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Assessing the Efficiency of Municipal Infrastructure - Case study in Vaaniyambadi Municipality, Tamilnadu, India

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Abstract: ***This document discusses the evaluation of infrastructure facilities in Vaniyambadi, with the aim of improving the quality of life by addressing the issues and suggesting ways to enhance these facilities. The study focuses on physical infrastructure, including water supply, sewage and drainage, solid waste management, and electricity supply. It highlights the need for alternate water sources, additional pumping stations, and proper distribution of overhead water tanks to ensure equal access to water. It also emphasizes the importance of covering open drains, installing sewage treatment plants, and raising awareness about proper waste management to create a cleaner and healthier environment. Furthermore, the document addresses social infrastructure, particularly healthcare facilities and educational institutions. It suggests improvements such as increasing the number of beds and water supply in government hospitals, enhancing security systems in schools, and promoting collaboration between the community and municipal workers to maintain cleanliness. The document concludes by emphasizing the significance of infrastructure in driving economic and social development and the need for continuous improvement and modernization. Keywords: Municipal infrastructure, Physical infrastructure, Social infrastructure, Solid waste management , water supply***

I. INTRODUCTION

The terminology is used for those structures that directly drive the economy of any country. Physical infrastructure is directly concerned with the needs of such production sectors as agriculture, industry, trade etc.These structures are the major instruments that drive social as well as economic change in any society. These Facility assist the operations of the social infrastructure as well and both of them go hand in hand. The planning of infrastructure shall be based on the hierarchy of urban development. The urban infrastructure is analogous to the internal frame of a building: as the frame is the underlying structural support for the building, the urban infrastructure is the underlying structural foundation of a city. A country's economic and social development is directly dependent on a country's infrastructure. Many developed countries make a lot of progress because of the enormous growth of economic and social infrastructures. A good infrastructure makes the work process easier, resulting in a positive and high productivity.

A. Aim

The aim of the study is to evaluate the infrastructure facilities in Vaniyambadi and understand the issuesand suggesting ways to improve the quality of life by improving these facilities.

B. Objective

The main objective of the study is,

1) To evaluate the performance, condition, and capacity of existing infrastructure systems.
2) To identify critical infrastructure needs and deficiencies of Vaniyambadi and develop strategies to meet those needs.
3) To analyze the impact of infrastructure on social equity and environmental sustainability.

II. LITERATURE REVIEW

A. Infrastructure And Municipalities

Municipalities are responsible for providing essential services to their residents, such as water supply,sanitation, waste management, electricity, education, public health, public safety and so on. Infrastructure is the physical foundation that makes these services possible.

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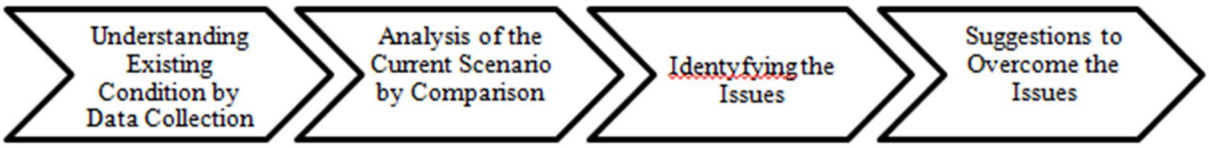
Without adequate infrastructure, municipalities cannot effectively deliver these essential services, and the quality of life for residents suffers.

B. Importance Of Municipal Infrastructure Evaluation

Evaluation is about understanding the needs and aspirations of the people who live and work in the city. Community engagement is crucial to ensure that infrastructure investments reflect the priorities and concerns of residents.

1) Safety and Security: Deteriorated infrastructure can lead to accidents, disruptions, and even disasters. Failing water mains, and overloaded power grids pose serious risks to public safety andeconomic stability. Evaluation helps identify potential hazards before they occur, allowing for proactive maintenance and repair.
2) Efficiency and Sustainability: Inefficient infrastructure wastes resources and money. Evaluation helps pinpoint areas where upgrades can improve efficiency, reduce environmental impact, and save money.
3) Livable Cities and Economic Growth: Good infrastructure is the backbone of a thriving city. It attracts businesses and residents, promotes economic development, and enhances the overall quality of life. Evaluation ensures that cities are investing in the right infrastructure projects to meet the needs of their communities and support future growth.
4) Resilience and Climate Change: Extreme weather events are becoming more frequent and intense. Cities need infrastructure that can withstand floods, droughts, and other natural disasters. Evaluation helps identify vulnerabilities and plan for adaptation and mitigation measures, buildingresilient cities that can weather any storm.

III. METHODOLOGY



IV. MUNICIPAL INFRASTRUCTURE IN VANIYAMBADI

A. Physical Infrastructure

1) Water Supply

The objective of a public protected water supply system is to supply safe and clean water in adequatequantity, conveniently and as economically as possible. In Vaniyambadi the water supply is under two government schemes: i) CWSS - Combined water supply scheme, ii) ULB – Urban local body. These schemes together provide 8.55 MLD of water to the city.

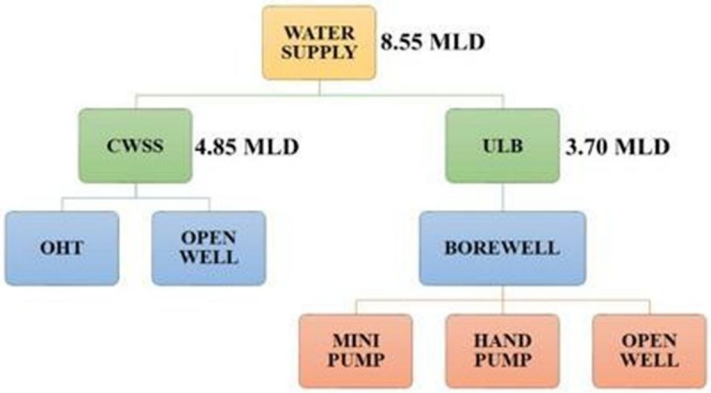


Chart 4.1 Water Supply - Classification

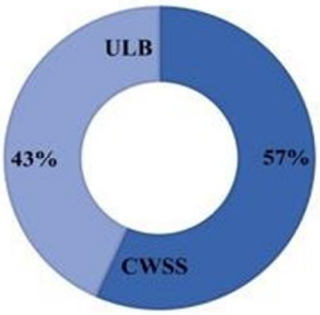
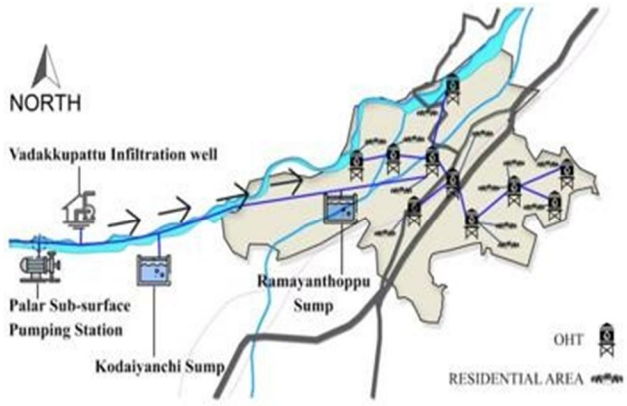


Chart 4.2 Contribution of ULB and CWSS

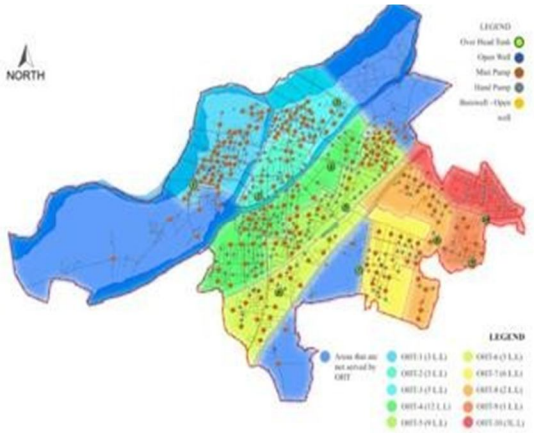
There are two main sources of water for Vaniyambadi.

- Palar Sub-surface water Pumping Station (3 pumps of size 4.5m dia by 11.5m depth)

- Infiltration well in Vadakkupattu (1 pump of size 4.5m dia by 10m depth)Water from both these systems are collected in two sumps:
- Kodaiyanchi Sump (1947)
- Ramayanthoppu Sump (1998)



Map 4.1 Water Source



Map 4.2 Water Supply

Both the schemes were proposed to supply 9.23 MLD of water to Vaniyambadi Municipality but now both the schemes are able to produce only 5 MLD. The overall supply of water in this town is inadequate for thepresent population and its demand.

2) Sewage and Drainage

The objective of public waste water collection and disposal system is to ensure that sewage or excreta and sullage discharged from community is properly discharged, collected, transported, treated to the required level of degree and finally disposed-off without causing any health or environmental problems. In Vaniyambadi, there is an OPEN DRAINAGE SYSTEM that is let into the Palar River, without any treatment. This causes contamination to the surface and ground water. Uncovered drains cause various health issues. The condition ofthe drains is not good enough to withstand heavy flow during rains. The open drains also act as the storm water drains for the city.

Map 4.3 Existing Open drains

Map 4.4 Destination of drains

With reference to the road hierarchy, the roads are classified into 4 types. The existing road width and length have been calculated. The dimensions of the drain for each type of road have been identified and its capacity has been calculated. Based on the

calculations, the present drains may be sufficient for non-rainy days,but will be insufficient for rainy days. This leads to overflowing of the rain water along with sewage. This is environmentally harmful and can cause various problems.

Table 4.1 Drain capacity calculation

DRAIN CAPACITY CALCULATION						
Road types	Existing road width	Existing drain width	Existing drain depth	Existing road length	Existing drain capacity/day(in cu. M.D)	Existing drain capacity/ day (in Mld)
Arterial Roads	20m-30m	2.5m	1.62m	5000 m	20250 cu.m/d	20.25 MLD
Sub arterial	12m-18m	2m	1.5m	5100 m	15300 cu.m/d	15.30 MLD
Collector Roads	9m-12m	0.9 m	1m	7300 m	6570 cu.m/d	6.57 MLD
Local Steets	2M-5M	0.6m	0.6m	77490m	27896.4 cu.m/d	27.89 MLD
					Total	70.01LD

3) Solid Waste Management

Municipal Solid Waste (MSW) is the trash or garbage that is discarded day to day in a human settlement. In Vaniyambadi, solid waste is collected on a door-to-door collection basis every day. The waste is segregated at the source and collected. The solid waste is categorized into two types:

WET WASTE – Biodegradable organic waste.

DRY WASTE – Non-biodegradable waste.

The total waste collected is about **33MTPD**, out of which out of which 55% (18MTPD) is wet wasteand 45 % (15 MTPD) is dry waste.

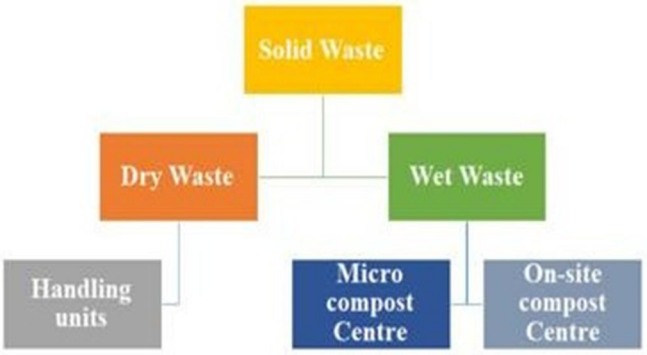
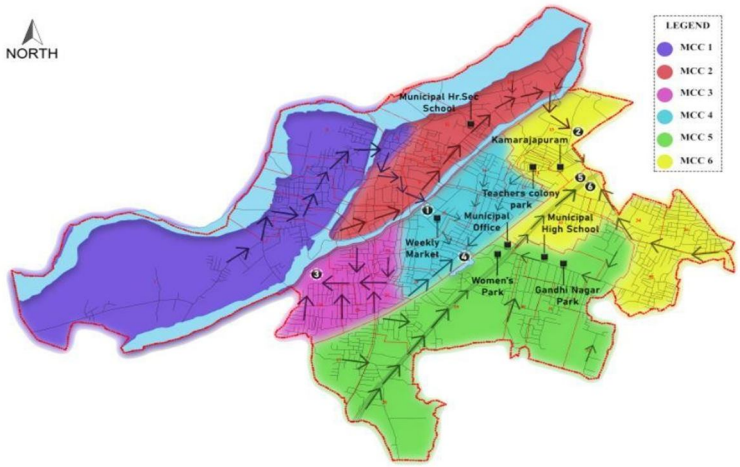


Chart 4.3 Types of Solid waste

Chart 4.4 Quantity of waste generated

Chart 4.5 Collection process of solid waste



Map 4.3 Service location of each compost center along with collection route

There are two types of wet waste handling compost centers:

- On-site compost center
- Micro-compost center

Table 4.2 List of On-site compost centers with location

s.no	On site composing centres	Processing capacity
1	Municipal Office	0.1 MTPD
2	Gandhi Nagar Park	0.1 MTPD
3	Womens Park	0.1 MTPD
4	Teachers colony Park	0.1 MTPD
5	Municipal Hr. sec. School	0.1 MTPD
6	Municipal high school	0.1 MTPD
7	Weekly Market	0.1 MTPD
8	Kamarajapuram	0.1 MTPD
	Total	0.8 MTPD

Table 4.3 Details of micro-compost centers

S. no	Micro Compost Centers	Wards Coverd	No.of Houses covered	Population Covered	Wet Waste	Dry Waste	Vehicle Type		MCC Number	Capacity
							BOV	LCV		
1	Weekly Market	1,2,3,4,5,6	2785	23528	2233	1884	6	1	1	4MTPD
2	Konamedu	7,8,9,10,11,12	2852	11440	2432	2109	7	1	2	4MTPD
3	Ramaiyan Thoppu	21,22,23,24,25,26	3490	19031	3400	2868	6	1	3	4MTPD
4	Noorullapet	15,16,17,18,19,20	3667	17207	3131	2572	7	2	4	4MTPD
5	Valaiyambattu-1	27,28,29,30,31,32	4207	20236	3288	2694	6	1	5	4MTPD
6	Valaiyambattu-2	13,14,33,34,35,36	4161	25200	3516	2873	6	1	6	4MTPD
	Total	36	21162	106642	18000	15000	38	7		24 MTPD

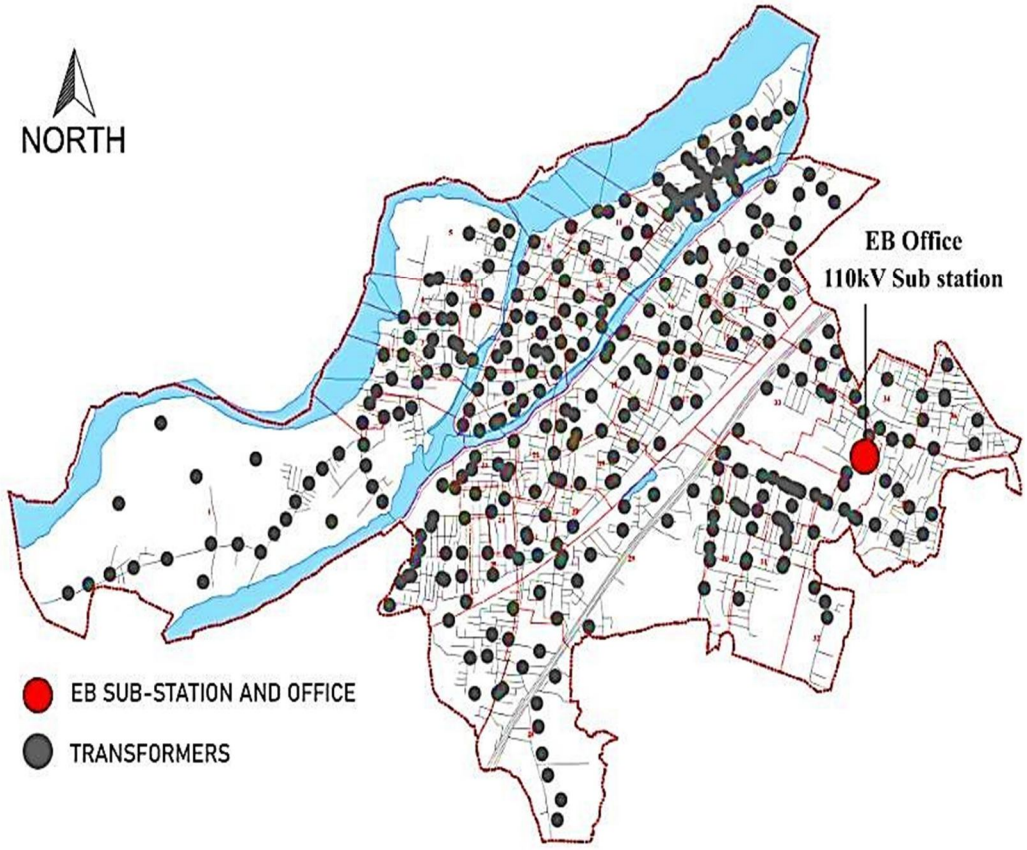
Dry waste is first segregated into five different categories and sent to different handling units. This enables proper disposal and recycling of waste.

Table 4.4 Dry waste handling methods

Dry waste	Handing
Recyclable dry waste	Collected on every Wednesdays and sold to the recyclers and amount realized is distributed to the sanitary workers as an incentive.
Non recyclable non saleable dry waste (Combustible)	Sent to the Ultratech Cement Factory, Ariyalur regularly.
Domestic hazardous	Incinerated in the incinerators installed in the respective micro-compost centers. (diapers, napkins, etc.)
E-waste	Collected on every Thursday and stored in Resource recovery center at Valayampattu and is being transported to TNPCB authorized vendor TESAMM Pvt. Ltd, Sriperumbudur.
Construction and Demolition waste	Is deposited by the residents at the earmarked location at Weekly Market.

4) Electricity Supply

There is one 110Kv Substation in Vaniyambadi that provides electric power to the Vaniyambadi Municipality and three other villages in the surrounding. The actual estimation of power can be made based on the industrial development (type and extent), commercial development, domestic and other requirements.



Map 4.4 Existing Transformers

B. Social Infrastructure

1) Healthcare Facilities

As per the Primary data, the private hospitals with proper facility are available as per the need of the people in Vaniyambadi. But there is only one Government hospital with the multispecialty facilities. In case of emergency, BPL & LIG of people have to travel for about 2.5Kms to reach the Government Hospital which is located in Vaniyambadi ward-19.

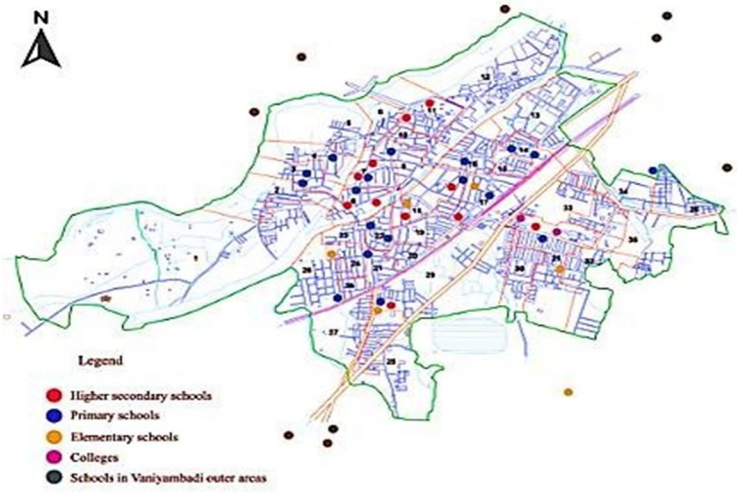
Map 4.5 Health care facilities

2) Educational Institutions

In Vaniyambadi there are 19 Government schools, 7 Government aided schools, 16 private schools within the limit of Vaniyambadi Municipality. The educational facilities like Palvadi, elementary schools, primary schools, Higher secondary school, colleges, ITI training institute etc. are all located within the Vaniyambadi.

Table 4.5 No. of schools in Vaniyambadi

Schools in Vaniyambadi	
Government Schools	19
Aided Schools	7
Private Schools	16
Total	44



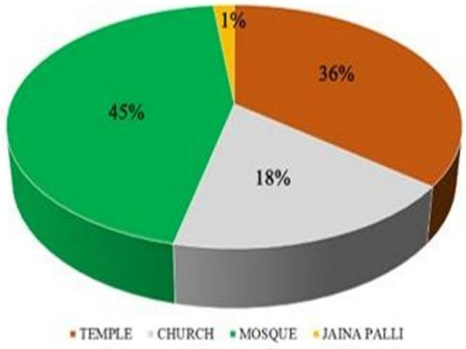
Map 4.6 Education Facilities

3) Socio-Economic AmenitiesReligious Facility

Vaniyambadi in Tamil Nadu derives its name and identity from mythological lore. Vaniyambadi is derived from Vaniampadi = Vani Ammai + Padi which denotes "Vani Ammai" the name of the Goddess Saraswathi, and "Padi" refers the infinitive, "to sing". Legend has it that Saraswati sang on the banks of the PalarRiver for God Vishnu 113 and God Shiva here, and hence it was named Vaniyambadi. Indeed, temples dedicatedto Sundara Varadaraja Perumal (Vishnu) and Athitheeswarar (Shiva) dot both banks of the fast-flowing Palar River.

It was observed that mosques are dominant, followed by Hindu temples and churches. Also, there is aJaina palli (Temple) located in Vaniyambadi. The Athitheeswarar temple is 1500 years old, followed by Alagu Perumal temple which is 900 years old and there are a few old mosques in Vaniyambadi.

Map 4.7 Religious Facility



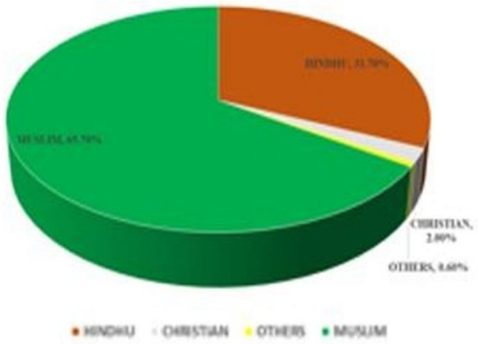


Chart - 4.6 Religeous Building Chart - 4.7 Religeous Population

4) Community Halls

As per the existing condition of Vaniyambadi, the community halls in Vaniyambadi are sufficient but Government community halls in Vaniyambadi is located only one in Konamedu, Vaniyambadi. The New Town of Vaniyambadi does not have Government community halls. There are more private community halls compared to Government community halls. More over the community halls are split based on their religious customs (i.e.Hindu, Christian & Muslim community hall). The Community halls have water supply connections, somecommunity halls get water by lorry water and 116 borewell. The majority of the community halls does not satisfythe parking criteria for both the two-wheeler & four-wheeler.

Map 4.8 Community Hall

5) Institutional Spaces

The Vaniyambadi is administrated by Vaniyambadi Municipality which comprises of 36 wards, providesbasic amenities to the citizens in Vaniyambadi. In Vaniyambadi, industrial domination is more compared to other sectors. Many Government institutions like TNPCB, TWAD, TNEB, PWD, Highways department etc., exist in Vaniyambadi. The Palar river is affected more due industrial dominant area polluting both air and water, so Tamil Nadu Pollution Control board comes under the picture which frames strict guidelines & restriction to protect the environment.

Map 4.9 Government Institutional Buildings

6) Public InfrastructureBanks and ATM

As per primary data collection, the Vaniyambadi town has total 15 Banks out of that 7 Banks are Government and 8 Banks are private.

a) Post Office ad Library

In Vaniyambadi there are 10 post offices which is sufficient for people and it exist more than required count as per URDPFI Guidelines. Whereas there is only one library in ward-19 which does not meet the demandof both people and the Guidelines.

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b) Police Station and Fire Station

As per URDPFI Guidelines both Police station and fire station are sufficient for now (2023) and for 20 years from now (2043). As per primary data collection, the access for fire engine is found to be difficult in mostof the wards in old town of Vaniyambadi.

Map 4.10 Public infrastructure facilities

7) Open and Green spaces

During the field survey it was observed that the Vaniyambadi has less green open spaces & playground.The Ward-1 in Vaniyambadi comprises / covers major portion of green & open spaces. There are 3 parks and one children ground and they are (i) Children Park/ground located in ward-16, (ii) Naivasal ladies park located in ward-29, (iii) Abdul Kalam Azad Park located in ward-31 & (iv) Children ground / park located in ward 30 existand nil playground for the public owned by Government/municipality. The people in Vaniyambadi use private open grounds or empty spaces as playground.

Map 4.11 Green / Open space & Recreational area

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V. EVALUATION AND ANALYTICS

A. Physical Infrastructure

1) Water Supply

The population of Vaniyambadi is 95061 as per 2011 Census of India. The water provided for each person is 90 LCPD as per the municipal records of Vaniyambadi. According to the URDPFI guidelines, the municipality should have 135 LCPD as the minimum water supply for each person. This shows that there is a shortage in the existing water supply by the municipality. When the population increases, the demand increases. This causes stress on the existing infrastructure. This can be resolved only by improving the water supply to the city. The table below shows the shortage in water supply by both ULB (Bore well pumps) and CWSS (Sub-surface water from Palar River).

Table 5.1 Water Supply - Requirement

Year	Projected population	LPCD as per URDPFI	LPCD provided by the Municipality	Shortage in LPCD	Required water in MLD	Water provided by the Municipality in MLD	Shortage of water in MLD
2011	95061	135	90	45	12.8	8.55	4.25
2021	114992	135	74.4	60.6	15.5	8.55	6.95
2023	117440	135	72.8	62.2	15.8	8.55	7.25
2031	129606	135	65.9	69.1	17.5	8.55	8.95
2033	132180	135	64.7	70.3	17.8	8.55	9.25
2041	144530	135	59.2	75.8	19.5	8.55	10.95
2043	147560	135	57.9	77.1	19.9	8.55	11.35

2) Sewage and Drainage

With reference to the road typology, the drains vary in size. The drain is calculated for each type of road and thereby determining the capacity of the overall drains. The calculations conclude that the total capacity of the drains is 70.01 MLD. As per the URDPFI guidelines, the sewage generated is 80% of the water used. For the population of 2011 Census, the water usage is about 12.8 MLD and the sewage generation is about 10.2 MLD. The total Run-off water during heavy rains is calculated as 242.15 MLD, by using the Rational Method of Run-off water calculation. The drains do not have the capacity to hold the run-off water and sewage generated.

Table 5.2 Sewage and run-off water generation

SEWAGE AND RUN-OFF WATER GENERATION						
Year	Population	Required water in MLD	Sawage generated in MLD	Total Run-off per day in MLD	Total water running through the drains in MLD	Existing Capacity of Drains in MLD
2011	95061	12.8	10.2		252.35	
2021	114992	15.35	12.4		254.55	
2023	117440	15.8	12.6		254.75	
2031	129606	17.5	14	242.15 MLD	256.15	70.01 MLD
2033	132180	17.8	14.2		256.35	
2041	144530	19.5	15.6		257.75	
2043	147560	19.9	15.9		258.05	

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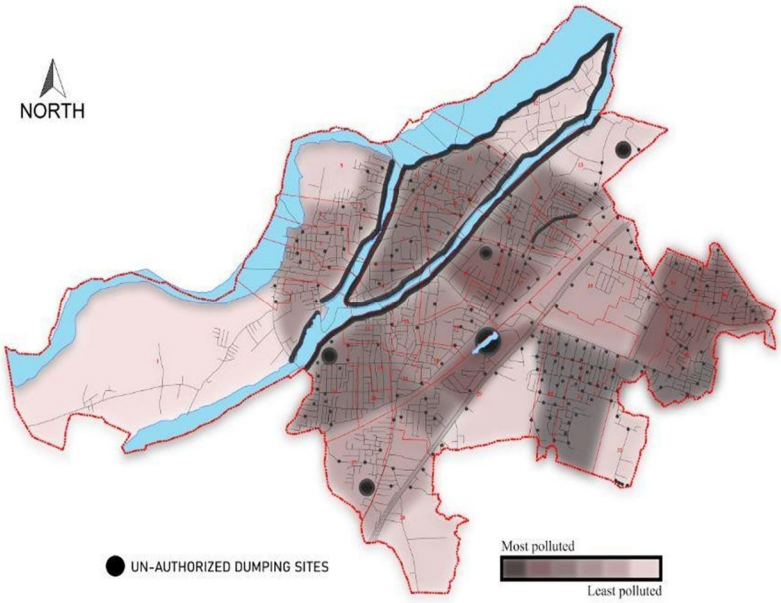
3) Solid Waste Management

The 33MTPD of waste generated is segregated and handled according to its type. The wet waste is sentto compost centres that are either on site or to Municipal Micro compost centres. The dry waste is further segregated according to its type and sent to different handling units such as local scrap dealers, incinerators, cement factories, etc. On-site compost centres have a total capacity of 0.8MTPD and Micro compost centres have a total capacity of 24 MTPD. According to the Management Rules 2016, 14 Bulk Waste generators have been identified in the city and they are advised to practice on site processing of their wet waste. Plastic bye-lawhas been framed to ban the manufacture, marketing and use of one time use and throw away plastics and is being implemented. Vaniyambadi has been certified as open defecation free city under Swacch Bharat Mission. According to the 12th Schedule of the Constitution of India, urban local bodies (ULBs) are responsible for keeping cities and towns clean.

Table 5.3 Projected Solid waste Generated

PROJECTED SOLID WASTE GENERATION						
Year	Population	Waste generated per capita per day in kg	Total waste generated in kg	Total waste generated in MTPD	Wet waste generated in MTPD	Dry waste generated in MTPD
2011	95061	0.28	26617.08	27	14.85	12.15
2021	114992	0.28	32197.76	32	17.6	14.4
2023	117440	0.28	32883.2	33	18.15	14.85
2031	129606	0.28	36289.68	36	19.8	16.2
2033	132180	0.28	37010.4	37	20.35	16.65
2041	144530	0.28	40468.4	41	22.55	18.45
2043	147560	0.28	41316.8	41	22.55	18.45

Due to lack of coordination from the people and the municipality, solid waste is dumped all over the city. The Municipality and the people should work hand in hand to keep the city clean and healthy. Un- authorized dumping can be seen all over the city, especially in open and vacant areas.



Map 5.1 Locations of un-authorized dumping of solid waste

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Table 5.4 Solid waste generation

PROJECTED SOLID WASTE GENERATION						
Year	Population	Waste generated per capita per day in kg	Total waste generated in kg	Total waste generated in MTPD	Wet waste generated in MTPD	Dry waste generated in MTPD
2011	95061	0.28	26617.08	27	14.85	12.15
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2041	144530	0.28	40468.4	41	22.55	18.45
2043	147560	0.28	41316.8	41	22.55	18.45

The projected amount of solid waste, cannot be handled in the existing compost centers and other handling units. It is necessary to increase the capacity of the processing units and to install new units in various locations. On-site composting can be encouraged in institutional buildings that generate large quantities of waste.

4) Electricity Supply

The recommended consumption is 1000 units per Capita per year or 2.74 kWh per capita per day demand which included domestic, commercial, industrial and other requirements. The provision of one electric substation of 11KV for a population of 15,000 can be considered as general standard for electricity distribution. As per the 2011 Census population, Vaniyambadi requires 260467.14 units of power per day. The existing power supply is adequate for the city, but if there is growth in the industrial sector the power supply may not be enough.

Table 5.5 Projected Electricity consumption

POWER REQUIREMENT			
Year	Population	Power required per person per day in Units	Total power required per day in Units
2011	95061	2.74	260467.14
2021	114992	2.74	315078.08
2023	117440	2.74	321785.6
2031	129606	2.74	355120.44
2033	132180	2.74	362173.2
2041	144530	2.74	396012.2
2043	147560	2.74	404314.4

B. Social Infrastructure

1) Healthcare Facilities

The Multispecialty hospitals are lacking facilities such as Ambulance, adequate beds, etc., according to the standards and they do not have enough doctors and diagnostic services. The Government Hospitals provides good medical facilities, but there are some facilities lacking such as major surgeries, diagnostic services and adequate beds. The water facilities are sufficient according to the bed counts in the private hospitals. But, in the government hospitals the water facilities are lacking as per the bed counts, and the deficiency is about 100 liters per bed.

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Table 5.6 Comparison of healthcare facilities with URDPFI guidelines

	COMPARISON WITH URDPFI GUIDELINES			
Type of health care facility	No. of health care facilities	URDPFI Guidelines	No. of Beds	URDPFI Guidelines
General Hospital	1	1	144	250
Primary Health Care	2	1	3	20
Multispecialty Hospital	1	1	60 - 70	200

Table 5.7 Comparison of Water tank capacity with URDPFI guidelines

	Water Supply			
Type of health care facility	No. of beds	Capacity of water Per bed	As per Guidelines	Remarks
Government Hospital	144	357L/bed	450L/bed	Insufficient
Multispecialty Hospital	60 - 70	400 - 425L/bed	450L/bed	Sufficient

Table 5.8 Comparison of various amenities of healthcare facilities

	Health Care Facilities		
Description/Amenities	Government Hospital	Private Multispecialty Hospital	UPHC
No. of Beds	144	60 - 70	60 - 70
Age	66 years	<50 years	<50 years
No. of Doctors	25	>5	>5
No. of Out Patient	1700	400 - 500	400 - 500
No. of In patient	130	40 - 50	40 - 50
Catchment area	Vaniyambadi and its outer area	Vaniyambadi	40 - 50
No. Of ICU	12	< 5	40 - 50
Land Area	25000 sq.m	5000 - 10000 sq.m	40 - 50
No. of Floors	1 - 2 floors	3 - 4 floors	40 - 50
No. of Blocks	>20	2 - 3 blocks	40 - 50
Space for Expansion	Yes	No	40 - 50
Safety and Security	Sufficient	Sufficient	40 - 50
Water Supply	51500 L borewell, municipal water	20000 L/hospital borewell, municipal water	20000 L/hospital borewell, municipal water
Drinking Water	Sufficient	Sufficient	Sufficient
Toilet facilities	Sufficient	Sufficient	Sufficient
Sanitation	Sufficient	Sufficient	Sufficient
Sewage	Open Drainage	Open drainage	Open drainage
Solid waste disposal	Ken bio link	Municipality	Municipality
Electricity	Sufficient	Sufficient	Sufficient
Power Backup	Insufficient	Sufficient	Sufficient
Transport	public	Public	Public
Road and approach	< 30 ft.	> 20 ft	> 20 ft
Connectivity within site	Good	Average	Average

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2) Educational Institutions

As compared with the guidelines in URDPFI guidelines along with present and projected population till 2043, it was observed that there are sufficient number of educational institutions like schools and colleges in and around Vaniyambadi.

Table 5.9 Comparison of educational facility with URDPFI guidelines

		Comparison with URDPET guidelines		
Description	Existing	URDPFI Guide lines		
		2023	2031	2043
Pre-Primary	7	45	50	55
Primary	21	22	25	28
Hr.Sec.School	11	15	16	18

3) Socio-Economic AmenitiesReligious Facility

It was observed that there are 25 Mosques, 20 Temples, 10 Church and 1 Jaina palli exist in Vaniyambadi. As per URDPFI guidelines it was observed that there should be at least 1 Religious place for every 5000 people. It was compared with URDPFI guidelines with the projected population of Vaniyambadi i.e. 2023 & 2033 with reference to 2011 census (97,601) is tabulated below in the sheet and found that only mosque is sufficient compared to temples & Churches.

Table 5.10 Comparison of religious facilities with URDPFI guidelines

S.no		Religious Buildings					
1	Category	Churches		Temples		Mosque	
2	URDPFI	1 for 5000		1 for 5000		1 for 5000	
3	Total No of facilities	10		20		25	
4	Is it sufficient? (Yes/No) (if not sufficient, Provision to be as per URDPFT)	No		No		YES	
5	Year	2023	2033	2023	2033	2023	2033
6	Population	1,17,440	1,32,180	1,17,440	1,32,180	1,17,440	1,32,180
7	No. of Facilities should be provided as per URDPFI	23	25	23	25	23	25

As per the existing condition of Vaniyambadi, the religious building existing in Vaniyambadi is sufficientas per the 2011 census. The area has the majority of Muslim, Hindu Community than the Christian community. Most of the Hindu festivals are celebrated at the month of May, July and Decembers. Each temple has their uniqueness in celebrating their festivals in these months. As per Muslims mostly celebrate only their religious festivals i.e. Ramzan and Bakrit.

4) Community Hall

The community halls located in Vaniyambadi which comprises of 36 wards. The total population in Vaniyambadi municipality is 97,601. Based on the projected population with reference to the 2011census was arrived i.e. 2023 & 2043. These data were compared with URDPFI guidelines along with the parking facilities, water supply and sewage discharge with reference to the norms / guidelines provided. The Vaniyambadi has a total of 16 community halls within the municipal boundary. In that 1 is Government and remaining 15 are private.

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Table 5.11 Comparison of community halls with URDPFI guidelines

S.no	Community halls		
1	URDPFI	*1 for 5000*	
2	TYPE — *PRIVATE*	*14*	
	GOVT	*2*	
3	Total No. of facilities	*16*	
4	Is it sufficient? (Yes/No) (If not sufficient, No. of facilities to be provided as per URDPFI)	*No*	
5	Year	*2023*	*2043*
6	Population	*1,17,440*	*1,47,560*
7	No. of Facilities should be provided as per URDPFI	*23*	*29*

For Community or Kalyana mandapams or Exhibition Hall shall be 15m as per TNCBDR 2019. The Roadwidth in local streets is between 2m to 5m only which does not satisfy the required road width for the community hall and cause road width violation and most of the community halls do not have parking facilities. Moreover, for water the Community halls depends mostly on water tankers and bore though they have water supply connection.

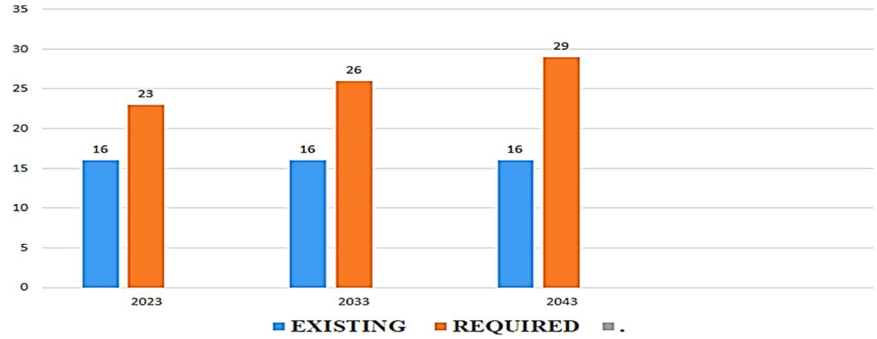

Chart 5.1 Requirement of Community halls

5) Institutional Spaces

In Vaniyambadi, industrial domination is more so Tamil Nadu pollution control board comes under pollution control board plays a key factor. Moreover, there are many Government students hostels like adi dravidar students' hostel, Electrical sub-station which supply electricity for the Vaniyambadi, co-operative society, TWAD board, Highways department, Public works department, Panchayat welfare office, Sub-Registraroffice are all within the municipal boundary of Vaniyambadi.

6) Public Infrastructure

As per the URDPFI Guidelines the current count of public infrastructure is sufficient for now (2023)and for upcoming 20 years (2043).

Table 5.12 Comparison of Banks and ATMs with URDPFI guidelines

S.no	BANKS AND ATM		
1	URDPFI	*1 for 15000*	
2	TYPE — *PRIVATE*	*8*	
	GOVT	*7*	
3	Total No. of facilities	*15*	
4	Is it sufficient? (Yes/No) (If not sufficient, No. of facilities to be provided as per URDPFI)	*Yes*	
5	Year	*2023*	*2043*
6	Population	*1,17,440*	*1,47,560*
7	No. of Facilities should be provided as per URDPFI	*8*	*10*

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Table 5.13 Comparison of Library and Post Office with URDPFI guidelines

S.No.	Category	Library		Post office	
1	URDPFI	1 for 15000		1 for 15000	
2	Total No of facilities	1		10	
3	Is it Sufficient? (Yes/No) (If not Sufficient, No. of facilities to be provided as per URDPFI)	No		Yes	
4	Year	2011	2043	2011	2043
5	Population	95061	147560	95061	147560
6	No of Facilities should be provided as per URDPFI	6	9	6	9

Table 5.14 Comparison of Police Station and Fire Station with URDPFI guidelines

S.No.	Category	Library		Post office	
1	URDPFI	1 for 15000		1 for 15000	
2	Total No of facilities	1		10	
3	Is it Sufficient? (Yes/No) (If not Sufficient, No. of facilities to be provided as perURDPFI)	No		Yes	
4	Year	2011	2043	2011	2043
5	Population	95061	147560	95061	147560
6	No of Facilities should be provided as per URDPFI	6	9	6	9

7) Open and Green spaces

The Vaniyambadi lacks in parks / Green space / open space. The Green space reduced to 3%. The population in Vaniyambadi as per 2011 census is 97,601. The existing parks are not in good condition and not in use. As compared with URDPFI guidelines it was found that the neighborhood parks are required for every 15,000 people. But the Vaniyambadi municipality as land asset (ward-1,2,5,16,28,29,30,31) comprising the totalarea of 32,436.36sq.m.

Table 5.15 Comparison of parks with URDPFI guidelines

S.no	*Ward no.*	*Total population (2011 Census)*	*Organised Green for Plain Areas (Neighbourhood parks-15000 populationfor 1 Neighbourhood Park)*		*Deficency / Park required*
			Park Required as per URDPFI Guidelines	*Park available as per URDPFI Guidelines*	
1	*1,2,3,4,5,6*	*12,468*	*1*	*Nil*	*1*
2	*7,89,1011,12*	*10,711*	*1*	*Nil*	*1*
3	*13,14,15,16,17,18,19,20, 21,22,23,24,25,26*	*40,479*	*2*	*1*	*1*
4	*27,28,29*	*10,231*	*1*	*1*	*Nil*
5	*30,31,32,33,34,35,36*	*21,172*	*1*	*2*	

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Table 5.16 Comparison of playgrounds with URDPFI guidelines

S.No	Category	Population served per unit	Total Population (2011 CENSUS)	PROJECTED POPULATION			Play ground Required as per URDPFI Guidelines	Play ground available as per URDPFI Guidelines
				Population (2023)	Population (2033)	Population (2043)		
1	Community level Multipurpose ground	1 lakh	97,601	1,17,440	1,32,180	1,47,560	1	Nil

VI. FINDINGS AND DISCUSSIONS

A. *Physical Infrastructure*

1) *Water Supply*

- The calculation and the comparison with the guidelines show that there is water demand and the municipality has to take action.
- There are areas that do not receive municipal water, showing uneven distribution of water.

2) *Sewage and Drainage*

- The open drains are not healthy options for sewage disposal as uncovered drains cause health hazards and unpleasant atmosphere for people to live in.
- The inadequate drain capacity causes overflow and flooding during the rainy seasons. This may lead environmental pollution and other health issues.

3) *Solid Waste Management*

- The city has the required basic infrastructure for proper waste management, but still the city found to be dirty and has an un-sanitary appearance.
- The main problem in the city is that people litter everywhere and do not have the awareness about proper waste management.
- There is lack in the manpower for solid waste management in the municipal level. This makes isdifficult for the government to keep the city clean.

4) *Electricity Supply*

- The city has old and outdated power supply infrastructure which has high maintenance issues.
- The municipality has industries that draw up a lot of energy.

B. *Social Infrastructure*

1) *Healthcare Facilities*

- In the government hospital the water facilities are lacking as per the bed counts, it is about nearly 100 liters per bed has been lacking.
- The Government Hospitals has been serving the good medical facilities, but there are some facilities lacking such as major surgeries, diagnostic service and bed count.
- The Multispecialty hospitals has not been serving as per the standards due to there is more facilities are lacking such as Ambulance.

2) *Educational Institutions*

- In the government schools the sanitation facilities has not been properly maintaining due to the lack oflabors.
- The safety and security system has not been good in the government schools.

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3) Socio-Economic AmenitiesReligious Facility

The Religious buildings is Vaniyambadi satisfy the URDPFI guidelines but they lack in maintenance of old temples and Jaina palli are not in good condition because of improper maintenance and lack in providing parking facility, water facility & drainage facility. The religious buildings mainly depend on borewell for water & Tankers. During festival season the religious building cannot accommodate the crowd due to overcrowding andminor accidents occur due to it.

4) Community Hall

Based on the primary & secondary data were compared with URDPFI guidelines along with the parkingfacilities, water supply and sewage provided in halls are not sufficient. As per 2023 projected population 23 community halls & 2043 only 29 community halls are required but only 16 exist. The New town of Vaniyambadidoes not have a government community hall.

5) Institutional Spaces

The main functions of the TNPCB under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 are to plan a comprehensive program for the prevention, control and abatement of water and air pollution, to inspect industrial plants or manufacturing process, any control equipment and to give directions to take steps for the prevention, abatement of air pollution and to inspect air pollution control areas for the purpose of assessment of quality ofair therein and to take steps for the prevention, control or abatement of air pollution in such areas

The Highway department takes care of the roads for laying and maintenance within the Vaniyambadi boundary, The PWD takes care for construction of Government projects and infrastructure development.

6) Public InfrastructurePost office and Library

The quantity of post offices surpasses the necessary provision, whereas the number of libraries stands at justone, which falls short of meeting the demand.

7) Police station and Fire station

According to the URDPFI guidelines, the existing police stations and fire stations are deemed adequate for thepresent time as well as for the projected needs up to the year 2043. Nonetheless, it is worth noting that the crime rate is notably higher in wards 34, 35, and 36.

8) Open and Green spaces

Based on the field survey and comparison with URDFPFI guidelines it was observed that based on ward population it was found that there is deficiency is parks and play grounds. The Open space & Green space in Vaniyambadi is very less and reducing and no proper playground exist in Vaniyambadi. The park required / deficiency are 3 & 1 play ground as compared with URDPFI guidelines

VII. CONCLUSION

A. Summary Of Key Findings And Their Implication

1) Physical Infrastructure

a) Water Supply

- Alternate water sources can be adopted or the existing sources can be enhanced. Additional pumping stations can be installed to increase the water supply to the city.
- The Overhead water tanks can be evenly distributed according to the population in each ward, so that all people receive the same amount of water.

b) Sewage and Drainage

- Covering of the open drains is a cost-effective and simple solution.
- A sewage treatment plant can be installed to avoid water body's pollution.

c) Solid waste Management

- The people and the municipal workers have to work with each other to keep the city clean.
- Awareness programs can be organized to make the people aware of the adverse effects of improper solid waste management.
- The government needs to increase the man-power for proper solid waste management.

d) Electricity Supply

- Alternate energy sources can be adopted for non-residential and non-commercial purposes.
- Modern technology can be adopted to make energy usage efficient.

2) Social Infrastructure

a) Healthcare Facilities

- Diagnostic Services facilitates the provision of timely, cost-effective, and high-quality diagnostic care in safe and secure environments. It includes the clinical services of Pathology and Laboratory Medicine, Radiology, and Nuclear Medicine.
- The proposed no. of beds for government hospital is about 106 beds, it will be sufficient for the Vaniyambadi population.
- The proposed water tank for the government hospital is about 60000 liters. It has been given as the 2 tanks of 30000 liters. For the 250 beds, the proposed water tank and the existing water tankcapacity is about 120000 liters. It can supply 450 liters for the each beds.

b) Educational Institutions

- In the government schools there is no proper security system such as, CCTV cameras and security. Proper security system has to be provided in schools and colleges for the safety of the children. The cameras can be placed on the main entrance and in each floor.
- CCTV cameras can be used to monitor the activities of students, staff, and visitors, and can help to deter any criminal activity, and also for the restriction of entry for unauthorized people.
- Most of the government schools does not have any sanitation workers. This exposes children to dust early in morning. Sanitation workers are involved in various tasks across the sanitation value chain, including cleaning toilets and spaces; cleaning and emptying sewers, septic tanks and drains; operating sewage treatment plants, etc. It is important to provide a safe and healthy environmentto the students.

c) Socio-cultural Amenities

Religious Facility

- Maintaining religious buildings and conserving them without affecting its originality.
- Providing proper parking facilities that can accommodate the vehicle traffic during the festival seasons.
- Providing proper water & drainage facility for the religious buildings.

Community Halls

- To provide a Common community hall or samuthaya koodam at new town in Vaniyambadi.
- To provide proper parking facilities for the existing community hall in or out of the premises.
- To provide proper water facilities & drainage facility in the community halls accommodating the capacity of the crowd.

d) Institutional Spaces

- To frame strict rules and action plan to reduce the pollution from the industries in Vaniyambadifrom polluting water and air.
- To put penalties by the government institutions who are violating the rules in solid waste orpolluting water and air.

e) Public Infrastructure

Post office and Library

- To align with the URDPFI Guidelines, additional libraries need to be constructed. Consequently, we have proposed the establishment of two libraries in distinct localities, with the potential for furtherexpansion or construction of additional libraries contingent upon the utilization of these new facilities.

Police station and Fire station

- According to the URDPFI guidelines, the existing police stations and fire stations are deemed adequate for the present time as well as for the projected needs up to the year 2043. Nonetheless,it is worth noting that the crime rate is notably higher in wards 34, 35, and 36.

f) Open and green spaces

The Vaniyambadi municipality as land asset (ward-1,2,5,16,28,29,30,31) comprising the total area of 32,436.36sq.m. There are totally 3 parks, i.e. two in old town and one in new town ofVaniyambadi. Moreover the Municipal has proposed for upgradation and renovation of 3 parks i.e.

1) Park at D.V.G Nagar layout in Vaniyambadi Municipality in ward no.30 for an amount of 40.75crores via Kalaignar Nagarpura Mempattu Thittam 2022-2023, 2) Development of Park in Kaliamman koil street, VSV road periyapet Vaniyambadi Municipality at ward-1 for an amount of 29 crores via Kalaignar Nagarpura Mempattu Thittam 2022-2023, 3) Municiapal Naivasl ladies park in ward-29 for an amount of 15 crores via Namaku Namae Thittam and upgrading other parks intosponge parks. Moreover, the Tamil Nadu Government has also proposed a mini stadium in Vaniyambadi of allocating an amount of Rs.3 crores only for the development of sport in Vaniyambadi.

B. Conclusion

The conclusion of the document is that infrastructure plays a crucial role in driving economic and socialdevelopment in Vaniyambadi. It states that a good infrastructure makes work processes easier, resulting in higherproductivity. The document also highlights the need to evaluate and improve the existing infrastructure facilities in Vaniyambadi to enhance the quality of life for its residents. It identifies various areas of infrastructure, such as healthcare facilities, educational institutions, water supply, and public infrastructure, and provides comparisons with the URDPFI guidelines to assess the adequacy of these facilities. The document suggests that there is a deficiency in certain areas, such as parks and playgrounds, and emphasizes the importance of addressing these deficiencies to meet the needs of the growing population. Overall, the document emphasizes the significance of infrastructure in promoting economic growth and improving the well-being of the community in Vaniyambadi.

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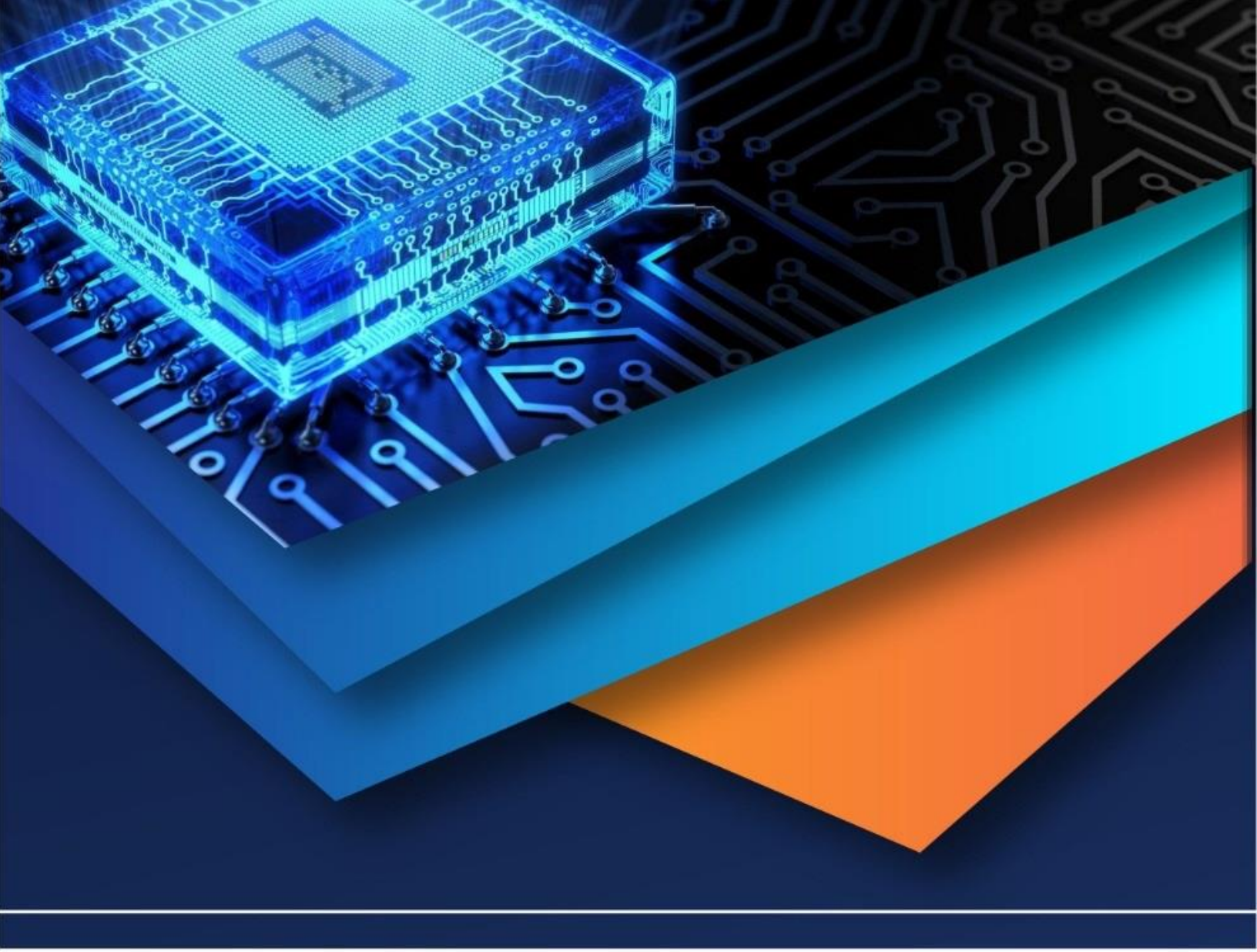

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