

**Executive Summary
of
Draft Environmental Impact Assessment (EIA)**

For

**Proposed Manufacturing of Active Pharmaceutical
Ingredients & Intermediates Unit**

at Plot No. 38, Survey Nos. 16 & 17, TANSIDCO Industrial Estate at
Tindivanam Mega Pharma Cluster, Pelakuppam Village, Tindivanam
Taluk, Villupuram District, Tamil Nadu



M/s. Juvenus Drugs

No. 55, Raj Flat, Near Ring Road, Devakai Nagar,
Ponnamman Medu, Chennai - 600110.

TOR Issued vide TO25B2405TN5666099N dated: 16.06.2025

Baseline Monitoring Period: March 2025 to May 2025

October 2025

EIA Consultant: Eco Services India Pvt. Ltd., Chennai
NABET Certificate No.: NABET/EIA/24-27/RA 0332

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1. Project Description

M/s. Juvenus Drugs (Project Proponent) has proposed to establish an Active Pharmaceutical Ingredients & Intermediates Manufacturing Unit with a capacity of 15.66 T/Month (187.92 T/Annum) at Plot No. 38, Survey No. 16 & 17, TANSIDCO, Tindivanam Mega Pharma Cluster, Pelakuppam Village, Tindivanam Taluk, Villupuram District, Tamil Nadu. The total plot area of the project site is 5,867.95 Sq.m (1.45 Acres).

The proposed activity falls under category “B1”, Schedule Sl. No. 5(f) - “Synthetic Organic Chemicals Industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)” of Environmental Impact Assessment (EIA) Notification 2006. The EIA Notification S.O.1533 (E), dated 14th September 2006 and subsequent amendments issued under the provisions of Environment (Protection) Act, 1986, has made it mandatory to obtain prior Environmental Clearance for all scheduled project activities.

The SEIAA-TN has accorded Terms of Reference for the projects vide TOR Identification No. TO25B2405TN5666099N dated: 16.06.2025.

The baseline study was conducted from March 2025 to May 2025. As per the issued Terms of Reference, Draft Environmental Impact Assessment (EIA) report has been prepared and submitted to TNPCB for conducting Public Hearing (PH).

2. Project Location

The proposed project site is located at Plot No. 38, Survey No. 16 & 17, TANSIDCO, Tindivanam Mega Pharma Cluster, Pelakuppam Village, Tindivanam Taluk, Villupuram District, Tamil Nadu. The salient features of the project are mentioned in the below **Table 2.1**.

Table 2.1 – Salient Features of the Project

S.No.	Item	Details
1.	Geographical Co-ordinates	Centre of the site
	Latitude	12°15'12.58"N
	Longitude	79°37'9.87"E
2.	Project Site Elevation in MSL	72-79 m
3.	Topo Sheet Nos.	57-P/07, 57-P/08, 57-P/11, 57-P/12
4.	Land use at the Proposed project site	Industrial Use Zone
5.	Nearest Highway	NH 77 – Thiruvannamalai – Tindivanam Highway, 0.45 Km, Southern Direction
6.	Nearest Railway Station	Tindivanam Railway Station – 4.38 Km, South Eastern direction
7.	Nearest Airport	Puducherry Airport – 37.22 Km, South Eastern direction
		Chennai International Airport – 99.19 km, North Eastern direction

S.No.	Item	Details			
8.	Nearest Habitation/ Village	Pattanam – 1.55 Km, North Eastern direction			
9.	Nearest Town/ City	Tindivanam – 4.55 Km, South Eastern direction			
10.	Interstate boundary	Nil within 10 km radius			
11.	Nearest River				
12.	Nearest Water Bodies	S. No.	Name of watercourse / water bodies	Direction	Distance (Km)
		1.	Pattanam Lake	NE	1.86
		2.	Buderi Lake	SE	2.47
		3.	Vempundi Lake	SW	2.63
		4.	Melpakkam Lake	NE	4.47
		5.	Avaiyurkuppam Lake	SW	7.51
		6.	Kodiyam Lake	N	7.83
		7.	Saram Lake	NE	8.16
		8.	Vilukkam Lake	W	8.45
		9.	Elamangalam Lake	NW	8.92
		10.	Tondi eri	SW	9.08
		11.	Saram eri	NE	9.37
		12.	Kondamur eri	SE	10.12
		13.	Olakkkur Lake	NE	10.92
		14.	Sankaraparani River	SW	11.07
		15.	Etanemali Lake	NW	11.22
		16	Ongur Channel / Stream	NE	14.05
14.	Ecologically sensitive zones or Protected areas as per Wildlife Protection Act, 1972	Nil within 10 km radius			
15.	Reserved Forests (RF)	Kilsevir Reserved Forest – 9.84 Km, South Eastern direction			
16.	Critically polluted areas as per CPCB Notification	Nil within 10 km radius			
17.	Historical and cultural important places	Gingee Fort – 24.36 Km, South Western direction			
18.	Seismic zone	Zone II			
19.	Defense installations	Nil within 10 km radius			

2.1. Size or Magnitude of Operation

The proposed unit has a total production capacity of 15.66 T/Month. Earlier the Terms of Reference had granted for 20.635 T/Month. The details of the products with their respective quantities as per the Terms of Reference along with the revised products and quantities proposed for Environmental Clearance are presented in **Table 2.2**, CAS No. of the products are given in **Table 2.3**.

Table 2.2 Proposed Changes in Product and Quantities (TOR vs. Draft EIA)

TOR obtained for the Product with quantity				EC Requested for the Product with quantity			
S. No.	Proposed Products	Quantity (T/Month)	Quantity (T/Annum)	S. No.	Proposed Products	Quantity (T/Month)	Quantity (T/Annum)
1.	Valproic acid	3.000	36.00	1.	Valproic acid	3.000	36.00
2.	Sodium valproate	3.000	36.00	2.	Sodium valproate	3.000	36.00
3.	Divalproex sodium	5.000	60.00	3.	Divalproex sodium	3.000	36.00
4.	Magnesium valproate	1.000	12.00	4.	Magnesium valproate	1.000	12.00
5.	Gabapentin	1.000	12.00	5.	Gabapentin	1.000	12.00
6.	Pregabalin	2.000	24.00	6.	Pregabalin	1.000	12.00
7.	Leflunomide	0.050	0.60	7.	Leflunomide	0.050	0.60
8.	Iguratimod	0.100	1.20	8.	Iguratimod	0.100	1.20
9.	Rivaroxaban	0.050	0.60	9.	Rivaroxaban	0.050	0.60
10.	Itopride Hydrochloride	0.100	1.20	10.	Itopride Hydrochloride	0.200	2.40
11.	Dothiepin Hydrochloride	0.500	6.00	11.	Permethol Sodium	0.025	0.30
12.	Amitriptyline Hydrochloride	0.500	6.00	12.	Amitriptyline Hydrochloride	0.500	6.00
13.	Duloxetine Hydrochloride	0.500	6.00	13.	Duloxetine Hydrochloride	0.500	6.00
14.	Sumatriptan	0.060	0.72	14.	Sumatriptan	0.060	0.72
15.	Acotiamide Hydrochloride hydrate	0.075	0.90	15.	Clidinium Bromide	0.080	0.96
16.	Labetalol Hydrochloride	0.500	6.00	16.	Montelukast Sodium	0.500	6.00
17.	Vildagliptin	0.200	2.40	17.	Ataluren	0.050	0.600
18.	Amisulpride	1.000	12.00	-	-	-	-
19.	Linezolid	1.000	12.00	18.	Linezolid	1.000	12.00
20.	Valethamate bromide	0.500	6.00	19.	Valethamate bromide	0.050	0.600
21.	R & D (Pre-Production)	0.500	6.00	20.	R & D (Pre-Production)	0.495	5.94
Grand Total		20.635 (T/Month)	247.62 (T/Annum)	Grand Total		15.66 (T/Month)	187.92 (T/Annum)

Table 2.3 – CAS No. / HSN Code of the Products

S. No.	Product	CAS No. / HSN Code	T/Month
1.	Valproic acid	99-66-1	3.000
2.	Sodium Valproate	1069-66-5	3.000
3.	Divalproex Sodium	76584-70-8	3.000
4.	Magnesium Valproate	62959-43-7	1.000
5.	Gabapentin	60142-96-3	1.000
6.	Pregabalin	148553-50-8	1.000
7.	Leflunomide	75706-12-6	0.050
8.	Iguratimod	610695-17-2	0.100
9.	Rivaroxaban	366789-02-8	0.050
10.	Itopride Hydrochloride	113871-53-6	0.200
11.	Permethol Sodium	95873-69-1	0.025
12.	Amitriptyline Hydrochloride	58-72-0	0.500
13.	Duloxetine Hydrochloride	136434-34-9	0.500
14.	Sumatriptan	103628-26-5	0.060
15.	Clidinium Bromide	33737-09-4	0.080
16.	Montelukast Sodium	158966-92-8	0.500
17.	Ataluren	374189-51-0	0.050
18.	Linezolid	165800-03-3	1.000
19.	Valethamate bromide	15617-94-4	0.050
20.	R & D (Pre-Production)	-	0.495
Total			15.66 (T/Month)

2.1.1. End Use of the Product

The proposed products are intended for pharmaceutical applications such as Anticonvulsant, Antiepileptic, Neuropathic Pain Agent, Antirheumatic, Anticoagulant, Prokinetic, Anti-inflammatory, Antidepressant, Antimigraine, Anticholinergic, Antispasmodic, Leukotriene Receptor Antagonist, Duchenne Muscular Dystrophy Agent and Antibiotic formulations.

2.2.Land Requirement

The total plot area of the project site is 5,867.95 Sq.m (1.45 Acres). The land area breakup details are provided in **Table 2.5**.

Table 2.5 – Land Area Breakup

S. No.	Description	Area (Sq.m.)	Percentage (%)
1	Total Area	5867.95	100
2	Process Building Area (Production and R&D)	930	16
3	Non Process Building Area (Ware house, Office Building, Canteen Block a Toilets)	744	13
4	Internal Road Area and Pavement	533	9
5	Surface Parking Area	80	1
6	Green Belt	2054	35
7	Vacant Land Area	1446	25

8	Other Utilities (Boiler Room, E.B. Panel Room, UG Sump, RWH, Septic Tank and Soak Pit, ETP area, Solid waste handling area, Hazardous waste storage area, Security room)	80.95	1
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2.3. Raw Materials

The raw material required for the manufacturing process will be sourced from local markets/ imported from various countries and stored in the earmarked areas within the project site. Transportation of raw materials and the dispatch of finished goods will be carried out through a combination of modes which includes road, rail, air, and sea. The list of major raw materials is given in **Table 2.6**.

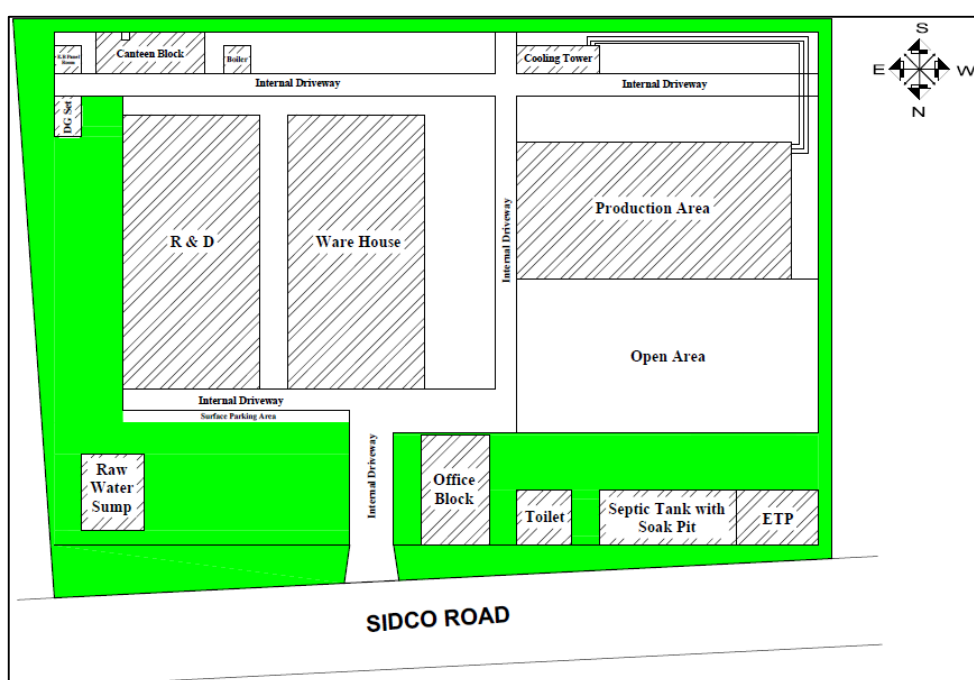
Table 2.6 – List of Major Raw Materials

S. No.	Raw Materials	Commercial Name
1.	Diethyl malonate	Malonic acid diethyl ester
2.	2-Propyl pentanoic acid	Valproic acid
3.	Cyclohexane-1,1-diacetic acid monoamide	Gabapentin Intermediate
4.	(R)-3-(2-amino-2-oxoethyl)-5-methylhexanoic acid	Pregabalin intermediate
5.	5-methyl-1,2-oxazole-4-carboxylic acid	Leflunomide Intermediate
6.	4-(trifluoromethyl)aniline	p-Trifluoromethylaniline
7.	N-[4-Formylaminoacetyl]-5-hydroxy-2-phenoxyphenyl] methane sulphonamide	Rivaroxaban Intermediate
8.	4(4-amino phenyl) morpholin-3-one	Itopride Intermediate
9.	4-Hydroxy benzaldehyde	p-Hydroxybenzaldehyde
10.	Para benzo quinone	p-Benzoquinone
11.	Dibenzosuberone	Dibenzocycloheptanone
12.	(S)-3-(Methylamino)-1-(thiophen-2 yl) propane-1-ol	Duloxetine Intermediate
13.	3-(2-Hydroxyethyl)-N-methyl-1H--indole-5 methanesulphonamide	Sumatriptan Intermediate
14.	Methyl 2-hydroxy-2,2 diphenyl acetate	Amitriptyline Intermediate
15.	(S)-1-(3-(2-(7-chloroquinolin-2-yl) vinyl) phenyl)-3-(2-(2-hydroxypropan -2-yl)phenyl) propan-1-ol	Hydroxychloroquine Intermediate
16.	3-cyanobenzoic acid	m-Cyanobenzoic acid
17.	1,2-difluoro-4 nitrobenzene	Difluoronitrobenzene
18.	2-bromo butane	sec-Butyl bromide
19.	Choline chloride	Vitamin B4 / Choline salt
20.	Iso propyl alcohol	IPA / Isopropanol

S. No.	Raw Materials	Commercial Name
21.	Acetone	Dimethyl ketone
22.	N-Hexane	Hexane
23.	Toluene	Methyl benzene

2.4. Process Description

The raw material sourced is checked for quality prior to chemical reaction process. The raw materials will undergo one or more chemical reactions such as hydrolysis, neutralization, condensation, purification, dehydration, heating, cooling and crystallization to obtain the final product. The products will be stored in containers/bags and will be placed in the warehouses temporarily and dispatched to customers. The Layout of the Plant is shown in the below figure.



2.5. Man Power Requirement

The employment generation during the operation phase is expected to be 41 including maintenance staff and visitors. The working hours in the operation phase will be 8 hours per shift and there will be 3 shifts per day.

2.6. Water Requirement

2.6.1. Construction Phase:

Water requirement for the project during construction is primarily for preparation of mortar, PCC, RCC, curing, sprinkling and domestic uses (construction work force). It is estimated that 25 KLD of water will be required during peak construction period, which will be sourced from TANSIDCO, Tindivanam. The peak manpower strength during the construction phase will be 60 persons. Only local labourers will be hired for the construction phase. Hence, labour sheds are not provided. The estimation of fresh water requirement is given in **Table 2.7**.

Table 2.7 – Estimation of Fresh Water Requirement – Construction Phase

Component	Total Occupancy (Nos.)	Water Consumption		Total Sewage Generation @ 80% of Total Water Requirement (Lts/Day)
		Water Consumption Rate (LPCD)	Total Water Requirement (Lts/Day)	
Employees	60	45	2700	2160
			2.7 KLD	2.2 KLD

During the construction phase, sewage generation is anticipated from temporary toilets and labour camps which will be disposed through temporary septic tank with soak pit arrangements.

2.6.2. Operation Phase:

The estimated fresh water requirement is about 16.24 KLD will be sourced from the TANSIDCO water supply distribution system. The fresh water requirement for the project activity is 16.24 KLD (Domestic purpose: 1.84 KLD, R.O Process: 10.00 KLD, Cooling Tower: 2.00 KLD and Gardening: 2.20 KLD). 3.00 KLD of R.O rejection (<600 PPM) will be sent to Gardening.

The sewage generation from the domestic activity is estimated to be 1.64 KLD which is treated in bio septic tank and soak pit arrangements. The effluent from wet scrubber 0.20 KLD and 3.37 KLD from the process and 0.90 KLD RO reject after ETP treatment will be sent straightaway to Solar pan / Heating pan since it will have high TDS.

The total quantity of the effluent generated from the other activity is 3.23 KLD (Process washing: 2.63 KLD, Boiler blow down: 0.50 KLD and Cooling tower blow down: 0.10 KLD) which will be treated in an Effluent Treatment Plant of 5 KLD capacity.

The treated effluent of 2.00 KLD after the RO process will be utilized for gardening and landscape development within the premises. The details of the water requirement for the proposed activity is shown in **Table 2.8**.

Table 2.8 – Estimation of Fresh Water & Recycled Water Requirement – Operation Phase

Component	Total Occupancy (Nos.)	Water Consumption			
		Water Consumption Rate (LPCD)	Total Water Requirement (L/day)		
			Fresh Water Requirement (L/day)	Recycled Water Requirement (L/day)	Total Water Requirement (L/day)
Working Population	41	45	1,845	-	1,845
Wet Scrubber	-	-	200	-	200

R.O for Process, Washing & Boiler Feed	-	-	10,000	1,000	11,000
Cooling Tower	-	-	2,000	-	2,000
Gardening & Landscaping	-	@ 3.5 L/Sq.m for 2,054 Sq.m of green area	2.200	5,000	7.200
Total	41	-	16,245	6,000	22,245
			16.24 KLD	6.00 KLD	22.24 KLD
<i>(Reference: National Building Code of India, 2016, Volume 2, Part IV, Clause 4.1.2 Table 1 Water Requirements for Buildings other than Residences, page 11)</i>					

2.7. Municipal Solid Waste Generation and Its Management

2.7.1. Construction Phase:

The construction waste generation in the project is estimated at the rate 20 – 30 kg/ Sq. m. of the construction area. (Source: Central Pollution Control Board, 2017 – Guidelines on Environmental Management of Construction & Demolition (C&D) Wastes, Section 2.2). The construction waste generated shall be used in the construction of internal driveways within the project site.

The Municipal solid waste generation during construction phase will be 18 Kg/day which will be disposed through TANSIDCO bins.

2.7.2. Operation Phase:

The municipal solid waste from the proposed project activity will comprise of biodegradable waste and non-biodegradable waste. The estimation of Municipal Solid Waste is given in **Table 2.9**.

Table 2.9 – Municipal Solid Waste Generation

S.No.	Component	Occupancy	Per Capita waste generation (kg/day)	Total waste generation (kg/day)	Biodegradable Waste	Non-Biodegradable waste
					@ 60% of total waste generation (kg/day)	@ 40% of total waste generation (kg/day)
1.	Maintenance Staff	41	0.3	12.3	7.38	4.92
2.	Canteen	41	0.3	12.3	7.38	4.92
Total				24.6	14.76	9.84
CPHEEO Norms, 2016						

The biodegradable waste will be handed over to TANSIDCO daily waste collection system and the non-biodegradable will handed over to authorized vendors.

2.7.3. Hazardous Waste Generation and Management:

The details of hazardous waste to be generated from the project activity are listed in **Table 2.10**.

Table 2.10 – Hazardous Waste Generation and Management

S. No.	Description of Waste	Category as per HWM Rules 2016	Quantity T/Annum	Storage Method	Method of disposal
1.	Used oil	5.1	0.2	Hazardous waste generated will be stored inside a hazardous waste storage shed having impervious floor	Will be collected and disposed through TNPCB Authorized recycler
2.	Waste or residue containing oil	5.2	0.1		
3.	Contaminated cotton rags or other cleaning materials	33.2	0.1		
4.	Concentration and evaporation residue	37.3	36		Will be collected and disposed through TNPCB Authorized TSDF
5.	ETP sludge	35.3	3.60		
6.	Process residue and waste	28.1	307		
7.	Spent catalyst	28.2	1.20		
8.	Spent carbon	28.3	3.62		
9.	Spent solvents	28.6	5		

2.8. Power Requirement

The power requirement for the plant is about 110 kVA, which will be sourced from TNEB. For backup, 1 no. of 125 kVA capacity DG set capacity will be installed to meet the emergency power requirements of the plant. Low-sulphur HSD or HSD available at the nearby fuel station, will be used. The details of power and fuel requirement are given in **Table 2.11**.

Table 2.11 – Details of Power and Fuel Required

S. No.	Description	Capacity	Type of Fuel	Quantity of Fuel
1.	DG Set	125 kVA	HSD	480 Lts/day
2.	Pulverizer	-	-	-
3.	Process Reactor Stack	-	-	-
4.	Boiler	800 kg/day	PNG	1700 SCM/day

2.9. Project Cost

The estimated project cost for the proposed activity is 4.52 crores. The breakup details of the project cost are given in **Table 2.12**.

Table 2.12 – Estimation of Project Cost

S.No.	Description	Cost (Crores)
1.	Land Cost	1.52
2.	Building Cost	1.00
3.	Plant & Machinery Cost	1.00
4.	Utilities/Other Infrastructure Cost	1.00
Total		4.52

3. Description of the Environment

3.1. Site Specific Micro Meteorological Characteristics

A micro-meteorological data comprising of various parameters like wind speed, wind direction, temperature, humidity, rainfall and cloud cover were collected. The monitoring was carried out for one season (March to May 2025) at an hourly frequency, following standard methodologies such as IS 8892:1978 and manufacturer's specifications.

3.2. Ambien Air Quality

The ambient air quality has been monitored at 8 locations in accordance with IS 5182 (P-14) 2000 and the norms prescribed by the Central Pollution Control Board (CPCB) within the study area and compared as per the standards of NAAQS, 2009. The result obtained are stated below:

3.2.1. The Core zone:

- **AAQ1 (Onsite):** The 98th Percentile value of PM10 (68.7 µg/m³), PM2.5 (28.7 µg/m³), SO₂ (5.3 µg/m³), NO₂ (20.7 µg/m³), VOC (BDL (DL: 0.5) µg/m³) and CO (BDL (DL: 1.14) mg/m³) are within the limits of National Ambient air quality standards.

3.2.2. The Buffer zone:

- **AAQ2 (Venmaniyathur):** The 98th percentile value of PM10 (62.7 µg/m³), PM2.5 (25.7 µg/ m³), SO₂ (3.7 µg/m³), NO₂ (19.0 µg/ m³) and CO (BDL (DL: 1.14 mg/m³) are within the limits of National Ambient Air Quality Standards.
- **AAQ3 (Ural):** The 98th percentile value of PM10 (62.7 µg/m³), PM2.5 (25.0 µg/ m³), SO₂ (5.1 µg/ m³), NO₂ (23.4 µg/ m³) and CO (BDL (DL: 1.14 mg/m³) are within the limits of National Ambient Air Quality Standards.
- **AAQ4 (Pattanam):** The 98th percentile Value of PM10 (69.4 µg/ m³), PM2.5 (28.0 µg/ m³), SO₂ (6.3 µg/ m³), NO₂ (19.0 µg/ m³) and CO (BDL (DL: 1.14 mg/m³) are within the limits of National Ambient Air Quality Standards.
- **AAQ5 (Tindivanam):** The 98th percentile value of PM10 (84.9 µg/ m³), PM2.5 (33.7 µg/ m³), SO₂ (6.7 µg/ m³), NO₂ (23.7 µg/ m³) and CO (BDL (DL: 1.14 mg/m³) are within the limits of National Ambient Air Quality Standards.

- **AAQ6 (Vempundi):** The 98th percentile value of PM10 (58.0 µg/ m³), PM2.5 (24.7 µg/ m³), SO₂ (4.2 µg/m³), NO₂ (20.0 µg/ m³) are within the limits of National Ambient Air Quality Standards.
- **AAQ7 (Kollar):** The 98th percentile value of PM10 (53.4 µg/ m³), PM2.5 (27.7 µg/ m³), SO₂ (4.1 µg/m³), NO₂ (18.4 µg/ m³) are within the limits of National Ambient Air Quality Standards.
- **AAQ8 (Kudisipalyam):** The 98th percentile value of PM10 (41.7 µg/ m³), PM2.5 (17.7 µg/ m³), SO₂ (3.6 µg/m³), NO₂ (16.0 µg/ m³) are within the limits of National Ambient Air Quality Standards.

3.3. Ambient Noise Level

The Ambient Noise Level has been monitored in 8 locations, out of 8 locations, 1 location (onsite) is considered as Industrial zone, 4 locations are considered as Silent zone, 1 location is considered as Residential Zone and another 1 location is considered as Commercial Zone. It was observed that all the ANL are within the limits except the ANL 4. The ANL is given in **Table 3.2** and the AAQ standards in respect of Noise is given in **Table 3.3**.

Table 3.2 – Ambient Noise Level

Location Code	Name of the Location	Noise levels in dB(A)	
		Day Time Leq	Night Time Leq
ANL 1 (Industrial)	Project Site	65.3	52.7
ANL 2 (Silent)	Near Govt.primary school – Vemaniyathur	49.1	38.5
ANL 3 (Silent)	Near Govt. middle school - Ural	49.9	39.1
ANL 4 (Silent)	Near Govt.primary school - Pattanam	51.5	42.9
ANL 5 (Commercial)	Near Karumariyamman Kovil -Tindivanam	62.3	50.7
ANL 6 (Silent)	Near Govt.middle school - Vempundi	49.0	38.6
ANL 7 (Residential)	Kollar	49.6	37.9
ANL 8 (Silent)	Near Govt. Primary school - Kudisipalayam	48.9	37.1

Table 3.3 – Ambient Air Quality Standards in Respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence zone	50	40

3.4. Water Environment – Surface Water Quality

The Surface water sampling are collected in 7 locations and results and interpretation are given below:

- The pH ranges from 6.39 to 7.82, suggesting that the water is mostly slightly acidic to neutral. SW3 (pH 7.82) is the only site approaching alkalinity.
- Conductivity and Total Dissolved Solids (TDS) vary significantly across the sites, with the highest values observed at SW5. This suggests a higher ionic concentration and indicates potential pollution inputs and anthropogenic influence at this location.
- At SW5, the highest conductivity (1112 µS/cm), elevated salinity (0.31 ppt), and TDS (660 mg/L) point to significant contamination. Elevated levels of nitrate (3.1 mg/L), phosphate (0.58 mg/L), chloride (171 mg/L) and hardness (278 mg/L) further support this. Chemical Oxygen Demand (COD) at 32 mg/L and Biological Oxygen Demand (BOD) at 7.0 mg/L indicate the presence of organic pollution and oxygen-demanding waste, likely from domestic or agricultural runoff.
- SW4 and SW2 also show signs of moderate organic loading, as indicated by elevated COD and BOD levels.
- Microbial contamination is evident from the presence of Total and Fecal Coliforms at all sites except SW3, pointing to possible sewage contamination.
- **Nutrient Profile and Eutrophication Risk:** Phosphate levels are highest at location SW1 (1.53 mg/L), which could lead to on-going algae growth and water pollution (eutrophication). Nitrate levels are mostly below the safe limit of 45 mg/L set by the CPCB for drinking water, but locations SW5 and SW3 show slightly higher amounts compared to others. Ammoniacal nitrogen and Total Kjeldahl Nitrogen (TKN) levels are all below 1.0 mg/L, which means they are within safe and acceptable limits.
- **Metals and Other Inorganics:** Zinc concentrations are highest at SW2 (2.01 mg/L) and SW3 (1.75 mg/L) but remain within tolerable limits. Other heavy metals were below detectable levels at all sampling locations. Fluoride levels are also below the acceptable limit of 1.5 mg/L, there is no immediate concern required. Silica and Sulphate levels vary moderately but are within acceptable environmental thresholds.
- **Microbiological Quality:** Total and Fecal Coliforms are present in all samples except SW3, which recorded <1.8 MPN/100 mL, indicating better microbial quality. E. coli was detected at all sites except SW3, again suggesting fecal contamination at most locations. SW5 exhibited the highest coliform counts, indicating significant microbial contamination and raising public health concerns, especially if the water is used for drinking or recreational purposes.

- To conclude, the collected surface water quality in the study area is generally good, except at SW5, which is the most polluted site based on almost all key indicators. The presence of organic matter, nutrients, and microbial contamination suggests notable anthropogenic influence at this location.

3.5. Water Environment – Ground Water Quality

The Ground water sampling are collected in 8 locations and results and interpretation are given below:

- Based on the groundwater sampling study, Total Dissolved Solids (TDS) levels at all locations are within the acceptable limit of 500 mg/L, except at sampling locations GW2 (1530 mg/L) and GW7 (1594 mg/L).
- While these two locations exceed the acceptable limit, they remain within the permissible limit of 2000 mg/L. Anion and cation concentrations exceed the acceptable limit of 200 mg/L at all locations but are within the permissible limit of 600 mg/L - except for GW7, which recorded a value of 750 mg/L, thus exceeding the permissible limit. This suggests that water from GW7 may not be suitable for drinking without treatment. All samples recorded pH levels within the acceptable range of 6.5–8.5.
- Turbidity levels at GW2 and GW4 slightly exceed the acceptable limit of 1 NTU but are still within the permissible limit of 5 NTU. Dissolved Oxygen (DO) levels, ranging from approximately 5.1 to 5.9 mg/L, are considered good and suggest minimal organic pollution.
- Heavy metals like Arsenic, Cadmium, Lead, Selenium, Silver, Zinc, Chromium, Copper, Iron, Nickel and Mercury are below detection limits in all locations, indicating no contamination from industrial sources. Fluoride, Nitrate, PAH, PCB, and Microbiological parameters (Total and Faecal Coliforms) are within safe limits across all locations indicating no immediate risk of contamination from sewage or agricultural runoff.
- Overall, Groundwater samples from GW2 and GW7 show elevated levels of hardness ions, salinity, silica, potassium, phosphate, sodium, chloride, and sulphate. These contribute to the high TDS levels observed at these locations. As a result, water from GW2 and GW7 may not be ideal for direct consumption and may require appropriate treatment prior to use.

3.6. Soil

The Soil sampling was collected in 8 locations and the result and interpretation are given below:

- **Soil Texture and Composition:** The soil texture in the study area ranges from clay loam and clay to loam. Clay content is moderately high (22.2%–44.6%), which typically indicates moderate water retention capacity. Sample SQ7 has the highest clay content (44.6%), suggesting lower permeability. The sandiest sample is SQ8 (43.7%), which is expected to have better drainage.

- **Grain Size Distribution (≤ 75 -micron fraction):** The proportion of fine particles is highest in SQ7 (55.8%) and lowest in SQ1 (15.5%). A high content of fines can reduce soil permeability, indicating that infiltration rates may vary significantly across different samples due to mixed particle distribution.
- **Soil pH:** Across the study area is within acceptable limits, ranging from slightly acidic to neutral. Samples SQ3 (6.14) and SQ6 (6.08) are on the more acidic side, while SQ4 shows a slightly alkaline pH (7.49). Overall, no pH-related concerns are apparent for plant growth.
- **Electrical Conductivity (EC):** All EC values are well below the non-saline threshold of 4.0 dS/m, ranging from 0.054 to 0.166 dS/m. These low values confirm that the soils are non-saline and suitable for agriculture, with no salinity-related restrictions for plant growth.
- **Soil Nutrients:**
 - **Phosphorus:** According to the standard range (10–30 mg/kg), all samples except SQ8 exceed the recommended levels. Notably, SQ4 has the highest phosphorus content (62 mg/kg).
 - **Nitrogen:** Nitrogen levels range from 414–582 mg/kg, which is typical for mineral soils. The highest concentration is in SQ4 (582 mg/kg), indicating good nitrogen availability across all samples.
 - **Potassium:** All samples are significantly below the standard potassium range (150–250 mg/kg), with values between 3.2–19 mg/kg. This potassium deficiency could severely limit plant growth and productivity.
 - **Calcium and Magnesium:** Calcium levels (3.4–20 mg/kg) are far below the standard range (1000–2000 mg/kg), with SQ4 showing the highest (yet still inadequate) level at 20 mg/kg. Magnesium levels are also very low (2.0–9.3 mg/kg) compared to the standard (100–300 mg/kg). These deficiencies can negatively impact soil structure, plant health, and metabolic functions such as chlorophyll production and enzyme activity.
- **Organic Carbon:** All samples fall below the standard organic carbon content (0.5–0.75%), ranging from 0.23% to 0.48%.
- **Sodium Adsorption Ratio (SAR):** SAR values are all below the critical threshold of 10, indicating no sodicity issues and confirming the soils are safe for agricultural use.
- **Heavy Metals and Micronutrients:** Heavy metals are within safe limits. However, levels of key micronutrients—iron (1.6%–2.3%) and manganese (0.07%–0.20%) is very low. Overall, the soils are moderately textured and generally suitable for crop production. However, phosphorus levels are high in several samples, which may increase the risk of nutrient runoff or leaching and indicate potential over-fertilization. Micronutrient deficiencies, particularly in iron and manganese, could affect plant health and may require corrective measures. Additionally, low organic matter content reduces nutrient and water

retention, weakens soil structure, and contributes to overall nutrient deficiencies. The nitrogen, phosphorus, and potassium (N-P-K) ratio is imbalanced across the sampling locations. Incorporating organic matter could improve soil structure, enhance fertility, and help correct nutrient imbalances in the study area.

3.7. Biological Environment

A detailed biological survey of the core zone (project site) and the 10 km radius buffer zone surrounding the proposed project area was conducted using primary and secondary data sources to document the existing flora and fauna.

Based on these observations, the project is unlikely to cause any significant, irreversible, or diverse ecological impacts. The proposed activities will involve construction and operational phases, and the potential biodiversity impacts are expected to be localized and insignificant.

Out of the 177 floral species identified, the majority are classified as Not Evaluated or Least Concern. The very low density and sparse distribution of vegetation are expected to further minimize potential impacts. Additionally, as there are no economically significant species present, no adverse effects on the livelihood of the local community are anticipated. Overall, the predicted impacts are site-specific, primarily associated with the construction phase, and are expected to be short-term in nature.

3.8. Socio Economic

Detailed socio-economic survey was conducted in the study area (Core and buffer zone) within 10 km radius that spreads in 317 Sq.km. A total of 88 villages fall within the radial distance of 10km at Pelakuppam Village, Tindivanam Taluk, Viluppuram District. The significant demographic features of the areas are given below:

- Total population of the region as per 2011 census is 2,26,561 out of which are 1,13,402 male and 1,13,159 are female.
- Total number of households in the region about 53,919.
- Sex ratio (number of male per thousand female) in the region is 998 this shows that male population is higher in the region as compared to the female population but ratio from other state good.
- Out of the total population Scheduled Caste and Scheduled Tribe population is about 29.05 % and 1.37% respectively.
- Total main worker population is about 36.08%, 9.65% comes under marginal worker category and 54.27 % belongs to non-workers category.
- Literacy rate of the population in the study area is about 77.40%.

4. Impact and Mitigation Measures for Air Environment

Air quality modelling has been carried out using AERMOD software to assess the ground-level concentrations resulting from the operation of the proposed industries. Based on the modelling

results, the combined ground-level concentrations from both point sources and line sources are presented in **Table 4.1 to 4.3**.

Table 4.1 – Ground Level Concentration from Stack Emission

Description	PM ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
Baseline Scenario	84.80	23.70	6.70	1,140
Predicted incremental GLC through AERMOD	0.071	0.936	0.061	1.986
Overall Scenario	84.871	24.636	6.761	1,141.986
NAAQ Standards	100	80	80	4000

Table 4.2 – Ground Level Concentration from Vehicular Emission

Description	PM ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
Baseline Scenario	84.80	23.70	1,140
Predicted incremental GLC through AERMOD	0.11	1.21	39.76
Overall Scenario	84.91	24.91	1,179.76
NAAQ Standards	100	80	4000

Table 4.3 – Ground Level Concentration from Cumulative Emission

Description	PM ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
Baseline Scenario	84.80	23.70	6.70	1,140
Predicted incremental GLC through AERMOD	0.09	0.996	0.061	39.76
Overall Scenario	84.89	24.696	6.761	1,179.76
NAAQ Standards	100	80	80	4000

5. Analysis of Alternatives

TANSIDCO has already established the Mega Pharma Cluster at Tindivanam with all necessary infrastructure for pharmaceutical industries. Accordingly, M/s. Juvenus Drugs has procured the land parcel at Plot No. 38, Survey Nos. 16 & 17 within the TANSIDCO Tindivanam Mega Pharma Cluster, Pelakuppam Village, Tindivanam Taluk, Villupuram District, Tamil Nadu for establishing the proposed API and Intermediates Manufacturing Unit. Hence, no alternative site has been considered.

6. Environment Monitoring Programme

A monitoring schedule for Ambient Air Quality, Water and Wastewater Quality and Noise levels shall be maintained in accordance with the guidelines prescribed by CPCB, MoEF&CC and the Tamil Nadu Pollution Control Board (TNPCB).

7. Public Hearing

The Draft EIA Report is being submitted to the Tamil Nadu Pollution Control Board (TNPCB) for the purpose of conducting the Public Hearing.

8. Rehabilitation and Resettlement

Rehabilitation and Resettlement is not applicable, since the project site is located within the TANSIDCO industrial area.

9. Environmental Management Plan

➤ Air Environment

- Wet scrubber with a stack height of 11 m (AGL) will be provided for Process Stack.
- Common Stack with monitoring facility to control the Particulate Matter (PM) emissions will be installed for Boiler stack with a height of 11 m (AGL)
- DG stack with a height of 10 m (AGL) will be provided
- Adequate Greenbelt area will be provided within the project premises.

➤ Noise Environment

As a preventive measure for noise reduction, the following practices will be implemented:

- Acoustic enclosures will be provided for DG set, air compressors, feed water pumps and other major noise-generating equipment.
- Development and maintenance of a greenbelt around the project site will help in attenuating noise levels.
- All equipment will be designed and maintained to ensure noise levels comply with the Occupational Health and Safety Administration (OSHA) standards.
- Personal Protective Equipment (PPE) such as earplugs and earmuffs will be provided to workers operating in high-noise areas.

➤ Water Environment

The sewage and the effluent generated and its disposal point is mentioned in **Table 9.1**.

Table 9.1 - Sewage and the Effluent Generated and its Disposal Point

S.No	Description	Proposed Quantity (KLD)	Disposal Point
Construction Phase			
1.	Sewage	2.20	Will be disposed through temporary septic tank and soak pit arrangements
Operation Phase			

1.	Sewage	1.64	Will be disposed through Bio Septic Tank with Soak Pit arrangement
2.	Effluent 1	4.48	Effluent generated from the wet scrubber and the process will have high TDS, once it is neutralized, the effluent will be sent to solar pan / heating pan for evaporation and the solid waste will be sent to TSDF.
3.	Effluent 2	3.23	Effluent from the process washing, boiler blowdown and cooling tower blowdown and sent to ETP (5 KLD Capacity) for treatment followed by RO. The treated water will be utilized for gardening and the RO reject will be sent to solar pan / heating pan for evaporation. Zero Liquid Discharge (ZLD) will be adopted.

➤ **Municipal Solid Waste and Hazardous Waste:**

- Municipal Solid Waste generation will be segregated into biodegradable waste and non-biodegradable waste. The biodegradable waste (14.76 kg/day) will be handed over to TANSIDCO daily waste collection system and the non-biodegradable waste (9.84 kg/day) will be handed over to authorized vendors.
- Hazardous waste generated will be stored inside a hazardous waste storage shed having impervious floor. The collected waste will be disposed through TNPCB Authorized recycler / TNPCB Authorized TSDF.

➤ **Greenbelt Development**

The area allocated for greenbelt development is 2,054 (35% of total land area) around 469 nos. of trees will be planted within the premises. The list of native species proposed to be planted is given in **Table 9.2**.

Table 9.2 – List of Species Proposed to be Planted within the Project Premises

S.No.	Common Name (Trees)	Botanical Name (Tree)
1.	<i>Pongamia glabra</i>	Pungan
2.	<i>Michelia champaca</i>	Shenbagam
3.	<i>Ficus religiosa</i>	Arasu
4.	<i>Azadirachta indica</i>	Vembu
5.	<i>Terminalia arjuna</i>	Neermardhu
6.	<i>Calophyllum inophyllum</i>	Punnai
7.	<i>Syzygium cumini</i>	Naval
8.	<i>Madhuca longifolia</i>	Ilipai
9.	<i>Mimusops elengi</i>	Magilam

➤ Risk Assessment

PHAST and PHAST Risk (SAFETI) 9.0 Version. The software developed by DNV is used for risk assessment studies involving flammable and toxic hazards where individual and societal risks are also to be identified. It enables the user to assess the physical effects of accidental releases of toxic or flammable chemicals.

PHAST is used for consequence calculations and PHAST Risk (SAFETI) is used for risk calculations. It contains a series of up to date models that allow detailed modeling and quantitative assessment of release rate pool evaporation, atmospheric dispersion, vapor cloud explosion, combustion, heat radiation effects from fires etc., The software is developed based on the hazard model given in TNO Yellow Book as the basis. The software is developed based on the various incidents that had occurred over past 25 years. VAL has used the latest version of PHAST software for developing the consequences and risks for each model.

➤ Budgetary Provision for EMP

The EMP cost for both the construction phase and the operation phase are given below:

Table 9.3 – EMP - Budgetary Allocation for Construction Phase

Description	Budgetary Allocation (Rs. In Lakhs)	
	Capital Expenses	Operational Expenses (Per Annum)
Drinking Water & Sanitation (Temporary Toilet) Facilities	2	2
Storm Water Management	2	0.5
Solid Waste/Debris Management	1	1
Environmental Monitoring	-	1
Dust Suppression Measures	1.5	0.5
Occupational Health & Safety	1	0.5
Total	7.5	5.5

Table 9.4 – EMP - Budgetary Allocation for Operation Phase

Description	Budgetary Allocation (Rs. In Lakhs)	
	Capital Expenses	Operational Expenses (Per Annum)
Effluent Treatment Plant	5	2.5
Rain Water Harvesting System	30	1
Air Pollution Control Measures	9	1.5
Solid Waste Management	1.5	0.5
Environmental Monitoring	-	5.08
Energy Conservation	25	0.5
Greenbelt Development	5	2
Total	75.5	13.08

10. Corporate Environmental Responsibility

1.0% of the total project cost (i.e., INR 4.52 lakhs) has been earmarked towards Corporate Environment Responsibility (CER) activities. The allocated amount will be utilized for the infrastructure development for nearby government schools, in line with the observations made during the public hearing.

11. Benefits of the Project

- The project will comply with all applicable environmental regulations, minimizing impacts on the surrounding environment.
- Generation of direct and indirect employment opportunities during both construction and operational phases.
- Reduction in dependency on imported pharmaceutical drugs, promoting self-reliance.
- Promotion of substantial growth in the State's pharmaceutical sector.
- Revenue generation for local body resulting in improvement of local infrastructure facilities.
- Corporate Environmental Responsibility (CER) initiatives resulting in socio-economic development activities in the surrounding areas.