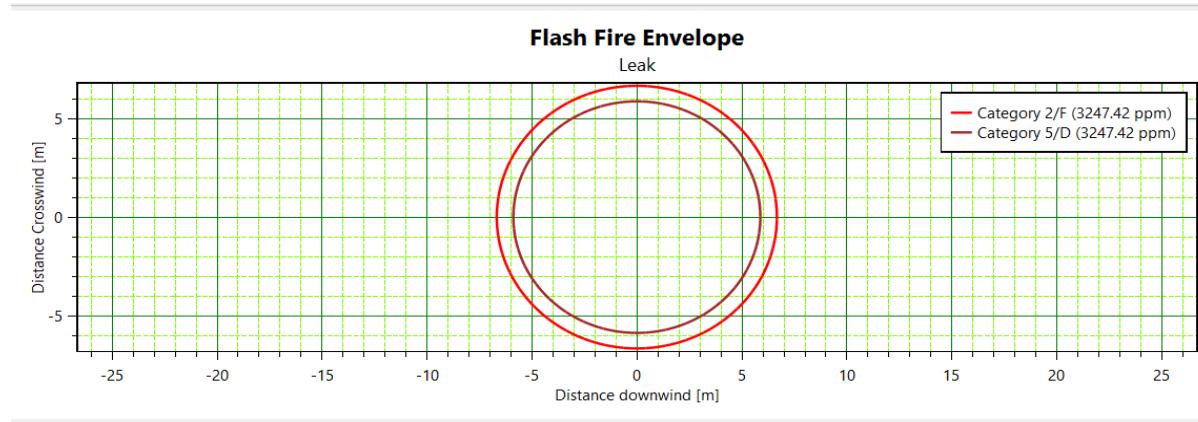
Jet Fire



Pool Fire



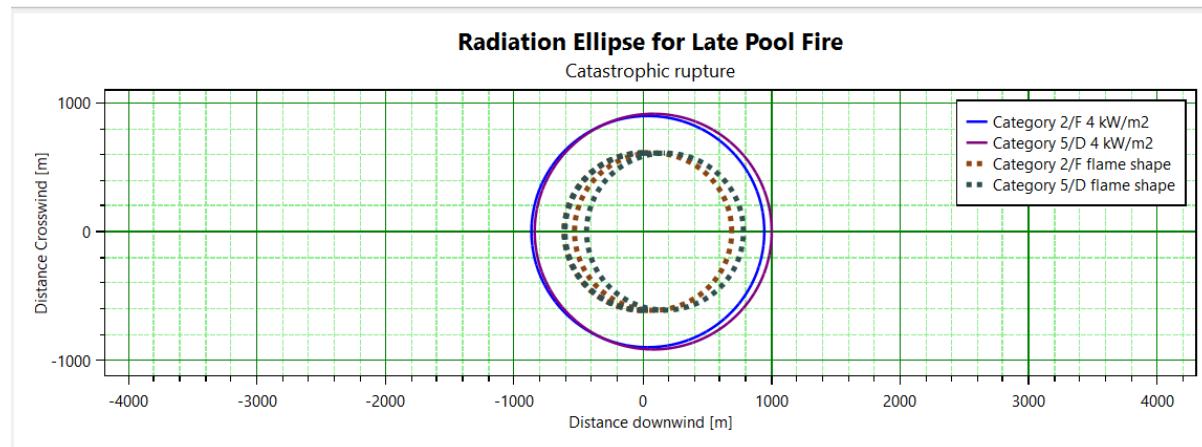
Flash Fire



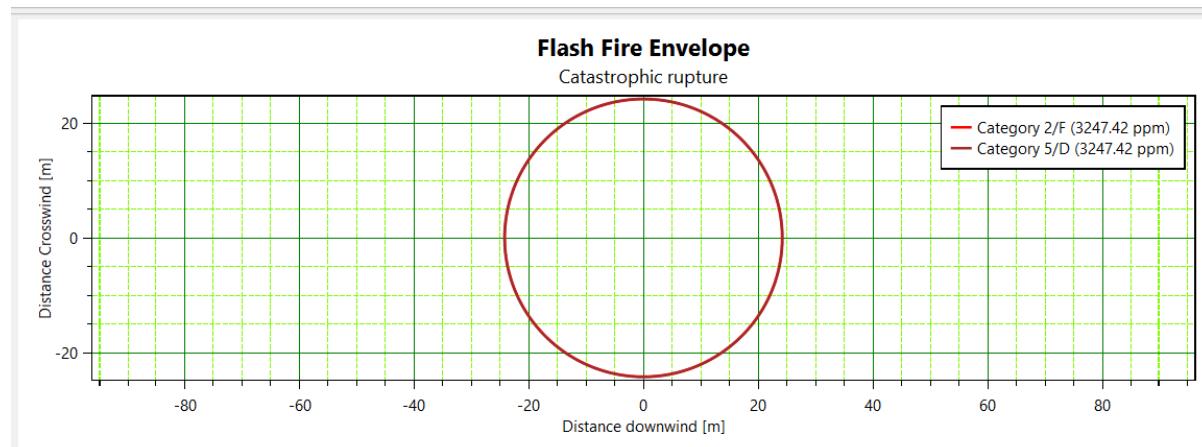


6000KL CBFS Tank – Catastrophic Rupture

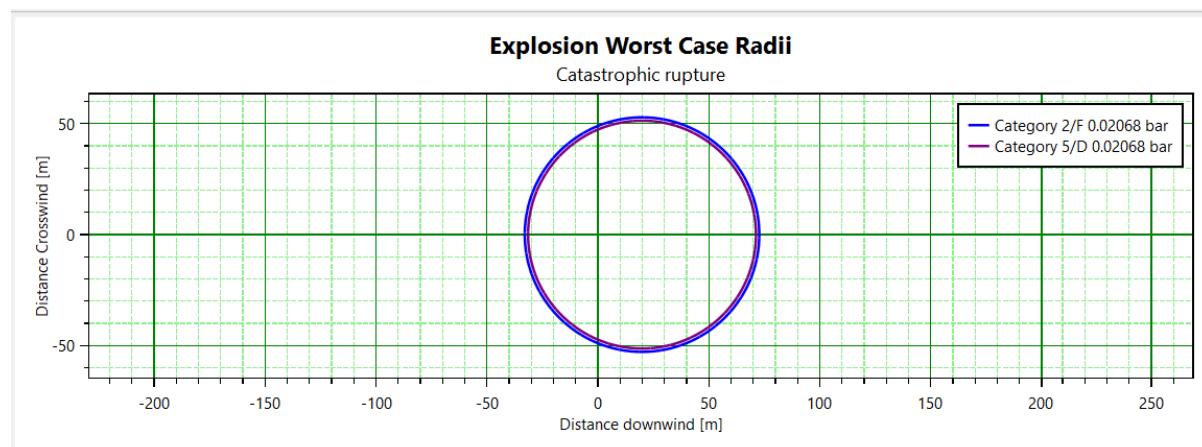
Pool Fire



Flash Fire



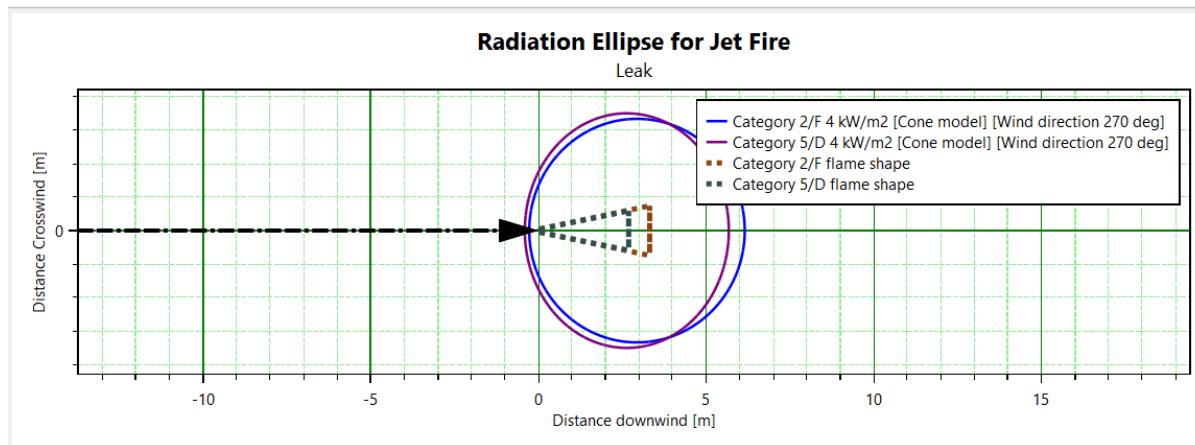
Explosion Overpressure



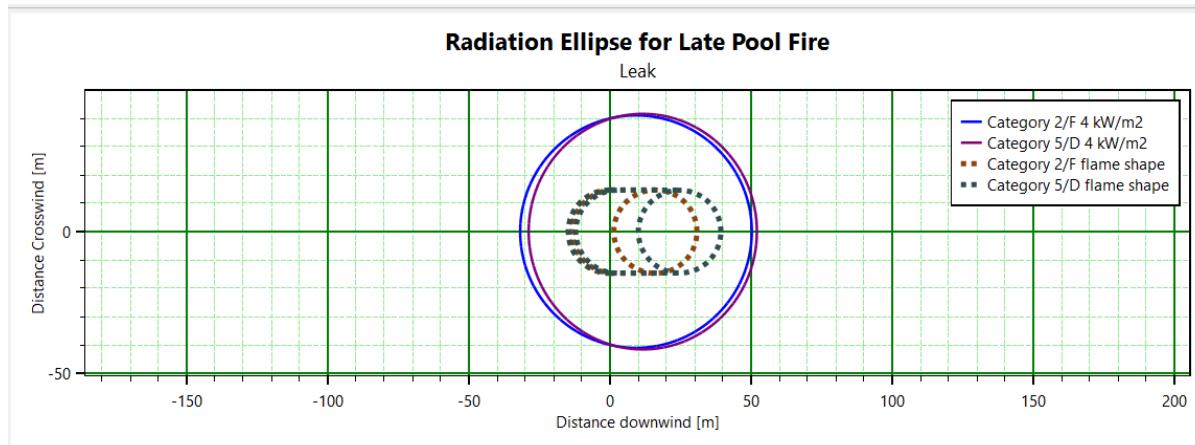


3000KL CBFS Tank – 10mm Leak

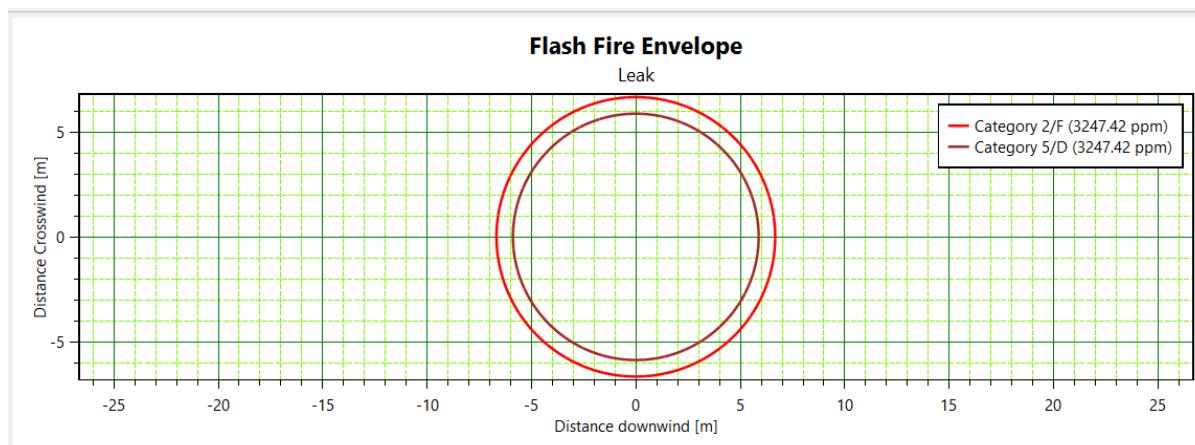
Jet Fire



Pool Fire



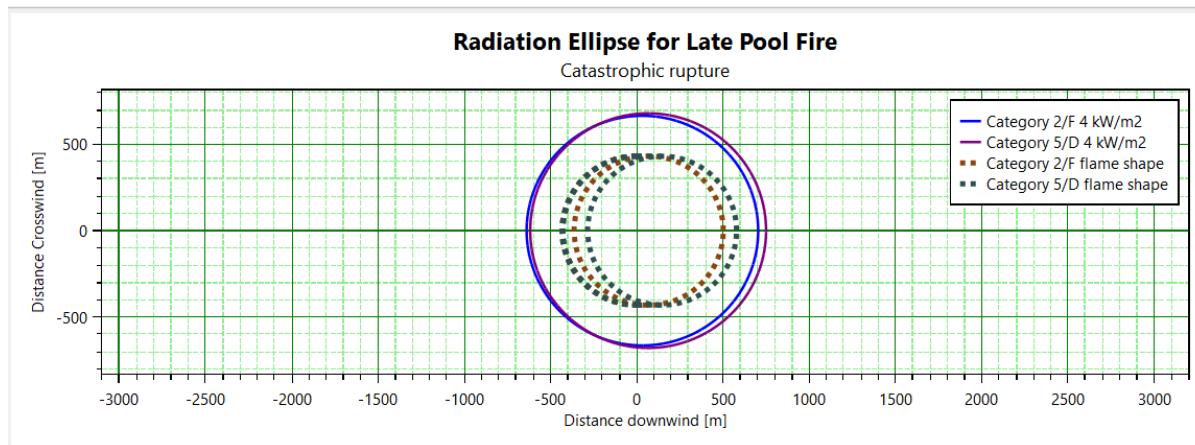
Flash Fire



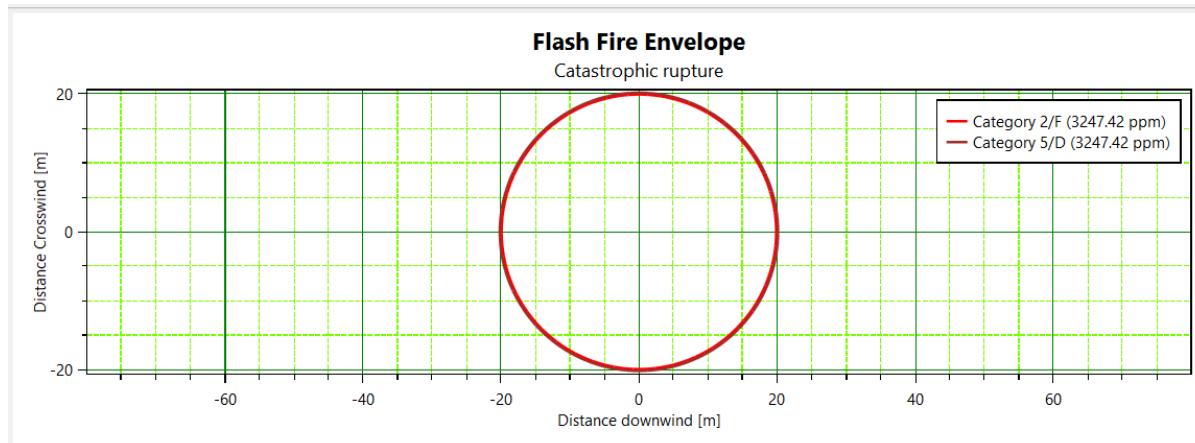


3000KL CBFS Tank – Catastrophic Rupture

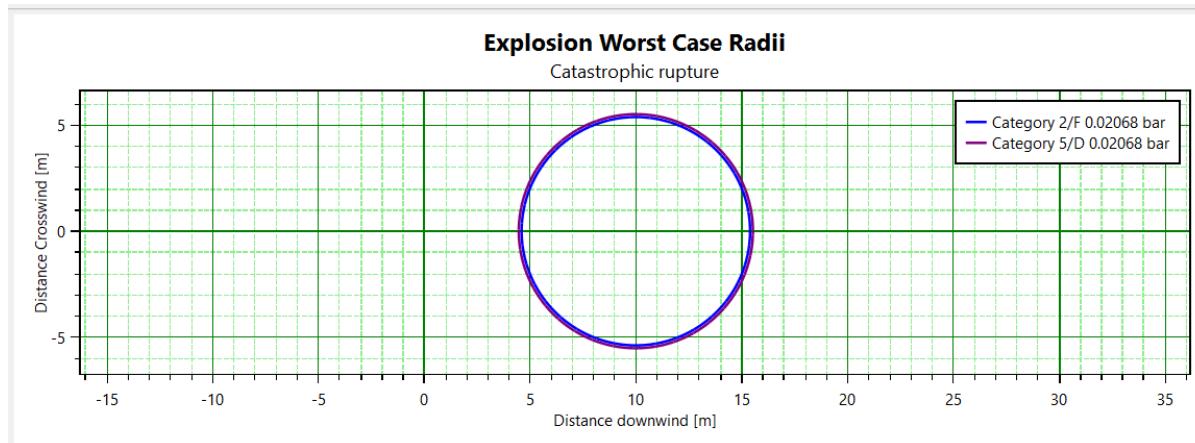
Pool Fire



Flash Fire



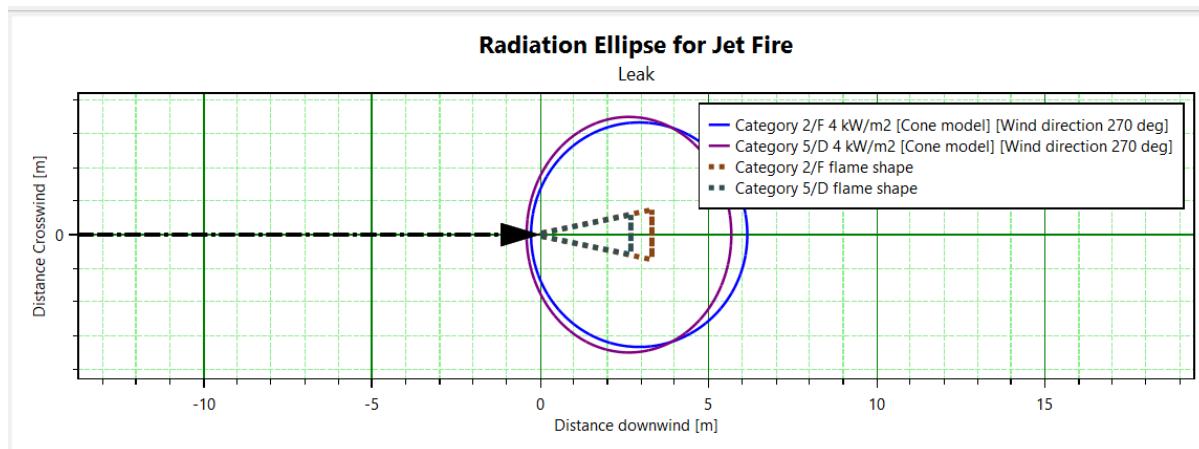
Explosion Overpressure



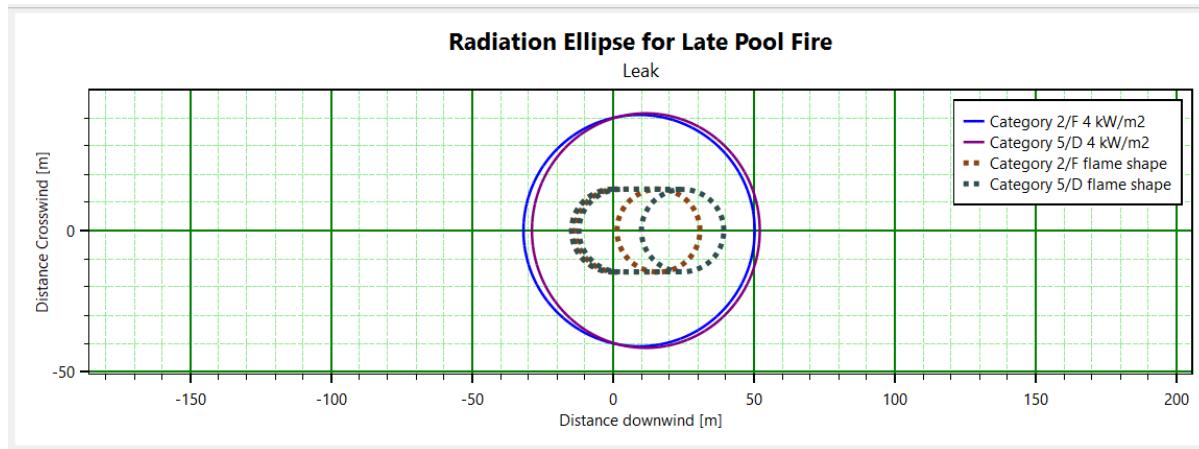


2000KL CBFS Tank – 10mm Leak

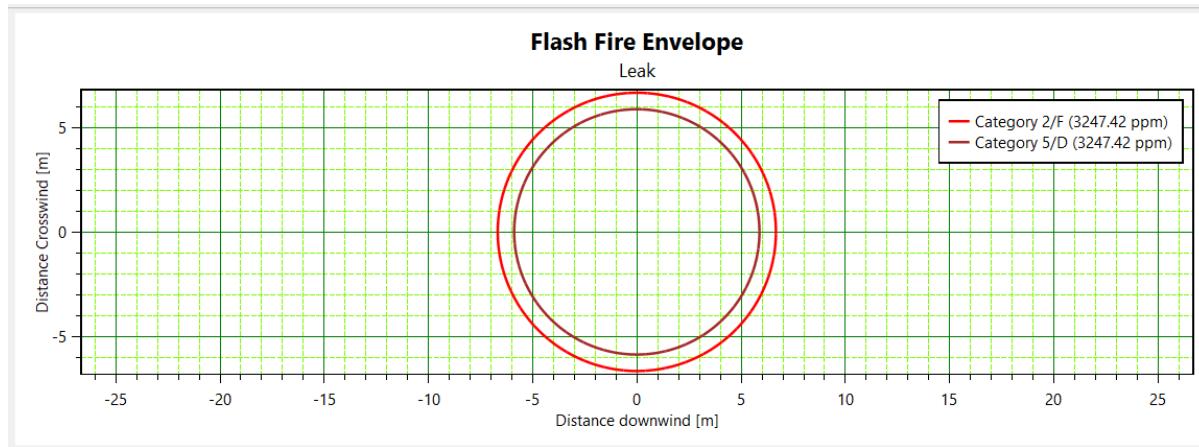
Jet Fire



Pool Fire



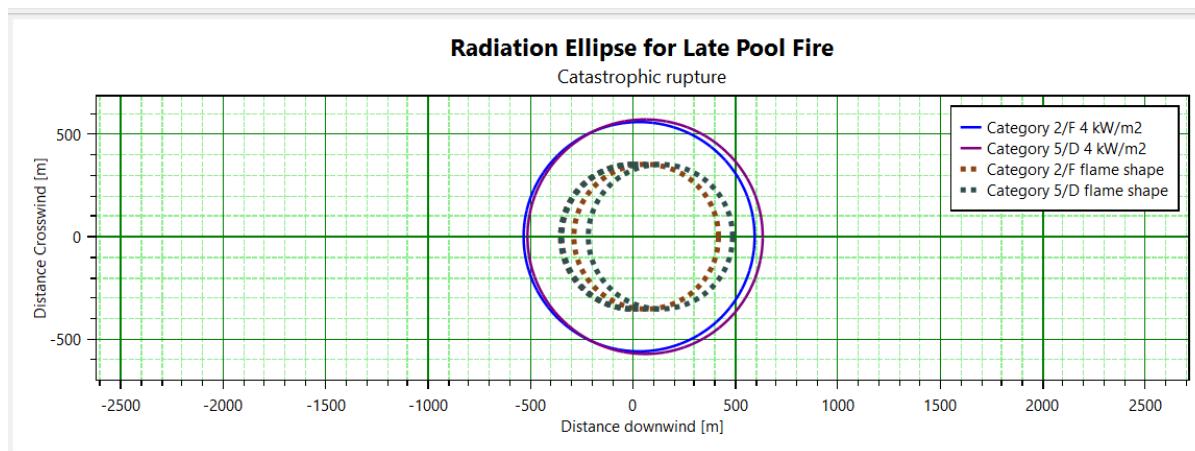
Flash Fire



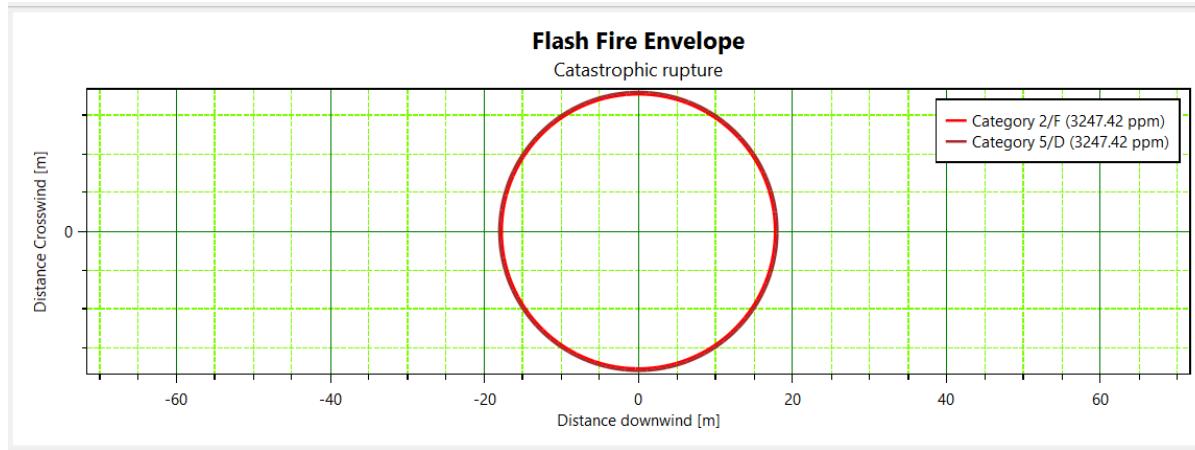


2000KL CBFS Tank – Catastrophic Rupture

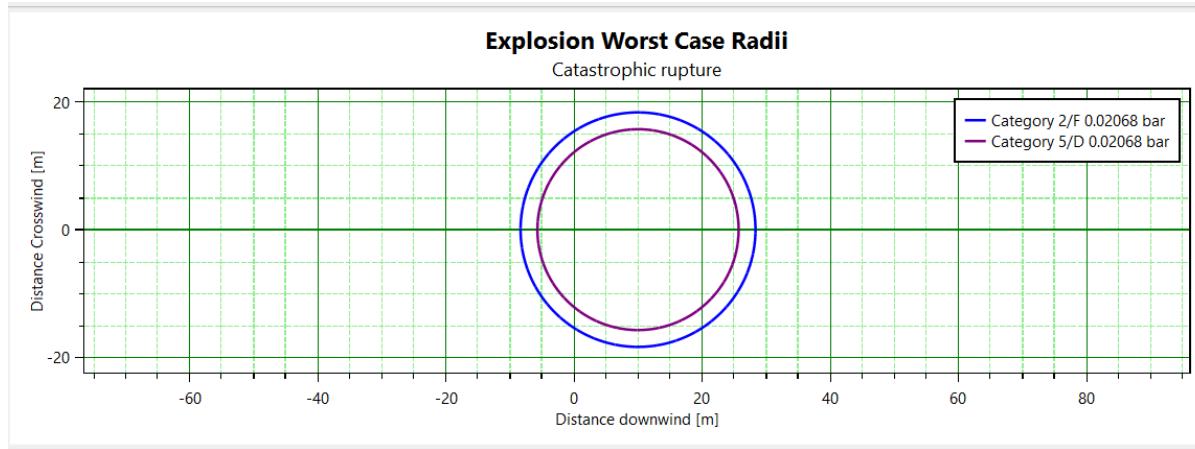
Pool Fire



Flash Fire



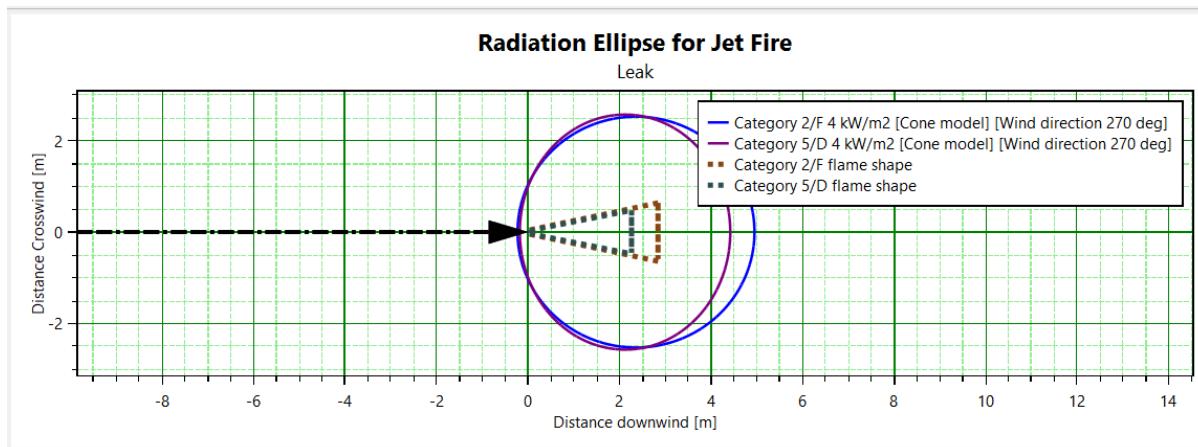
Explosion Overpressure



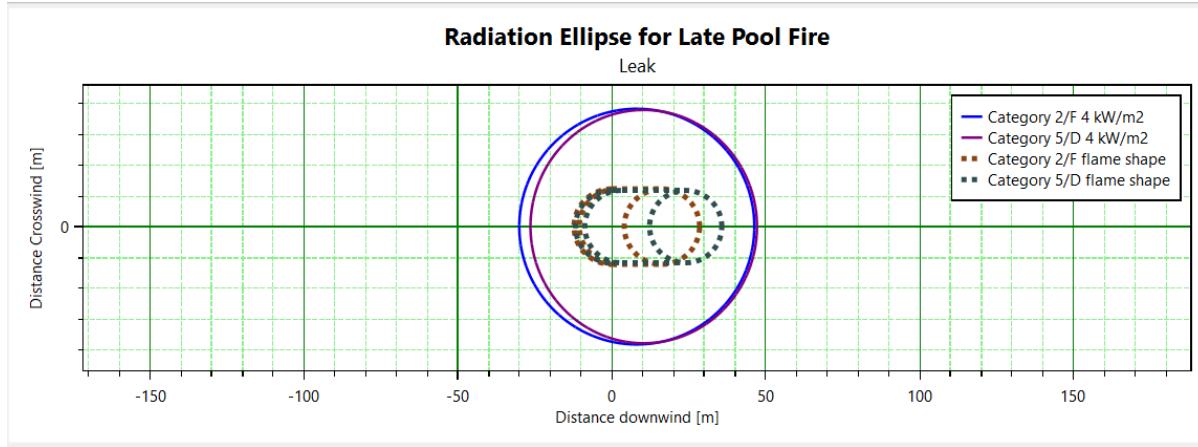


100KL HSD Tank – 10mm Leak

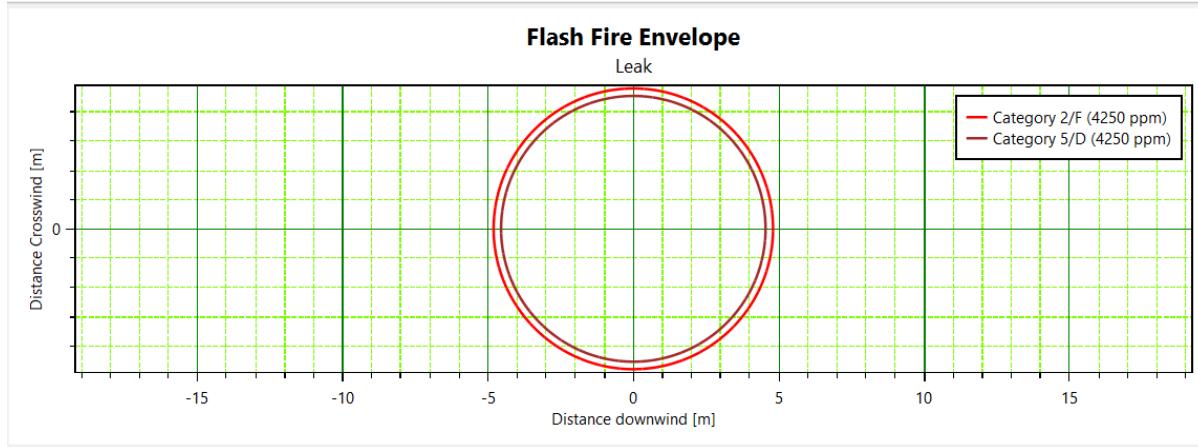
Jet Fire



Pool Fire



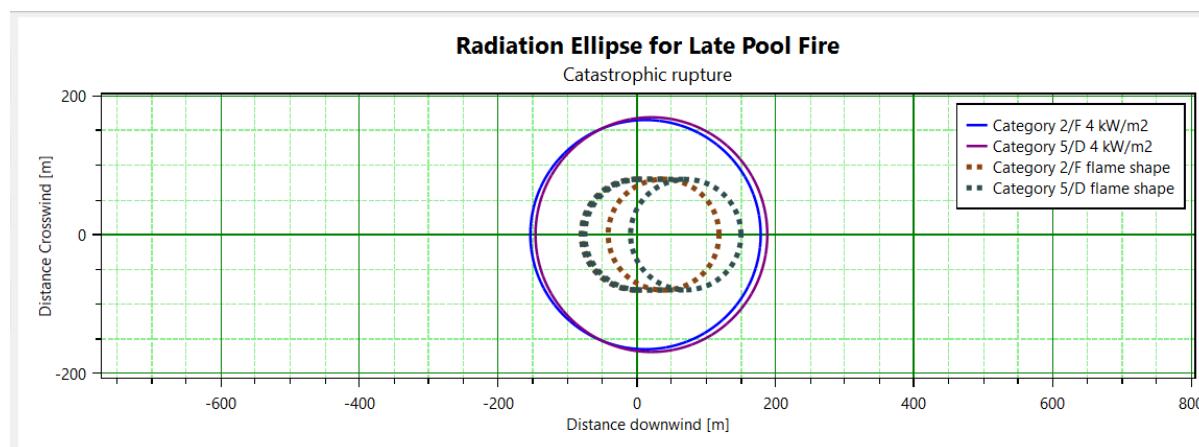
Flash Fire



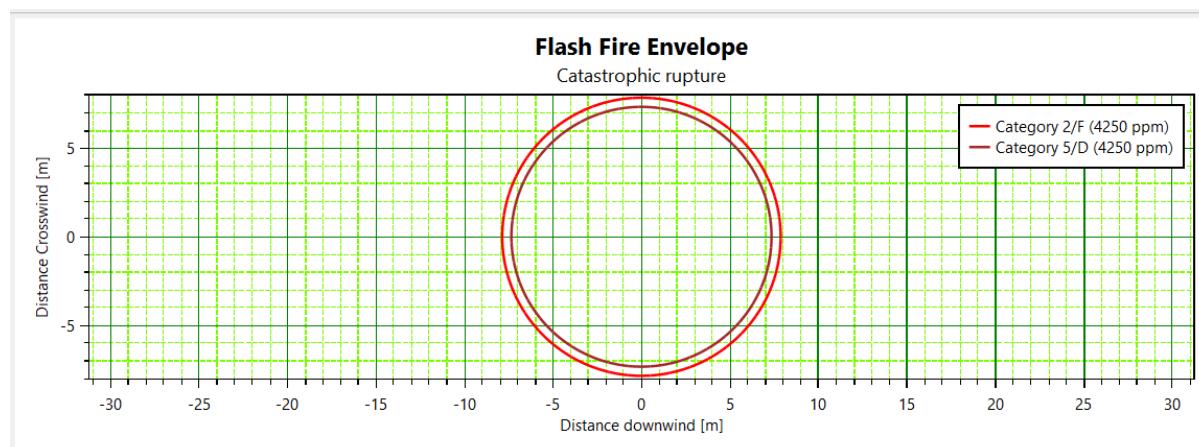


100KL HSD Tank – Catastrophic Rupture

Pool Fire



Pool Fire



7.1.9.1 Measures taken to prevent such accident

- Priority will be given to Tanker to immediately enter the storage premises at site and will not be kept waiting near the gate or the main road.
- Security person checks License, TREM CARD, Fire extinguisher condition, required PPEs as per SOP laid down.
- Store officer will take sample as per sampling SOP from sampling point.
- After approval of QC department unloading procedure is allowed be started.

7.1.9.2 Following precautions adopted during unloading

- Wheel stopper is provided to TL at unloading platform.
- Tanker unloading procedure is followed according to check list and implemented.
- Flexible hose connection is done at TL outlet line and checked for no leakage.
- The quantity remaining in the hose pipeline is drained to a small container, which will be subsequently transferred to the main storage tank thus ensuring complete closed conditions for transfer from road tanker.
- All TL valves will be closed.



7.1.9.3 Following precautions adopted storage of such chemicals

- Storage tank is stored away from the process plant.
- Tanker unloading procedure is prepared and implemented.
- Caution note and emergency handling procedure is displayed at unloading area and trained all operators.
- NFPA label is provided.
- Required PPEs like full body protection PVC apron, Hand gloves, gumboot, Respiratory mask etc. is provided to operator.
- Neutralizing agent is kept ready for tackle any emergency spillage.
- Safety shower, eye wash with quenching unit is provided in acid storage area.
- Material is handled in close condition in pipe line.
- Dyke wall is provided to all storage tanks, collection pit with valve provision.
- Drain valve is provided.
- Level gauge is provided on all storage tanks.
- Safety permit for loading unloading of hazardous material is prepared and implemented.
- TREM CARD is provided to all transporters and trained for transportation Emergency of Hazardous chemicals.
- Fire hydrant system with jockey pump as per TAC norms is installed.

7.1.10 Mitigation measures to control emergency:

- Safety Shower and eye wash is provided away from the tank and unloading station.
- Sand bags/ buckets is provided near tank area.
- Neutralizing medium (Lime and dry sand) is kept ready near tank farm.
- Emergency siren and wind sock is provided.
- Tele Communication system and mobile phone is used in case of emergency situations for communication.
- First Aid Boxes and Occupational health center is made at site.
- Emergency organization and team is prepared.
- Full body protection suite and other PPEs will be kept ready in ECC at site.
- Emergency team is prepared and trained for scenario base emergency. Like Toxic control team, Fire control team, First aid team, communication and general administration team, Medical team etc.

7.1.11 Emergency Response

7.1.11.1 Spill & Leak

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

7.1.11.2 Small spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.

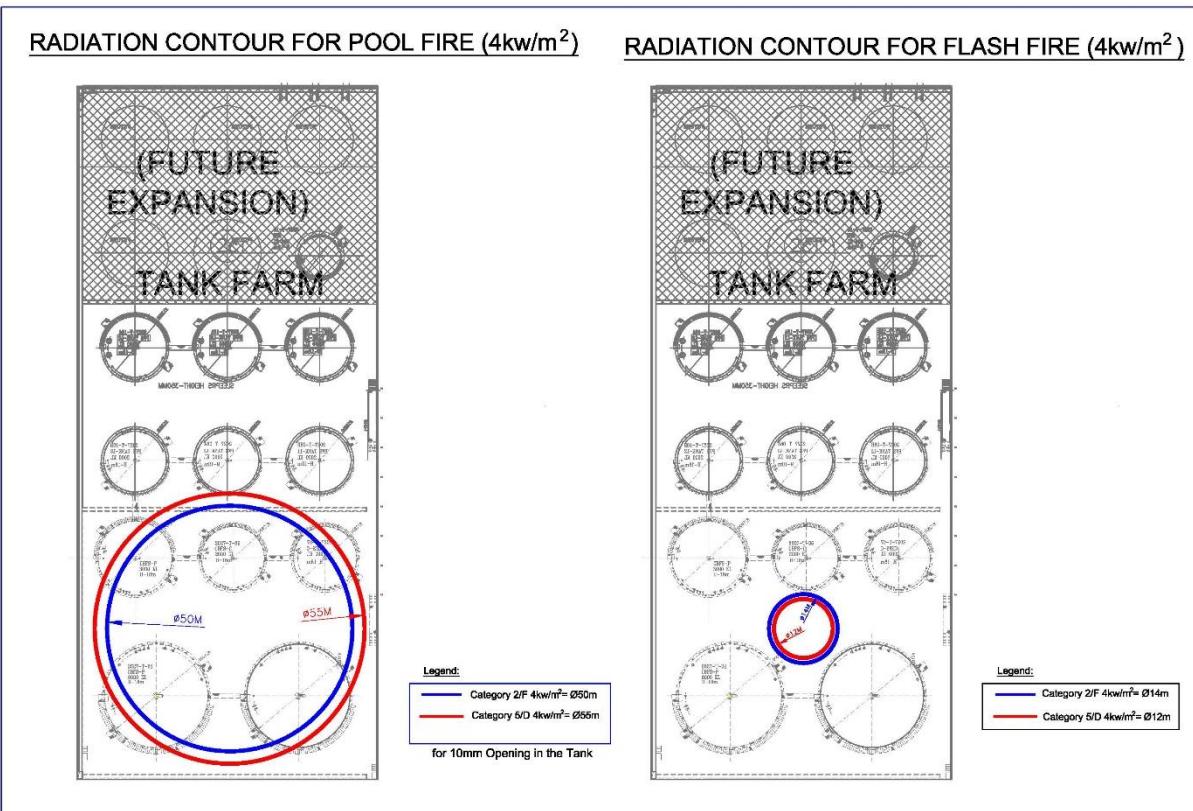


- Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

7.1.12 Risk Assessment Summary

The preliminary risk assessment has been completed for the proposed expansion of plant and associated facilities:

- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.



7.2 Disaster Management Plan

7.2.1 Objective

- To establish a method of systematic, safe and orderly evacuation in the least possible time, to a safe area or by the nearest safe means of way out.
- Control the accidents.
- Rapid control and containment of hazardous situation.
- Rescue and treatment of casualties.
- Safeguard people (both at site and neighborhood).
- Minimize damage to property and environment.
- Identify casualties, notify their relatives and render necessary help to them.
- Proper training of the concerned person.



- Prevent recurrence.
- Be capable of dealing with largest incident that can reasonably be foreseen.
- Have sufficient flexibility with a view to handling the emergency efficiently and avoiding unnecessary calling external agencies like fire brigade services.

7.2.2 Basic Forms of Emergency

- Fire
- Explosion
- Toxic release
- Natural disaster (earth quake, flooding, tsunami etc.)
- A combination of more than one

7.2.3 Types of Emergency

7.2.3.1 On-Site Emergency

An accident/ incident that take place in a factory, with effects being confined to the factory premises, involving only the persons working in the factory and the property inside the factory is called On-site Emergency. It can further be classified as minor and major emergency based on severity of the incident.

7.2.3.2 Minor Emergency (Evacuation is not required)

In the case of minor emergency there is no need for an evacuation siren and the respective department personnel will handle the same with assistance of Safety Squad.

7.2.3.3 Major Emergency (Evacuation is required)

In case of major emergency, there must be an emergency siren and situation is tackled as per the plan

7.2.3.4 Off-Site Emergency

If the accident is such that it affects inside the factory uncontrolled and it may spread outside the factory premises, it is called as Off-site Emergency.

Assessment reveals that an Off-site emergency is a very remote possibility in the factory. If situation dictates, local police may be availed to warn and advice the local public on mitigation in an emergency situation.

7.2.4 On Site Emergency Plan in Place with PCBL (TN) Limited

7.2.4.1 Purpose

The main purpose of preparing “On-Site Emergency plan” is to define responsibility for individuals and teams to control and mitigate emergency situation in a systematic way without affecting adjacent building, neighboring industry and public of the surrounding vicinity.

7.2.4.2 Emergency Organization

The effective control of emergency situations depends upon the way in which the individual and team acting during emergency in an appropriate time. So this is very essential to identify key individual and teams for fixing specific responsibility as part of emergency organization to avoid confusion.

The following are the important key persons and team identified as part of emergency organization.



- Emergency identifier
- Incident controller
- Chief controller
- Works controller
- Liaison team
- Fire and safety team
- First aid team
- Environmental team
- Internal communication team
- Task force team

7.2.4.3 Individual and Teams Roles and Responsibilities

The following are the individual and team responsibility of emergency organization. PCBL (TN) LIMITED has assigned the following roles to their responsible employees as applicable. Some suggested responsibility bearers may be Plant Manager, Head-Maintenance, Head-QC, Head- E&I, Head-Operation, Head-HSE, etc.

7.2.4.4 Incident Identifier

The person who is noticing an incident is called “Incident Identifier”. After noticing the incident he has to take the following action immediately.

In case of major incident, to inform the shift in charge about the incident. While informing, he has to tell his,

Name: -----

Location: -----

And nature of Incidents likes Fire, solvent leakage and Gas leak, etc.

Shout about the Incident like “Fire! Fire or “Leak! Leak” to gather people for help.

7.2.4.5 Shift in Charge /Manager

After receiving the information from Incident Identifier, the following are the action to be taken by Shift in Charge or Manager of the particular location:

- Assess the situation and inform the Works controller.
- Try to evacuate the people in that area including contract workers.
- Act as the incident controller till works controller reaches the spot.
- After handing over the charge to works controller, he should take the lead of controlling the situation with the available resource.

Note: In the absence of shift in charge the next responsible person should act as shift in charge.

7.2.4.6 Chief Controller

The following are the roles and responsibility of Chief controller during an emergency:

- After receiving the communication about the emergency he should reach the emergency control centre and take the control actions to control the overall incident.
- Keep communicating to works controller about the action to be taken to control the emergency either directly or through internal communication team.



- Send the required team to the emergency site to attend the emergency as per the requirement of works controller.
- Inform external agencies like fire brigade, ambulance or other vehicles through coordinator for liaison team.
- Arranging additional protective equipment through mutual help scheme through liaison coordinator.
- Instruct security department to close the gate and stop loading and unloading activities inside the plant and move the vehicles to safe location.
- Keep informs higher authorities either through liaison coordinator or by himself. Keep inform to kith and kin of the affected victims through liaison coordinator.
- Keep informs all the necessary statutory authorities through liaison coordinator.
- Keep inform to respective hospitals for arranging treatment for victims through liaison coordinator.
- Instruct liaison coordinator to receive press and media and keep them in conference hall.

7.2.4.7 Works Controller

After receiving the communication from incident controller and ensuring the incident to be a major one, he has to report to the chief controller about the incident and ask him to declare an emergency.

- Arrange for the evacuation of the people.
- Instruct shift in charges of respective plant and adjacent plant to stop the operation if needed.
- Instruct electrical department to isolate the power.
- Guiding the people to control and contain incident.
- Directing the team leader to take action according to their responsibility.
- Communicating various actions taken to control the incident to Chief controller either directly by phone or through internal communication coordinator.
- Informing to Chief controller about the external help as per mutual agreement.
- Informing to Chief controller about help of external fire brigades.
- Instruct environmental team to contain the effluent water without getting mixed with storm water gutter.
- Instruct safety and firefighting team to use right type of extinguishers and use hydrant system for fighting fire.
- Instruct safety and firefighting team to supply sufficient numbers of personal protective equipment to meet the emergency.

7.2.4.8 Liaison team

Immediately after receiving the communication about emergency, he should reach the emergency control centre and act as follows:

- Carefully receive the instruction from Chief controller and act accordingly.
- Instruct security to regularize the manpower at the assembling point.
- Instruct security to close the gate and restrict unwanted movement.
- Inform kith and kin of the affected victim as per the instruction of Chief controller.
- Receive representative from Press and Media and ask them to stay in conference hall and inform to chief controller.
- Inform all the statutory authorities as per the instruction from Chief controller.



- Arrange additional transport including ambulance as per the instruction of Chief Controller.
- Arranging food and other facilities for emergency team members and others.
- Keep informed hospital authorities for necessary arrangements for treating the victims.
- Make way for moving ambulance.
- Instruct security guards to move lorry/ tankers to safe location.
- Instruct security guards to evacuate contractor workers available inside the plant to assembling Point I or II depending upon the wind direction.
- Receive statutory authorities and inform to chief controller.

7.2.4.9 Fire and Safety Team

After receiving the communication about the emergency, he should reach the Emergency control centre along with Fire Squad and Fire Guards and report to the chief controller and act as follows:

- Try to extinguish the fire using suitable type of fire extinguishers or fire hydrant system or foam (AFFF) depending upon the material involved.
- Instruct fire guard to barricade the area.
- Ensure supply of necessary personal protective equipment and inform works controller to get additional equipment as per the mutual scheme.
- In case of leakage of chemicals, instruct people to contain the leakage by provide barricade using sand without mixing into storm water gutter by using necessary personal protective equipment.
- Helping first aid team to shift the victims.
- Instruct one of the fire squad to ensure fire water pump is running.
- Inform different action taken to control the emergency to works controller.

Note: In the absence of Head safety, the person next to him will act as the coordinator.

7.2.4.10 First Aid Team

After receiving the communication about the emergency, he should reach the Emergency control centre along with first aid team and report to the Chief controller and act as follows:

- Organize the first aid team and arrange first aid treatment to the affected persons.
- To arrange for immediate medical attention.
- After getting head count details search for missing person.
- Coordinate with Liaison coordinator for transporting the victims to the hospital.
- To arrange for required medicines.

7.2.4.11 Environment Team

After receiving information about the emergency, he should reach the spot of emergency along with his team and report to chief controller and take the following action.

- Contain the effluent generated during emergency and divert it to ETP without getting mixing up with storm water.
- Monitor the surrounding area and inform to works controller in case of any deviation.
- Mobilize suitable neutralizing agent through raw material stores.
- Ensure ETP collection tank is empty.



Note: In the absence of Head environment, the person next to him will act as the coordinator.

7.2.4.12 Internal Communication Team

After receiving the communication about the emergency, he should reach the spot of emergency and report to Incident controller and act as follows:

- Communicate the information given by Chief controller then and there to works controller by nearby intercom or by person and vice a versa
- Make all the necessary arrangements for communication system in case of failure of any system

Note: In the absence of Head Instrumentation, the person next to him will act as the internal communication team coordinator.

7.2.4.13 Task Force Team

After receiving the communication about the emergency, he should reach the spot of emergency and report to Incident controller and act as follows:

- Ensure evacuation of peoples and inform to Works controller.
- Inform chief controller about the stoppage of loading and unloading of lorry tanker and safe parking the same.
- Helping other teams like First aid and Liaison for arranging infrastructure for shifting victims.
- Arranging critical equipment as per the instruction of chief/works controller.
- Use appropriate personal protective equipment and arrange for transferring of chemicals either into spare tank or suitable container.
- Action to be taken for arranging sufficient number of barrels for transferring of chemicals. Use appropriate personal protective equipment and arrests the leak.
- Communicating works/chief controller about the additional facility needed for controlling either Toxic chemical leak or Gas leak.
- Cut off the power as per the instruction of works Controller.
- Ensure running condition of the DG.

Note: In the absence of Head Maintenance, the person next to him will act as coordinator.

7.2.5 Emergency Communication Facility

The effective communication is must to alert both people and emergency action teams to take action in controlling emergency in a stipulated time.

The following are the communication system, limited to communicating emergency situation, may be considered:

- Siren System for common evacuation.
- Siren system for Toxic release.
- Public Announcement System.
- Local alarm for fire.
- Megaphone
- Walkie Talkie

7.2.5.1 Siren System

The following are the two different types of siren used for communicating emergency.



➤ Wailing siren.

Wailing siren is used for declaring emergency. This is the type of siren having high and low frequency for the duration of 90 seconds.

➤ Continuous siren.

This is the type of siren used for declaring all clear about the emergency. This is the continuous siren of high frequency for a period of 90 seconds.

“Beep” sound for Toxic gas release.

7.2.5.2 Public Announcement System

The Public Announcement System via megaphone, etc., is provided for the effective communication about the Nature of emergency and its location so as to mobilize the individuals and action team to take timely action to control emergency without damaging men, property and environment.

This system is also used for communicating to the general public in the surroundings, about the emergency and various actions taken to control.

Declaration of Emergency

Both emergency siren and announcement will be operated from emergency control centre.

After receiving the information about emergency, the Security who is available in emergency control centre will note down,

- Name of the person intimated about emergency.
- Nature of Incident.
- Location.

After getting the instruction from chief controller, he actuates the wiling Siren for around 90 Seconds followed by Announcement given by using public announcement system and inform about the Nature of emergency and location.

Declaration of all clear

After controlling an emergency, based on the environment team report, works controller will inform Chief controller to declare all clear siren to allow people to resume their jobs. Based on the report from both works controller and Head count from HR, chief controller will instruct emergency control centre operator to declare “All Clear” using both siren and public announcement.

The security guard will actuate the “All Clear” siren of continuous high frequency for 90 Seconds and then inform through public announcement system stating “Emergency is cleared! All should resume their work”.

7.3 Offsite Emergency Plan

7.3.1 Preamble

An offsite emergency, arising out of chemical hazards is one which has potential to cause serious damage or loss of life beyond the plant boundary. In addition, Accidents during transportation of hazardous chemicals by road, rail, pipeline etc., can cause offsite emergencies. Emergency services such as Police, Fire, Medical etc., need to be prepared to handle such situations promptly and effectively. It is mandatory under Rule 16 of the Hazardous Chemical Rules for District authorities to prepare an off-site emergency plan in respect of clusters of hazardous chemical industries or at locations



where accidents are likely to have an off-site adverse effect. In order to be in a state of preparedness to respond to the accidents and minimize their adverse impacts on the offsite population, requires an offsite emergency plan to be prepared by the District Controller for every District or Industrial Areas as applicable.

7.3.2 Objective

The objective of the present assignment is to prepare an area specific Offsite Emergency Action Plan for the district which can be practically implemented / activated at a short notice to ensure minimal impact on life and property due to emergencies arising out of Chemical Accidents or during Transportation of Hazardous Chemicals in the district.

The plan should be regularly updated when there are changes occurring in the Industrial set up, Transportation Aspects, Key Manpower and Administrative Changes etc., Regular drills, Training of key persons, increasing safety awareness etc., is extremely important areas that must be looked into for sound preparedness.

7.3.3 Offsite Emergency Control

After the “Bhopal Gas Tragedy” (Methyl Isocyanides- MIC Poisonous and toxic gas release Accident at Union Carbide, 1984) the Government felt an immediate need to be more conscious about handling of Hazardous Chemicals. Central control room Centre or Offsite Industrial Emergency Control Room “OIECR” should be established by company. It should work under the Governing Council. The Governing Council should be headed under the chairmanship by District Collector & Magistrate.

The Governing Council Members are the permanent Ex. Officio Members to manage the affairs of the Emergency Control Room.

7.3.4 Emergency Instruction to the General Public

The Notification of Emergency

The emergency can be declared by following media to alert or alarm the public;

- Public address system
- Blow horns/Bells
- Sirens / Hooters
- Telephone message / Fax Messages / Hot lines/ Pager / E-mail / Mobile Phone / Satellite system.
- Sending messages through a messenger.
- Rushing personally to the Central Control Room or to the nearest Police Department or Fire Department for declaration of emergency.
- Rising of Flag for denoting the level of natural calamities.
- By any other source by which information can reach to the public in time.

Category of Alarm Systems

The following alarm system may be considered which will identify the various levels of emergency.

First Level Warning (Fire Alarm)

- For an accident / incident within the unit
- Siren – Short, intermittent

Second Level Warning



- When the District Authority receives information that a toxic or flammable gas has leaked then the siren has to be sounded in order to facilitate early evacuations from the unit.
- Siren – A wailing short and long intermittent siren notification of emergency.

Third Level Warning (All Clear)

- When the District Authority considers that the accident / incident is under control, emergency is withdrawing and it is safe for re-entry.
- Siren – A wailing, long and continues, intermittent siren.

Fire Fighting System

In order to tackle great risk of fire explosion, spillage of hazardous liquid or release of toxic gases, firefighting system should be mobilized under chief fire officer. The operational response will be coordinated from the Central Control Room.

General Instruction to the Public

A major emergency may affect areas outside the worksite. The surrounding public must be alerted with public address system by Police or Government Authorities or nearby industrial concerns. The siren must blow to indicate the emergency situation aroused.

The type of emergency aroused, must be communicated via telecommunication sources (Television, Radio, etc.,). The public may accordingly take prompt action to protect themselves in their then location or rush to the safe shelters, as instructed by the authority.

Public action must be to investigate the type of emergency aroused.

- Fire
- Explosion
- Gas Leakage / Release
- Collapse of Building, Bursting of Vessel etc.
- Natural Calamities.

If gas leakage emergency aroused, ascertain probability of gas whether flammable, toxic or poisonous. The following actions are suggested as per prevailing situation: Otherwise follow the instruction as issued by the authority.

Flammable Gas:

- Be calm.
- Do not light Cigarette etc.
- Shut down open flame, gas and electrical instruments or any source of ignition.
- Do not move any vehicle in the area.
- Do not go near the incident & don't allow anyone else either.
- Shut down the windows, doors etc & seal open ground or terrace.
- Follow the instruction as directed by the authority.

Toxic Poisonous Gas

- Cover your nose with wet hand kerchief/ cloth and breathe through it.
- Come out in open, check the wind direction and move away quickly in perpendicular direction of wind. (Cross wind direction).
- Immediately try to get to a higher elevation, if gas is heavier than air (like chlorine, as it settles in low lying area).



-
- Follow the instruction and reach safe shelter as instructed notified by Government Authority or Public authority.

General Instruction:

Don't

- Do not get panicky, be calm.
- Do not approach the site of incident as a spectator.
- Does not approach unnecessarily for information or more enquires.
- Do not allow unnecessarily crowd nearby incident place.
- Do not believe in rumors unnecessarily.

Do's

- Listen radio, TV or Public Addressing System.
- Emergency will be communicated by public addressing system / TV / Radio or siren (Siren- code wailing sound for one minute).
- Follow the instruction & convey to others accordingly.
- On announcement of withdrawal of emergency or clearance Siren, start your routine work.
- On enquiry, deposit your statement as required by authority at the time of investigating the incident.
- Co-operate, help and assist the person(s) / authority handling the emergency and rescue operation.

Security & Police

Security, protection of life & property and traffic control & maintenance of law and order should be taken care of by police. During an emergency duties and responsibilities of the police may be:

- Cordonning of the incident area.
- Warning public about the hazards.
- Traffic Control Assist firefighting.
- Services Assist first-aid medical teams.
- Assist evacuation and ensure protection of property in evacuated areas.

Before the Crisis

Proper planning of manpower, transport and communication network to coordinate possible incident areas and regulation of traffic should be made for each industry in the area.

During the Crisis

The Security Commander of the area will set in motion the relevant contingency plan to control the operation.

After the Crisis

Protect property in the evacuated area.

Media

The Control Room should release up-to-date information through the media to the people.



7.4 Occupational Health Hazard and Safety Program for the Project

Occupational Health is eventually a branch of preventive medicine which examines the relationship between work and health and effects of work on the health of the worker. Occupational health service is operated to achieve the statutory declared aim of occupational health by medical and technical measures. Its role is mainly preventive and to give first aid and emergency treatment. It is certainly useful in early detection of any occupational or non-occupational disease or any man-adjustment of the man-job relationship.

7.4.1 Occupational Health and Safety Program

- Medical examinations: Pre-employment, periodic and others
- Supervision of the working environment industrial hygiene, safety, job analysis and adaptation of the job to the worker in good working conditions.
- Advice to management and worker.
- Health education and training.
- Health statistics.
- Medical treatment-first aid, emergency and ambulatory treatment.
- Health counseling-individual.
- Nutrition.
- Research in occupational health.
- Co-operation with other services in the undertaking.
- Collaboration with external services.

Other purposes of industrial medical services are:

- Identifying the Hazards
- Preventing or minimizing the Hazards
- Curative treatment in case of exposure
- Determining the Compensation for damages

The working personnel shall be given the following appropriate personnel protective equipments.

- Industrial Safety Helmet;
- Face shield
- Welders equipment for eye and face protection;
- Ear muffs;
- Self-contained breathing apparatus;
- Leather apron;
- Aluminized fiber glass fix proximity suit with hood and gloves;
- Boiler suit;
- Safety belt/line man's safety belt;
- Leather hand gloves;
- Acid/Alkali proof rubberized hand gloves;
- Canvas cum leather hand gloves with leather palm;
- Electrically tested electrical resistance hand gloves; and
- Industrial safety shoes with steel toe.

7.4.2 Expected Occupational Health Hazards & Safety

- Physical Hazards: Noise, Heat, Dust



- Chemical Hazards: Corrosive, Toxic Substances, Irritants, Carcinogens, Chemical emissions
- Psychological hazards resulting from stress and strain
- Hazards associated with the non-application of ergonomic principles, for example badly designed machinery, mechanical devices and tools used by workers, improper seating and workstation design, or poorly designed work practices

7.4.3 Periodic Medical Examination

It is proposed that client will ensure that workers employed shall be medically examined by a qualified medical practitioner/Factory Medical Officer, in the following manner:

- Once in a period of 6 months, to ascertain physical fitness of the person to do the Particular job;
- Once in a period of 6 months, to ascertain the health status of all the workers in respect of occupational health hazards to which they are exposed and in cases where in the opinion of the Factory Medical Officer it is necessary to do so at a shorter interval in respect of any workers;
- In periodic and pre-medical examinations, various parameters will be checked. Viz., LIVER FUNCTION TESTS, Chest X-rays, Audiometry, Spirometry, Vision testing (Far & Near vision, color vision and any other ocular defect) ECG and other parameters as will be found necessary as per the opinion of Factory Medical officer.

No person shall be employed for the first time without a certificate of granted by the Factory Medical Officer.

7.4.4 EMP for The Occupational Safety & Health Hazards

Mitigation Measures for OSH: It is proposed to formulate and implement a structure for Occupational Safety and Health with following aims

- To keep air-borne concentration of toxic and hazardous chemicals below PEL and TLV.
- Protect general health of workers likely to be exposed to such chemicals
- Providing training, guidelines, resources and facilities to concerned department for occupational health hazards.
- It is proposed that this EMP be formulated on the guidelines issued by Bureau of Indian Standards on OH&S Management Systems: IS 18001:2000 Occupational Health and Safety Management Systems
- Proposed EMP will be incorporated in Standard Operating Procedure also.

The proposed EMP will also include measure to keep air-born concentration of toxic and hazardous chemicals below its PEL and TLV, like...

- Leak Surveys
- Separate storage for toxic chemicals
- Exhaust Ventilation
- Proper illumination
- Close processes to avoid spills and exposures
- Automation of process operations to hazards of manual handling of chemicals
- Supply of proper PPEs like Air mask, Breathing canisters, SCBA sets, On-line breathing apparatus at the places where there is possibility of presence of toxic chemicals



- Decontamination procedure for empty drums and carboys.
- Regular maintenance program for pumps, equipment, instruments handling toxic and corrosive chemicals
- Training to persons handling toxic and corrosive chemicals

7.4.4.1 Arrangements for Ensuring Health & Safety of Workers Engaged in Handling of Toxic Materials

- The top management is committed towards safety & employees' well-being is the numerous no and safety always takes precedence over production.
- Each and every process will be assessed with safety tools like HAZOP, JSA, PSSR, JRA etc.
- Emergency Response Team will be formed and mock drills will be conducted regularly.
- Appropriate engineering controls will be provided to prevent any mishap.
- Scheduled preventive maintenance will be carried out in the plant including that of safety equipment.
- Standard Operating Procedures will be provided to workers to ensure that all the work is done in a safe manner.
- Signage's will be provided wherever required, instructing them to use PPEs and other safety equipment.
- MSDS will be displayed at strategic locations. PPE matrix, Brief SOPs and chemical compatibility charts shall be displayed at prominent locations.
- Contract workmen will be imparted induction training, Safety training on process and Health & safety awareness on a regular basis.
- Well established permit to work system will be in place.
- All incidents including near misses will be investigated and learning's will be shared with all relevant personals.
- All employees will undergo pre-employment & periodical medical check-up ensuring their well-being.
- Workplace monitoring will be carried out to ensure there will no adverse health effect on workers.

7.4.4.2 Workplace Monitoring Plan

- It is proposed that a Workplace Monitoring Plan to be prepared & implemented in consultation with FMO and industrial hygienists.
- Each workplace must be evaluated to identify potential hazards from toxic substances or harmful physical agents. Air-borne concentration of toxic chemicals will be measured and record will be kept.
- The current state-of-the-art exposure measurement model is as follows: For purposes of measuring worker exposure across a single shift it is sufficient to place a reasonably accurate exposure measuring device on the worker, within the worker's breathing zone, and have it operate for nearly the full shift. Client will propose to study the exposure data when the plant is operative.
- Permanent changes to workplace procedures or work location to be done if it is found necessary on the basis of findings from workplace Monitoring Plan.

7.4.4.3 Health Evaluation of Workers

It is proposed that management will devise a plan to check and evaluate the exposure specific health status evaluation of workers.



M/s. PCBL (TN) LTD is committed towards the Health and Safety of workers and provided a facility of pre-medical and regular medical check-up of employees for detecting any kind of adverse effect on the health of employee due to the chemical or work place condition and will provide opportunity to improve the working condition. The workers exposed to fugitive emission will be provided with some protective devices like dust mask to prevent respiratory disorders. The workers exposed to higher noise level will be provided with ear muffs/ ear plugs. The protective devices will be provided to the employees who are exposed to any kind of hazard. Proper handling of the materials and the maintenance of Material Safety Data Sheet (MSDS) will be followed to ensure safety within the plant area. A regular monitoring of the Occupational Health and Safety will reduce the chances of accidents hence all the records of job related accidents and illness shall be maintained as per the requirements of factory act.

Workers will be checked for physical fitness with special reference to the possible health hazards likely to be presented where he/she is being expected to work before being employed for that purpose. Basic examinations like Liver Function tests, chest x ray, Audiometry, Spirometry Vision testing (Far & Near vision, color vision and any other ocular defect) ECG, etc. will be carried out. However, the parameters and frequency of such examination will be decided in consultation with Factory Medical Officer and Industrial Hygienists.

7.5 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. Safety plan shall be prepared and implemented in the project activity. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in the plant is possible due to collapse of structures and fire/explosion etc.

- The proponent would formulate safety policy keeping in view the safety requirement during construction, operation, maintenance phases, with the following regulations:
- To allocate sufficient resources to maintain safe and healthy conditions of work;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate firefighting service together with training facilities for personnel involved in this service;



- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees
- To prepare separate safety rules for each type of occupation/processes involved in a plant; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

7.5.1 Safety Organization

Construction and Erection Phase

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions.

Operation and Maintenance Phase

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined thereof.

7.5.2 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of about five to six employees from that area. The circle normally shall meet for about an hour every week.

7.5.3 Safety Training

Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets shall be distributed.

Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentalization of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual firefighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and firefighting; and



- Proper fire watching by all concerned would be ensured.

7.5.4 Health and Safety Monitoring Plan

The health of all employees shall be periodically monitored for early detection of any ailment due to exposure to heat and noise.

7.5.5 Training, Rehearsal & Records

7.5.5.1 Need of Training & Rehearsal

Training is important in order to

- Teach worker's how to handle chemicals safely, how to act as a runner/messenger, how to use PPE, how to start and shut down the plant, how to carry out emergency repairs etc.
- Teach one to be a safe and alert worker.

Rehearsal is essential for

- Explaining and making key personnel and essential workers aware of their role in case of an emergency.
- Testing the emergency procedure, emergency arrangements and ability of all involved with it to grasp the procedure and implement the same.
- Testing the effectiveness of communication system including the alternative arrangement in case of failure.
- Testing the speed of mobilization of resources, search, rescue and treatment of casualties, emergency isolation and shut down.
- Detecting the shortcomings in the emergency plan and incorporating remedial measures.
- Allowing professional emergency services to test their parts of the plan and testing co-ordination.
- Building confidence in workers which is helpful in facing real situations.

Training shall be given to regular employees and contract personnel also. Effective and latest teaching aids will be used to train workers and supervisory staff. Such training courses shall be conducted once in a year and co-ordination with offsite personnel shall be sought during such training. Records will be maintained for training.

7.5.5.2 Records and Updating the Plan

All records of On-Site and Off-Site Emergency Plan and modifications by experience and suggestion, the rehearsals and conclusions of such plans and the enquiries shall be well maintained and preserved. The necessary data bank shall be also maintained for the utility of industries and others. New information and the deficiencies identified during the rehearsal is reviewed and incorporated in the document for continual updating of the plan and such information shall be communicated to the concerned authorities.

7.5.6 Do's & Don'ts

Do's:

- Store used oil at proper place as per plant guidelines.
- Use lubricating oil carefully to avoid spillage on ground.
- Use lubricating oil as per requirement.
- Use minimum amount of water wherever it is required as per plant guidelines.
- Waste disposal system for all plants should be separate.



- Avoid spillage of liquid, hand gloves, cotton waste on road, which will cause pollution. Recycle or dispose that material.
- Use cleaning equipment carefully. (i.e. cotton waste, oil & chemicals)
- Place all the equipments (i.e. Fire Hose, Rubber Pipe and Chisel) at proper place.
- Handling of chemicals should be as per plant guidelines to avoid undesired chemical reaction.
- Safety training and correct use of PPE's must for all the employees.
- Environment guidelines should follow during cleaning of vessels, Tank, channels etc.
- Follow shift in charge's instructions during loading or unloading of chemicals.
- In case of fire or any accident, immediately inform responsible person.
- In case of emergency, inform operator as well as control room.
- Area of work during excavation, radiography, sand blasting shall be cordoned with warning tags of "work in progress", "no entry", "radiography" in progress' etc.
- Switch off lights and computers when not in use.
- Shut the water cock properly when not in use.
- Always follow safety rule during the plant operation.

Do's during shut down:

- All equipment, vessels, lines where hot work is envisaged shall be purged, flushed thoroughly and positively isolated. Similar precautions should be taken for vessel entry also.
- Back flow of materials from sewers, drains should be avoided by proper isolations. In case of confined space entry and other cleaning jobs etc. which are to be carried out by the process department, vessel entry permit should be issued to immediate supervising officer/operator by shift in charge. This permit should be renewed by incoming shift in charge during every shift.
- Hoist, Platform, cages used for lifting persons or to send persons inside vessels by such means must be of sound construction with wire ropes slings, etc. to avoid failure.
- All steam, condensate, hot water connections should be made tight with clamps.
- Nitrogen hazard should be kept in mind. All nitrogen sources should be positively isolated from vessels/confined spaces to avoid oxygen deficiency where vessel entry is required.
- All nitrogen hoses used for purging before vessel entry should be removed from source/utility point.
- All underground sewers shall be flushed, protected from sparks.
- Full PPEs like PVC suits, gum boots, face shield & other required shall be used while draining, flushing and other reclaiming activities to avoid burn, poisoning etc.
- Wet asbestos cloth/metallic plate should be used to collect flying sparks.
- Water, steam flushing, nitrogen blanketing shall be continued where spontaneous combustion takes place. Precautions should be taken for pyrophoric nature of material.
- Temporary electrical connections, cords, boards and other electrical fixtures should be of sound material to prevent electrical shock.
- Oil spillage in the pit of oil slope tank should be cleaned with water/sand.
- Proper approach like aluminum ladder should be provided to reach to the platforms of scaffolding and ladder must be tied.



- All clumps of scaffolding should be tightened properly and planks should be tied at both ends and supported at proper distances along span to avoid sagging and failure.
- Always use safety belt while working at height of more than 2 meters and ensure tieing the life line of safety belt with firm support.
- Ensure area cordonning for hot work, X-ray, excavation, hazard material temporary storage.
- Ensure proper tagging of valves, switches etc to prevent its use.
- Ensure proper guidance to workman and make him aware about local area hazards before start of the job.
- All welding machines should be provided with power isolation switch of suitable rating.
- Portable electrical appliances/tools earthing should be in good working condition. Insulation portion should be free from damages.
- All electrical cables should be joints free and connection taken by using three pin plugs.
- While inserting fuse all care should be taken so that no one touches conductor to avoid the shock to the persons.
- During hydro jetting work workers should wear hand gloves, safety helmet goggles and PVC suit.

Don'ts:

- Do not use fire hydrant water for washing/bath purpose.
- Do not use water for cleaning purpose, use broomstick if possible.
- Do not wash or clean trolley, tractor or trucks which are used for chemical/fertilizer's transportation. Wash them at proper place.
- Smoking & carrying matchbox, cigarettes, lighter, bidis etc. are prohibited.
- Photography & carrying cameras/Mobile phones are strictly prohibited in all areas.
- Do not spill liquid or chemicals in open atmosphere.
- The use of Radio Active Source within the plant shall not be allowed without obtaining valid permission/work permit and intimation in the form of a circular to all plant persons shall be given in advance.
- Unauthorized entry into any battery limit of plant is strictly prohibited.
- Sitting or walking on rail tracks, crossing between wagons, taking rest under stabled wagons, crossing the rail through the openings underneath the stationary wagons are strictly prohibited.

Don'ts during shut down:

- Do not use gasket or other blinds as it can fail during job. All blinds should be metallic.
- No toxic/corrosive/irritating materials should remain plants or sections where hot work is to be carried out.
- No hot work should be permitted in battery limits near sewers till areas have been cleaned flushed properly.
- No hot work irrespective of place of area shall be done without valid permit.
- No combustible material shall be there in flare line for taking up of flare line job. Isolations shall be ensured.



7.5.7 Process Safety

- Safety measures will be adopted from the design stage.
- Safety Valve and pressure gauge will be provided on reactor and its jacket (if jacket is provided).
- Utility like Chilling, cooling, vacuum, steaming and its alternative will be provided to control reaction parameters in a safe manner.
- Free Fall of any flammable material in the vessel will be avoided.
- Static earthing provision will be made at design stage to all solvent handling equipments, reactors, vessels & powder handling equipments.
- Any reaction upsets will be confined to the reaction vessel itself.
- All emergency valves and switches and emergency handling facilities will be easily assessable.
- Further all the vessels will be examined periodically by a recognized competent person under the Gujarat Factory Rules.
- All the vessels and equipments will be earthed appropriately and protected against Static Electricity. Also for draining in drums proper earthing facilities will be provided.
- Materials will be transferred by pumping through pipeline or by vacuum from drums.
- All solvents and flammable material storage tanks will be stored away from the process plant and required quantity of material will be charge in reactor by pump or by N2 pressure transfer.
- Jumpers will be provided on all solvent handling pipeline flanges.
- Caution note, safety posters, stickers, periodic training & Updation in safety and emergency preparedness plan will be displayed and conducted.
- Flame proof light fittings will be installed in the plant.
- All the Plant Personnel will be provided with Personal Protection
- Equipments to protect against any adverse health effect during operations, leakage, spillages or splash. PPE like Helmets, Safety Shoes.
- Glasses, Acid-Alkali Proof Gloves etc. will be provided to the employees.
- All employees will be given and updated in Safety aspects through periodic training in safety.
- Material Safety Data Sheets of Raw Materials & Products will be readily available that the shop floor

For Hazardous Storage Farm

- Farm will be constructed as per explosive department requirement and separation distance will be maintained.
- Tanks shall be located and marked in designated area of hazardous chemical storage.
- Static earthing provision will be made for road tanker as well as storage tank.
- Tanks of proper MOC will be selected.
- Flame arrestor with breather valve will be provided on vent line.
- Road tanker unloading procedure will be prepared and implemented.
- Fire load calculation will be done and as per fire load Hydrant System will be provided as per NFPA std. and Fire extinguishers will be provided as per fire load calculation.
- Spark arrestor will be provided to all vehicles in side premises.



- Flame proof type equipments and lighting will be provided.
- Lightening arrestor will be provided on the top of chimney.
- Trained and experience operator will be employed for tank farm area.
- NFPA label (hazard identification) capacity and content will be displayed on storage tank.
- Solvents will be transferred by pump only in plant area and day tank will be provided. Overflow line will be return to the storage tank or Pump On-Off switch will be provided near day tank in plant.
- Jumpers will be provided on solvent handling pipe line flanges.
- Flexible SS hose will be used for road tanker unloading purpose and other temperature connection.
- All tanks shall be uniformly tagged.
- Level indicator shall be provided in tanks.
- Dyke will be provided.
- Industrial type electric fittings shall be provided.
- Adequate firefighting equipments will be provided.
- Anti-corrosive paint shall be done.
- Safety instruction board will be displayed.

Transportation

- Road tanker unloading procedure will be in place and will be implemented for safe unloading of road tanker.
- Static earthing provision will be made for tanker unloading.
- Earthed Flexible Steel hose will be used for solvent unloading from the road tanker.
- Fixed pipelines with pumps will be provided for solvent transfer up to Day tanks/reactors.
- Double mechanical seal type pumps will be installed.
- NRV provision will be made on all pump discharge line.

7.5.8 Fire Fighting System

Fire and Toxicity Control Arrangement

- Necessary equipment and facilities for controlling fire and toxicity like fire extinguisher, hydrant system, foam storage, Safety shower and Self Contained Breathing Apparatus will be provided as per Section 38 (1) in The Factories Act, 1948
- Emergency siren for emergency declaration.
- Safe means of escape for all persons in the event of a fire and toxicity
- Emergency siren for emergency declaration.
- Types of Portable Fire Extinguishers as below:

Sl.No.	Type of Fire-Extinguisher	Capacity
1	DCP Type F.E.	05 Kg / 10 Kg
2	CO2 Type F.E	4.5 Kg / 22.5 Kg
3	Mechanical Foam	9.0 Liter / 50 Liter
4	ABC Type F.E.	01 Kg / 05 Kg

- Fire Blankets.



- Safety interlocking systems with production equipments. And Flammable chemical unloading,

Fire Alarm

200 V AC operated fire alarm, with manual call points shall be provided in plant call points location to start, activate alarm, siren shall be indicated in site plant provided in ECC, control rooms and OHC. Zone indication is received at main gate. To identify problem area and communicate to main gate security officer, coordinate with OHC / fire station, to organize help to respective zones with ambulance and fire tender.

7.6 Public Consultation

As per Para 7 (i) Stage III (3)(i)(b) of the EIA notification, 2006, all projects or activities located within industrial estates or parks (item 7(c)of the Schedule) approved by the concerned authorities, and which are not disallowed in such approvals.

The unit is located in Industrial Complex of SIPCOT (State Industries Promotion Corporation of Tamil Nadu Limited). M/s. State Industries Promotion Corporation of Tamil Nadu obtained Environmental Clearance from MoEFCC, New Delhi vide letter No. 21-41/2009. IA III dated: 09/08/2010. Hence Public Hearing is exempted.

7.7 Demographic & Socio – Economic

For assessing the prevailing socio-economic aspects of people in the study area around the proposed expansion of the industry, the required data has been collected from various secondary sources and analyzed.

7.7.1 Demographic aspects & Socio – Economic of Thiruvallur district

7.7.1.1 Demographic aspects

The below **Table 7.12** represents the Distribution of Population within Thiruvallur district

Table 7.12 Summary of Distribution of Population within Thiruvallur district

SI.No.	Particulars	Tiruvallur district	Unit
1	No. of Households	946949	Nos.
2	Male Population	1876062	Nos.
3	Female Population	1852042	Nos.
4	Total Population	3728104	Nos.
5	Sex ratio	987	
6	Number of villages and Town	675	Nos.
7	SC Population	821646	Nos.
8	ST Population	47243	Nos.
9	Total Working Population	1538054	Nos.
10	Main Workers	1247918	Nos.
11	Marginal Workers	290136	Nos.
12	Cultivators	73444	Nos.
13	Agricultural Labourers	270586	Nos.
14	Household Industries	58240	Nos.
15	Other Workers	1135784	Nos.
16	Literates population	2791721	Nos.

Source: District Primary Census Hand Book – Thiruvallur District, 2011



7.7.1.2 Education Facilities

The district has recorded higher literacy rate (84%) as compared with the State literacy rate of 80.1% Thiruvallur stands at the sixth place in the case of percentage of literacy. The Literacy rate of the district is 84% in 2011 which is increased from 76.9% in 2001, against to the literacy rate of the state as 80.1%. The literacy of females stood at 78.3% as compared to 89.7% for males. The female literacy rate is considerably increased in the district from 68.4% in 2001 to 78.3% in 2011. It is interesting to note that urban literacy of Thiruvallur district (85%) and the literacy of Chennai district (85.3%) is apparently equal. The table below shows that rural literacy rate of 2011 among males and females got considerably increased from 2001.

Table 7.13 Education Infrastructures in Thiruvallur District

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

(Courtesy: Census Dept., GOI)

7.7.1.3 Health Facilities

Primary Health Centers (PHCs) and Health Sub-centers (HSCs) are providing the preventive, curative and rehabilitative health care services to the rural people. The district has good number of public health systems accessible and affordable apart from the private health facilities. **Table 7.14** provides the health facilities data in all villages falling within the area of interest.

Table 7.14 Medical Facilities available in Tiruvallur District

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

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



7.7.1.4 Methodology adopted for the Study area

The methodology adopted for the study is primarily based on the review of secondary data, such as District Primary Census Statistical Handbook of Thiruvallur District, 2011 for the parameters of demography, occupational structure of people within the study area of 10km radius around the project site. The village wise demographic data as per 2011 census is presented in **Table 7.20**. The salient features of the demographic and socio-economic aspects of the study area are described in the following sections.

7.7.1.5 Demographic Aspects

As per 2011 census the study area consisted of 1,01,222 persons inhabited in the 10km radius study area. The distribution of population in the study area is shown in **Table 7.15**. The males and females constitute about 49.29% and 50.71% of the study area.

Table 7.15 Distribution of Population in Study Area – 2011

Sl.No	Particulars	Study Area	Unit
1	No of Households	26353	Nos.
2	Male Population	49888	Nos.
3	Female Population	51334	Nos.
4	Total Population	101222	Nos.
5	Sex ratio	987	
6	Average Household Size (Persons)	4.00	Nos.

Source: District Primary Census Hand Book – Thiruvallur District, 2011

7.7.1.6 Average Household Size

The study area had an average family size of 4 persons per household in 2011. This is moderate family size and is in comparison with the other parts of the district.

7.7.1.7 Sex Ratio

The configuration of male and female indicates that the males and females constituted about 49.29% and 50.71% of the total population respectively, as per 2011 census records. The study area on an average had 987 females per 1000 males as per 2011 census.

7.7.1.8 Social Structure

In the study area, as per 2011 census, 36.86% of the population belonged to Scheduled Castes (SC) and 5.47% to the Scheduled Tribes (ST). This indicates that a considerable share of population in the study area belong to weaker sections which works out to about 42.33% of the total population in 2011. The distribution of population in the study area by social structure is shown in **Table 7.16**.

Table 7.16 Distribution of Population by Social Structure – 2011

S. No	Particulars	Population	Percentage (%)
1	Scheduled caste	37,314	36.86
2	Scheduled tribe	5535	5.47
3	Other castes	58373	57.67
	Total	101222	100



7.7.1.9 Literacy Levels

The analysis of the literacy levels in the study area reveals a moderate literacy rate in the study area. The literacy rate of the study area is 61.74% in 2011. If this is computed only for the people of above the age group of 5 years, i.e. the school going age people, this would considerably increase the literacy rates. The distribution of literates and Illiterates in the study area is given in **Table 7.17**.

Table 7.17 Distribution of Literates and Illiterates – 2011

Sl. No.	Particulars	Study Area
1	Total Literates	62496
2	Average Literacy Rate (%)	61.74
3	Male Literates	34430
4	Male Literacy (%)	34.01
5	Female Literates	28066
6	Female Literacy (%)	27.72
7	Total Illiterates	38726
8	Average Illiteracy Rate (%)	38.25
9	Male Illiterates	15458
10	Male Illiteracy (%)	15.27
11	Female Illiterates	23268
12	Female Illiteracy (%)	22.98

Source: District Primary Census Hand Book – Thiruvallur District, 2011

7.7.1.10 Occupational Structure

The occupational structure of the study area is presented in **Table 7.18**.

Table 7.18 Occupational Structure – 2011

Sl. No.	Occupation	Study Area	
		Population	Percentage (%)
1	Total main workers	39452	38.98
2	Marginal workers	8965	8.85
3	Non-workers	52805	52.17
Total Population		1,01,222	100

7.7.1.11 Health Facilities within the study area

The majority of people visit nearby Hospitals/health services provided by the Government. The area has good public health facilities at easily reachable distances. Even for any minor ailments they contact medical facilities immediately as it is very accessible. The local transport facilities and the communication facilities are the main reasons to get immediate medical attention. The emergency medical service facility “108” is very familiar and being used by the people in this area. The incidents of institutional delivery are high due to awareness, education, economic development, proximity to health delivery system. The Infant mortality rate and the maternal mortality rate have significantly reduced.

Table 7.19 Health Facilities within the study area

Sl. No	Type	Study area
1	Community health centre	0
2	Primary health centre	3
3	Primary health sub-centre	24



Sl. No	Type	Study area
4	Maternity and Child Welfare Centre	7
5	TB hospital/Clinic	3
6	Hospital Allopathic	0
7	Hospital Alternative Medicine	1
8	Dispensary	3
9	Veterinary hospital	10
10	Mobile health clinic	0
11	Family Welfare Centre	3
12	Non-Government Medical facilities Out Patient	4

(Courtesy: Census Dept., GOI)

Table 7.20 Demographic Data of the villages fall in 10 km radius study area

Sl. No	Name	No of House holds	Total Population Person	Total Population Male	Total Population Female	Population in the age group 0-6 Person	Scheduled Castes population Person	Scheduled Tribes population Person
UTHUKOTTAI								
1	Vadathillai	161	598	307	291	52	0	94
2	Mambakkam	495	1911	953	958	192	1019	17
3	Thamarai kuppam	281	1017	493	524	157	0	255
4	Senjiagaram	356	1394	651	743	175	377	418
5	Palavakkam	764	3013	1501	1512	324	1214	723
6	Sirunai	0	0	0	0	0	0	0
7	Sengarai	372	1368	670	698	178	427	123
8	Rallapadi	1030	4104	2067	2037	452	1122	158
9	Ellapuram	113	448	219	229	41	320	0
10	Ariapakkam	394	1596	784	812	135	547	34
11	Athupakkam	254	922	458	464	101	0	0
12	Vannankuppam	350	1390	699	691	160	360	0
13	Thoddareddykuppam	76	242	120	122	17	25	0
14	Kaiyadai	73	306	161	145	39	248	5
15	Kilakarmanur	166	633	309	324	69	463	0
16	Soolaimani	337	1199	591	608	117	332	6
17	Lachivakkam	652	2481	1218	1263	249	646	104
18	Perandur	683	2502	1265	1237	246	987	45
19	Tharatchi	906	3187	1547	1640	316	1119	218
20	Panapakkam	518	1936	968	968	197	838	79
21	Sennankaranai	535	1821	887	934	170	98	21
22	Tholavedu	302	1099	532	567	110	681	3
23	Kakkavakkam	357	1337	668	669	122	764	0
24	Paruthimerikuppam	106	371	177	194	38	0	0
25	Thumbakkam	155	553	265	288	66	0	0
26	Thandalam	419	1594	781	813	172	322	30
27	Chittraiyampakkam	0	0	0	0	0	0	0
28	Melmaligaipattu	290	1113	560	553	137	905	0
29	Velagapauram	631	2372	1181	1191	239	1012	17
30	Enambakkam	168	629	300	329	84	0	49
31	Kalpattu	580	2050	1016	1034	237	482	8
32	Palavakkam R.F.	0	0	0	0	0	0	0
GUMMIDIPOONDI								
33	Chedilpakkam	329	1369	671	698	163	724	2
34	Nemalur	1106	4251	2086	2165	416	1724	476



Sl. No	Name	No of House holds	Total Population Person	Total Population Male	Total Population Female	Population in the age group 0-6 Person	Scheduled Castes population Person	Scheduled Tribes population Person
35	Budur	495	1863	934	929	173	1160	30
36	DharkasthuKandigai m	0	0	0	0	0	0	0
37	Varnasikuppam	0	0	0	0	0	0	0
38	Kannankottai	538	2008	987	1021	227	1256	75
39	Siruvada	196	795	393	402	82	524	0
40	Panchalai	417	1505	738	767	161	540	4
41	Vaniamallee	416	1518	755	763	165	672	112
42	Poovalambedu	268	1056	547	509	110	692	0
43	Periapuliyur	195	683	345	338	50	405	0
44	Kollanur	164	525	262	263	52	0	0
45	Thervoy	792	3122	1558	1564	359	2433	4
46	Karadipudur	500	1926	963	963	220	718	28
47	Madhavaram	0	0	0	0	0	0	0
48	Mukkarambakkam	869	3488	1768	1720	420	1829	341
49	Nelvoy	476	1632	816	816	155	335	0
50	Sepedu	61	231	113	118	23	205	0
51	Madaharpakkam (CT)	1109	4250	2082	2168	479	359	377

SATYAVEDU

52	ChinnaEetivakam	225	813	413	400	85	300	79
53	Kothamarikuppam	694	3230	1316	1914	262	1277	416
54	Narasaraju Agraharam	259	977	485	492	95	7	59
55	Dalavai Agraharam	508	2245	1024	1221	214	1164	23
56	Satyavedu	2897	11474	5799	5675	1145	2756	888
57	VenkataraJ Khan driga	199	766	379	387	95	210	20
58	Madanambedu	1046	4045	1999	2046	407	1248	54
59	Madanamjeri	138	576	294	282	84	254	0
60	Peradam	161	609	278	331	73	63	124
61	Sirunambudur	377	1570	771	799	200	1290	13
62	Kadirvedu	394	1509	764	745	182	861	3
Total		26353	101222	49888	51334	10689	37314	5535

Table 7.21 Literacy Rate of the villages fall in 10 km radius study area

Sl. No	Name	Total Population Person	Literates Population Person	Literates Population Male	Literates Population Female	Illiterate Persons	Illiterate Male	Illiterate Female
UTHUKOTTAI								
1	Vadathillai	598	299	184	115	299	123	176
2	Mambakkam	1911	1194	690	504	717	263	454
3	Thamaraikuppam	1017	388	214	174	629	279	350
4	Senjiagaram	1394	741	400	341	653	251	402
5	Palavakkam	3013	1958	1065	893	1055	436	619
6	Sirunai	0	0	0	0	0	0	0
7	Sengarai	1368	811	438	373	557	232	325
8	Rallapadi	4104	2854	1585	1269	1250	482	768
9	Ellapuram	448	299	160	139	149	59	90
10	Ariapakkam	1596	1055	579	476	541	205	336
11	Athupakkam	922	556	338	218	366	120	246



Sl. No	Name	Total Population Person	Literates Population Person	Literates Population Male	Literates Population Female	Illiterate Persons	Illiterate Male	Illiterate Female
12	Vannankuppam	1390	843	490	353	547	209	338
13	Thoddareddykuppam	242	159	91	68	83	29	54
14	Kaiyadai	306	167	98	69	139	63	76
15	Kilakarmanur	633	399	213	186	234	96	138
16	Soolaimani	1199	822	458	364	377	133	244
17	Lachivakkam	2481	1433	796	637	1048	422	626
18	Perandur	2502	1562	886	676	940	379	561
19	Tharatchi	3187	1840	1016	824	1347	531	816
20	Panapakkam	1936	909	517	392	1027	451	576
21	Sennankaranai	1821	1038	599	439	783	288	495
22	Tholavedu	1099	706	387	319	393	145	248
23	Kakkavakkam	1337	954	519	435	383	149	234
24	Paruthimerikuppam	371	233	125	108	138	52	86
25	Thumbakkam	553	366	207	159	187	58	129
26	Thandalam	1594	1210	632	578	384	149	235
27	Chittraiyampakkam	0	0	0	0	0	0	0
28	Melmaligaipattu	1113	660	368	292	453	192	261
29	Velagapauram	2372	1359	773	586	1013	408	605
30	Enambakkam	629	376	222	154	253	78	175
31	Kalpattu	2050	1113	657	456	937	359	578
32	Palavakkam R.F.	0	0	0	0	0	0	0
GUMMIDIPOONDI								
33	Chedilpakkam	1369	739	412	327	630	259	371
34	Nemalur	4251	2568	1393	1175	1683	693	990
35	Budur	1863	1048	595	453	815	339	476
36	DharkasthuKandigam	0	0	0	0	0	0	0
37	Varnasikuppam	0	0	0	0	0	0	0
38	Kannankottai	2008	1179	630	549	829	357	472
39	Siruvada	795	520	284	236	275	109	166
40	Panchalai	1505	784	441	343	721	297	424
41	Vaniamallee	1518	710	409	301	808	346	462
42	Poovalambedu	1056	688	412	276	368	135	233
43	Periapuliyur	683	427	241	186	256	104	152
44	Kollanur	525	369	203	166	156	59	97
45	Thervoy	3122	1906	1060	846	1216	498	718
46	Karadipudur	1926	1100	649	451	826	314	512
47	Madhavaram	0	0	0	0	0	0	0
48	Mukkarambakkam	3488	2084	1169	915	1404	599	805
49	Nelvoy	1632	1028	599	429	604	217	387
50	Sepedu	231	101	52	49	130	61	69
51	Madaharpakkam (CT)	4250	2776	1481	1295	1474	601	873
SATYAVEDU								
52	ChinnaEetivakam	813	472	285	187	341	128	213
53	Kothamarikuppam	3230	2159	864	1295	1071	452	619
54	Narasaraju Agraaharam	977	613	349	264	364	136	228
55	Dalavai Agraaharam	2245	1600	790	810	645	234	411
56	Satyavedu	11474	8040	4455	3585	3434	1344	2090
57	VenkataraJukhandrig	766	485	272	213	281	107	174



Sl. No	Name	Total Population Person	Literates Population Person	Literates Population Male	Literates Population Female	Illiterate Persons	Illiterate Male	Illiterate Female
a								
58	Madanambedu	4045	2534	1436	1098	1511	563	948
59	Madanamjeri	576	291	155	136	285	139	146
60	Peradam	609	266	134	132	343	144	199
61	Sirunambudur	1570	903	506	397	667	265	402
62	Kadirvedu	1509	802	447	355	707	317	390
	Total	101222	62496	34430	28066	38726	15458	23268

Table 7.22 List of Nearby Existing Industries within 10 Km radius

Sl.No.	Industries	Distance	Direction
1	Jesons Industries Limited	0.59km	NE
2	Feed Mill - Sheng Long Bio-Tech (India) Pvt. LTD	0.22km	ENE
3	Sovereign Agro Tech Refinery Pvt Ltd	0.24km	N
4	Super Gas	0.32km	N
5	Autoclaved aerated concrete (AAC) Blocks	Adjacent to Site	-
6	Bekaert Industry	0.38km	S
7	Michelin India Private Limited	0.06km	SE
8	Harsha éxito Engineering Private Limited	1.08km	E
9	suryaans paper mill	4.47km	NE
10	Pashupati Metallics	6.29km	NE
11	Chetna Steel Tubes Pvt. Ltd	6.03km	NNE
12	Balsara Engineering Products Limited	5.92km	NNE
13	Maruthi Office Equipment Private Limited	6.50km	WSW
14	Mohanraj Kal Company	8.40km	SSE
15	Sivanesan Company	9.41km	ENE
16	Chennai United Metals Ltd	8.75km	ENE
17	Oren Hydrocarbons Pvt Ltd	9.79km	ENE
18	Caplin Point Laboratories Unit-IV	9.18km	ENE
19	Cauvery Power Plant	9.92km	ENE
20	Vamshadvara Paper Mills	9.29km	ENE
21	Agra Coal Impex	9.91km	ENE
22	Tulisan NEC Ltd power plant	9.45km	NE
23	Prakash Ferrous Industries Private Limited	6.00km	N
24	Mico Plast Industries Pvt. Ltd	7.88km	ENE
25	Agrawire Industries	9.88km	NE
26	S.L.Packaging Industries	8.60km	NNE
27	J.R.Metals	6.55km	ENE
28	Shalimar Paints Ltd	7.93km	ENE
29	Jindal Stainless Steelway Limited	8.04km	ENE
30	Dite aqua pvt ltd	7.35km	W
31	Sri Venkatachalapathy Alloys P Ltd	5.63km	NNE

7.8 Rehabilitation and Resettlement (R & R)

The unit is located in Industrial Complex of SIPCOT (State Industries Promotion Corporation of Tamil Nadu Limited). Hence, R & R is not applicable.



8.0 Project Benefits

8.1 General

The expansion of PCBL (TN) Ltd. will cater to increased demand of carbon black which can be used as replacement for natural rubber product in the industries like industrial rubber compounds and other rubber lining equipment, plastics products, inks, paints etc. In addition to tangible benefit, the proposed expansion project will also help in enhancing energy requirement of Tamil Nadu. The major direct benefits that can be anticipated are in terms of (i) employment for the locals, both in the skilled and the semi-skilled category (ii) growth of allied rubber and automobile industries and iii) development of infrastructure facilities. The impacts from these are generally difficult to quantify in a precise manner, since the plant is not a virgin site, the present status of development with respect to these aspects could form a convenient yardstick for the judging the potential for future development. Accordingly, this chapter covers a comprehensive overview of the present status. The potential future benefits from the proposed expansion project are also identified in this chapter.

8.2 Expansion Programme of PCBL Unit

Presently, PCBL (TN) Limited unit having an EC for 550 TPD of carbon black. Out of this, about 420 TPD is being generated now with 3 production lines. The expansion programme it is planned to increase the quantity to 675 TPD. PCBL is the first Carbon Black Company in the world to receive carbon credits. PCBL has redefined its business by establishing captive power plants at each factory from the off-gas or waste product from the carbon black manufacturing process thus creating a sustainable green movement. The gas, a by-product of carbon black production, is harnessed for producing electricity at the Company's Captive Power Plants (CPP), at Thervoy Kandigai, Palej, Durgapur, Mundra and Kochi. The Company has heavily cut down on carbon and gas emission, and serves green power to Large Private industrial units and State Electricity utilities. At present, the combined production capacity is 5.71 lakh ton/Annum.

The project scope involves in the production of different grades of carbon black of capacity 2,36,250 lakh tone/annum and waste heat recovery-based cogeneration captive power plant (36 MW). These products are widely used in tyres manufacturing, ink jet toners, printing newspaper and other such uses. These products are high in demand in the market. The environmental and social benefits are detailed below in sequel.

8.3 Environment benefits

The product acts as reinforcing filler in tires and other rubber products, to be used in the plastics, paints, and inks industry. The other environmental benefit is the raw material, which is residue of oil industry Anthracene or coal tar which will be effectively used. While producing the synthetic rubber about 36 MW power is produced as a byproduct which is from the off-gas produced from the reactor.

The major environmental issues addressed are:

- Proposed manufacturing processes are studied in detail with a view to minimize generation of liquid/gaseous waste streams as a part of continuous improvement
- Company will not aim at just pollution minimization but also to conserve energy, improve process yields and product quality



8.4 Benefits to the Region and State

- On meeting, the internal demand of synthetic rubber the excess quantity will be exported which generates Foreign Exchange through export. The other tangential benefits are as follows;
- Country/state will gain local taxes as applicable other than Forex through exporting products
- Country/state will have technology control and R&D on the product
- Contribute to increase GDP.

8.5 Social Benefit

Due to project and its expansion, the corporate environmental responsibility is earmarked Rs. 6.15 crore and Rs. 2.7 crore respectively. The amount will be spent towards education, solar power and health facilities in three financial years 2024-2027 for the local village people. The expenditure details are given in **Table 8.1**.

Table 8.1 CER expenditure

Sl.No	Activities under CER	Total Projection 2022-27 (Rs in Crore)	Cash Flow- Half Yearly Plan in Crore			
			FY 2023-24	FY 2023-24	FY 2024-25	FY 2024-25
1	Education in Government Schools in nearby villages	2.85	0.7125	0.7125	0.7125	0.7125
2	Solar power to nearby villages	2.00	0.5	0.5	0.5	0.5
3	Health in Government hospitals in nearby villages	4.00	1.00	1.00	1.00	1.00

8.5.1 Employment Potential

The Proposed PCBL (TN) Ltd expansion will generate additional employment of 60 nos. from the existing employment of 300 nos. In addition to the operation, about 500 personnel are likely to be employed during construction period. Besides, contract workers belong to nearby villages are planned to be engaged for various activities. The growth of the area has led to significant socio-economic benefits for the people residing in the surroundings of Thervoy Kandigai village and Town. Transport and communication services have also vastly improved. Besides, the mass transport by state run buses etc. have grown appreciably.

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9.0 Environmental Cost Benefit Analysis

9.1 General

Environmental Cost Benefit analysis is not recommended at the scoping stage. Hence, it is not required as per the standard ToR given by MoEF&CC file no IA-J-11011/95/2024-IA-II (I) dated 14.03.2024. However, this chapter provides the information regarding the capital cost of the project and expenditure for the implementation of environmental mitigation measures. The cost envisaged for pollution control is included in the capital cost. Cost towards environmental monitoring facilities are additionally included. In the analysis of capital cost, recurring cost is also included to know the yearly expenditure. Other features like bag filters, ETP, STP and RO forms integral part of the plant are included in the analysis. However, emergency water scrubbing system, flare system and inline waste heat recovery boilers are not included in the analysis. Expenditure towards environmental monitoring and environmental monitoring plan is detailed in **Table 9.1**.

9.2 Project Cost

The estimated project cost is **Rs. 360 crores**. A good fraction of project cost is earmarked towards pollution control measures. **Table 9.1** gives the breakup of the cost for various control measures.

- In addition to those indicated in the table, there are a number of other features, which forms an integral part of the plant design and contribute to either save energy or to decrease the energy conservation. Those components are not included in this cost.
- Likewise, the costs of fire protection and physical protection measures are not considered, although there may be secondary environmental consequences due to fire or security lapses
- The estimate of recurring cost includes only the revenue expenses for operating the respective facilities. The salary of staff and capital depreciation are not included.

9.3 Budgetary Provisions for Environmental Control

The updated capital and recurring cost for the environmental facilities for the expansion project works out to Rs.151.37 crore including CER amount of 8.85 Crore for 3 years.

Table 9.1 Cost of Environmental Management Plan

Sl.No.	Activities	Capital cost (lakh)		Recurring cost (lakh)/annum
		Existing	Proposed	
1	Air pollution control			
	Boiler stacks	1800	-	
	Bag filter	6420	2602	
	Dryer stack	900	-	
	VBC stack	180	-	
	scrubbers	180	-	
2	Water pollution (Construction of ETP, STP, MEE surface drains etc.,)	2000	-	
	Noise Pollution control	25	-	



Sl.No.	Activities	Capital cost (lakh)		Recurring cost (lakh)/annum
		Existing	Proposed	
3	Ambient Air monitoring and online system setup	65	-	
4	Greenbelt Development	40	-	
5	Storm Water and RWH management	20	-	
6	Waste Management	10	-	
7	Occupational Health and safety measures	10	-	
	CER budget as per earlier EC	615	-	
	CER budget for expansion	-	270	
	Total	12,265	2,872	

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10.0 Environmental Management Plan

10.1 General

M/s. PCBL (TN) Ltd. is committed to act as a responsible corporate and is steadfast towards protection of environment and the community. PCBL (TN) Ltd. has consecrate to employ best environmental management practices, regular maintenance and keep track record consistent in operation of pollution control systems, effluent treatment plants, recycling of solid wastes and adoption of cleaner and environment friendly technologies etc. The concerted efforts implemented earlier and also proposed through an Environmental Management System (EMS) are expected to result in resource conservation, waste reduction as well as to increase in the green cover.

The Corporate Environmental Policy of PCBL (TN) Ltd. emphasizes "adopting environmental management system and continual improvement in environmental quality by applying best available practices".

The importance of environmental control has been recognized by of PCBL (TN) Ltd. and it has taken necessary steps to identify and control pollution in the plant, and also in the peripheral areas. PCBL (TN) Ltd. has also implemented Environmental Management System (EMS).

Environment management has been considered as one of thrust areas of operation. A three-tier strategy has been adopted and they are as follows:

- Developing a well-organized monitoring/analysis and inspection setup
- Adopting best environmental management practices in all its operation
- Contributing to regional development in terms of social capital building, infrastructural development, catering to immediate and long terms primary needs of local inhabitants (medical, secondary and direct employment, boosting local activities and protecting ethnic culture)

In line with PCBL (TN) Ltd.'s commitment for environmental protection, the project strives to:

- Conduct processing operation in compliance with relevant environmental legislations and regulations.
- Employ best management practices and environment control for sustainable development of the region
- Consider regional carrying capacity in resource and pollution discharge related decisions and give emphasis to conserve energy and other natural resources and minimize waste generation
- Periodic pollution monitoring to review performance of pollution abatement measures and reporting the same to statutory agencies
- Modernization of occupational health set up facility including regular health monitoring of employees and villagers in the vicinity of the project.
- Strengthen the safety management strategy. Prepare emergency/disaster control plan and a properly trained group to meet the emergency situations
- Green belt development in and around the project site.
- Involvement in area development activities and inviting people's participation in area development projects. Increase awareness in employees and villagers towards environmental preservation
- R & D activities with regard to specific pollution problems.



- Periodical review of the system for continual improvement

10.2 Organizational Set Up

10.2.1 Environmental Monitoring Cell

It is imperative to establish an effective organization to implement, maintain, monitor and control the environmental management system. A separate section Environmental Monitoring Cell (EMC) has been established to carry out day to day environmental Monitoring and inspection of PCBL (TN) Ltd.'s operations. The environmental monitoring cell comprises of environmental engineer, chemist, lab assistant and other staff.

10.2.2 Quality Control Department

Quality Control Department is responsible for quality assessment for product and raw materials. Quality assessment of raw water and waste water is carried out by quality control office in association with EMC. In addition to above, services of external agencies are also taken on periodical basis to carry out the necessary monitoring work. Casual laborers etc. are employed for plantation, drain cleaning etc. as and when required. Services of recognized laboratories for sampling and monitoring the effluent quality and emission are availed.

Environmental impact register has been prepared for various activities of processing plant. Operation Control Procedure (OCP) is available for various environmental aspects to control the pollution.

The various Standard Operating Procedures (SOPs) are:

1. Dust control procedure
2. Noise control procedure
3. Sewage treatment procedure, Effluent treatment procedure
4. Solid waste management
5. Procedure for e- waste, hazardous waste.
6. Biomedical waste disposal procedure
7. Fire-fighting procedure

10.2.3 Plant Safety Committee

Dedicated safety committee for production plant are functional at PCBL. The safety committee looks after and reviews the safety aspect of the operations involved in production. The safety committee comprises of engineers, medical officer, environmental engineer, workmen, occupational health in- charge etc. The committee reviews the safety aspect of the operations periodically and the minutes of the meeting is communicated to higher management. The recommendations of the committee as well as corrective actions are implemented.

10.2.4 Activities under EMS

A surveillance for environmental parameters is carried out under EMC in PCBL. Guidelines of TNSPCB, MOEF&CC, are being followed. EMC carry out monitoring of all relevant parameters of industrial hygiene significance for in-plant, and for surrounding natural environment. The monitoring data generated on routine basis serve as tools for assessment and control of in-plant operations impact; and to ensure environmental protection and to demonstrate the regulatory compliance as and when required. The basis of control measures to be adopted is inline with recommendations of national agencies.



Activities of environmental management cell are:

1. Emission from the stack-online monitoring
2. Water quality monitoring for WTP, ETP and STP
3. Ambient Air Quality monitoring
4. Soil quality monitoring
5. Rainwater harvesting monitoring
6. Groundwater monitoring
7. Plantation and greenbelt development
8. Occupational health & safety surveillance
9. Socio-economic development
10. Implementation of various regulatory guidelines

The details of monitoring programme is covered in Chapter -06.

10.2.5 Reporting procedure

A built in mechanism for reporting on compliance of the environmental and other related aspects has been evolved. The compliance conditions and other data is reported to higher authorities as shown in **Table 10.1**. As per guidelines of MoEF &CC, all the Environment Clearances and status of their compliances are shown on the website of the company regularly. Periodic auditing and performance measurement is also taken up to look for improvement.



Table 10.1 Responsibility matrix for Environmental management

Attributes	In-house Environmental management					Reporting & receiving feedback from statutory authority	
	Primary responsibility and report generation	Short term and time series analysis & generation of status report	Approval of status report & decision on actions	Implementation of follow up action	Verification of follow up action & reporting back to approval authority	Who will do?	Whom to report?
Environment Monitoring (Air, Water & Noise)	EMC	EMC	GM	EMC	EMC	EMC	Regional MoEFCC / TNPCB
Plantation & Greenbelt development	EMC			EMC			
Reclamation progress [Biological reclamation]	EMC			EMC			
Social Welfare	CSR cell			CSR cell			
Drainage network maintenance and rain water harvesting	EMC			EMC			
Water and Energy Utilization	Mechanical, Electrical and Civil Maintenance			Mechanical, Electrical and Civil Maintenance			
Occupational Health Monitoring	OHC,			OHC,			
Environmental and safety related training	EMC			EMC			

Note: EMC = Environmental Engineering Cell; OHC = Occupational Health Centre; CSR = Corporate Social Responsibility; TNPCB = Tamil Nadu Pollution Control Board

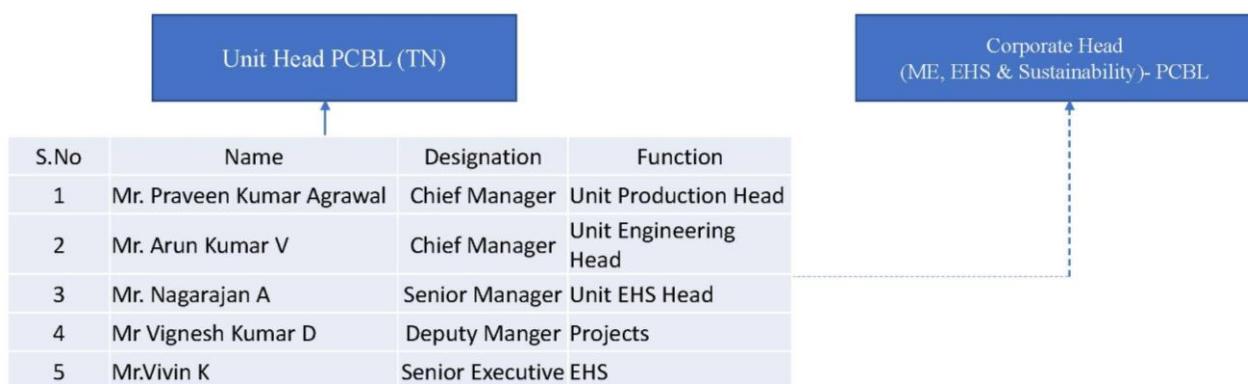


Figure 10.1 Organogram of EMC

The EMC is headed by a Plant Head. In his day to day work, the plant head is assisted by chemists, laboratory assistants and other staff. Services of forest officials are also taken for effective implementation of plantation schemes. For development and maintenance of jobs like drainage, clearing settling pits etc. assistance from the plant's civil engineering department is taken. The officers of the department meet frequently to assess the progress and analyses the data collected during the preceding fortnight/month. Total manpower of EMC is shown in **Table 10.2**. If required, this will be augmented suitably after expansion.

Table 10.2 Manpower of EMC

Description	Nos.
Environmental Engineer for Statutory compliances	2
Civil Engineers for Water pollution control	2
Mechanical Engineers for Air Pollution Control	
Chemists for Sample analysis	2
Laboratory assistant	1
Field assistant	3
Gardeners	2
Laborers	2

10.2.6 Duties of EMC

In order to carry out environmental monitoring, EMC performs following functions:

- The EMC oversees the implementation of environmental control measures as per approved EC and consent.
- Plan for conservation of water and energy
- Identify and record the constraints in respect of environmental planning and implementation
- Systematically document and maintain records w.r.t environmental issues
- Working of environmental engineering laboratory
- Field monitoring and laboratory analysis
- Monitoring of green belt and plantation development
- Compliance of environmental regulations and specific stipulations of regulatory authorities
- Communication with concerned department (of the plant) on environmental issues. The same are also discussed with the top management of the company.



- Interaction and liaison with State/Central government departments / agencies.

The EMC has also a well-equipped laboratory to undertake routine environmental monitoring. Environmental Survey Laboratory of PCBL is in charge of carrying out all surrounding monitoring covering background levels in air, water, soil, agricultural produce. The data of EMC will be shared with plant head for corrective measures if any.

10.2.7 Occupational Health Center

Functions of the Occupational Health Centre, M/S. PCBL (TN) Ltd.

- Daily OPD (outdoor patient Department) cases of company employees as well as contractual workers.
- IPD (indoor patient department) cases of company employees and contractual workers as and when required.
- Emergency treatment of patients in case of chemical burns, gas inhalation, ingestion of chemical, mechanical injuries like head injury and fracture.
- First aid treatment in case of minor abrasion, contused lacerated wound, etc. Referral services to higher centre as and when required.
- Pre-employment medical examination of all the employees before their joining to decide their fitness and to decide their placement in various plants.
- Periodical medical examination every 6 monthly for all the employees.
- Maintenance of form no. 33 after pre-employment medical examination.
- Maintenance of form no. 32 after periodical medical examination
- Placement and maintenance of first aid boxes to the various departments in the company. First aid boxes are checked twice in a month and replenished with the materials needed.
- Preparation of injury report on daily basis.
- First aid training to the company employees.
- Preparations of monthly report and annual reports describing injuries and sickness.
- Oxygen cylinder refilling and maintenance.
- Ambulance daily test round and daily checking as per our check list.
- Canteen worker's personal hygiene checkup twice in a month.
- Contractual worker's pre-employment physical check-up on daily basis.
- Medicine consumption and keeping record of the same, daily basis and monthly.
- OHC equipment check list as per our SOP.
- Autoclaving of dressing material to sterilize it.
- Segregation and proper disposal of biomedical waste with Globe bio care institute.
- Instrument calibration once yearly.
- Maintenance of clean OHC and beds and linen washing.
- Division of all the work among all four full time medical assistants.
- Blood donation camp, eye checkup camp arrangements at OHC.

Pre-Medical/Periodical Medical Examination

Pre-Medical/Periodical medical examination of worker exposed and other staff members is being carried out at regular intervals.

Pre-Employment Screening / Examinations - All employees will be subjected to pre-placement medical examinations to determine their fitness for the jobs on site. Potential exposures to the work environment will be considered before placing an employee on the job.



Periodic Medical Examinations - Periodic medical examination is the same as the pre-employment screening and may be modified according to current conditions, such as changes in the employee's symptoms, site hazards or exposures. However, List of tests is proposed to done during half yearly employee check-up: -

- a. Height
- b. Weight
- c. Audiometry
- d. ECG
- e. Eye Vision
- f. Complete Blood Count (26 parameters)
- g. Pulmonary function testing
- h. Blood Sugar
- i. Blood pressure
- j. Urine Routine & Microscopy

PCBL (TN) Limited will allocate Rs.5.0 Lakhs per month for the purpose of occupational, health and safety for the employees.

First aid Boxes

A first aid kit is a collection of supplies and equipment for use in giving first aid. First Aid boxes will be kept available in Admin Block and Production area etc. First Aid items will be issued to injure only by authorized persons.

Following are the contents of First Aid Box,

1. Dettol – Antiseptic solution
2. Ciplox – Eye Drops
3. Soframycin – Skin ointment
4. Silverex – Burn ointment
5. Betadine – Microbicidal solution
6. Iodex – Pain reliever
7. Sterilized Cotton Wool
8. Surgical Paper Tape
9. Small Sterilized Dressings
10. Medium Sterilized Dressings
11. Roller Bandage – 5 cm wide
12. Roller Bandage – 10cm wide
13. Band Aid
14. Crocin / Paracetamol Tablet

10.2.8 Occupational Health Monitoring

Medical Surveillance Program: Medical surveillance program is essential to assess and monitor employees' health and fitness both prior to employment and during the course of work; to determine fitness for duty and to provide emergency and other treatment as needed. Effectiveness of a medical program depends on active involvement of employees. PCBL (TN) Limited medical surveillance program will include the following major elements;

1. Developing an OH-IH Medical Surveillance Program.
2. Pre-Employment Examination and Periodic Medical Examinations
3. Determination of Fitness for Duty.



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4. Communications.
 5. Emergency Medical Treatment.
 6. Medical Records.

Implementation of OHS Standards as per OSHAS

The overall objective of the company is to provide a system that is capable of delivering healthy and safe workplace. Following measures have been adopted for implementation of OHS standards:

- Well-equipped Occupational Health Centre with adequate paramedical staff.
- Routine and special investigation related to occupational health.
- Health surveillance and maintenance of health record.
- Rules and procedure for effective implementation of Safety Health and Environment policy and made to know all employees.
- Round the clock Ambulance facility.
- Sufficient number of First aid boxes.
- Implementation of OHSAS 18001 for Occupational Health and Safety Management System.
- Implementation of ISO 14001 for Environment Management System.
- Risk assessment of each and every activity.
- Implementation of OHS management program.
- Training, awareness program and work place talk.

Personnel Protective Equipment

M/s. PCBL (TN) Limited will provide full range of Personnel Protective equipments to its workers for their safety. A complete list of Personnel Protective equipments has been listed below:

List of Personnel Protective Equipments

Boiler operation: Cotton type retardant suit, IR resistant goggles, helmet, safety shoes and cotton gloves.

Electrical Work Area (MCC and PCC): 433 V to 22 kVA electrical resistance gloves, Electrical safety shoes (without metal toe guard) and helmet and electrical gloves. Tested date and due dates should be marked legibly.

Working at Height: Personal fall protection (i.e. Full body harness), helmet and Safety shoes.

Safety Equipment

- Safety Helmets
- Safety Hand Gloves – PVC, Rubber Cotton, Cum, Leather Asbestos
- Safety Goggles - Spectacle Type, Panoramic Type
- Face Shield
- Aprons – PVC, Cotton
- PVC Suits
- Safety Gum Boots
- Self-Contained Breathing Apparatus
- Gas mask with canister
- Safety emergency
- Fire extinguishers



- Fire hoses with branches
- Explosive meter
- Gas detection devices
- Resuscitator
- Portable mike
- First aid box
- Emergency siren switch
- Telephone- P&T intercom Personal protective equipment (PPE) will be provided during operation as per norms Spill Emergency Mitigation Procedure
- Spill Kit is kept in all Emergency cupboards.
- Once the spill is observed, Spill Kit shall be collected from the nearest area/emergency cupboard installed and neutralizing agent (if required) based on the nature of the spill.

In case if the spill is not controlled, immediately declare the emergency as per emergency response procedure.

- While handling the spill, use most appropriate PPE's like SCBA, chemical suit, acid/ alkali proof hand gloves, face shield, safety goggles, gum boots or even respiratory masks with suitable cartridges.
- Once the spill is controlled using Sorbent pad/Boom collect in a double polythene bag and secure with the plastic ties. Dispose it as per applicable disposal procedure.
- Report the incident of spill to EHS department through online incident reporting System.
- Once in a month, the items of the Spill Kit shall be inspected and recorded by EHS representatives of the individual area.

10.2.9 Industrial/ Occupational Health Monitoring

- The workers exposed to noisy sources will be provided with ear muffs/plugs.
- Adequate facilities for drinking water and toilets will be provided to the employees.
- The health of the workers will be regularly checked by a qualified Doctor and proper records will be kept for each worker.
- Isolated storage for all hazardous chemicals with adequate safety measures, sign board outside storage etc.
- Good Air circulation will be ensured within the plant area.
- Hand wash will be provided in vicinity of work area with ample quantity of water available.
- Proper First Aid centre and medical facilities will be provided.

10.2.10 Work Zone Monitoring Equipment

The unit will install the ambient air monitoring kit all over the facility for regular monitoring and these will provide the alarm once the set level is crossed. Same will be connected to TNPCB online Monitoring Server (CAC).

10.2.11 Proposed Safety System

Fire Hydrant System

A pressurized automatically operated Fire Hydrant System will be installed in the plant with rings and wet risers around all blocks to achieve maximum coverage. Water reservoir capacity will be provided. Following are the details of the system.



- Jockey pump with pressure switches
- Main electrical pump
- Yard Hydrant points.
- Hose Boxes
- Hose Reel Drums
- Foam Concentrate tank
- Water Monitor
- Mobile Foam Unit
- Two-way fire brigade inlet
- Automatic sprinkler system.

Table 10.3 Fire & Safety Systems

Sl. No	Name of the equipment	Qty(Nos)	Capacity
1	Fire Extinguishers	41	4.5 kg
2	Fire Extinguishers (ABC)	41	6 kg
3	Fire Extinguishers (Mechanical Foam)	2	45 l
4	Fire Extinguishers (Trolley Mounted)	4	22.5 kg
5	Fire Hydrant Points (External)	64	
6	Fire Hydrant Points (Internal)	20	-
7	Fire Hydrant Pumps	2+1 (Standby)	273 m3/hr
8	Jockey Pump	1	273 m3/hr
9	Water Monitors	4	-
10	Fire Brigade Connection (FBC)	3	-
11	Fire Hose	64 (2 Nos)	15m RRL (each)
12	First Aid	14	-
13	Water storage tanks	1	1716 KL

Fire extinguishers

Depending on the combustible material, fires have been classified into four types.

Table 10.4 Suitability of Extinguishing Media for Different Fires

Sl. No	Class of fire	Suitable Fire Extinguisher
1	Class A: Organic Material i.e. wood, papers, rubber & plastics.	DCP, Mechanical Foam
2	Class B: Flammable Liquid and Flammable Gases i.e., Petroleum Products, Paints, Chemicals etc.	Mechanical Foam, CO2 and DCP
3	Class C: Electrical	DCP and CO2
4	Class D: Flammable Metals i.e. Lithium, Sodium, and Potassium etc.	Special DCP, Sand

The company will train personnel for firefighting and intends to improve the firefighting skills of employee by conducting frequent training on Firefighting.

10.2.12 Measures for Conservation of Energy

M/s. PCBL (TN) Limited shall adopt various measures for energy conservation:



- Energy efficient machineries will be used during operation phase.
- Installation of economizer & high efficiency burner on steam boilers.
- Enough care will be taken to prevent/minimize energy losses at each stage.
- Energy audit will be used as a tool for monitoring purpose.
- External lights will be controlled through timers for auto on/off function based on timings.
- The cable size will be selected so as to minimize the power losses.
- The power factor improvement capacitors will be provided individually for AC loads.
- Using water cooled chillers, variable frequency drives for secondary pumps and public area and building management system for HVAC equipments with non-CFC and non-HCFC based refrigerants.
- Use of VFDs for various utilities in variable load application to optimize pump and air handling unit performance, wherever required.
- Automated day light control.
- Efficient lamps and ballasts.
- Automated control for external lighting (Astronomical/Sensor).
- Occupancy Sensors.
- Phase-wise implementation of Advance Process Control (APC) in the process plants.
- Replacement of conventional lighting fixture by more energy efficient fittings.
- Installation of improved insulation over the High Pressure (HP) steam line to reduce the heat loss.
- Use of FRP blade on Cooling Tower.
- Use of Energy Efficient Lighting, Transformers, HVAC system, Use of Energy Efficient Motors, electrical appliances to minimize the energy consumption in addition to Process Planning.

Interaction with statutory bodies

EMC will be in regular touch with TNPCB and the Regional Office of MoEF&CC and sends them periodic compliance report on EMP compliance in the prescribed format. Any new regulations/ guidelines considered by TNPCB/CPCB is taken care of by EMC. Action is taken to update the EMP on regular basis in accordance to the guidelines of regulatory authorities as TNPCB/MoEF&CC etc.

Training

For the proposed expansion project, training facilities will be developed for environmental control. For proper implementation of the EMP, the officials responsible for EMP implementation will be trained as per need.

The training will be given to employees covering the following areas:

- Awareness of pollution control and environmental protection (for all employees)
- Operation and maintenance of specialized pollution control equipment/systems.
- Field monitoring, maintenance and calibration of pollution monitoring instruments
- Laboratory testing of pollutants.
- Repair of pollution monitoring instruments.
- Occupational health and safety.
- Disaster management.
- Environmental management.

- Plantation and post care of plants.
- Knowledge of norms, regulations and procedures.
- Risk assessment and Disaster Management.

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11.0 Summary and Conclusions

11.1 Introduction

Presently, M/s. PCBL (TN) Limited is operating at SIPCOT Industrial Park, Thervoy Kandigai village, Gummidiyoor Taluk, Tiruvallur District, Tamil Nadu – 601202 and possessing Environmental clearance issued by MoEF&CC vide File No. J-11011/128/2021-IA-II(I) dated 27.08.2021 and valid consent for operation till 31.03.2028 with the production capacity of 1,47,000 MTPA. Now, the company has planned to expand its production from 550 to 675 MTPD (1,92,500 to 2,36,250 TPA).

The proposed expansion project attracts environmental clearance from the State Environment Impact Assessment Authority (SEIAA), Project activity Sl.No. 5 (e) Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes) and Category B, as per the guidelines of EIA notification of 2006, and the amendments thereafter. However, as per general conditions, Tamil Nadu- Andhra Pradesh interstate boundary falls at a distance of ~ 2.67 Km (W) as per SOI Topo map is located within 5 km radius from the site. In view of this, the project is being appraised as category “A” with MoEF&CC for obtaining Environmental Clearance.

In this connection, ToR has been issued by MoEF&CC vide File no: IA-J-11011/95/2024-IA-II(I) dated 14.03.2024 with exemption of Public Hearing.

11.2 Project Description

The proposed expansion project involves to enhance the production capacity of 550 to 675 MTPD. The total land extent of 62.46 acres (25.2767 Ha.) which includes additional land of 2.44 acres had been allotted by SIPCOT for the purpose of expansion of PCBL (TN) Limited. The products before and after expansion along with capacities are as follows:

Sl.No.	Products	Existing capacity		Proposed capacity		Total Capacity	
1.	Different grades of Carbon Black	550 MTPD	1,92,500 MTPA	125 MTPD	43,750 MTPA	675 MTPD	2,36,250 MTPA
2.	Cogeneration Captive Power Plant	36 MW		-		36 MW	

The raw material required are Carbon Black Feed Stock, Molasses, Potassium Nitrate / Potassium Carbonate/ Hydrochloric Acid/ Caustic Soda, Water Treatment Chemicals, Light Diesel Oil/ High Speed Diesel.

The production of carbon black needs equipment like reactors, pelletization, waste heat recovery boilers, CPP cooling towers, bag filters, ETP, STP, RO with MEE to ensure ZLD, raw material, product storage and packing area, rainwater harvesting pond, surface drainage system etc.

Carbon Black is manufactured from highly aromatic hydrocarbon oils, which are thermally cracked at high temperature in specially designed reactor. Carbon Black particles formed are recovered and converted into pellets for ease of storage, handling and transportation and product cleaned gas will be used for CPP as fuel.

Product gases laden with Carbon Black particles are cooled down to 240-260 degree centigrade in a SS venturi cooler and they enter the Process Bag Collector (PBC) section



for separation of Carbon Black from gaseous products which is a mixture of CO, CO₂, CH₄, C₂H₂, N₂, H₂, Air and water vapors.

Process Bag Collector is pulse jet filter and comprises of number of modular compartments. Compartments are housed with very special type of filter bags made of fiber glass/Huy glass/membrane coated fiber glass.

Off gases collected in the off-gas header are sent to pelletizing and drying section and energy conservation section for their 100% utilization and thus eliminate the risk of atmospheric pollution.

Water evaporated due to drying of wet pellets in the dryer along with some powdered material is removed by a Vapor Fan at the feed end of the dryer.

Low Btu off gases generated in the manufacturing process of CB in the reactor section and separated from accompanying CB particles in PBC section are collected in the off-gas header to recover their calorific value in a specially designed waste heat boiler system to generate high pressure steam and in a specially designed dryer combustor furnace to supply the heat energy requirements in the pelletizing and drying section.

The quantum of high-pressure steam which can be generated through burning of these off gases meets the plant requirement of steam and power. Excess power generated is feed to the grid.

Utilities for the proposed expansion

The total requirement of water after proposed expansion is about 3953 KLD. Out of this, about 683 KLD will be recycled within the process. The estimated domestic water requirement is estimated to be about 57 KLD. The approval obtained for fresh water requirement is about 3737 KLD which will be met from SIPCOT. The entire amount of 683 KLD of wastewater being recirculated into system after primary treatment with the help of RO and MEE to ensure ZLD.

The existing power requirement is ~10 MW and the estimated power requirement for expansion is ~1.8 MW. The total power requirement is ~11.8 MW. The CPP power generation is about 36 MW.

The proposed expansion will generate additional employment during construction & operation. It is expected that employment generation with a potential of 20 person's permanent and 40 persons contractual.

Greenbelt is developed in the factory premises and will occupy a total area of about – 83589 Sq.m. (i.e. 33 % of the total plot area). The species and plantation norms will be as per directives of CPCB guidelines in consultation with local forest department. The native species like teak, Mahogany, illupai, pungai, neem marudhu, naval are predominantly planted.

The estimated project cost is Rs. 360 crores.

11.3 Description of Environment

The base line study was conducted during the pre-monsoon season from the month of March 2021 to May 2021 and secondary data collected from various Government, Semi-Government and Public sector organizations. The existing baseline data was used. Additional a month data included and monitoring is continued and these data



corroborated with the 2021 data in sequel. The baseline data is continued for March, April and May as summer season data.

11.3.1 Meteorology

From the summary of the wind pattern for study period (March 2021- May 2021) season the predominant direction is WSW and followed by SW with less calm of 0.32 percent. The average wind speed is 2.42 m/s. The nearby India Meteorological Department station that is generating meteorological data is 58 km from the site i.e. IMD, Nungambakkam, Chennai. Hence, secondary information on meteorological conditions has been collected from IMD station.

The monthly mean maximum temperature varied from 28.5°C to 36.9°C while monthly mean minimum varied from 20.9°C to 27.9°C indicating January & December as the coldest month while May & June as hottest month.

During the month of November, the relative humidity was highest (83%). The annual average Relative humidity is 76% (at 08:30 Hours) and 69% (at 17:30 Hours). Generally, the weather during other seasons was observed to be humid.

The rainfall occurred maximum in the month of November (407.4 mm). The total rainfall received in the year is about 1391.5 mm and the monsoon period is November December. It is evident from the available IMD data that the area is not prone to any special weather phenomena like dust storm, hail, heavy down pour etc.,

11.3.2 Atmospheric Inversion Level

This height is determined by the observation of the atmospheric temperature profile. The inversion level during March to May ranges from 700m at 8 A.M. and 1000m at 5 P.M.

11.3.3 Geology

The Thiruvallur district rock type can be geologically classified into sedimentary rock 80% and hard rock 20%. The geological formation of the district is principally made up of Charnockite, Gneiss, Conglomerate, Sandstone, Shale, Laterite, Alluvium and Marine deposits. Soils in the area have been classified into red soil, black soil, alluvial soil and colluvial soil. Thiruvallur district is underlain by both porous and fissured formations.

11.3.4 Hydrogeology

The maximum thickness of alluvium is 30m. whereas the average thickness is about 15m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter point. The thickness of weathered zone in the district is in the range of 2 to 12m. The piezometric head varied between 2.20 to 10.30 m bgl during premonsoon and 2.72 to 8.55 m bgl during post monsoon. The study area is demarcated by dendritic pattern with lakes at low lying area of drainage system.

11.3.5 Landuse/Landcover

The IRS-P6 satellite data of 1:50000 scale is used for land use and landcover study. From the study it is observed that about 53.03% of land use is covered by agricultural land followed by reserved forest of 16.64%.



11.3.6 Environmental Status

Air: The maximum and minimum concentrations for PM10 were recorded as 64 µg/m³ and 42.3 µg/m³ respectively. The maximum and minimum concentrations for PM2.5 were recorded as 32 µg/m³ and 18 µg/m³ respectively. The maximum SO₂ concentrations were recorded as 8.4 µg/m³ and minimum is found to be 5.1µg/m³. The maximum and minimum NO_x concentrations were recorded as 21.6 µg/m³ and 12.2 µg/m³. It is observed that very marginal decrease in the revalidated baseline data which could be attributable due to completion of construction activity and mitigation measures already adopted in the project site.

Noise: The day time noise level at industrial zone was observed to be 49.3 dB(A) which is within the prescribed limit of 75 dB(A). The day time noise level at all rural & residential zone was observed to be 48.2 to 54.5 dB(A) which is within the prescribed limit of 55 dB(A). The night time noise level at industrial zone was observed to be 42.9 dB(A) which is within the prescribed limit of 70 dB(A). The night time noise levels at residential locations were found to be 43.5 to 45 dB(A) within the prescribed limit of 45 dB(A). From the revalidated data, it is observed that the noise level is increasing by 1dB(A) when compared with existing baseline data this could be attributable due to increased activity of the industrial area.

Water: The pH value of the collected ground water in the study area varies from 7.56 to 7.98 and meets the acceptable limit for drinking water standards. The essential parameters of ground water are well within the permissible limits. The heavy metal parameters are also well within the IS10500 norms. The surface water analytical results are compared with best of use norms given by MoEF&CC and the observed values are well within the limit.

From the revalidated data of surface and groundwater samples, it is evident that there is no change in the chemical parameters and hence, it can be concluded the operation of plant does not have any impact on surface and ground water.

Soil: Eight numbers of soil samples have been collected from the study area and all the physical and chemical parameters are observed to be normal and the soil does not require any amendment for developing greenbelt.

Ecology: The detailed study revealed dominance of Cocos nucifera, Azadirachta indica, Acacia auriculiformis, Acacia nilotica, etc. Totally 38 species of trees found in the study area along with 21 shrub species, 21 herb species and 17 climber species. Prosopis juliflora, Lantana camara, Achyranthes aspera, Datura metel were found to be the predominant species among shrub. Among the herbaceous species Euphorbia hirta, Aerva lanata, Ageratum conyzoides, Boerhavia diffusa, Eclipta prostrata etc. found to be abundant.

Livestock like cattle, buffalo, goat, poultry, duck and pig are reared for dairy products, meat, egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area. Species recorded/reported from the study area, out of which 5 species belongs to Schedule-I, 38 species belongs to schedule-II, 1 species belongs to Appendix-II and 1 species belongs to Appendix-III, and there are no endangered, threatened wild animal species in the study area.

To assess the planktonic profile of Phytoplankton and Zooplankton, 3 water samples from Kakkavakkam Lake, Arani Lake and Uttukkottai Eri have been collected. About 20



macrophytes have been observed in study area and about 21 phytoplankton species, 15 zooplankton species and 21 fish species were also observed.

Traffic: The existing PCU per day volume of SH-51 is about 15441 against the capacity of 36000 PCU per day.

11.4 Anticipated Impacts and Mitigation Measures

Land: As the project site (total area 62.46 acre) is under possession of PCBL (TN) Limited and already approachable through a well laid Black topped road. The internal access roads (7m and 4m wide) for the plant site of about 4 km in length is also BT paved. Site clearing activities like removal of bushes and leveling are also not expected as the site is cleared, levelled and kept ready for 550 TPD. Hence, the impacts on air, water, noise and soil within close proximity of the project site is not expected.

Water: The drainage density of project site is 1.15 km/sq.km and the top soil layer is unsaturated with low infiltration capacity of lateritic soil. The study area is mainly governed by simple dendritic drainage system. The surface run-off water from the project site is naturally diverted into surface water drainage system which is constructed already on either side of the road and all along the boundary wall and finally diverted to rainwater harvesting pond. The plant is located on elevated area with height ranging from 43 in West to 49 in East AMSL and away from any potential flooding water bodies. Hence, flooding of the area is not anticipated.

The estimated run-off volume for pre and post construction scenarios for project site. The annual average run-off volume increases from 1,40,690.11 m³ to 3,05,365.79 m³, showing an increase of 1,64,675.68 m³ of run-off about 53.9% in post construction scenario after construction of PCBL (TN) Limited which will be passing through rainwater harvesting pond.

Air: The construction and other associated activities will lead to emission of different pollutants, viz. particulate matter and gaseous pollutants (SO₂ and NO_x) from machineries and vehicles. Particulate matter is not expected as the plant is already paved.

In the upcoming units of PCBL (TN) Limited, air pollutants will be generated at different stages of production. The expected air pollutants are particulate matter, Sulphur dioxide, oxides of nitrogen etc. The pollutants are expected to be released from point sources like stacks & ducts. Fugitive emissions are not expected from material handling as they are in closed loop.

The existing air quality status has been reviewed. It was observed that the maximum of all C98 pollutant concentrations in the study area of PM₁₀, PM_{2.5}, SO₂ and NO_x are 63.54, 31.54, 9.30 and 21.51 µg/m³ respectively. These concentrations are due to the emissions emitted into the atmosphere from the existing industrial activities in the area, road transport as well as due to urban activity in the study area.

The maximum GLCs for each grid point were predicted with respect to pollutants PM₁₀, PM_{2.5}, SO₂ and NO_x. In order to obtain the impact due to proposed project, Background concentration recorded in the study area are considered and the contribution due to proposed project is added to it. The predicted cumulative GLC values are as follows and the isopleths are enclosed in the report.



Resultant Concentrations due to Incremental GLC's at Project Site

Pollutant	Maximum AAQ Concentrations Recorded During the Study Period in Project site ($\mu\text{g}/\text{m}^3$)	Incremental Concentration ($\mu\text{g}/\text{m}^3$) – Worst Case	Resultant Concentration ($\mu\text{g}/\text{m}^3$)	Standards (mg/Nm^3)
PM	76.5	1.78	78.28.	150
NOx	15.5	0.421	15.921	600
SOx	7.7	3.94	11.64	600

Noise: The noise is generated due to continuous operation of machineries like blowers, fans, compressors, cooling tower fans, reactors, handling of products, vehicular movement etc. It is all likely that equipment manufacturers are to adhere the noise norms in design stage which may further reduce the noise levels. Machines would be housed in acoustic enclosures/buildings in such a way that they would not be contributing any additional noise levels in the surrounding environment.

The propagation modeling Dhawani Pro considered for operation and the predicted noise level at source during operation is 104 dB(A). The results of the noise modelling reveal that the maximum noise level will be 59.6 dB(A) at 1.5km distance due to the proposed plant. The results are predicted without any attenuation factors.

Wastewater: The effluent generated from the plant is treated in Membrane Bioreactor (MBR) based ETP capacity of 210 KLD. The treated water will meet the requirement of TNPCB norms viz. BOD <30 mg/l, TSS <30 mg/l and pH 5.5-8.5. The MBR plant consists of clarifier, oil and grease removal, closed aeration followed by pressure sand filter and activated carbon filter. The treated water is fed into ultra-filtration and the UF treated water will be passed through Two stage RO. The RO treated water will be used for process. The RO reject will be fed into Multi-Effect Evaporation (MEE) to ensure Zero liquid discharge.

About 48 KLD of sewage will be generated and the same will be treated in MBR based STP of capacity 50 KLD. The treated water from STP will be used for plantation and green belt to reduce the fresh water consumption. Hence, a major reduction in consumption of fresh water is expected as the RO, ETP and STP is in place. In addition, the efficient rainwater management plan is also adopted for entire plant area according to the topography. The specific water consumption after expansion for PCBL (TN) Limited is 4.67KLD/Tonne against current specific water consumption 5.06KLD/Tonne of product. Effective control measures are implemented such as MBR based STP and ETP.

Solid waste: After expansion, approx. 260 kg per day solid waste will be generated during operation of PCBL (TN) Limited which will be collected, segregated and disposed through local panchayat as per Solid Waste Management Rules, 2016.

Hazardous Wastes are properly handled in containers and stored in hazardous waste storage areas as per rules and also bunding is provided to avoid overflow of spillage waters which can contaminate the surroundings. Recyclable waste is handed over to authorized recyclers and other hazardous waste will be disposed through approved TSDF facility.



Conservation Plan: During the baseline survey, there is no Schedule-I fauna identified in the plant area. However, the schedule – I fauna like Oriental Honey Buzzard, Black Kite, Shikra, Indian Peafowl and Indian Flapshell Turtle have been identified in the buffer zone which is about 9.5 km from the proposed site. The conservation plan for the same is prepared and enclosed as **Annexure IV** to this EIA report which will be scrutinized and vetted in consultation with forest department.

Traffic: PCBL (TN) Limited is located near to Thervoy kandigai village about 1.53km in the Northeast direction on SH - 51 which is leading to Puthur. Since the plant is located on the isolated path major traffic is not expected. From the study, the density of heavy vehicles was comparatively low. The LOS study shows that the existing traffic scenario is "Excellent" and the free flow of vehicles is observed during the study period February 2024. Out of the total traffic vehicles, 2 wheelers are very high followed by 4-wheeler light and medium vehicles. Due to the proposed expansion of PCBL plant, the traffic density will have negligible increase and there will be no change in V/C ratio.

11.5 Analysis of Alternatives

The proposed expansion of PCBL (TN) Limited requires additional land area of 2.44 Acres which is adjacent to the existing project site. The project site is located in notified Industrial Estate (SIPCOT) and it is coming under Industrial use zone as per land use classification certificate issued by District Town and Country Planning (DTCP). Hence alternative site is not applicable. However, while selecting the site initially all Environmental parameters like away from settlements and sensitive areas for construction of PCBL(TN) Limited are considered and meeting the requirement.

11.6 Environmental Monitoring Programme

The key issues associated with the life cycle of a project are the monitoring of environmental parameters. Three types of environmental monitoring are ensured the compliance through the envisaged to existing EMC.

11.7 Risk Assessment

The preliminary risk assessment has been completed for the proposed expansion of plant and associated facilities:

- LSIR contour has not generated as the risk level is low i.e., 1E-09 per year.
- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.
- F-N curve is not generated as effect is not reaching off-site population
- However, Jet Fire, Flash Fire, Pool Fire have been conducted and enumerated in the report.

Socio-economic: As per 2011 census the study area consisted of 1,01,222 persons inhabited in the 10km radius study area. The distribution of population in the study area males and females constitute about 49.29% and 50.71%.



11.8 Project Benefits

The expansion of PCBL (TN) Ltd. will cater to increased demand of carbon black which can be used as fillers in the rubber products & rubber compounds and other rubber lining equipment, plastics products, inks, paints etc. In addition to tangible benefit, the proposed expansion project will also help in enhancing energy requirement of Tamil Nadu. The major direct benefits that can be anticipated are in terms of (i) employment for the locals, both in the skilled and the semi-skilled category (ii) growth of allied rubber and automobile industries and iii) development of infrastructure facilities.

The product acts as reinforcing filler in tires and other rubber products, to be used in the plastics, paints, and inks industry. The other environmental benefit is the raw material, which is residue of oil industry Anthracene or coal tar which will be effectively used. While producing the synthetic rubber about 36 MW energy is produced as a byproduct which is from the off-gas produced from the reactor.

11.9 Environmental Management Plan

The EMC is envisaged and headed by a plant head. In his day to day work, the plant head is assisted by chemists, laboratory assistants and other staff. Services of forest officials are also taken for effective implementation of plantation schemes. For development and maintenance of jobs like drainage, clearing settling pits etc. assistance from the plant's civil engineering department is taken. The officers of the department meet frequently to assess the progress and analyses the data collected during the preceding fortnight/month. Total manpower of EMC is about 14 numbers.

11.10 Conclusion

Anticipated adverse environmental impacts from the expansion of PCBL (TN) Limited will be localized, short term and low/moderate in nature, and visible only during construction phase. Adverse environmental impacts identified in EIA study due to the proposed expansion will be mitigated by implementation of mitigation measures/environmental management plan (EMP) described in EIA report and compliance of applicable environmental regulations. The proposed expansion project will have long term and regional beneficial/positive direct and indirect impacts on employment, socioeconomic conditions and development of the area and region.

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12.0 Disclosure of Consultant

ABC Techno Labs India Private Limited (formerly ABC Environ Solutions Pvt. Ltd.) is an ISO 9001, ISO 14001 & OHSAS 18001 Certified Company & leading Environmental Engineering & Consultancy Company constantly striving towards newer heights since its inception in 2006. Our Company is dedicated to providing strategic services in the areas of Environment, Infrastructure, Energy, Engineering and Multi lab.

It is the first firm to be accredited by NABET (National Accreditation Board for Education and Training), Quality Council of India, as an EIA Consultant, approved for carrying out EIA studies and obtaining environmental clearance for various sectors such as Thermal Power Plants, Infrastructure, Industrial Estates/Complexes/Areas, Mining, Township & area development and Building construction projects etc. ABC Techno Labs is equipped with in-house, spacious laboratory, accredited by NABL (National Accreditation Board for Testing & Calibration Laboratories), Department of Science & Technology, Government of India.

ABC has been accredited for various Sectors including Sector-1 (Mining) for Category 'A' by the National Accreditation Board for Education & Training (NABET), Quality Council of India vide Certificate NABET/EIA/2225/RA 0290 with validity extended till 16.11.2025 (Sl. No. 4 of QCI/NABET List dated 26.04.2024). ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) vide Certificate No. TC-5770. The Lab is also recognized by the Ministry of Environment, Forest and Climate Change (MoEF&CC) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

Since establishment ABC Techno Labs focus on sustainable development of Industry and Environment based on sound engineering practices, innovation, quality, R&D and most important is satisfying customers need. The company has successfully completed more than 100 projects of a variety of industries, in the field of pollution control and environmental management solutions. The company is also dealing in the projects of waste minimization and cleaner production technology.

12.1 Services of ABC Techno Labs India Pvt. Ltd

Environmental Services

- Environmental Impact Assessment (EIA)
- Environmental Management Plan (EMP)
- Social Impact Assessment (SIA)
- Environmental Baseline data collection for Air, Meteorology, Noise, Water, Soil, Ecology, Socio-Economic and Demography etc;
- Environmental Monitoring
- Socio-Economic Studies
- Resettlement & Rehabilitation Plan
- Ecological & Human Health Risk Assessment Studies
- Ecological Impact Assessment
- Environmental Management Framework
- Solid Waste Management
- Hazardous Waste Management
- Internship & Training



Turnkey Projects

- Water Treatment Plants
- Sewage Treatment Plant
- Recycling & Water Conservation Systems
- Zero Discharge System

Other Services

- Operation & Maintenance of Water & Waste Water Plants
- Water & Waste Water Treatment Chemicals
- Pilot Plant studies
- Feasibility studies & preparation of budgetary estimates

Laboratory Services

- Chemical Testing
- Environmental Testing
- Microbiological Testing
- Food Testing
- Metallurgical Testing



National Accreditation Board for Education and Training



Certificate of Accreditation

ABC Techno Labs India Private Limited, Chennai

ABC Tower, 400, 13th Street, SIDCO Industrial Estate, North Phase, Ambattur, Chennai 600098

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation including pelletisation	7	2 (b)	A
6	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
7	Cement Plants	9	3(b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Leather/skin/hide processing industry	15	4 (f)	A
10	Chemical fertilizers	16	5 (a)	A
11	Petro-chemical complexes	18	5 (c)	A
12	Petrochemical based processing	20	5 (e)	A
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Distilleries	22	5 (g)	A
15	Integrated paint industry	23	5 (h)	B
16	Sugar Industry	25	5 (j)	B
17	Oil & gas transportation pipeline, passing through national parks/ sanctuaries/coral reefs / ecologically sensitive areas including LNG terminal	27	6 (a)	A
18	Airports	29	7 (a)	A
19	Industrial estates/ parks/ complexes/ Areas, export processing zones(EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
20	Ports, harbours, break waters and dredging	33	7 (e)	A
21	Highways	34	7 (f)	A
22	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
23	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
24	Building and construction projects	38	8 (a)	B
25	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated June 09, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/23/2795 dated July 11, 2023. The accreditation needs to be renewed before the expiry date by ABC Techno Labs India Private Limited, Chennai following due process of assessment.

Sr. Director, NABET
Dated: July 11, 2023

Certificate No.
NABET/EIA/2225/RA 0290

Valid up to
Nov 16, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website.

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