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CHAPTER 1. INTRODUCTION

1.1 INTRODUCTION

Perumbavoor derives its name from the vernacular term “Perumbazhoor” which refers to the large uncultivable land existed in the centre of the town. Perumbavur had been a part of the princely state of Travancore and remained a panchayat until 1953.

Perumbavoor Municipality was constituted on 1st January 1953 with an area of 13.59sq.km and it became the headquarters of Kunnathunadu taluk. Centuries back, this place was a thick forest. It is believed that the “Kaduval” of this taluk had been the cave of tigers. Even now a piece of thick forest exists in the south east corner of the town with a famous temple in the middle known as “Iringolkavu”. The area attract many Indian and foreign tourists throughout the year. The famous Christian Catholic church at Vallam is also an attractive monument of the town.

Perumbavoor is famous for the trade of timber. The Travancore Rayons (Pvt) Ltd. established their first unit in India at Perumbavoor near the banks of Periyar River. The availability of raw materials from the nearby forest is the main attraction to establish the company in Perumbavoor.

Road is the only means of Transport to and within this town. The two state high ways viz. Aluva- Munnar road and Main Central (M.C) Road passing through the town intersects at Kalady Junction which is the centre of this urban area. The nearest Railway Station of this town is at Aluva which is about 16Km. west of Perumbavoor. The “Periyar” river forms the western boundary of this town.



M.C.Road



Iringole Kavu

1.2 AIM

1. To guide and promote development of the town in an orderly manner, exploiting its resources and development potentials, so as to have a diversified economic base and an improved quality of life of its residents;

2. To develop the town as a major urban centre with higher order facilities and services, to cater the need of the town as well as surrounding panchayats

1.3 OBJECTIVES

1. To assess the physiographic, nature and trend of development and the characteristics of existing land use

2. To assess the land for various uses and the infrastructure requirements and identify suitable measures to provide for the same

3. To accommodate diversified economic activities in the town.

1.4 SCOPE

1. The Master Plan for the town is meant to be a plan for guiding developments rather than being used/ interpreted only as a 'regulation plan'. This Master Plan is not an immediate problem-solving plan, but contains measures to be translated to implementation in a phased manner that may mitigate problems even when promoting developments.

2. Land use surveys and household surveys were conducted by the Town and Country Planning Department and the outcome of these surveys are widely used in the Master Plan preparation

3. Studies relating to traffic and transportation are based on a study conducted by NATPAC in the year 2010.

1.5 LIMITATIONS

1. The land use and household surveys were originally conducted in the year 2005 and only the land use could be updated in the year 2010

2. The census data used in the study relates to the year 2001as 2011 data could not be made available at the time of preparation of the Plan.

1.6 EARLIER PLANNING EFFORTS AND STUDIES

A Master Plan with a horizon year 2011 was prepared and published in 1998 vide G.O. (Rt) No. 2544/98/LAD dated 22.10.1998 under the provisions of Town Planning Act 1108 ME. Demographic data used in this plan were related to Census 1991.

The main concept and objectives of the published Plan (1998)

Major activities in the municipality are concentrated around the central area, which is located towards the southern boundary of the town. Other than, the central area and the industries located in the western side of the town, the predominant development in the town are residential. The areas other than the central area do not have a proper road network and the population density in this area is also low. In the absence of other major commercial nodes in the town the dependence on the central area is high. The thrust of the plan was thus on decongesting the central area by developing two sub centers, one in the east and the other in the west and providing adequate infrastructural facilities in the residential areas.

The major proposals of the plan

- Mixed use zone for the existing town centre.

- Two sub centers, one near the Travancore Rayons and the other at Pattal Junction to accommodate nonresidential activities.
- Storage and warehousing facilities on the northern side of Aluva-Munnar road and the outer ring road.
- A higher density residential development in the town centre and relatively low residential densities in other areas.
- Other than the Travancore Rayons, a new industrial use zone on the north eastern corner of the municipal limits.

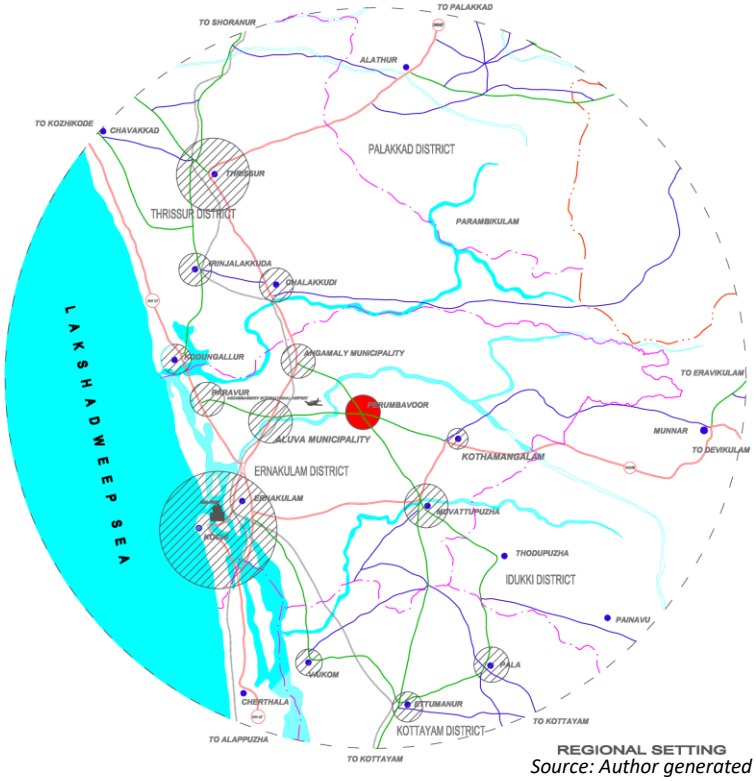
Master Plan was published in the gazette on 24.11.1998 and leading news papers on 30.10.98. As per the notification published, a number of objections and suggestions were received, most of them related to the ring roads and the industrial use zone. Further processing of the Scheme was not pursued by the Municipality mainly because of these objections. After that as per GO(Rt) No.2766/2009/LSGD dated 24/10/2009 the Government ordered to prepare a revised Master Plan for Perumbavoor town as part of the preparation of Master Plans for 32 towns in Kerala.

CHAPTER 2. REGIONAL SETTING

2.1 REGIONAL SETTING

Perumbavoor is the Taluk Headquarters of Kunnathunadu and is a fast developing town in Ernakulam District. Perumbavoor is bounded on the north by Koovappady Panchayat, on the east by Rayamangalam Panchayat, on the south by Vengola Panchayat and on the west by Periyar River.

Perumbavoor is well connected to other urban centers within the district through roads. This is one of the major collection and distribution centres of hill and agricultural produces and caters to the need of the neighbouring villages. The town has importance in many other aspects such as timber industry, entry path for spices and rubber, and a place of interim stay for Sabarimala Pilgrims.



Source: Author generated

Figure 2.1 Regional Setting of Perumbavoor Town

2.2 CONNECTIVITY

The town has good regional connectivity through the Main Central Road (MC Road) in the North South direction and the Aluva-Munnar (AM Road) road in the East West direction. These roads intersect at Kalady Junction around which the central area of the town is developed. Aluva Railway Station is the nearest railway station which is 8kms from Perumbavoor town and the nearest Airport is the Cochin International Airport at Nedumbassery.

Perumbavoor town is situated 16 km east of Aluva, 16 km North of Muvattupuzha and 13 km South of Angamaly, which are the major nearby urban centers. Perumbavoor lies in between 10° 6’ and 10 ° 8’ of north latitude and 76 ° 20’ and 76 ° 31’ of east longitude. Fig 2.2 shows location of Perumbavoor in the district.

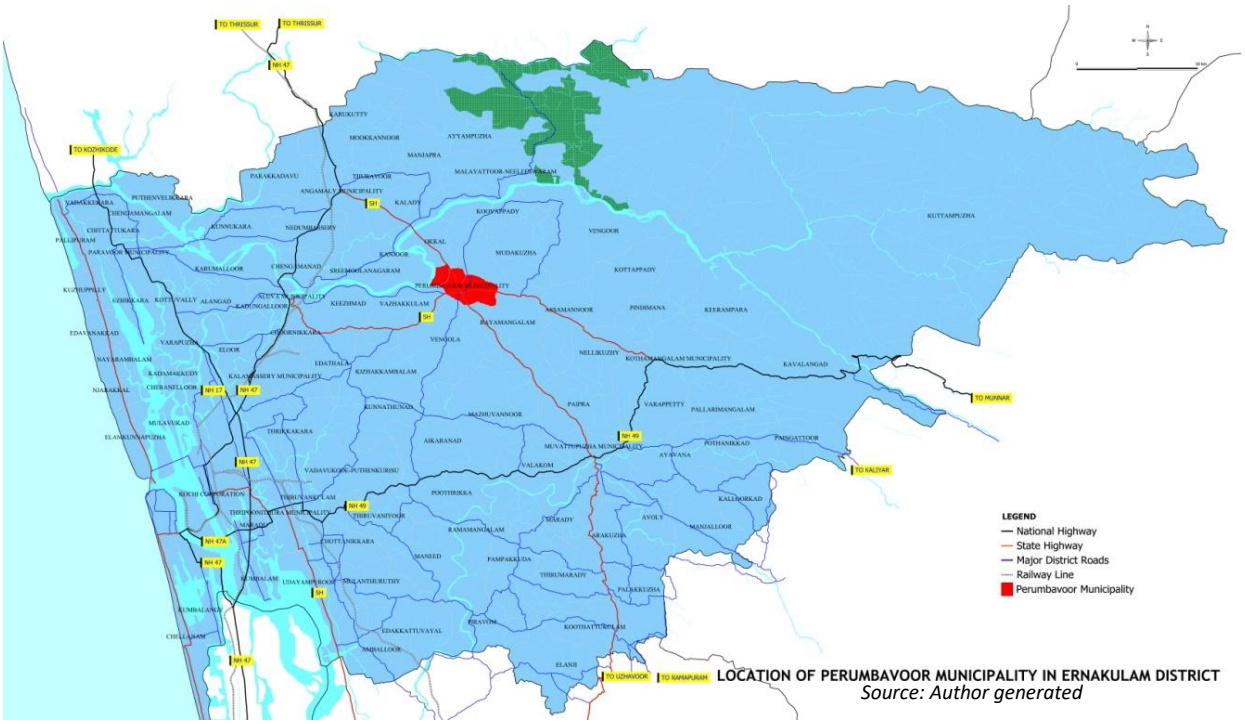


Figure 2.2 Location of Perumbavoor in Ernakulam district

2.3 TOPOGRAPHY

Depending upon the topography, Kerala State is divided into three regions namely high land, mid land and low land from east to west. Perumbavoor town comes in the mid land

region. The surrounding hilly area of the town is full of plantation and cash crops. The low level areas are also fertile and are put to agriculture.

2.4 CLIMATE

Perumbavoor has moderately hot humid climate. The hot season from March to May is followed by south west monsoon season from June to September. The rainy season ends by the end of December and the rest of the year is generally dry. The average annual rainfall in the region is 2677 mm, the average daily maximum temperature during the hottest months of March and April is around 31 to 36°C.

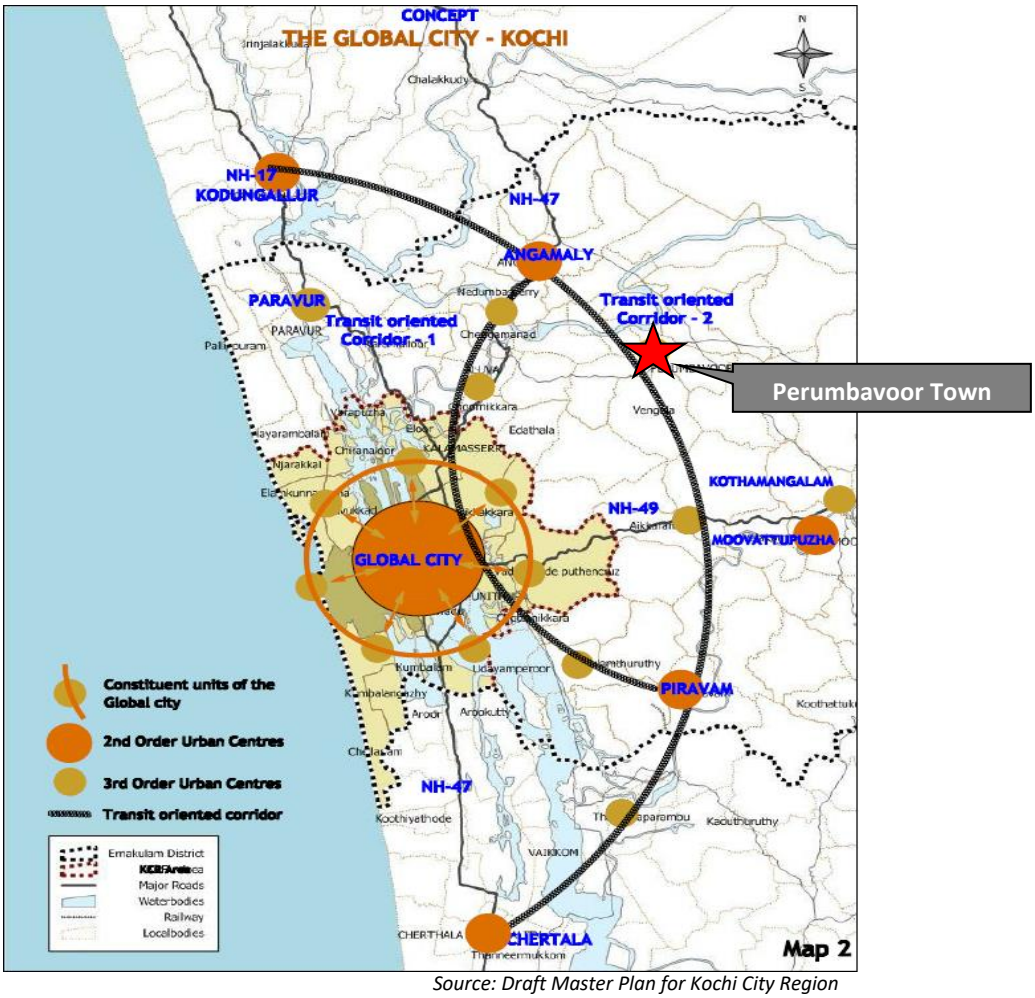
2.5 ROLE OF PERUMBAVOOR AS IDENTIFIED IN THE DRAFT DEVELOPMENT PLAN FOR KOCHI CITY REGION, 2031

Kochi UA in Ernakulam district is the largest urban agglomeration in the State. Studies conducted as part of preparation of draft Master Plan for Kochi City Region reveals that Kochi city attracts a huge influx of floating population. This floating population converges to the city for availing of job opportunities, education and health facilities, trade and commerce and other higher order amenities /facilities. This trend points to the need for stimulating the growth of second order urban settlements around the city, like Municipalities of Angamaly, Perumbavoor, Muvattupuzha, Kothamangalam, North Paravur and Kodungallur, to provide the much needed facilities and better job opportunities.

Perumbavoor has the potential to develop as second order centre as envisaged in the draft Master Plan for Kochi City Region. In order to strengthen the town, certain higher order facilities and supporting services are promoted to be developed. Hence Perumbavoor town is expected to accommodate major facilities like super specialty hospitals, non-polluting hi-tech industries, major employment centers, centre of excellence, tourism development and uses ancillary to these uses apart from other facilities expected of a second order urban centre.

Also in the draft Master Plan for Kochi City Region, for arresting the urban sprawl and opening up new area for development in the wider influence region of Kochi city, a new development corridor with reduced dependency on Kochi city is proposed. This corridor

connecting centers of Kodungallur, Angamaly, Perumbavoor, Kolenchery, Piravom, Thalayolaparambu and Cherthala is proposed to be developed as a transit oriented development corridor to accommodate major developments without stressing the available infrastructure in Kochi. Intense development shall be permitted around the transit centers along this corridor. The road linkage connecting the above centers would also function as a bypass to Kochi UA, in tune with the draft Kerala road Development policy, 2009 and shall be developed in such a way that MRTS could be introduced in this corridor at a later stage. Proposal for this TOD corridor is shown in Fig.2.3.



Source: Draft Master Plan for Kochi City Region

Figure 2.3 Transit Oriented Corridor

2.6 HIERARCHY OF SETTLEMENTS

A study conducted by the Department of Town and Country Planning in 2009 –'10 on the urbanisation pattern of the District resulted in the District Urbanisation Report, Ernakulam 2011. The report identifies hierarchy of settlements. This is based on factors like trend of physical development, locational importance, administrative status and trend of urbanisation. The existing hierarchy of the settlements in Ernakulam District shows that the settlement falls under five Hierarchies viz. Ist order settlement, IInd order settlement, IIIrd order settlement, IVth order settlement and Vth order settlement. The first order and second order settlements are shown in Fig 2.4. As can be seen, Perumbavoor Municipality falls in second order settlements.

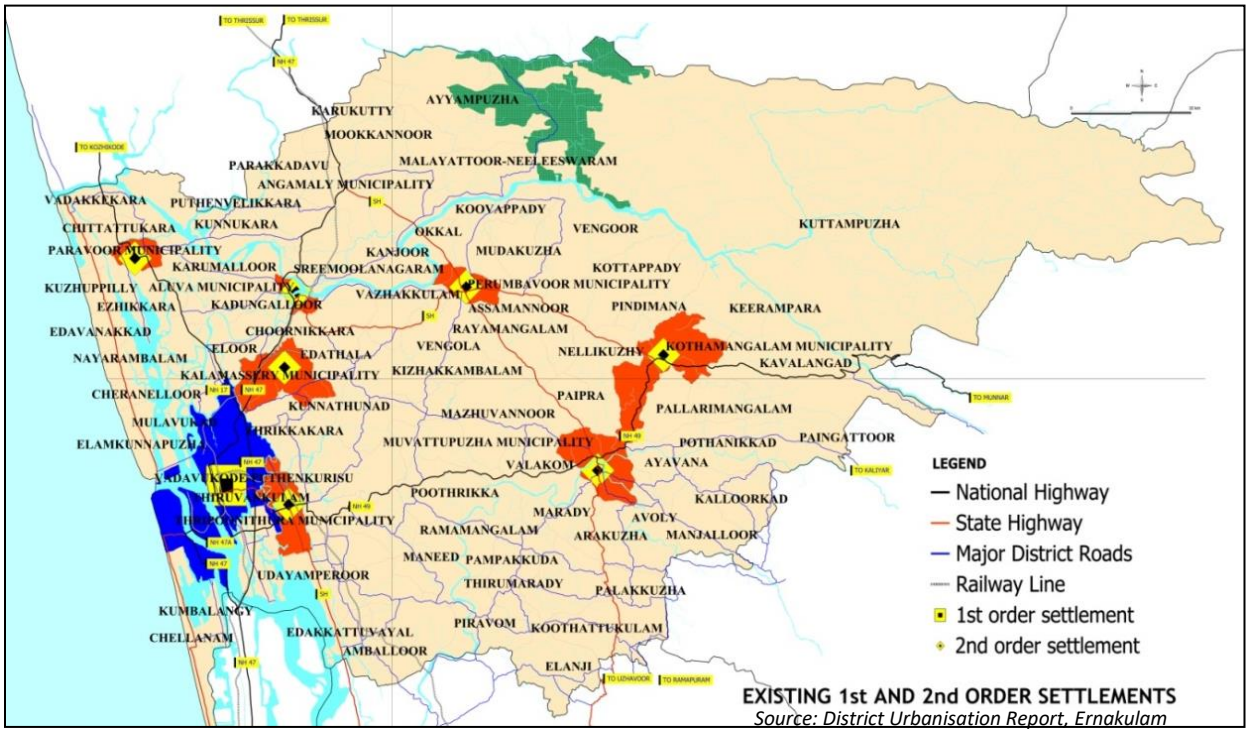


Figure 2.4 Existing 1st and 2nd order settlements of Ernakulam Dist.

CHAPTER 3. DETAILED STUDY AND ANALYSIS

3.1 DEMOGRAPHY

In 1901, the total population of Kerala was 65.96 lakhs but within hundred years this rapidly increased to 318.41 lakhs. The population of Kerala accounts for 3.1% of the national population, whereas the area account for 1.18 per cent of the total land of the country. As per 2001 census the population of Ernakulam District is 3105798, which is 9.75% of the total population of the State. The area of Ernakulam district is 3068 sq. km which is 7.89 per cent of the total area of Kerala.

As per the 2001 census, the total population of Perumbavoor is 26,547 which is 0.85% of the total district population. The urban population of the town constitutes 1.80% of the total urban population of 1477085 in the district. The average density of population for Ernakulam district, Kunnathunadu taluk and Perumbavoor town are 1012, 658 and 1951 persons/sq.km respectively. The details are shown in Table 3.1 and Table 3.2. The decadal growth rate of Kerala, Ernakulam and Perumbavoor are shown in the Table 3.3.

Table 3.1 Area and population density of Kerala, Ernakulam and Perumbavoor.

	Area in Sq. Km	Density per Sq.km	Population
Kerala	38863	819	31841374
Ernakulam	3068	1012	3105798
Perumbavoor (M)	13.59	1953	26547

Source: Census of India 2001

Table 3.2 Taluk wise Decennial growth of population 1981-1991 & 1991-2001

Name of Taluk	Total Population			Growth ratein %		Urban population			Growth rate in %	
	1981	1991	2001	81-91	91-01	1981	1991	2001	81-91	91-01
Paravur	320987	350364	382628	9.15	9.21	171969	271238	248540	57.72	-8.37
Aluva	365567	407318	444607	11.42	9.15	53585	146399	205677	173.2	40.51
Kunnathunadu	348168	389287	433606	11.81	11.38	23064	24667	26547	6.95	7.62
Kothamangalam	164735	184805	225551	12.18	22.05	33122	35535	37173	7.29	4.61
Muvattupuzha	277694	301591	324644	8.61	7.64	25313	69626	29246	9.02	5.98
Kanayannur	607084	699867	790212	15.28	12.91	443957	557748	654677	25.63	17.38
Kochi	451059	484004	504550	7.3	4.25	251882	267964	275225	6.38	2.71

Source: Census of India 1981, 1991 & 2001

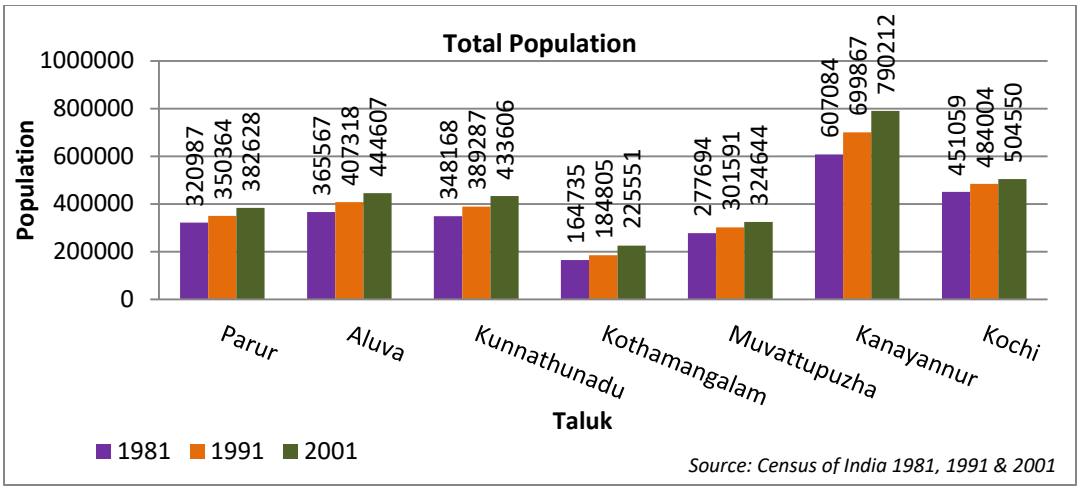


Figure 3.1 Total Population of Taluks in Ernakulam district from 1981 to 2001

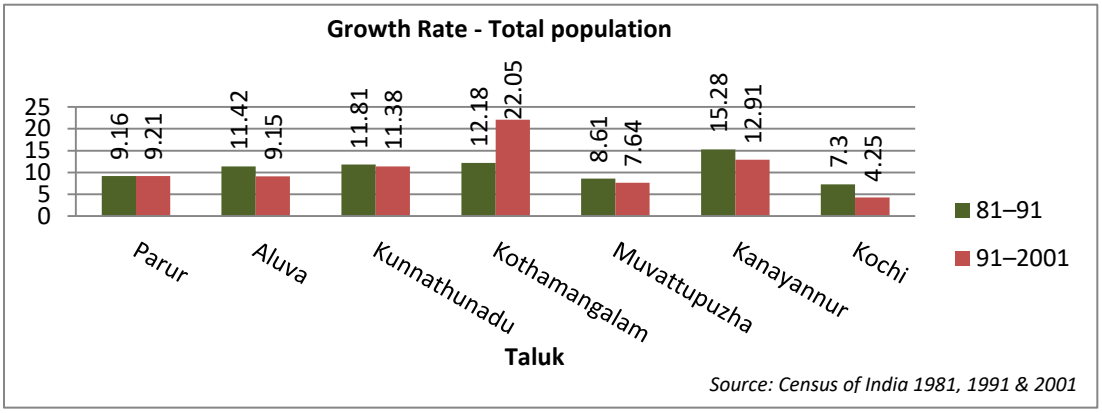


Figure 3.2 Growth rate of Population of Taluks in Ernakulam district in 1981-91 and 1991-01

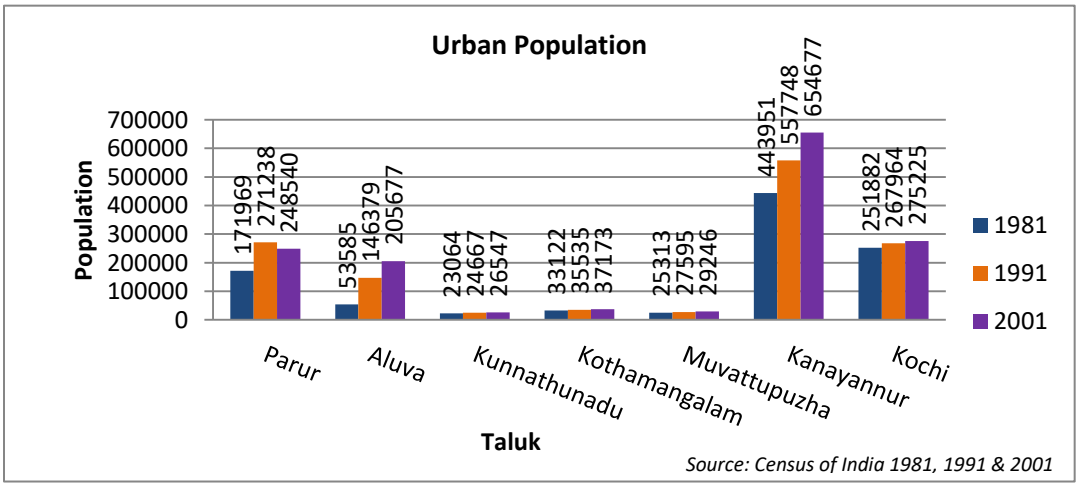


Figure 3.3 Urban population of Taluks in Ernakulam district from 1981 to2001

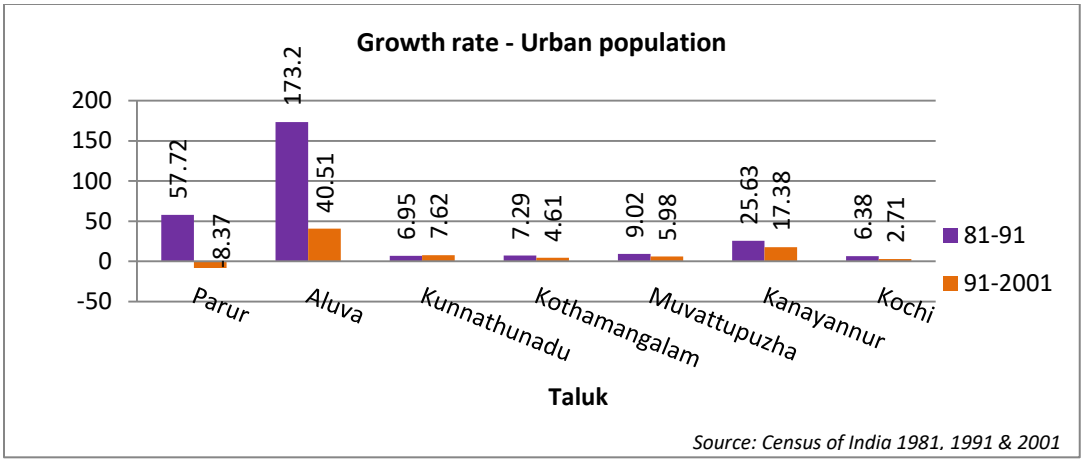


Figure 3.4 Growth rate of urban population of Taluks in Ernakulam district from 1981 to2001

Table 3.3 Decennial growth of population of Kerala,Ernakulam and Perumbavoor 1981-1991 & 1991-2001

	Total Population			Growth rate in %		Urban population			Growth rate in %	
	1981	1991	2001	81-91	91-01	1981	1991	2001	81-91	91-01
Kerala	25453680	29098518	31841374	14.32	9.43	4771275	7680294	8266925	60.97	7.64
Ernakulam	2535294	2817236	3105798	11.12	10.24	1002892	1373177	1477085	36.92	7.57
Perumbavoor	23064	24667	26547	6.95	7.62	23064	24667	26547	6.95	7.62

Source: Census of India 1981, 1991 & 2001

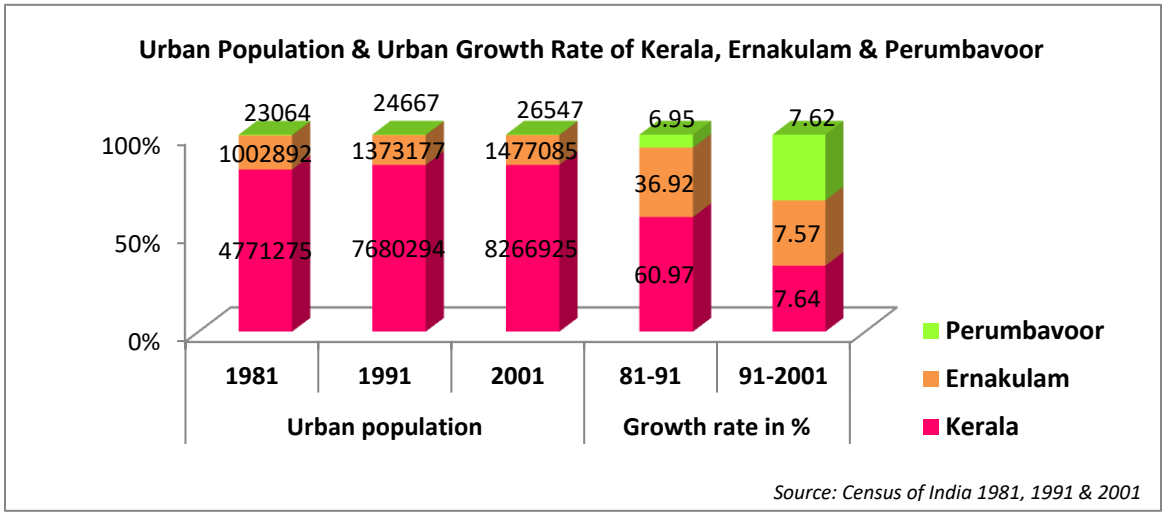


Figure 3.5 Urban Population & Growth rate of Kerala, Ernakulam and Perumbavoor during the period 1981-2001

INFERENCE

Growth rate shows a decreasing trend in the State as well as in the District. A sharp increase in growth rate of Kerala and Ernakulam can be seen during the period 1981-91. This

may be due to industrialization and in migration. The growth rate of Perumbavoor has increased due to the influence of migrant workers in large number.

3.1.1 GROWTH OF POPULATION IN THE TOWN

The decennial growth rate of population in Perumbavoor town during 1991-2001 was 7.62. The growth rates of population of towns in Ernakulam district are shown in Table 3.4.

Table 3.4 Decennial growth of population in the Urban centres in Ernakulam district

Name of Town	Population			Percentage of increase	
	1981	1991	2001	1981-1991	1991-2001
Angamali	28307	30391	33409	7.36	9.93
Aluva	25278	24774	24110	-2	-2.68
Muvattupuzha	25313	27595	29246	9.02	5.98
Paravur	26288	27906	30059	6.15	7.72
Perumbavoor	**23064**	**24667**	**26547**	**6.95**	**7.62**
Kothamangalam	33122	35535	37173	7.29	4.61
Thripunithura	43646	51078	59884	17.03	17.24
Kalamassery	43767	54342	63116	24.16	16.15

Source: Census of India 1981, 1991 & 2001

INFERENCE

Aluva, Muvattupuzha, Kothamangalam and Kalamassery show a decreasing trend in growth rate. The reason may be out migration from the municipalities to nearby local bodies. Major influencing factors are land availability, infrastructure facilities and better living environment.

Growth rate of Angamaly, Paravur, Perumbavoor, and Thripunithura has increased during the period 1991-01. It may be due to the immigration of migrant workers and the influence of Kochi region.

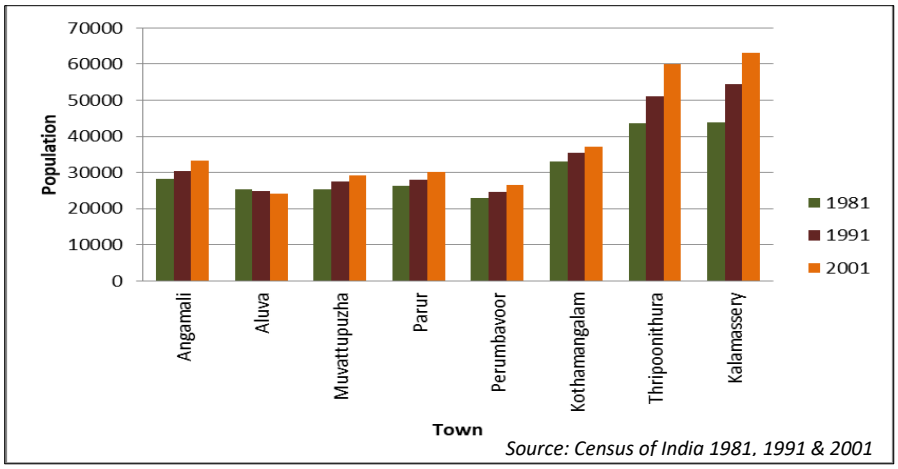


Figure 3.6 Population of municipal towns in Ernakulam district from 1981-2001

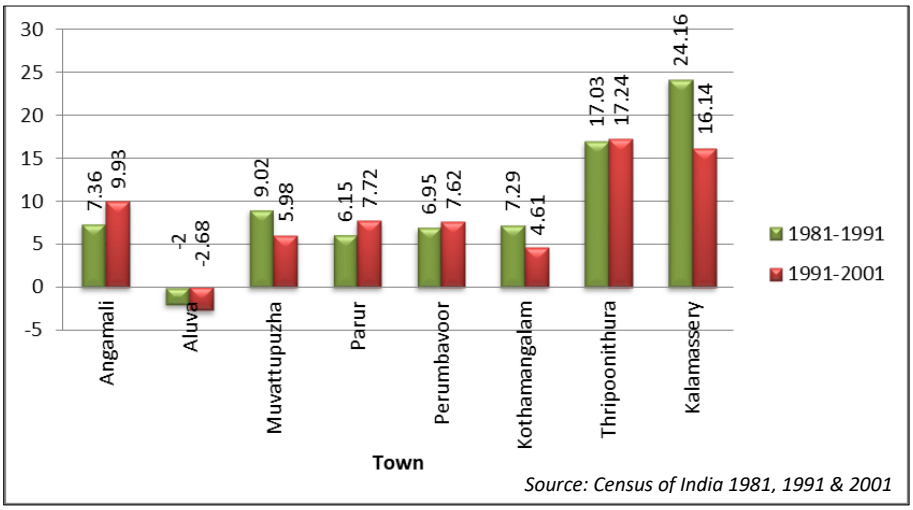


Figure 3.7 Percentage of increase in growth rate in 1981-91 and 1991-2001

Table 3.5 Population of Nearby LSGI'S

Nearby LSGI	Population		
	1981	**1991**	**2001**
Okkal	-	-	* 22374
Koovappady	46747	50441	33102
Mudakkuzha	14280	15346	16767
Asamannoor	14589	16429	17947
Rayamangalam	27271	30259	33903
Vengola	29831	36116	42866
Vazhakulam	23934	28591	34277
Sreemoolanagaram	19087	22395	24600
Kanjoor	18056	19712	21651
Perumbavoor	**23064**	**24667**	**26547**

Source: Census of India 1981, 1991 & 2001

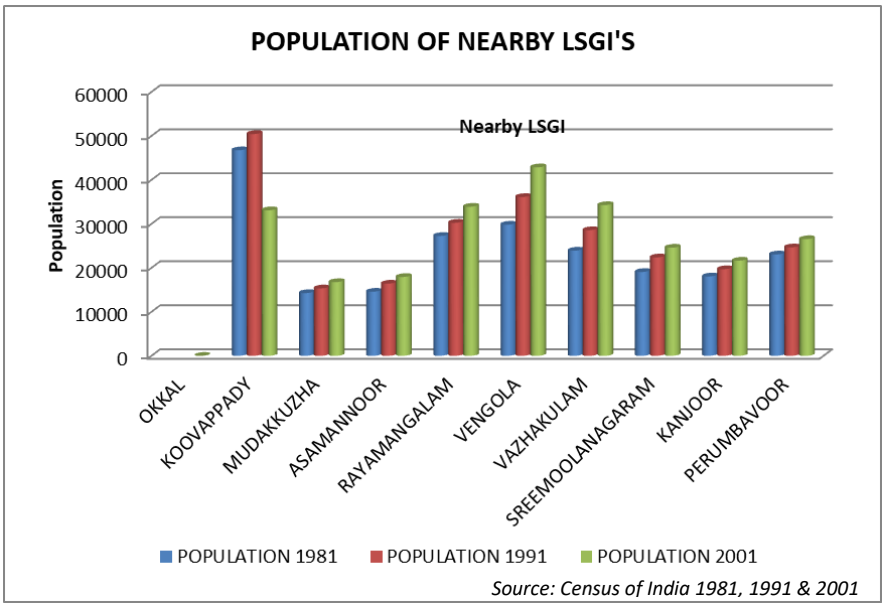


Figure 3.8 Population of Nearby LSGI'S in 1981, 1991 & 2001

Table 3.6 Growth Rate of Nearby LSGI'S

GROWTH RATE		
Nearby LSGIs	**1981-1991**	**1991-2001**
Okkal	-	-
Koovappady	7.9	-34.37
Mudakkuzha	7.46	9.26
Asamannoor	12.61	9.24
Rayamangalam	10.96	12.04
Vengola	21.07	18.69
Vazhakulam	19.46	19.89
Sreemoolanagaram	17.33	9.85
Kanjoor	9.17	9.84
Perumbavoor	6.95	7.62

Source: Census of India 1981, 1991 & 2001

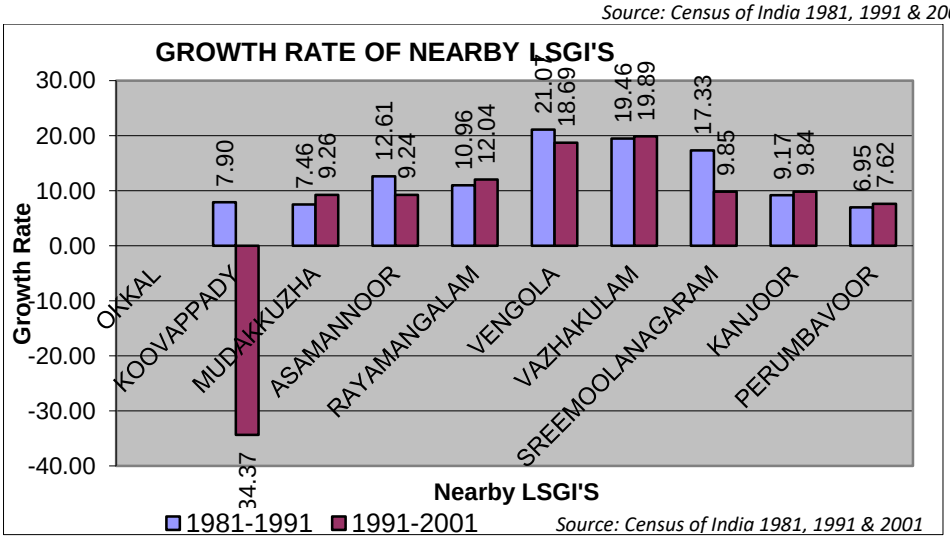


Figure 3.9 Growth rate of Nearby LSGI'S in 1981-1991 & 1991-2001

* As per the order no. G.O. (M.S)No.266/99 LSGD dated 29.12.1999 Koovappady grama Panchayat is divided into Koovappady and Okkal Grama Panchayat (Census of India 2001). In 1991 area of Koovappady Panchayat was 43.98 sq. km with population 50441. In 2001 the area and population of Koovappady Panchayat decreased to 31.18 sq. km and 33102 respectively. So Growth rate of Koovappady Panchayat shows negative value. The growth rate of Okkal Panchayat cannot be compared since it was formed in October 2000. Perumbavoor municipality shows an increasing trend in growth rate during the period 1991-2001.

Table 3.7 Decennial growth of population in Perumabvoor Town

Census year	Population	Area in Sq. Km	Decennial growth in population	Percentage
1971	20888	13.59	-	-
1981	23064	13.59	2176	10.42
1991	24667	13.59	1603	6.95
2001	26547	13.61	1880	7.63

Source: Census of India 1971, 1981, 1991 & 2001

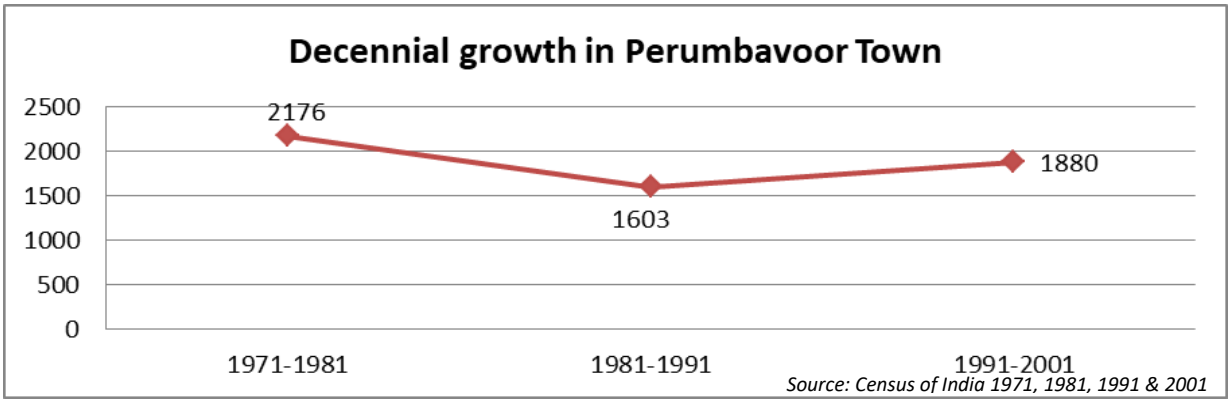


Figure 3.10 Decennial growth of population in Perumbavoor town during the period 1971-2001

3.1.2 AGE STRUCTURE OF POPULATION

Based on 2001 Census the distribution of population in each age group is shown in table No.3.8 and Fig 3.11.

Table 3.8 Age structure of population

Age Group	Total Population	Male Population	Female Population
0-4	2101	1039	1062
5-9	1906	943	963
10-14	2135	1056	1079
15-19	2168	1073	1095
20-24	2386	1180	1206
25-29	2413	1194	1219
30-34	2353	1164	1189
35-39	2239	1108	1131
40-44	1873	927	946
45-49	1804	892	912
50-54	1372	679	693
55-59	1006	497	509
60-64	881	436	445
65-69	735	364	371
70-74	516	255	261
75-79	332	164	168
80+	308	152	156
Age not stated	19	9	10

Source: Census of India 2001

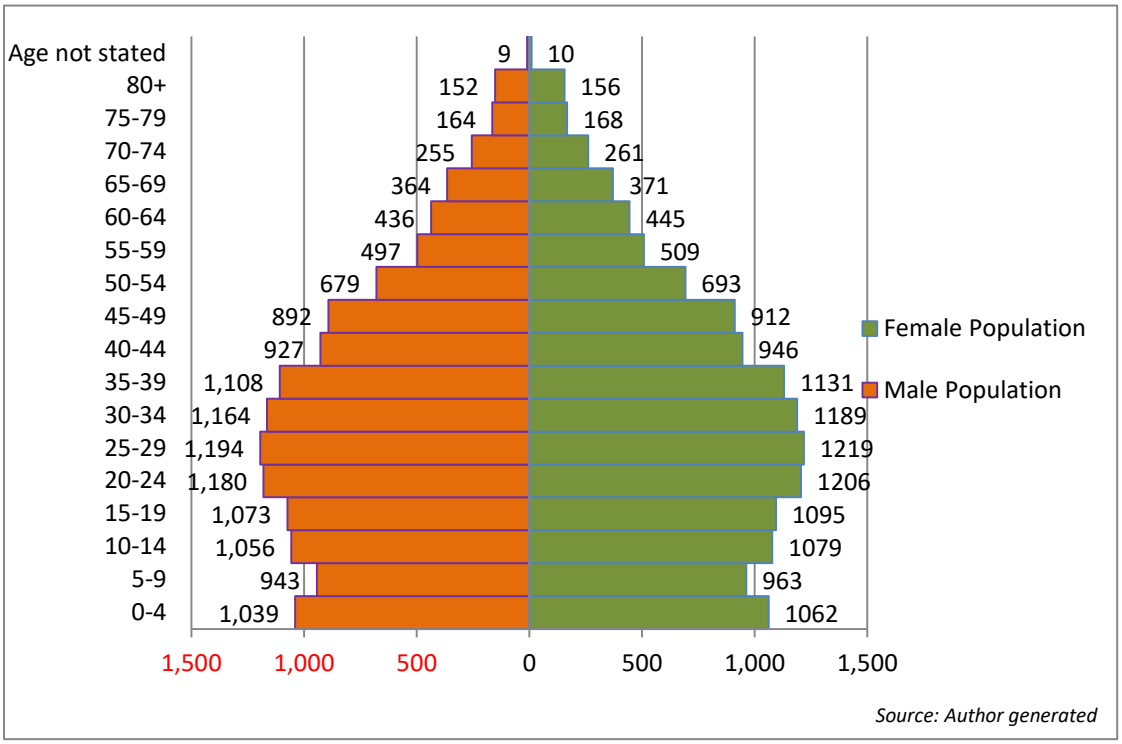


Figure 3.11 Age-Sex Pyramid of Perumbavoor in 2001

Number of female is more in every age group. Pyramid highlights the importance of working age group (20 -55 age group). It shows a salubrious sign for the economy of the town. It is observed that old people are decreasing and number of children is increasing which shows the possibility of increase in population in future.

3.1.3 HOUSEHOLD SIZE

A comparison of house hold size in 1981 and 1991 reveals that the size has decreased in Perumbavoor as in the case of Kerala State and Eranakulam district. Average household size of state, district, Taluk and Perumbavoor town for the period 1981 – 2001 are shown in Table 3.9 and Figure 3.12.

Table 3.9 Household size of Kerala, District, Taluk & Town

Sl No.	State, District, Taluk & Town	Average household size		
		1981	1991	2001
1	Kerala	5.75	5.28	4.7
2	Ernakulam	5.75	5.07	4.5
3	Kunnathunadu	5.58	4.93	4.4
4	Perumbavoor	5.54	4.85	4.38

Source: Census of India 1981, 1991 & 2001

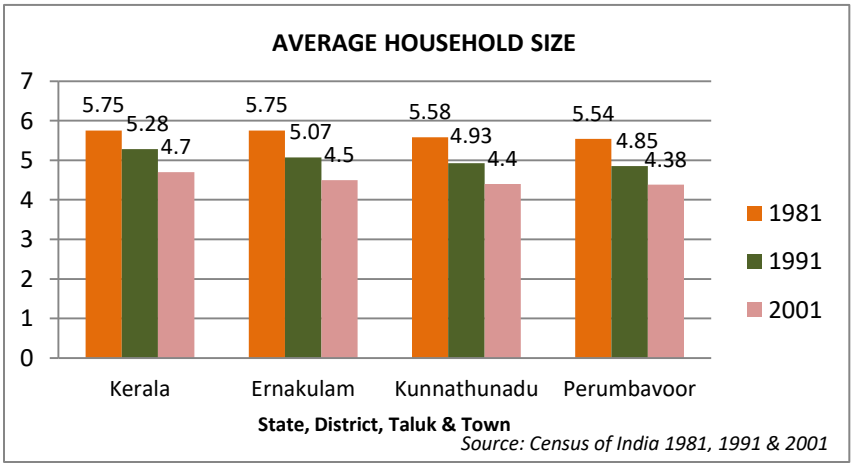


Figure 3.12 Average household size of State, District, Taluk and Town

3.1.4 LITERACY

As in every other urban or rural area in the state, the literacy rate in Perumbavoor town is also fairly good.

Table No.3.10 below shows the percentage of literates in the district, taluk and town during the years 1981, 1991 & 2001.

Table 3.10 Literacy in Perumbavoor Town

State, District, Taluk & Town	Percentage of literates of the total population		
	1981	1991	2001
Kerala	70.42	77.96	90.86
Eranakulam	76.82	82.03	93.2
Kunnathunadu	74.46	80.17	81.55
Perumbavoor	76.09	82.98	94.09

Source: Census of India 1981, 1991 & 2001

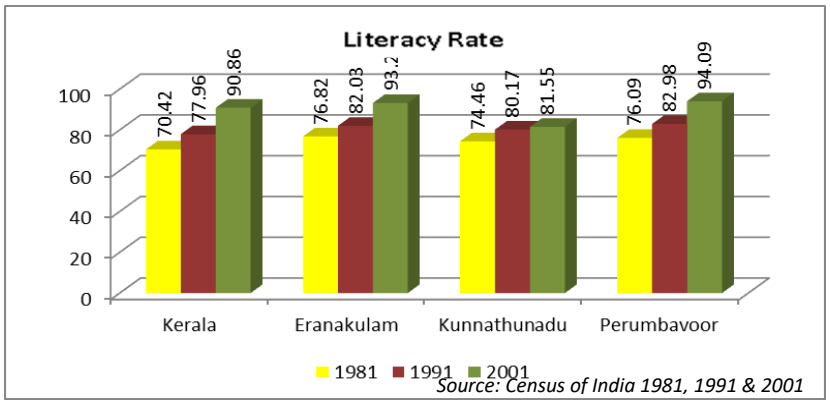


Figure 3.13 Literacy rate of State, District, Taluk and Town

The increasing trend of literacy of inhabitants can be utilized as a resource for the future development.

3.1.5 DISTRIBUTION OF POPULATION

The total population of Perumbavoor town as per 2001 census is 26547. Among the 21 Municipal Wards, Ward No.21 has the highest population i.e. 1593 persons. Next in the hierarchy is Ward 17 which has a population of 1477. This ward is situated in the south eastern corner of the town. The distribution of population in the various wards are shown in Table No.3.11 and the graph is shown in Fig 3.14, Fig 3.15 and Fig 3.16.

Table 3.11 Ward wise area, population density and percentage of population-2001 census

Ward No.	Ward Name	Area in Ha	Density per Ha	Population	Male	Female	% of total population
1	Vallam North Ward	86.62	16	1385	697	688	5.22
2	Pazhaya Vallam North	87.04	15	1333	670	663	5.02
3	Masjid	74.54	17	1240	637	603	4.67
4	Sasthamangalam	55.61	22	1198	605	593	4.51
5	Chakkarakkattu	38.67	34	1329	667	662	5.01
6	Temple Ward	27.25	42	1139	555	584	4.29

7	Taluk Hospital	103.14	12	1189	582	607	4.48
8	Karattupally	32.54	39	1272	628	644	4.79
9	Asram Ward	44.87	25	1140	565	575	4.29
10	Alppara Ward	74.31	19	1412	711	701	5.32
11	Iringole	51.94	24	1267	646	621	4.77
12	Nagamcheri Ward	61.94	21	1278	652	626	4.81
13	Pankulam	97.63	11	1076	511	565	4.05
14	Vrindavan	54.45	26	1429	669	760	5.38
15	Church	96.55	10	948	460	488	3.57
16	Theatre	61.55	17	1038	553	485	3.91
17	Municipal Bus stand	53.34	28	1477	623	854	5.56
18	Ayurveda Hospital	58.24	21	1223	589	634	4.61
19	Thetticode	39.96	35	1384	700	684	5.21
20	Vallam South	78.51	15	1197	617	580	4.51
21	Rayons	80.31	20	1593	795	798	6.02

Source: Census of India 2001

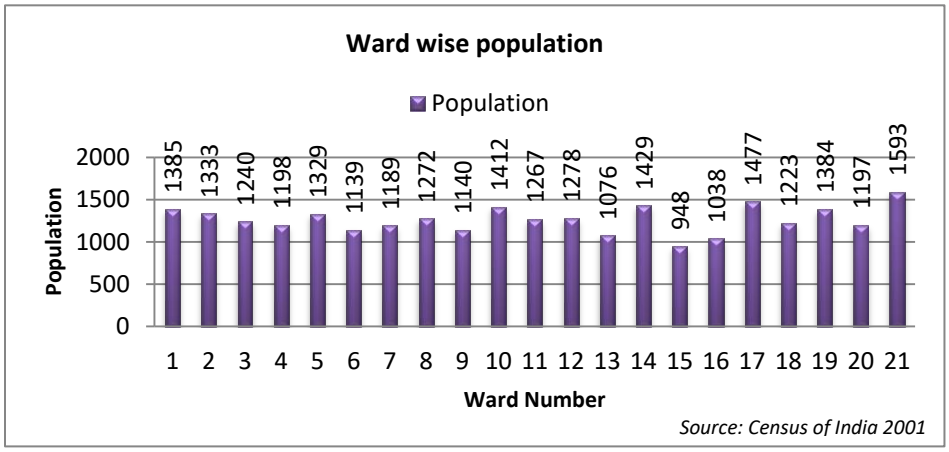


Figure 3.14 Ward wise population of Perumbavoor Municipality in 2001

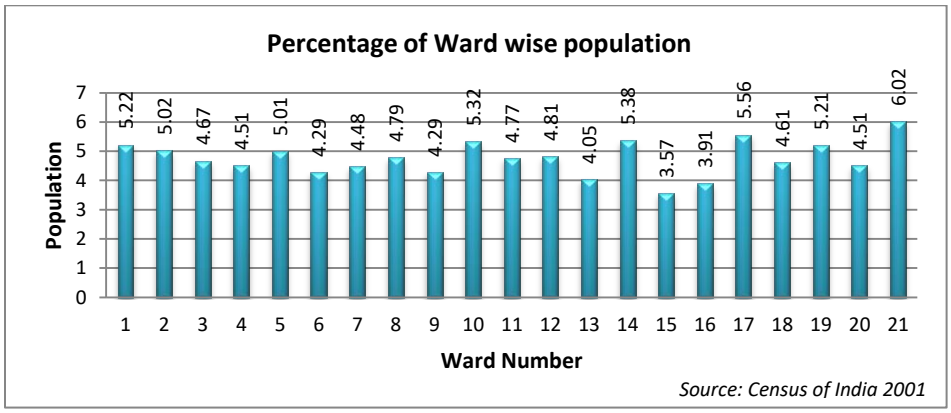


Figure 3.15 Percentage of Ward wise population in Perumbavoor

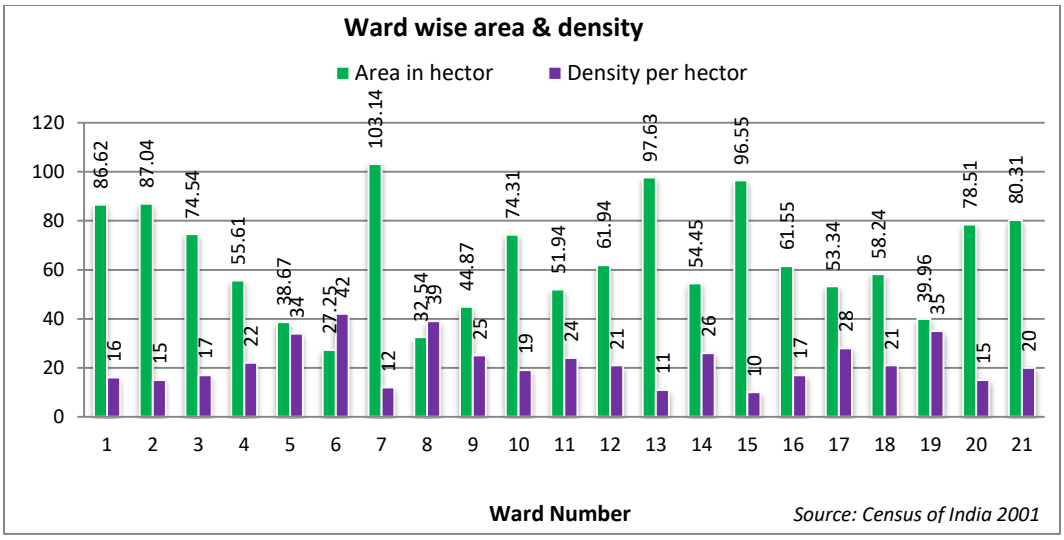


Figure 3.16 Ward wise area and density of Perumbavoor Town in 2001

The above table reveals that the population density in Perumbavoor ranges from 11 to 42 pph. There is no ward at present having such a residential density which leads to congestion. The low residential density while ensuring quality of life, does not pose any problem of lack of civic amenities. It is now, the time to effectively control the growth of the town, So that it does not grow haphazardly. Wards 5, 6, 8 and 19 have the highest density of population

INFERENCE

Studies on decadal growth shows that there is a fluctuating growth rate in Perumbavoor. There was a high growth rate in 1971-81. Due to the shutdown of Perumbavoor Rayon's factory, which provided employment to majority of population, large number of people lost job and left the town. This resulted in a declining growth rate during the year 81 to 91. But due to mushrooming of veneer and plywood related industries in the locality, new employment opportunity was opened and this attracts many more people to the town and thereby increasing the growth rate during the year 1991 to 2001.

3.1.6 OCCUPATIONAL PATTERN

As per census 2001 92.48% of the workers in Perumabavoor town are other workers. Table 3.12 and figures shows the details of workers classification of Perumbavoor in 1981, 1991 and 2001.

Table 3.12 Workers classification in Perumbavoor

Sl No	Category of main workers	1981				1991				2001			
		No. of workers		Total workers	% of total workers	No. of workers		Total workers	% of total workers	No. of workers		Total workers	% of Total workers
		Male	Female			Male	Female			Male	Female		
1	Cultivators	250	19	269	4.44	381	20	401	5.44	157	22	179	2.28
2	Agricultural labourers	418	260	678	11.2	591	283	874	11.84	202	83	285	3.62
3	Household industry workers	80	61	141	2.23	94	54	148	2.01	76	52	128	1.62
4	Other workers	4227	735	4962	82.03	4902	1045	5947	80.69	5764	1513	7277	92.48
5	Total main workers	4975	1075	6050	100	5968	1402	7370	100	6199	1670	7869	100

Source: Census of India 1981, 1991 & 2001

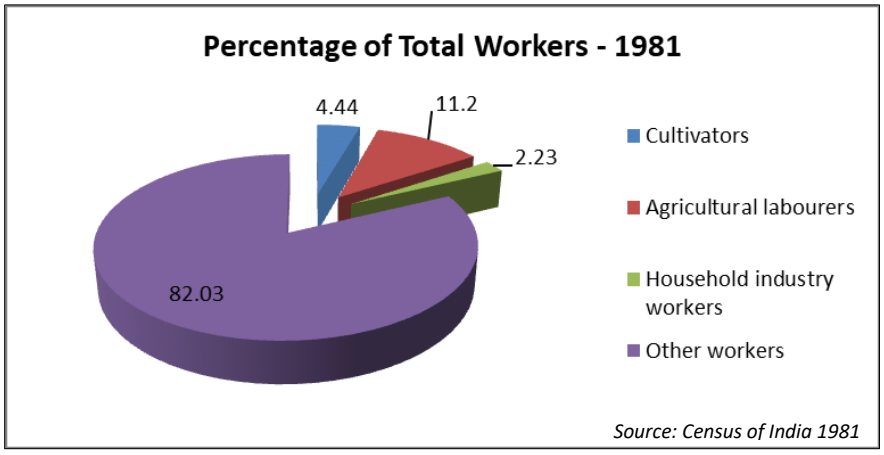


Figure 3.17 Percentage of Total Workers -1981

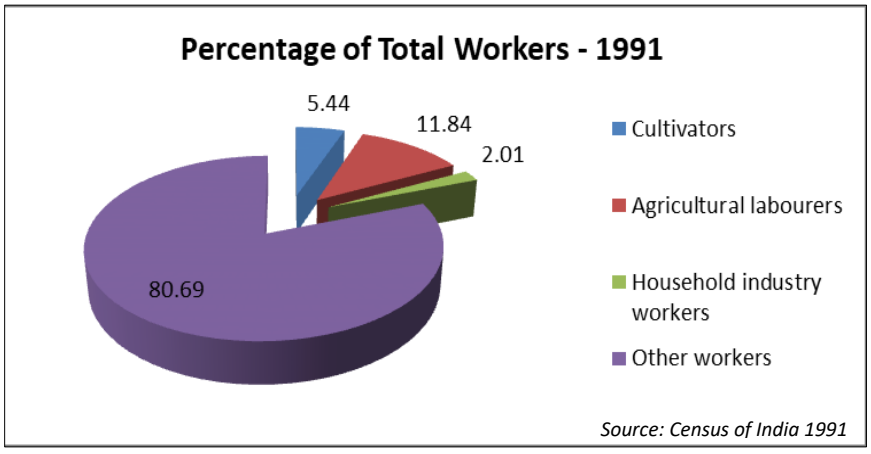


Figure 3.18 Percentage of Total Workers -1991

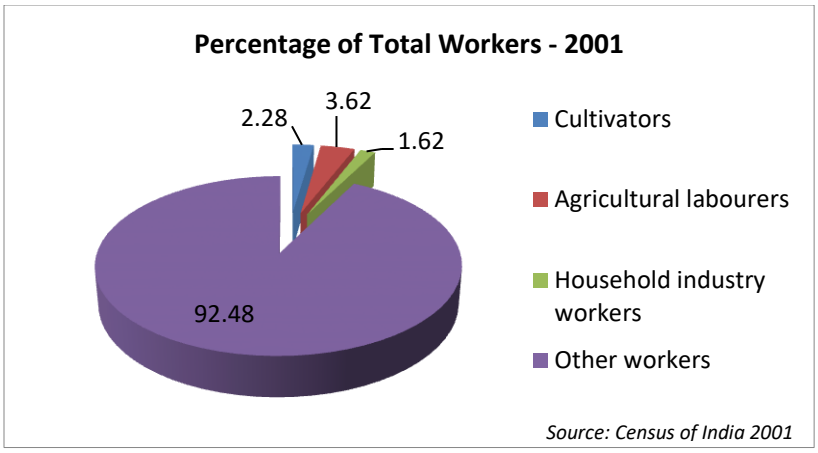


Figure 3.19 Percentages of Total Workers -2001

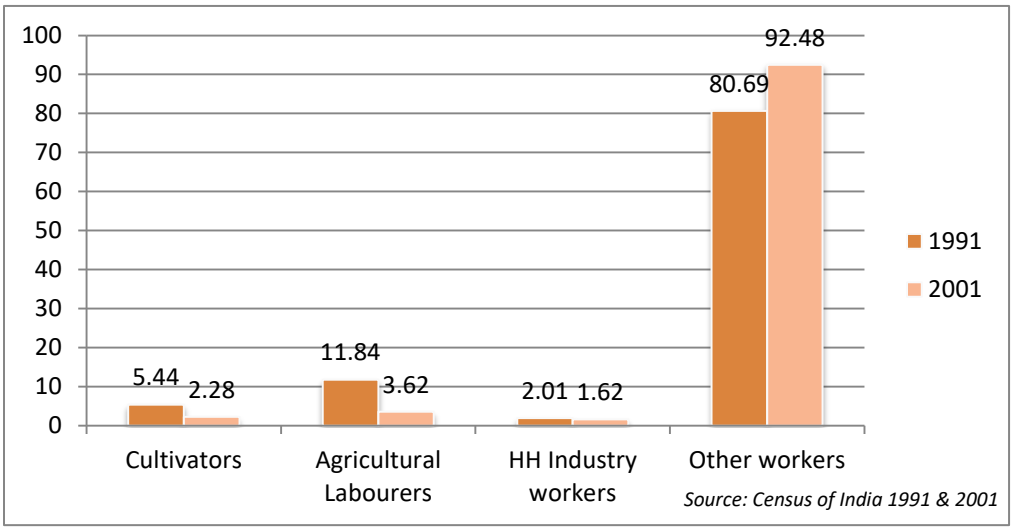


Figure 3.20 Percentage of Total Workers 1991 & 2001 – Comparison

As urbanisation increases in any town, the number of workers under primary occupation likes cultivation and agriculture decreases. In 1981 percentage of cultivators was 4.44%. In 1991 it increased to 5.44% and then decreased to 2.28% in 2001.

In 1981 percentage of agricultural labourers was 11.20%. In 1991 it has increased to 11.84% and then decreased to 3.62% in 2001.

This show that some of the agricultural workers have turned to non-agricultural workers. This is not healthy trend as far agriculture is concerned. But the share of workers both in industries and other service sectors has increased. In the agricultural sector, coconut plantation is the main activity. It has got a strong impetus for industrial growth and in the field of manufacture of coir and oil expulsion.

Work force of a place is usually indicated by work force participation rate (WPR) which is the ratio of total workers (Main & Marginal) to the total population.

Table 3.13 Work Participation Rate in Perumbavoor Town

Category	1961	1971	1981	1991	2001
Total Population	16147	20888	23064	24667	26547
Total Workers	4884	5465	6297	8003	8790
Participation rate	30.25%	26.16%	27.30%	32.44%	33.11%

Source: Census of India

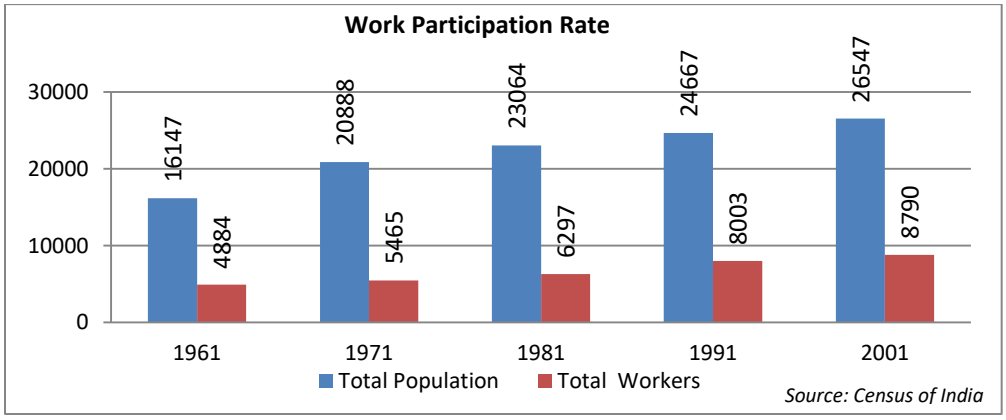


Figure 3.21 Work Participation Rate in Perumbavoor Town

Table 3.14 Occupational pattern of Perumbavoor Town and Ernakulam district

Classification of Workers	Perumbavoor		Ernakulam	
	Total workers	% population	No. of workers	% of workers
Total Main Workers (a+b+c+d)	7869	29.64	915756	29.49
a) Cultivators	179	0.67	47886	1.55
b) Agricultural labourers	285	1	52237	1.68
c) Household industry workers	128	0.47	24834	0.8
d) Other workers	7277	27.41	790799	25.46
Marginal workers	921	3.47	201335	6.48
Non workers	17757	66.89	1988707	64.03

Source: Census of India 1991

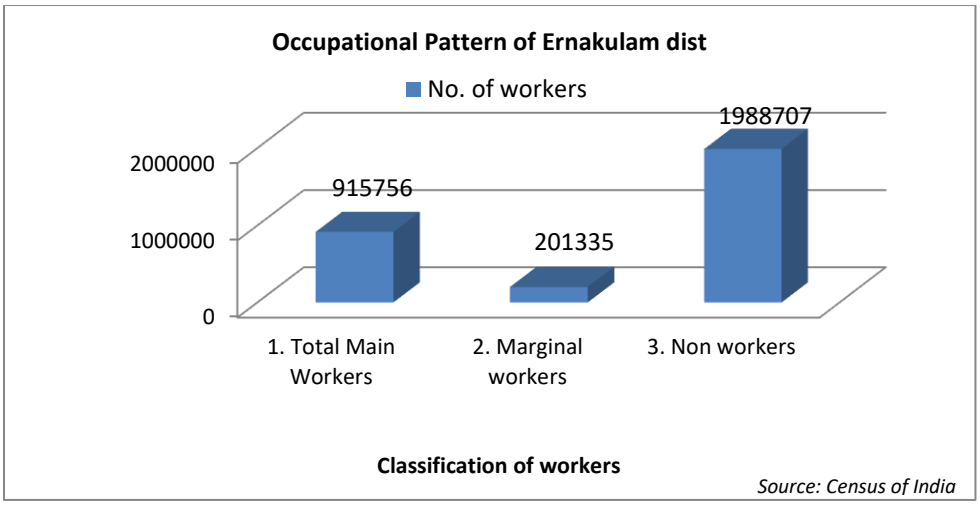


Figure 3.22 Occupational Pattern of Ernakulam District

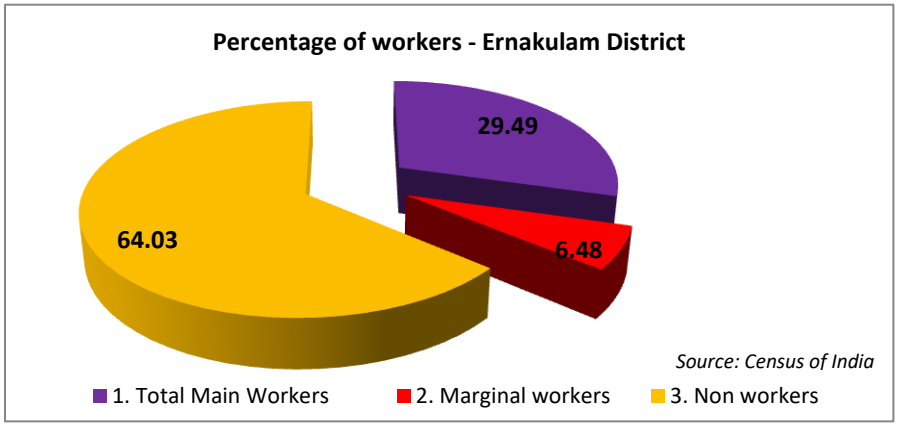


Figure 3.23 Occupational pattern (% of workers) of Ernakulam district

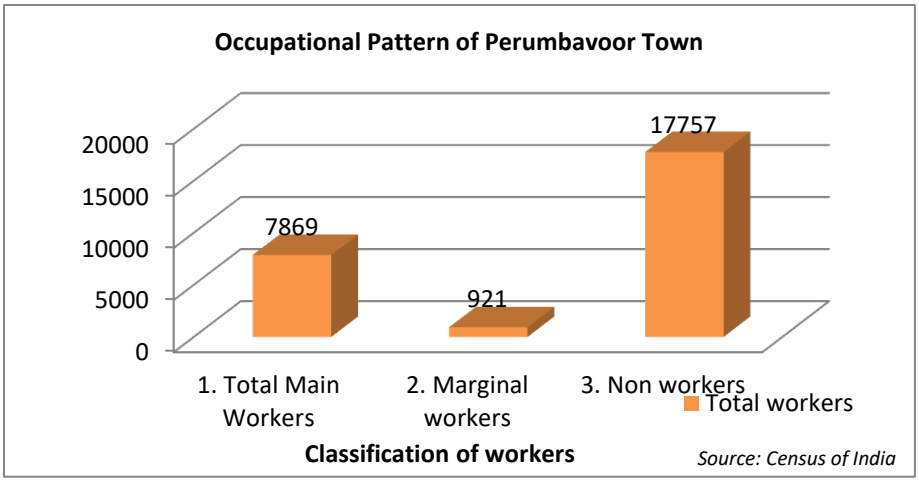


Figure 3.24 Occupational pattern of Perumbavoor Town

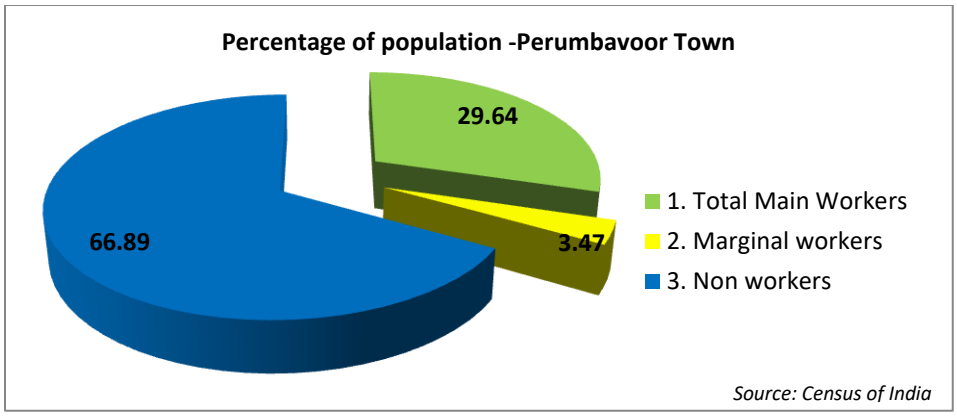


Figure 3.25 - Occupational pattern (% of population) of Perumbavoor Town

Table 3.15 Number of workers – Perumbavoor

Workers	1971	1981	1991	2001
Total Workers	5465	6297	8003	8790
Total Main Workers	5465	6050	7484	7869

Source: Census of India 1971, 1981, 1991 & 2001

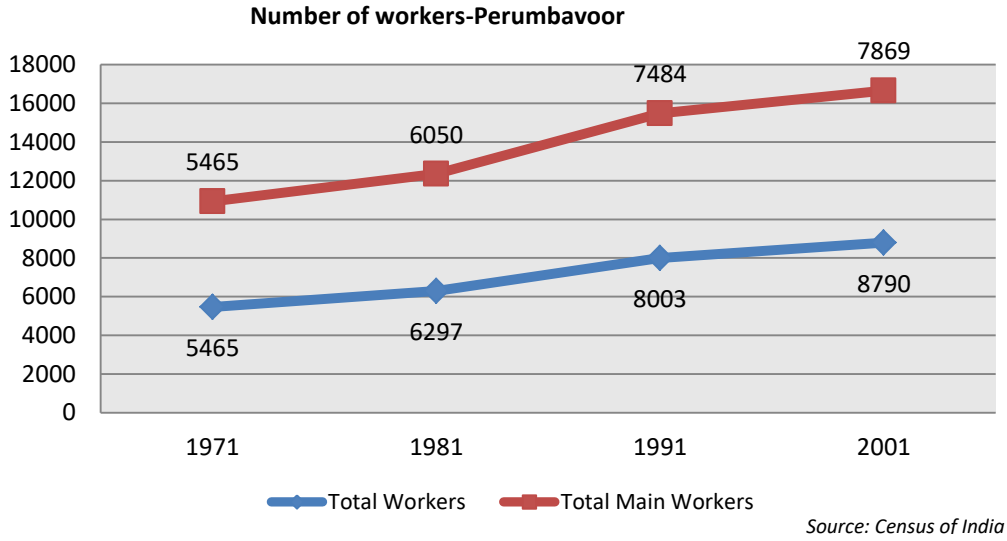


Figure 3.26 - Temporal variation of total workers and total main workers-Perumbavoor

Cultivators and Agricultural labourers show drastic decrease in total numbers (a decrease of 50%). Whereas the other workers show an increase. This is a clear indication of weakening of the primary sector, mainly the agriculture one. This has resulted in the dilution of the rural nature of the rural area of the town.

INFERENCE

Occupational structure of town shown in this chapter indicates that 92.48% of the total workers engage in non agricultural pursuits indicating a declining trend of primary sector. This indicates agricultural land in the town is unutilized or underutilized. From the view of economic as well as environments stability agricultural land should be put to optimal use.

On analysis of work force participation rate and number of workers during the period of 1961-71, it is seen that there is increase in number of workers, but there is a decline in work participation rate. This shows that job opportunities are not increasing in proportion to the increase in population. This trend has changed from 1981 to 2001. Work participation rate and number of workers increased.

3.2 ECONOMIC BASE

Perumbavoor town had a glorious past in timber industries. The easy availability of raw materials and the transportation facilities through the two State Highways are the reason for the growth of the town as one of the leading centres of timber industries. Further, making use of the favourable situation a number of ancillary industries also developed complementary to the major industries. About 215 numbers of industries including small scale have so far registered in the town. Out of this about 50% comes under wooden based industries, mainly plywood veneer etc. So the main economic base is through timber industries.

As outlined earlier, timber industries and metal based industries are the dominant in the manufacturing sector in the town. Service industries are nominal in number and consequently employ a small percentage of workers.

Major resources for timber industries are from nearby forests. For other industries like metal based, engineering work etc. raw materials are still brought from outside. There has been a steady increase in output in metal –based industries during the past few years.

There are a few service industries existing in Perumbavoor town. They are mainly concentrated by the side of Aluva-Munnar road (AM Road) and Main Central road (MC Road).

Trade and commerce is another important economic base of Perumbavoor town. Commercial activities are mainly concentrated in the town centre and both sides of A M road and OM road. As per the existing land use map of Perumbavoor town 22.75Ha(1.95% of total

developed area) is comes under commercial land use. Textiles, home appliances, wood products etc are the main commercial activities in the town.

INFERENCE

In the town 41.96 hectare of land is under industrial use. 29 hectare of land occupied by defunct Perumbavoor rayons factory. Rest includes plywood and veneer saw mills and rice mills. Industries are the major economic base of the town. Small scale units mainly engaged in timber sawing and veneer units are scattered all over the municipal area. Industrial potential of the area should be exploited to the maximum extent in the plan period in order to establish a sustainable economic base. Commercial activity is now mainly concentrated in the town area and along major roads. Commercial activities in the inner area of the town needs improvement.

3.3 LAND USE

Land is the essential and perhaps the most precious of all physical possessions, which is not only the source of almost all resources but also the base on which the human activities take place.

Land has various competing and conflicting demands. As the settlement grows, various uses of land compete each other, ultimately the competition between uses and consequent conversions create problems in the utilization and managements of land. The existing mixed pattern of land use of the town creates a number of physical problems. An analysis of the existing land use pattern can provide means of identifying and simplifying the problems.

Land use of an area is indicated by predominant activities, be it agriculture, residential, commercial, industrial etc. Hence analysis of the existing land use is inevitable to understand the predominant economic activities of an area as well as the availability of vacant land for future economic activities.

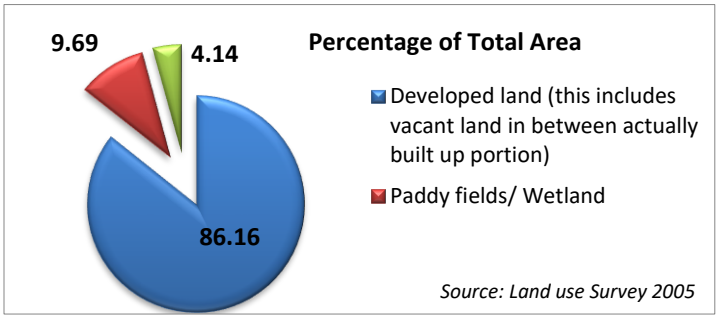


Figure 3.27 Classification of land in Perumbavoor Town

As per the census Perumbavoor Municipal town has an area of 13.59 Sq. Km. The area can be broadly classified into three categories as shown in table No.3.16.

Table 3.16 Classification of land in Perumbavoor Town

Sl No.	Classification	Area in ha	Percentage Total
1	Developed land (this includes vacant land in between actually built up portion)	1170.98	86.16
2	Paddy fields/ Wetland	131.77	9.70
3	Water Course and Canal	56.25	4.14
	Total	1359	100

Source: Land use Survey 2005

3.3.1 METHODOLOGY ADOPTED FOR LAND USE SURVEY

Land use pattern of the town was identified by detailed survey conducted by the Department. Existing land use map was prepared based on the land use survey. The above map contains land uses such as Residential, Commercial, Industrial, Public & Semi Public, Transportation, Dry cultivation, Open space, Paddy/wet land, Natural Heritage, Water body, Vacant land etc. Land use split up of the town is as shown in Table 3.17 and figure 3.28.

Table3.17 Existing land use of Perumbavoor Town area - 2005

Sl. No.	Land use	Area in Ha	% of Developed Land	% of Total Area
1	Residential	797.37	68.09	58.67
2	Commercial	22.76	1.94	1.67
3	Industrial	57.06	4.87	4.20
4	Public & Semi Public	46.07	3.93	3.39
5	Transportation	90.17	7.70	6.64
6	Park & Open Space	2.06	0.18	0.15
7	Dry Cultivation	129.08	11.02	9.50
8	Vacant (vacant land shaped for conversion)	18.19	1.55	1.34
9	Forest (Natural Heritage)	8.22	0.70	0.60
10	Paddy / Wetland	131.77	--	9.70
11	Water bodies	56.25	--	4.14
Total		1359	100.00	100.00

Source: Land use Survey 2005

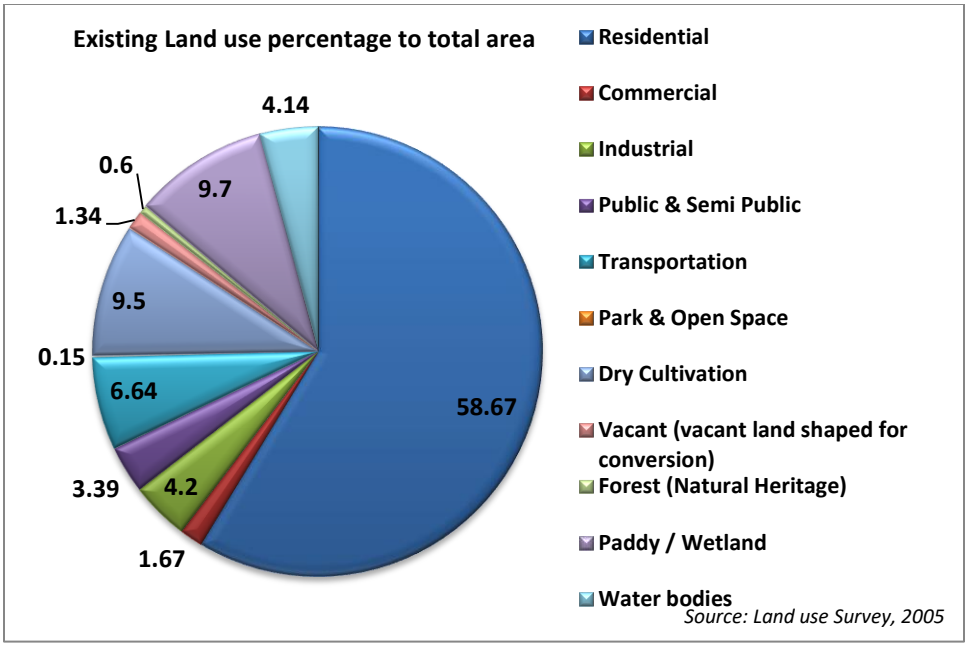


Figure 3.28 Existing Land use of Perumbavoor Town

3.3.2 LAND UNDER RESIDENTIAL USE

Out of the total developed area of 1170.97 about 797.37 ha is under residential use. This is 68.09% of total developed area. 45% is recommended as per UDPFI guidelines.

3.3.3 LAND UNDER COMMERCIAL USE

Out of the total developed area about 22.76 ha is under commercial use. This is about 1.95% of the total developed area. 2% is recommended as per UDPFI guidelines (planning standard).

The main commercial activities in the town are wholesale and retail business on either side of Aluva- Munnar road, Main-Central road and old Muvattupuzha road.

The Aluva- Munnar road intersects main central road at Kalady junction. The central business area of this town is concentrated at this junction. A well planned distribution of shopping and marketing is very essential for this town to provide better shopping facilities.

3.3.4 LAND UNDER INDUSTRIAL USE

In the town 57.06 ha is under industrial use. This is about 4.87% of the total developed land of the town. This includes nearly 29 ha of land occupied by the Travancore Rayons Ltd. Other timber industrial units also occupy a large area of land. The availability of timber from the

nearby forest is the main favorable factor to establish timber industries in this town. The timber industries are located on both sides of the Aluva-Munnar road, Perumbavoor-Puthencruz road and Main Central road. 8% is recommended as per planning standards.

3.3.5 PUBLIC AND SEMI PUBLIC USE

An area of 46.07 ha. Falls under this category this mainly comprises of area occupied by educational institutions, health care units, religious institutions and public offices. There is no town hall within the town facilitating public assembly. Now four auditoria are functioning in the Private Sector. The area comes out 3.93% of the developed area. UDPFI recommendation is 6%.

3.3.6 GREEN AND OPEN SPACES

An area of about 2.06 ha comes under parks, playground and open spaces. By any standard, the existing area available under this category is very low as compared to the extent of the town and the density of population. The major open space in the town is the playground attached to the Government Boys High School. At present there is only one Mini Stadium which is situated in front of the Municipal Office building. The children's park is another one in this group and is very near to Municipal Library. The area comes about 0.18% of total developed area. UDPFI recommends 12%.

There are large stretches of agricultural and allied fields throughout the urban area. This comes to 11.02% of the total extent. Some of these fields serve as long open space, reducing pollution in congested area.

The deficiency of open spaces might not be felt so long as the residential plots are large and the density is low. But it is certain that the huge land prices would lead to the creation of smaller plots resulting in increase in the residential density. At that time the need for public open spaces would be more obvious.

3.3.7 TRAFFIC AND TRANSPORTATION

Perumbavoor is connected by State Highways to Angamaly, Aluva, Kothamangalam and Muvattupuzha towns. The total area covered by roads and allied facilities comes to about 90.17

ha. This is 7.7% of the total developed area of the town. The inadequacy of space at junctions, poor road geometries, lack of facilities for parking and consequent haphazard parking of vehicles, unauthorized use of footpaths on certain roads and the irrational use of carriage ways for loading and unloading of goods form vehicles have led to serious bottlenecks in the smooth flow of traffic Further almost all the secondary roads of this town are narrow with poor and substandard road geometrics.

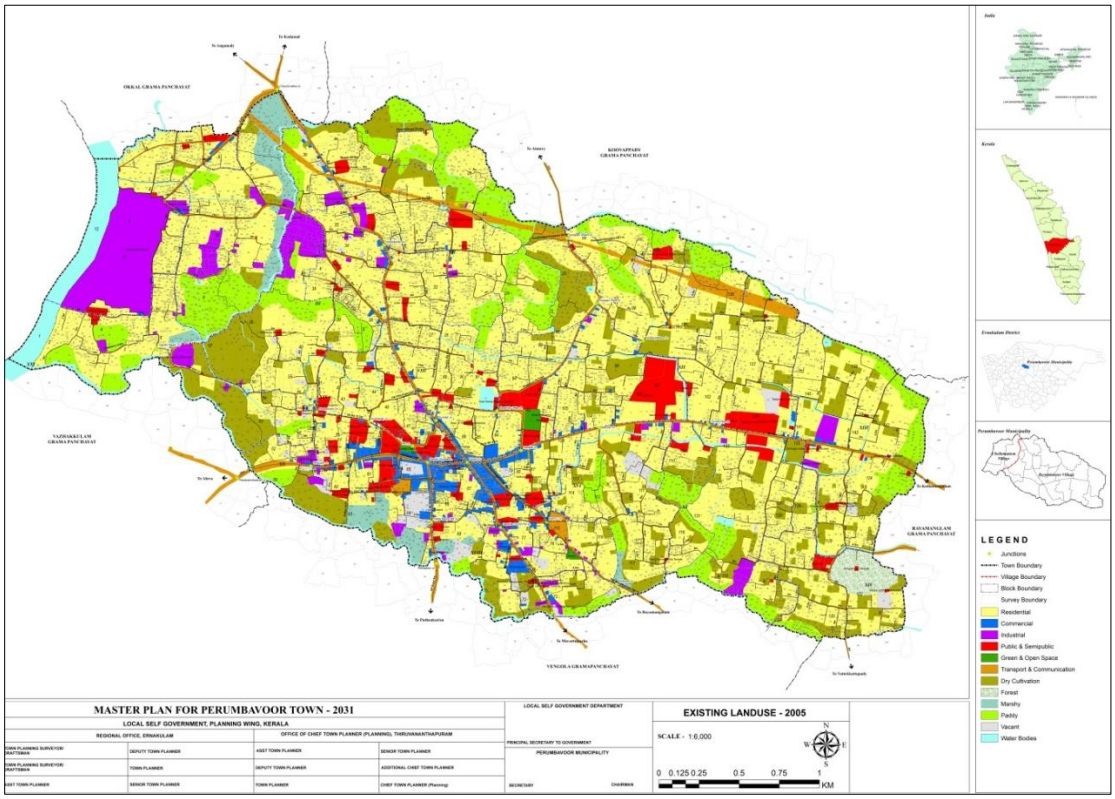


Figure 3.29 Existing Landuse (Refer Map 1 for detailed view)

Table: 3.18 - Existing Land use v/s UDPFI norms with in the Perumbavoor Town

Sl. No.	Land use	Existing area in Ha	Existing % to gross area	Existing % to Net area	UDPFI Recommend (%)	Existing (Net) /UDPFI ratio
1	Residential	797.37	58.67	68.09	45	1.513
2	Commercial	22.76	1.67	1.94	2	0.970
3	Industrial	57.06	4.20	4.87	8	0.609
4	Public & Semi Public	46.07	3.39	3.93	6	0.655
5	Transportation	90.17	6.64	7.70	10	0.770
6	Park & Open Space	2.06	0.15	0.18	12	0.015
7	Dry Cultivation	129.08	9.50	11.02		
8	Forest(Natural Heritage)	8.22	0.60	0.70		
9	Paddy / Wetland	131.77	9.70	--		
10	Water bodies	56.25	4.14	--		
	Total	1359	100.00	100.00		

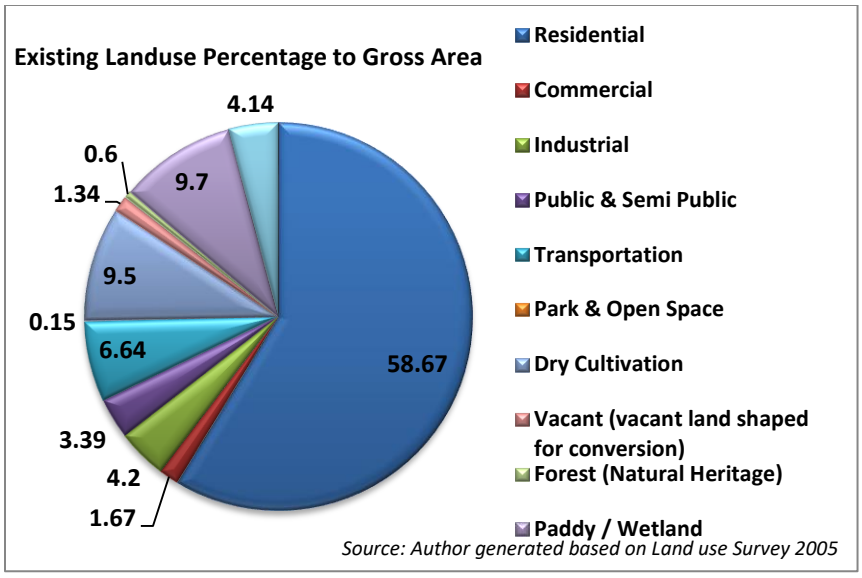


Figure 3.30 Existing Landuse – Percentage to Gross Area

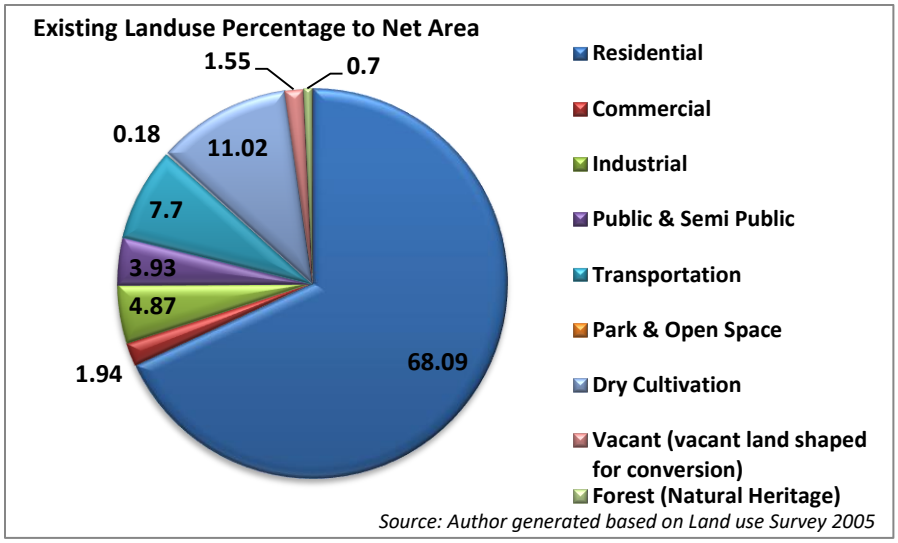


Figure 3.31 Existing Landuse – Percentage to Net Area

3.4 HOUSING

One of the basic needs of man is shelter and the provision of shelter has been accepted as the responsibility of welfare state. Housing along with urban development has been recognized as an effective tool for economic growth and should aim at social change in any country. Creation of employment opportunities both on the site and off the site is another significant advantage of housing.

Housing is a process, but not nearly a product of dynamic processes which creates social and physical changes. The modern concept in housing includes a basic environment in

conjunction with infrastructure which makes the world more habitable ensuring fresh air, water, good sanitation and recreation in addition to shelter.

The provision of housing and a healthy habitat with at least minimum amenities for teeming millions is still a distant dream and a big challenge.

The study of housing involves two components (a) assessment of housing need, the existing need and the projected need for the future plan period; (b) study of supply of dwellings, existing supply and that expected in future. The study would help to chalk out a policy for housing.

The rapid increase of population and the evolution of single family system have increased the quantum of houses needed in the cities and towns, results in growing demand for new housing in the town. Planning for housing requires additional study about the area, population etc.

In preparing a housing scheme for a town, full details regarding the quality and quantity of housing stock available, its style, conditions and environmental characteristics .etc. are to be analysed.

According to 2001 census there are 6063 households and 5983 occupied houses. The household size as per census 2001 is 4.38.

The other salient housing characteristics are discussed below.

3.4.1 SIZE OF HOUSING UNITS

22% of the existing housing units have plinth area less than 51 sq.m, 59% of houses have plinth area between 51-100 sq.m, 13% of houses have plinth area between 101-150 sq.m and 6% of household have plinth area higher than 151 sq.m. From the table No.4.1 it can be seen that houses of plinth area 51-100 m2 are the most common type of residence in this town.

Table 3.19 Distribution of Households according to plinth area of building

Plinth Area	No. of Households	Percentage
Below 51 Sq. Metres	1334	22%
51 – 100	3577	59%
101-150	788	13%
151 and above	364	6%
Total	6063	100

Source: Socio Economic Survey

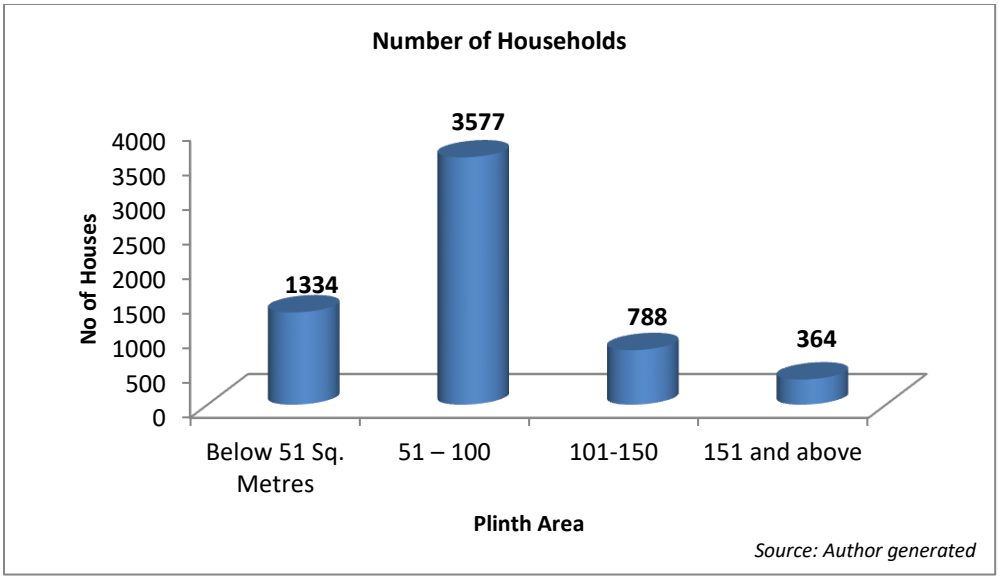


Figure 3.32 Number of Households

3.4.2 OCCUPANCY OF ROOMS

According to the socio economic survey conducted by the Town Planning Department, 3% of housing units is single room dwelling units, 48% of housing units has an average of 2-4 ms, 39.99% has 5-7 rooms and 10.98% of housing units has more than 7 rooms.

From the table No. 4.2 below, it is seen that the houses having 2-4 rooms are the most common type in Perumbavoor Town.

Table 3.20 Distribution of Houses according to number of rooms occupied

No. of Rooms	Total Number of Houses	
	Number	Percentage
One room	62	1.03
2-4 rooms	2872	48
5-7 rooms	2393	39.99
More than 7 rooms	656	10.98
Total	5983	100

Source: Socio Economic Survey

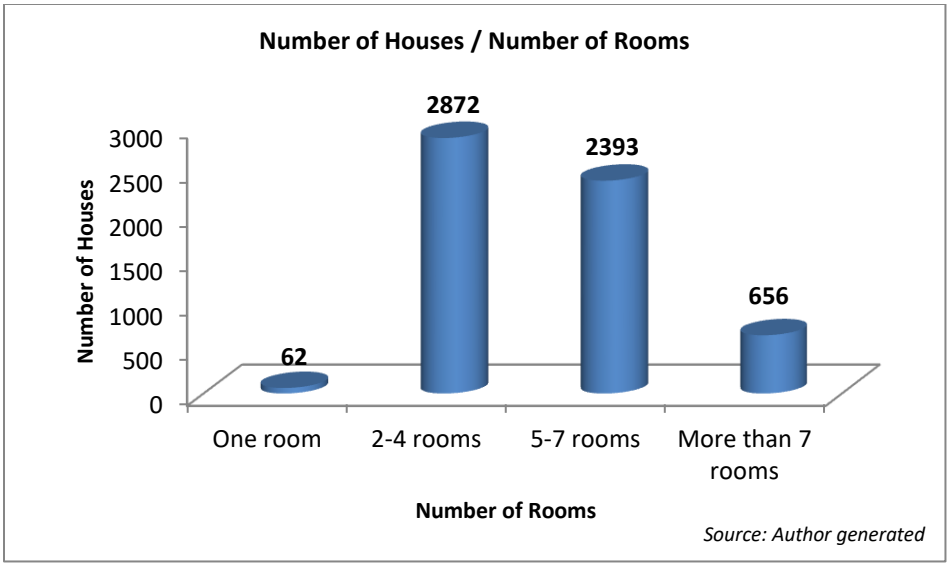


Figure 3.33 Distribution of Houses according to number of rooms

3.4.3 MIGRANT LABOUR ISSUES

Kerala with its higher wages and ample opportunities is emerging as a new gulf of unskilled and semi skilled labour from other states. Even as far away as Orissa & West Bengal. The high wages Rs.250 - 300 per day, for unskilled labour in construction sector seems to be the main attraction of migrant labours. Many of these workers are brought in by labour contractors for certain projects. Even though the contractors take a share of daily wages, labours still find it attractive to work here. In Perumbavoor town also inflow of migrant labours are considerably high due to these above reason.

Housing of migrant labour is found to be serious issues. They live on margin of main stream Kerala life in labour camp and ghettoized neighbor hoods. They are causing numerous issues regarding sanitation. Mainly regarding cleanliness, in terms of toilet practices, spitting and panparg consumption.

3.4.4 HOUSING BACK LOG

The following assumptions are made to estimate the existing housing back log of Perumbavoor town.

The ideal situation of housing is the availability of one house per every household. As per the census 2001 there are 6063 households and 5983 houses. Hence there is only a numerical shortage of 80 houses at present.

All the houses constructed with mud, coconut leaves bamboo, straw etc. are structurally unsound and require replacement. There are 272 housing units under this category (Source: Survey conducted by the Town Planning Department).

It is also assumed that all moderate houses of 60 years and above are to be replaced, total houses in the category comes to 292 Nos. (Source: Survey conducted by the Town Planning Department). Thus, there is a total housing shortage of 644 units in Perumbavoor town.

3.4.5 TREND OF HOUSE CONSTRUCTION

As per the municipal records, the construction of residential buildings in Perumbavoor town is at a slow pace. On an average the construction rate is about 100 houses per year. Almost the entire house building activities have been in the private sector.

3.5 TRAFFIC AND TRANSPORTATION

3.5.1 GENERAL

Traffic and transporting system has been evolved as a result of the interaction between the various land use functions. Its requirements are the physical manifestation of the mobility of the people. At present the development of this town is concentrated around the Kalady Junction, where the State Highways intersect. Considering the junction as the centre of the town, the roads are in a radial pattern.

With the rapid growth of vehicle population and intense development of commercial activities in the central area, the traffic flow into the town has continuously increased and has outstripped the supply of facilities. The slow and fragmented capacity augmentation has resulted in bottlenecks and traffic congestions. There has been considerable delay and chaos in the central area of the town during most part of the day. Thus there is a need to optimally

utilize the existing transport facilities and at the same time formulate lasting solutions to the traffic and transportation problems faced by the town.

3.5.2 TRANSPORTATION

As the transportation sector is a vital component of any city, planning of transportation infrastructure commensuration with the increased travel demand and vehicle population is an essential requirement. To plan for the same it is imperative that necessary planning inputs like inventory of existing road network, vehicle ownership, traffic volume, travel characteristics, capacity utilization of roads should be identified.

In 2010 Perumbavoor municipality engaged national transportation planning and research centre (NATPAC), Trivandrum to carry out a detailed study of existing transportation system of the town and to propose long term traffic plan of the town. Major finding of the study are summarized in the following sections.

3.5.3 EXISTING ROAD NETWORK

An understanding of the extent and quality of road network is very important to formulate improvement plans. With this objective, an inventory survey of all major roads in the town has been carried out to evaluate the road network characteristics.

3.5.3.1 Major Roads

The Main Central road in the north-south direction and the Aluva-Munnar road in the east-west direction are the major roads in the town passing through the central area. These roads intersect at Kalady junction around which the Central Business Area (CBA) of the town is located. Apart from these two major roads, various roads originate from Perumbavoor town and lead to places outside Perumbavoor municipal limits. They are generally set in the north-south axis and are discussed below:

(i) Old Muvattupuzha road originating from Pushpa Jn. on AM road to Rayamangalam Panchayat via KSRTC station. Existing width of road is 8.5m (Pushpa junction is located on the busy AM road opposite to Vegetable market and has lot of commercial activities all through the day. The road passes through KSRTC station and beyond which, the road is predominantly a residential land use.)

(ii) Perumbavoor-Pattimattam road (PP road). The road originates from Gandhi Square, the busiest commercial area of the town and leads to Pattimattam through the private bus station enroute. With abundant commercial activities, this is one of the congested roads in Perumbavoor town. Existing width of Road is 9 m.

(iii) Pooppani road: KSEB office on Oushadi Jn-Hospital junction road to Kodanad. Existing width of road is 8m. The road has minimum commercial activities and passes predominantly through residential area.

(iv) BOC road: BOC road Jn from AM road to Koovapady panchayat via Karattupallikara. This road passes through residential area. Existing width of the road varies from 4m to 6m.

(v) Konnamkudy road: Onnam Mile Jn on AM road to Koovapady panchayat. This road passes through residential area. Existing width of road is 5m.

(vi) Quarry road: Pattal Jn on AM road to Koovapady panchayat - This road passes through residential area. Existing width of road is 6m.

(vii) Iringol Kavu road: Iringol Jn on AM road to Rayamangalam panchayat via Iringol Kavu temple – This road has residences all through the entire stretch. Existing width of road is 5m.

(viii) Palakkattuthazham Bridge on AM road to Kadathara on Vazhakulam panchayat via Saddam road. This road passes through agricultural area for a distance of around 500m and beyond which residential areas are found on the side of the road. Existing width of road is 5m.

3.5.3.2 Minor Roads

Apart from these roads, there are a number of minor roads either in the north-south direction or in the east-west direction within Perumbavoor municipal limits.

Brief descriptions of these minor roads are presented below:

North-south direction

(i) Mudikkal-Choondivallam road connecting AM road and MC road via Travancore Rayons. This roads starting from Mudikkal junction on AM road passes through thickly populated area and have narrow ROW. After this, the road has adequate ROW and passes along the compound wall of the Travancore Rayons Ltd. Existing width of road is 3.5m to 7m.

(ii) Parappuram–Choondivallam road (Colony road). The road passes through open areas as well as residential area. A few saw mills are found alongside the road stretch. Existing width of the road is 7m.

(iii) Library road and G K Pillai road connecting AM road and MC road via Kuzhipilly temple. Library road originates from AM road and has commercial building throughout the entire stretch. Due to narrow ROW, parking of vehicles is found to be quite minimal. G K Pillai road passes through residential areas and terminates at M C Road.

(iv) Govt. Girls High School to TB Jn – This road connects Govt. Girls HS on AM road with TB road. At present, the road serves as one-way street for goods vehicles. The road has commercial buildings on both sides. Existing width of the road is 4m.

(v) Gandhi Square to Oushadi Jn via MO Jn. This road serves as a bypass for Kalady junction, an intersecting point of MC road and AM road. It connects Gandhi Square, the heart of the town located on AM road to Oushadi junction located on MC road. Location of Municipal office, court and commercial buildings make the road as one of the busiest roads in the town.

(vi) C T road from Oushadi Jn on MC road to Kanjirakkad. The road mainly passes through residential areas. Existing width of the road is 9m.

(vii) Pattal Jn on AM road -Pankalam road. This road has residential land uses on both sides. Existing width of the road is 4m.

(viii) Marudu road originating from AM road. Residential areas are found on both sides of the road. Existing width of the road is 6m.

(ix) Thottunkal road originating from AM road. Residential land uses are found on both sides of the road.

(x) UBI road originating from AM road. The road originates from Hospital Junction on AM road and passes through both commercial and residential area and terminates at PP road, before the KSRTC station.

East-west direction

(i) Gandhi Nagar Jn to Hospital Jn via Parappuram, Kareri-Kollamkudy Road, Oushadi Jn. The road has varying ROW with minimum vehicular traffic. Existing carriage way varies from 5 to 6m.

(ii) Road connecting Colony road and Broad way (Chenganattu Road and Broadway). This road has mainly residential area. Existing width varies from 4 to 7m.

(iii) Road connecting Colony road and MC road (Old Vallam road). This road has adequate ROW with minimum vehicular traffic. A few saw mills are found on the side of the road, with predominately residential land uses.

(iv) Thrikkaparambu road connecting Old Vallam road and MC road. This road has mainly residential area. Existing width of the road is 4m.

(v) Kanjirakkad Jn on MC road to Pooppani Palam on Pooppani road. The road passes through sparsely populated areas. Existing width of the road is 6m.

(vi) Pooppani Palam on Pooppani road to Karattupallikara via MET school. This road with sharp horizontal curves passes through residential areas with varying ROW. Existing width of the road is 8m.

(vii) Pooppani Para on Pooppani road to Onnam Mile Jn on AM road via Alppara Temple. This road passes through residential areas. Marthoma College for Women and Alppara temple are located by the side of the road. Existing width of the road is 6m.

(viii) Alppara temple to Konnamkudy road. Residential land uses are found on the sides of the road. Existing width of the road is 4m.

(ix) Iringol Temple to KSRTC Jn via Marudu Kavala. The road mainly passes through residential areas. Existing width of the road is 4m.

(x) Marthoma Church connecting Old Muvattupuzha road and MC road. The road passes through open as well as residential areas. Existing width of the road is 6m.

(xi) Jacobite Church road connecting Old Muvattupuzha road and MC road. The road has predominantly residential land uses. Existing width of the road is 7m.

(xii) Cattle Market road connecting MC road and PP road. Open areas are found on the sides of roads. Existing width of the road is 5m.

3.5.4 INVENTORY OF ROADS

Details of the available carriageway, length and capacity of roads in Perumbavoor town are presented in Table 3.21. The AM road has a carriageway width of 10m between Palakkattuthazham Bridge on the western side and Iringol on the eastern side. The total length

of the road within Perumbavoor municipal limit comes to around 4.5 km. The MC road has a length of about 4 km within the town limit of Perumbavoor municipality with a carriageway width of 10m throughout. Within the influence area of the intersecting point of these two main roads, namely Kalady Jn, the roads have a four-lane divided carriageway on all the four arms. Apart from these two major roads, nine roads originate from Perumbavoor town to the neighboring panchayats like Koovapady, Rayamangalam and Vazhakulam etc. They together have a length of about 3.65 km within the town limits.

There are various roads within Perumbavoor town limits which have importance from the traffic point of view. Of these roads, 10 roads are aligned in north-south axes which have a total length of about 10 kms. 13 roads set in the east-west direction with a total length of about 14 km. The carriageway width of these roads range from 4m to 9m and are predominantly located in residential area.

The road network of Perumbavoor town is given in Figure 3.34. The capacity of the road section has been worked out based on carriageway width and service level of the road stretch. The basis of working out the capacity of road section is given in Appendix I.

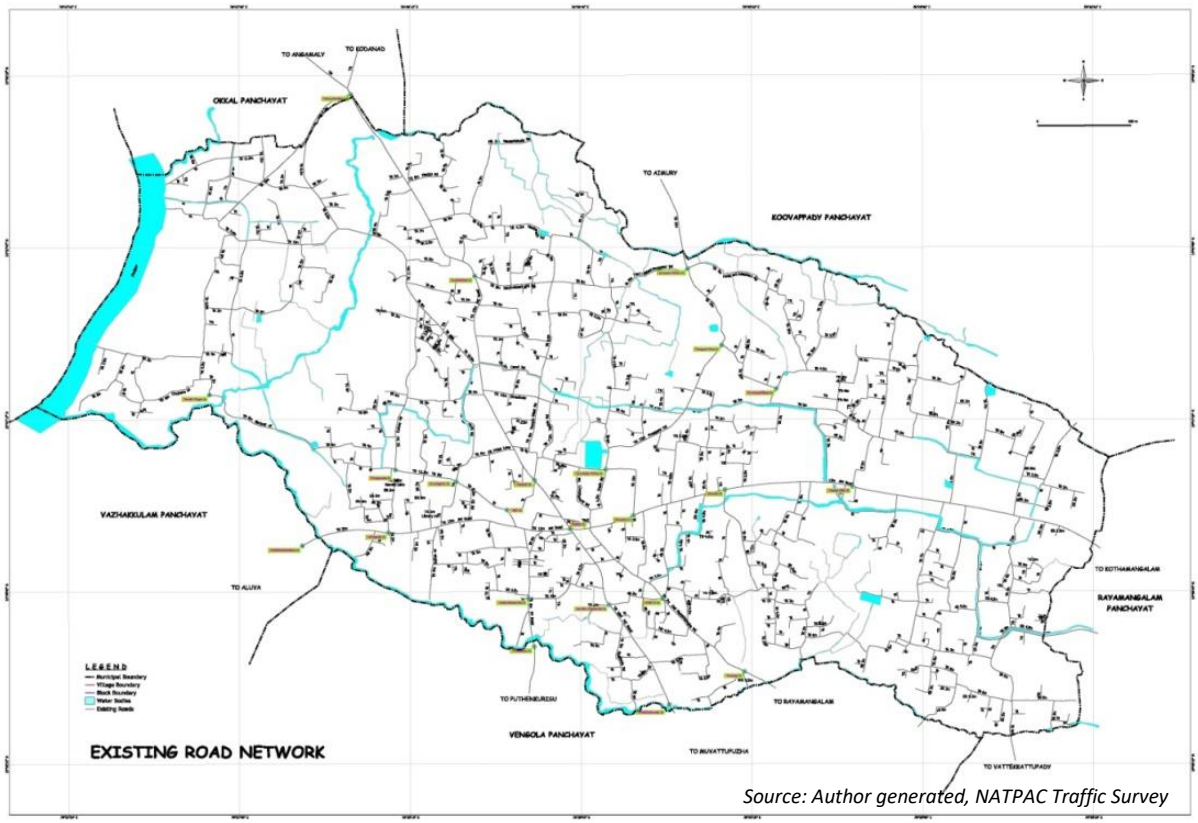
Table 3.21 Profile of major roads in Perumbavoor town

Sl. No.	Name of homogeneous section	Length (m)	ROW (m)	Carriage-way (m)	Capacity (PCU/Hr)	Adjoining land use
I. MAJOR INTERNAL-EXTERNAL ROADS						
1	Aluva-Munnar road (AM Road)					
	(i) Palakattuthazham (Municipal Border) to Kalady Jn	1,500	16 to 19	10	1500	Commercial
	(ii) Kalady Jn to Municipal Border	2,925	18	10	1500	Commercial
2	Main Central road (MC road)					
	(i) Vattikattupady (Municipal Border) to Kalady Jn	1,150	18	10	1500	Semi-commercial
	(ii) Kalady Jn to Choondivallam (Municipal Border)	2,775	18	10	1500	Semi-commercial
3	Old Moovattupuzha road					
	(i) Pusha Jn on AM road to KSRTC Jn	600	8 to 12	8.5	1,200	Semi-commercial
	(ii) KSRTC Jn to Municipal Border	800	8 to 12	8	1,200	Residential
4	Perumbavoor-Pattimattam road - Gandhi Square on AM road to Pathipalam (Municipal Border)	600	12	9	1,200	Semi-commercial
5	Pooppani road	1,550	8 to 10	8	1,200	Residential
II. MINOR INTERNAL-EXTERNAL ROADS						
1	Iringol Jn on AM road to Municipal Border via Iringol temple (Iringol Kavu road)	1,350	8	5	450	Residential
2	Palakkattuthazham on AM road to Municipal Border (Saddam road)	200	8	5	450	Agricultural, residential

3	BOC road Jn on AM road to Municipal Border (BOC road)	1,900	6 to 8	4 to 6	450	Residential, built-up, open
4	Onnam Mile Jn on AM road to Municipal Border (Konnamkudy road)	1,000	6	5	450	Residential, open area
5	Pattal Jn on AM road to Municipal Border (Quarry road)	800	8	6	900	Residential
6	Iringol Jn on AM road to Municipal Border (Old post office road)	700	6	5	450	Residential
III. INTERNAL ROADS in the north-south direction						
1	Mudikkal on AM road to Choondivallam on MC road via Travancore Rayons (Gandhi Nagar road & Rayon road)	2,725	5 to 12	3.5 to 7	900	Residential, industrial, Open
2	AM road to Parapuram Jn (Karothu Lane)	400	6	4	450	Commercial, residential
3	Parappuram Jn to Old Vallam road (Colony road)	900	5 to 8	7	900	residential
4	AM road to Kuzhipilly temple (Library road)	275	7	4.5	450	Commercial
5	Govt. Girls High School on AM road to TB Jn	150	6	4	450	Built-up area
6	Gandhi Square on AM road to MO Jn	80	12	9	1,500	Commercial
7	Kuzhipilly temple to MC road (G K Pillai road)	375	6	5	900	Residential
8	Oushadi Jn on MC road to Kanjirakkad (Temple west road & CT road)	900	6	5	450	Built-up area
9	Pattal Jn on AM road to Pankulam (Pattal-Pankulam road)	825	6	4	450	residential
10	Marudu Jn on AM road to Marudu Jn (Marudu road)	600	10 to 12	6	900	residential
11	AM road to KSRTC station (Thottunkal road)	550	8	5	450	Residential
12	Hospital Jn on AM road to Old Moovattupuzha road (UBI road)	500	8	5	450	Semi-commercial
IV. INTERNAL ROADS in the east-west direction						
1	Gandhi Nagar Jn to MO Jn via Parappuram, Kareri-Kollamkudy road, T B Road	1,850	8	5 to 6	900	Residential, commercial, open
2	MO Jn to Ousadhi Jn on MC road (Court road)	250	12	9	1,500	Commercial
3	Oushadi Jn on MC road to Hospital Jn on AM road	845	12	7	1,500	Commercial
4	Colony road to CT road (Chenganattu Road & Broadway)	900	6 to 10	4 to 7	450	Residential
5	Kaduval Jn on MC road to Rayons road (Old Vallam road)	1,600	8	7	900	Residential, Open area
6	MC road to Old Vallam road (Thrikkaparambu road)	275	6	4	450	Residential
7	Kanjirakkad Jn on MC road to Pooppani Palam on Pooppani road	1,150	6 to 8	6	900	Residential, Open area
8	Pooppani Palam on Pooppani road to Karattupallikara via MET school	1,000	6 to 12	8	900	Residential, Open area
9	Pooppani Para on Pooppani road to Onnam Mile Jn on AM road via Alppara Temple	1,175	8 to 12	6	900	Residential, canal, college
10	Alppara temple to Konnamkudy road	1,175	6	4	450	Residential
11	Iringol Kavu Temple to KSRTC Jn via Pankulam, Marudu Kavala, Vrindavan Road	2,250	8	4	450	Built-up area, open area

12	Old Moovattupuzha road to MC road (Marthoma Church road)	350	6	6	900	Residential
13	Old Moovattupuzha road to MC road (Jacobite Church road)	300	6	7	450	Semi-commercial
14	MC road to PP road (Cattle Market road)	475	8	5	450	Semi-commercial, open area

Source: Traffic survey by NATPAC, 2010



Source: Author generated, NATPAC Traffic Survey

Figure 3.34 Road Network of Perumbavoor Town

3.5.5 TRANSPORT TERMINALS

There are two transport terminals located in Perumbavoor town. Of these, KSRTC bus station is located on the Old Moovattupuzha road, operating bus services to places like Ernakulam, Thrissur, Angamaly, Aluva, Moovattupuzha, Kothamangalam etc. The bus station handles around 343 buses a day.

Private Bus station located by the side of PP road and connected through Fish Market road and bypass road, operates bus services to major destinations except places along MC road. Places connected by Private buses include Pattimattam, Kolenchery, Aluva, Angamaly, Kothamangalam etc. A fleet of around 400 buses are operated to various routes from the

private bus station. These include about 250 buses on Aluva-Munnar route, 60 buses on Kolenchery route and 25 buses on Pooppani route.

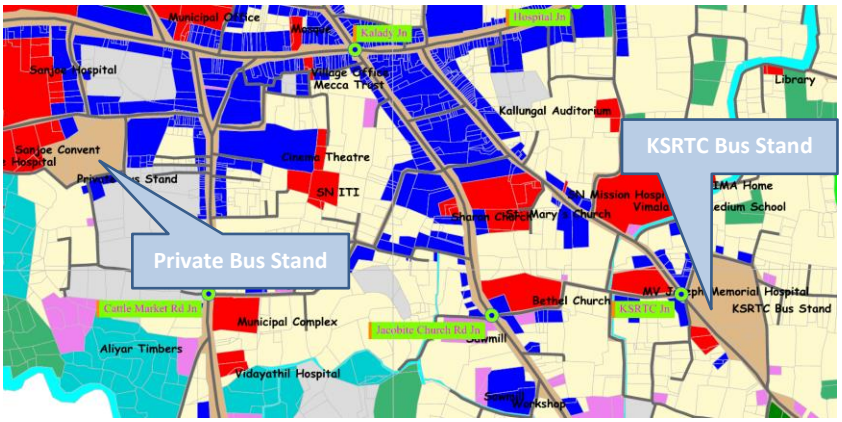


Figure 3.35 Existing Transport Terminals





3.5.6 EXISTING TRAFFIC SCENARIO

Traffic volume data help in evaluating the capacity utilization of the roads and also provide an understanding of the efficiency at which the system works. During the field visit, volume count survey on major roads of the town has been carried out. The survey was carried out at selected points between 8 AM and 12 Noon and between 3 PM and 7 PM. The peak hour traffic passing through the various road sections was estimated from the surveys. As the traffic composed of different types of vehicles, for the purpose of comparison, they are converted to a common unit called 'Passenger Car Unit (PCU). For this, each vehicle type is converted into equivalent PCU as per Indian Roads Congress Guidelines.

3.5.7 TRAFFIC VOLUME ON MAJOR ROADS

The peak hour volume of traffic on major road sections is presented in Table 3.22. It is seen from the table that all the major roads in Perumbavoor town carried traffic exceeding its carrying capacity during the peak periods. On the AM road, Aluva section carried peak hour traffic volume of around 4,800 PCU while on Kothamangalam section, it was 1,800 PCU. On MC road, peak hour traffic volume was found to be around 1,700 PCU on both sides of Kalady junction. Other roads which carried high volume of traffic were the road between Oushadi Jn and Hospital Jn (2,033 PCU), Court road (1,810 PCU), PP road (1,787 PCU) and Old Moovattupuzha road between Pushpa Jn and KSRTC BS (1,210 PCU).

The following roads registered peak hour traffic flow between 500 and 1,000 PCU.

(i) Cattle market road (814 PCU)
(ii) GHS to TB road (729 PCU)
(iii) Marthoma Church Road (677 PCU)
(iv) Pooppani road (584 PCU)
(v) Onnam Mile to Pooppani Para via Alppara temple (540 PCU)
(vi) Old Moovattupuzha road between KSRTC BS & border (530 PCU)

Peak hour traffic flow in PCU on major road stretches in Perumbavoor town is illustrated in Figure 3.36. The other roads have recorded traffic load of less than 500 PCU during the peak hour.

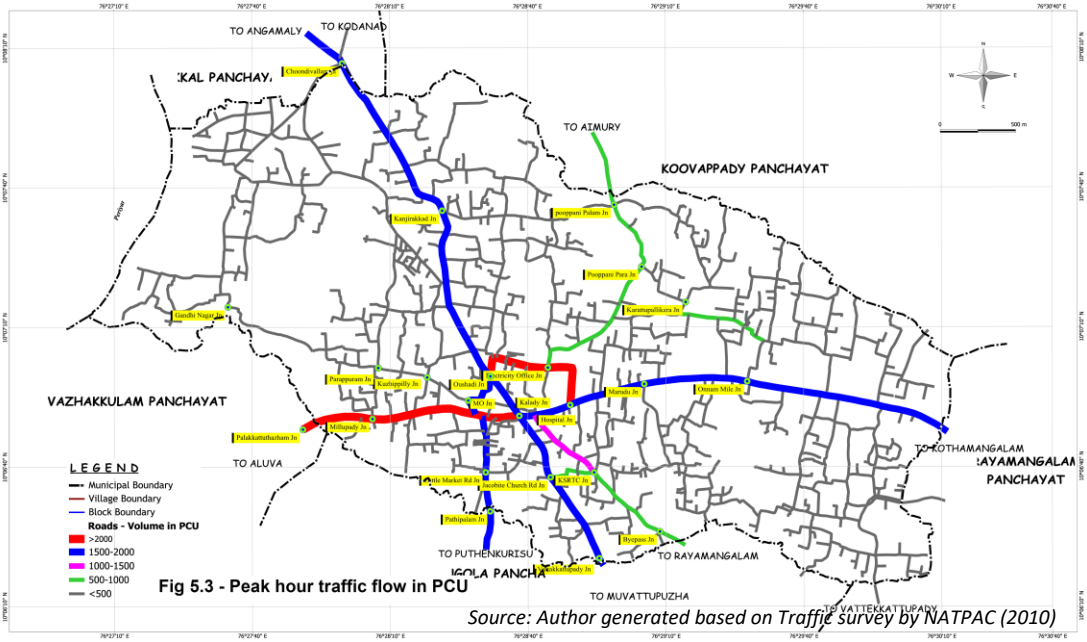


Fig 5.3 - Peak hour traffic flow in PCU

Source: Author generated based on Traffic survey by NATPAC (2010)

Figure 3.36 Peak hour traffic flow on major roads in Perumbavoor Town

3.5.8 VOLUME-CAPACITY RATIO ON MAJOR ROADS

Volume-capacity (V/C) ratio is a measure reflecting the capacity utilization of a road stretch. A measure of V/C ratio above 1.0 indicates over-utilization of the road, i.e., volume of traffic exceeding its carrying capacity while the V/C ratio under one reflects under-utilization of the road. In the case of Perumbavoor town, V/C ratio of road sections especially AM road, MC road, Court road and road between Oushadi Jn and Hospital Junction have higher than 1.0 which implies over-utilization of the roads.

Table 3.22 Peak hour traffic volume on major roads in Perumbavoor town

Sl. No.	Name of road section	Peak hour capacity (PCU)	Peak hour volume (PCU)	V/c Ratio
I. MAJOR INTERNAL-EXTERNAL ROADS				
1	**Aluva-Munnar road (AM Road)**			
	(i) Palakattuthazham (Municipal Border) to Kalady Jn	1,500	4,791	3.19
	(ii) Kalady Jn to Municipal Border	1,500	1,790	1.19
2	**Main Central road (MC road)**			
	(i) Vattikattupady (Municipal Border) to Kalady Jn	1,500	1,670	1.11
	(ii) Kalady Jn to Choondivallam (Municipal Border)	1,500	1,882	1.25
3	**Old Moovattupuzha road**			
	(i) Pusha Jn on AM road to KSRTC Jn	1,200	1,210	1.01
	(ii) KSRTC Jn to Municipal Border	1,200	530	0.44
4	**Perumbavoor-Pattimattam road** - Gandhi Square on AM road to Pathipalam (Municipal Border)	1,200	1,526	1.27
5	Pooppani road	1,200	584	0.49
II. MINOR INTERNAL-EXTERNAL ROADS				
1	Iringol Jn on AM road to Municipal Border via Iringol temple (Iringol Kavu road)	450	162	0.36
2	Palakkattuthazham on AM road to Municipal Border (Saddam road)	450	184	0.41
3	BOC road Jn on AM road to Municipal Border (BOC road)	450	129	0.29
4	Onnam Mile Jn on AM road to Municipal Border (Konnamkudy road)	450	104	0.23
5	Pattal Jn on AM road to Municipal Border (Quarry road)	900	107	0.12
6	Iringol Jn on AM road to Municipal Border (Old post office road)	450	274	0.61
III. INTERNAL ROADS in the north-south direction				
1	Mudikkal on AM road to Choondivallam on MC road via Travancore Rayons (Gandhi Nagar road & Rayon road)	900	195	0.22
2	AM road to Parapuram Jn (Karothu Lane)	450	115	0.26
3	Parappuram Jn to Old Vallam road (Colony road)	900	230	0.26
4	AM road to Kuzhipilly temple (Library road)	450	437	0.97
5	Govt. Girls High School on AM road to TB Jn	450	729	1.62

6	Gandhi Square on AM road to MO Jn	1,500	1,593	1.06
7	Kuzhipilly temple to MC road (G K Pillai road)	900	425	0.47
8	Oushadi Jn on MC road to Kanjirakkad (Temple west road & CT road)	450	125	0.28
9	Pattal Jn on AM road to Pankulam (Pattal-Pankulam road)	450	115	0.26
10	Marudu Jn on AM road to Marudu Jn (Marudu road)	900	139	0.15
11	AM road to KSRTC station (Thottunkal road)	450	307	0.68
12	Hospital Jn on AM road to Old Moovattupuzha road (UBI rd)	450	243	0.54
IV. INTERNAL ROADS in the east-west direction				
1	Gandhi Nagar Jn to MO Jn via Parappuram, Kareri-Kollamkudy Road, T B Road	900	252	0.28
2	MO Jn to Ousadhi Jn on MC road (Court road)	1,500	1,810	1.21
3	Oushadi Jn on MC road to Hospital Jn on AM road	1,500	2,033	1.36
4	Colony road to CT road (Chenganattu Road & Broadway)	450	188	0.42
5	Kaduval Jn on MC road to Rayons road (Old Vallam road)	900	153	0.17
6	MC road to Old Vallam road (Thrikkaparambu road)	450	75	0.17
7	Kanjirakkad Jn on MC road to Pooppani Palam on Pooppani road	900	150	0.17
8	Pooppani Palam on Pooppani road to Karattupallikara via MET school	900	73	0.08
9	Pooppani Para on Pooppani road to Onnam Mile Jn on AM road via Alppara Temple	900	280	0.31
10	Alppara temple to Konnamkudy road	450	180	0.40
11	Iringol Kavu Temple to KSRTC Jn via Pankulam, Marudu Kavala, Vrindavan Road	450	225	0.50
12	Old Moovattupuzha road to MC road (Marthoma Church rd)	900	677	0.75
13	Old Moovattupuzha road to MC road (Jacobite Church road)	450	322	0.72
14	MC road to PP road (Cattle Market road)	450	814	1.81

Source: Traffic survey by NATPAC (2010)

In the following road sections, although the traffic volume was below 1,000 PCU, available capacity was not adequate to cater to the traffic with V/C ratio more than 1.0.

(i) Girl's High School to TB road (V/c ratio 1.62)

(ii) Cattle Market road (V/c ratio 1.81)

(iii) Library road (v/c ratio 0.97).

V/C ratio for the major road sections in the central area of Perumbavoor town is presented in Table 3.22.

On the whole, it can be inferred that major roads passing through the town have very high traffic volume during peak hours while minor roads are not fully utilized.

3.5.9 PATTERN OF TRAFFIC MOVEMENT

Origin-destination survey was conducted at the four exit/entry points of MC road and AM road in Perumbavoor town to assess the pattern of traffic movement. During the survey, passenger and goods vehicles were stopped at random with the help of Police personnel to collect trip particulars of the traveling public and goods vehicles. Particulars like origin of trip, final destination, number of passengers in the vehicle, purpose of journey, etc., were collected from the passenger vehicles crossing the survey station. In the case of goods vehicles, details like origin and destination of goods traffic, type of commodity carried, quantity carried, etc. were collected.

It has been observed that about 48,000 vehicles passed through Palakattuthazham survey point on AM road, followed by 19,000 vehicles through Kanjirakkad survey point on MC road, 18,000 vehicles through Iringol survey point on AM road and 17,000 vehicles through Karottupady on MC road. One-third of the vehicles passing through these survey points were found to be cars, auto and two wheelers. The break-up of vehicular traffic passing through the survey points according to vehicle type are given in Table 3.23.

Table 3.23 Daily traffic volume on outer cordon points of major roads in Perumbavoor town

Sl. No.	Type of vehicle	Palakkattuthazham on AM road			Kanjirakkad on MC road			Iringol on AM road			Vattaikattupady on MC road		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
1	KSRTC Bus	190	110	**300**	60	60	**120**	60	50	**110**	150	130	**280**
2	Private bus	350	160	**510**	190	230	**420**	360	310	**670**	10	10	**20**
3	Education / Institution bus	180	200	**380**	10	10	**20**	10	10	**20**	-	-	**-**
4	Other buses	40	10	**50**	-	10	**10**	10	20	**30**	10	30	**40**
5	Mini-bus/tempo (Edn/Ins)	-	50	**50**	20	30	**50**	10	-	**10**	-	-	**-**
6	Mini bus / tempo (Others)	-	10	**10**	90	40	**130**	50	-	**50**	30	30	**60**
7	Car / van / jeep	4,960	5,240	**10,200**	2,420	2,000	**4,420**	1,870	1,660	**3,530**	1,510	1,640	**3,150**
8	Passenger autorikshaw	2,860	2,030	**4,890**	740	600	**1,340**	790	350	**1,140**	590	500	**1,090**
9	Two - wheeler	5,910	7,620	**13,530**	2,000	2,540	**4,540**	2,830	2,560	**5,390**	2,760	2,720	**5,480**
10	MAT	10	390	**400**	130	140	**270**	60	20	**80**	120	80	**200**
11	Truck	1,650	2,030	**3,680**	720	850	**1,570**	1,420	60	**1,480**	880	980	**1,860**

12	Mini-truck / tempo	800	3,410	**4,210**	820	530	**1,350**	460	940	**1,400**	400	640	**1,040**
13	Goods autorikshaw	2,090	920	**3,010**	330	270	**600**	630	310	**940**	210	220	**430**
14	Bi-cycle	20	60	**80**	200	110	**310**	50	50	**100**	30	40	**70**
15	Hand cart	10	-	**10**	10	-	10	-	-	**-**	10	-	**10**
16	Others (Specify)	-	-	**-**	10	-	**10**	10	-	**10**	-	10	**10**
Total (No)		**19,070**	**22,240**	**41,310**	**7,750**	**7,420**	**15,170**	**8,620**	**6,340**	**14,960**	**6,710**	**7,030**	**13,740**
Total (PCU)		**21,390**	**26,520**	**47,910**	**9,610**	**9,205**	**18,815**	**11,420**	**6,475**	**17,895**	**8,080**	**8,615**	**16,695**

Source: Traffic survey by NATPAC (2010)

Origin-destination details of vehicles passing through the four survey points located on MC road and AM road were analyzed to obtain interaction of vehicular movements in Perumbavoor town. For the purpose of assessing the travel pattern, the study area consisting of Perumbavoor town and surrounding regions were divided into five regions as given below;

(i) Perumbavoor town

(ii) Region on Aluva side of AM road

(iii) Region on Angamaly side of MC road

(iv) Region on Kothamangalam side of AM road and

(v) Region on Moovattupuzha side of MC road.

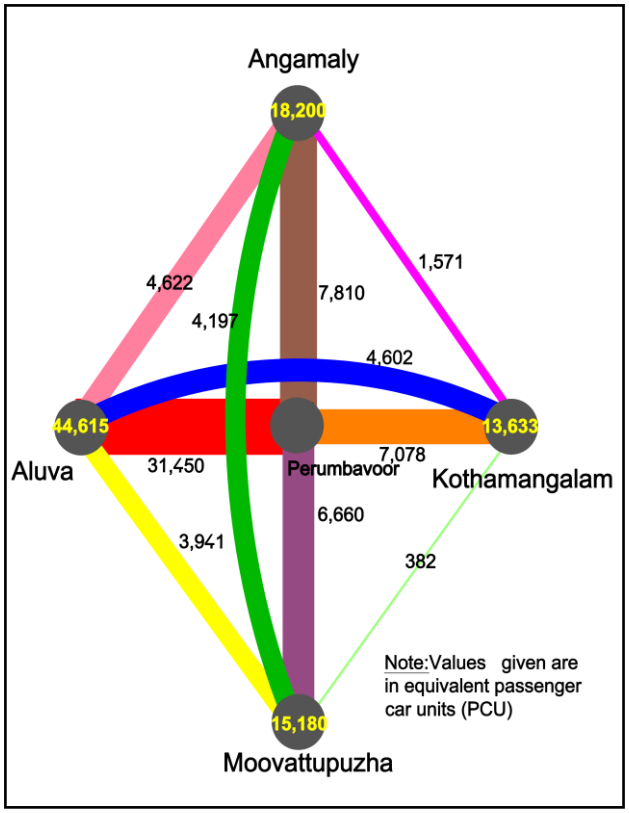


Figure 3.37 Desire Line Diagram

Pattern of vehicular movements passing through Perumbavoor town according to the above regions were obtained and are presented in Table 3.23. It was seen that a total of 68,000 vehicles (excluding buses) either entered or exited the town during a normal working day through the four outer cordon points. External-internal and internal-external movement implying the traffic potential of Perumbavoor

town were estimated to be 44,000 passenger vehicles and 11,000 goods vehicles constituting 80 per cent of the total vehicles. 4,200 vehicles were found to be bypassable traffic plying along MC road while 3,200 vehicles were found to be bypassable from AM road. Traffic interaction to the tune of 4,600 vehicles was found to be between Aluva side and Angamaly side, 3,900 vehicles between Aluva and Moovattupuzha, 1,500 vehicles between Kothamangalam and Angamaly and 400 vehicles between Kothamangalam and Moovattupuzha. Desire line diagram showing the pattern of vehicular movement in Perumbavoor town is presented in Figure 3.37.

3.5.10 MAJOR TRAFFIC PROBLEMS

The major traffic problems in the town are associated with the concentration of commercial activities along the two road stretches namely AM road and MC road which form the CBD area of the town. The passenger and goods traffic bypassing the town, however have to pass through the central area of the town, either in the north-south or in the east-west direction in the absence of bypasses.

Table 3.24 Pattern of passenger and goods vehicle movement through Perumbavoor town

Sl. No	Origin	Destination					Total
		Perumba-voor town	Aluva side	Angam-aly side	Kothaman-galam side	Moovattu-puzha side	
	CAR						
1	Perumbavoor town	-	4,127	1,131	1,479	1,312	**8,049**
2	Aluva side	3,255	-	252	465	720	**4,692**
3	Angamaly side	1,397	254	-	295	474	**2,420**
4	Kothamangalam side	1,166	424	237	-	27	**1,854**
5	Moovattupuzha side	966	252	257	73		**1,548**
	Total	**6,784**	**5,057**	**1,877**	**2,312**	**2,533**	**18,563**
	AUTO						
1	Perumbavoor town	-	1,966	300	351	234	**2,851**
2	Aluva side	2,080	-	130	130	130	**2,470**
3	Angamaly side	636	130	-	-	-	**766**
4	Kothamangalam side	790	130	50	-	-	**970**
5	Moovattupuzha side	462	121	142	-	-	**725**
	Total	**3,968**	**2,347**	**622**	**481**	**364**	**7,782**
	TWO WHEELER						
1	Perumbavoor town	-	6,154	1,848	1,620	1,963	**11,585**
2	Aluva side	4,488	-	397	306	280	**5,471**
3	Angamaly side	1,416	236	-	262	420	**2,334**
4	Kothamangalam side	2,548	92	168			**2,808**

5	Moovattupuzha side	2,105	276	104	339		**2,824**
	Total	**10,557**	**6,758**	**2,517**	**2,527**	**2,663**	**25,022**
	TRUCK						
1	Perumbavoor town	-	1,950	-	24	144	**2,118**
2	Aluva side	922		320	85	120	**1,447**
3	Angamaly side	476	593		82	563	**1,714**
4	Kothamangalam side	70	568	35	-	24	**697**
5	Moovattupuzha side	212	423	239			**874**
	Total	**1,680**	**3,534**	**594**	**191**	**851**	**6,850**
	MINI-TRUCK						
1	Perumbavoor town	-	1,885	-	413	105	**2,403**
2	Aluva side	516		95	127	87	**825**
3	Angamaly side	405	278		235	303	**1,221**
4	Kothamangalam side	40	624	5	-	20	**689**
5	Moovattupuzha side	108	387	90			**585**
	Total	**1,069**	**3,174**	**190**	**775**	**515**	**5,723**
	GOODS AUTO						
1	Perumbavoor town	-	582	-	156	120	**858**
2	Aluva side	1,901		105	26	20	**2,052**
3	Angamaly side	678	136		62	58	**934**
4	Kothamangalam side	90	142	-	-	10	**242**
5	Moovattupuzha side	144	79	8			**231**
	Total	**2,813**	**939**	**113**	**244**	**208**	**4,317**
Grand total (in No)							
1	Perumbavoor town	-	16,664	3,279	4,043	3,878	**27,864**
2	Aluva side	13,162	-	1,299	1,139	1,357	**16,957**
3	Angamaly side	5,008	1,627	-	936	1,818	**9,389**
4	Kothamangalam side	4,704	1,980	495	-	81	**7,260**
5	Moovattupuzha side	3,997	1,538	840	412	-	**6,787**
Total		**26,871**	**21,809**	**5,913**	**6,530**	**7,134**	**68,257**
Grand total (in PCU)							
1	Perumbavoor town	-	18,430	2,355	3,488	3,237	**27,509**
2	Aluva side	13,020	-	1,788	1,220	1,501	**17,528**
3	Angamaly side	5,455	2,834	-	1,087	2,886	**12,261**
4	Kothamangalam side	3,590	3,382	484	-	139	**7,595**
5	Moovattupuzha side	3,423	2,440	1,311	243	-	**7,416**
Total		**25,487**	**27,085**	**5,938**	**6,036**	**7,762**	**72,308**

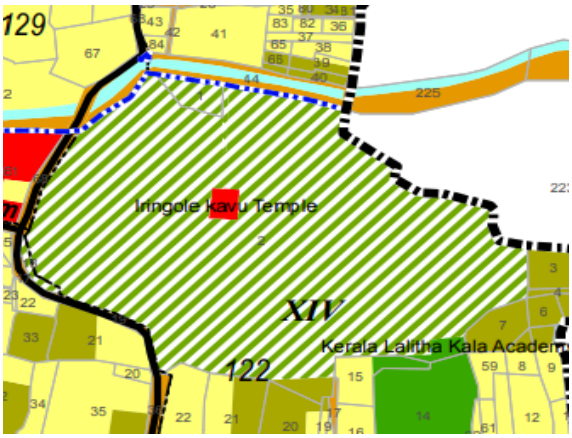
Source: Traffic survey by NATPAC (2010)

The convergence of activities in the central areas of the town and the mixing of local and through traffic cause the major traffic bottlenecks in CBD areas of the town. Due to this the travel speeds within the central area are quite low with frequent traffic hold-ups resulting in delay, vehicular conflicts and high level of vehicular emissions.

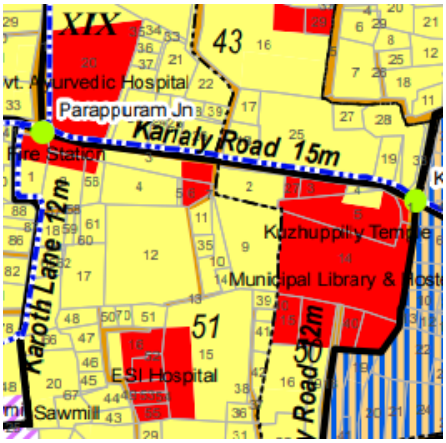
Aluva-Munnar Road (A M road) and Main Central road (M C road) are the two main roads passing through Perumbavoor carrying a major flow of traffic which causes noise pollution in the town. Perumbavoor houses several noise generating industries like wood and other small scale industries also.

As per the Noise Pollution (regulation and control) Rules, 2000 and the GO (P) No: 64/02 dated 20/04/2002 of Local Self-Government Department, it is necessary to include the noise pollution as a parameter of quality of life to avoid noise menace and to achieve the objective of maintaining the ambient air quality standards with respect to noise. According to above rule and GO, 'Silent zones are areas comprising not less than 100m around hospitals, educational institutions and courts, provided that the area shall not fall under silent zone category unless notified by state government. Also religious places, reserve forests, wildlife sanctuaries or any other areas notified by Government of Kerala from time to time falls under the category of silence zone.

Considering the natural heritage value of Iringolkavu and its location in the town centre, it can be considered to be classified under silence zone for its sustenance. So many educational institutions and hospitals are functioning in Perumbavoor Municipal area and a court complex also.



Iringole Kavu



Public Places

The existing carriageways of these roads have been widened to the maximum extent within the available ROW and there is shortage of space for providing proper footpath, bus bays and parking.

Intersections located on both MC road and AM road cause considerable delays which in turn results in traffic congestion along the major travel corridors. The junctions are:

(i) Kalady junction – a four arm junction where AM road and MC road meet

(ii) Pushpa junction – a three arm junction located close to the Vegetable Market.

(iii) Gandhi Square – a four arm staggered junction from where the Pattimattam road originates. It is also located close to the private bus stand.

(iv) Hospital junction – a four arm staggered junction on the AM road located near the General Hospital.

Another major problem in the central area is the unorganized roadside parking of vehicles on both sides of roads. The absence of proper pedestrian facilities causes safety problems throughout the central area of the town especially at junction areas, vegetable market area and old bus stand area etc.

3.6 INFRASTRUCTURE FACILITIES

3.6.1 WATER SUPPLY

In Kerala all major public water supply systems are under the control of Kerala Water Authority (KWA), the public sector under taking for planning, implementing and maintaining water supply and sewerage schemes of Government of Kerala, formerly known as Public Health Engineering Department (PHED). The present water supply scheme covers almost the entire town area. The source of water supply in Perumbavoor is Periyar River with three collection points in vallam area with total capacity of 13.50 MLD and there are three treatment plants. The details of sources, treatment plants and Over Head and Ground Level tanks are shown in table given below. Out of the total capacity of 13.5 MLD, 7MLD is supplied to Perumbavoor Municipality. The remaining water is supplied to Vengola Panchayat (4 MLD) and Rayamangalam Panchayat (2.5 MLD). There are 3809 water supply connections in the town. The total consumption comprises of domestic and non domestic consumption including water requirement for industrial, commercial and institutional uses, hospitals, hotels, theatres, gardens etc. To this total consumption unaccounted water which includes requirements for fire fighting, allowances for leakage losses etc are added to get the total water demand.

Table 3.25 Sources of water supply

Sl. No	Source of water (Rivers, fresh water lakes, streams, ponds ,Tube well, Bore well)etc	Location/ Ward	Quality of water source wise (Potable water that can be used after Chlorination -1 Water containing Iron, salt, Hardness –2, Treated water - 3.)	Yield from the sources (MLD)	Challenges to the sources (Stake holder discussion)
1	River	Vallam	1	10 MLD	
2	River	Vallam	1	1 MLD	Pressure filter
3	River	Vallam	1	2.5 MLD	

Source: KWA

Table 3.26 Details of Water Treatment Plants

Sl. No.	Location	Source of water (Rivers, fresh water lakes, streams, ponds , Tube well, Bore well)etc	Capacity of the Plant(MLD)	Types of treatment	Working Condition
1	Kanjirakad	River	10 MLD	Rapid sand filter	Yes
2	Perumbavoor	River	2.5 MLD	”	Yes
3	Vallam quarters	River	1 MLD	Pressure filter	Yes

Source: KWA

Table 3.27 Details of Distribution Network

Sl No	Net work	Sources	Area of coverage (wards)	No. of houses covered / no of connections	No and Capacity (ML)of OH tank	Total Quantity supplied /day	Quality of water (properly treated / only chlorination / no treatment)
1	Distribution	O.H. Tank	1 to 21	3729	2.27 + 12.50 Lakhs	35 Lakhs	Treated
2	”	River	1,2, 19 & 20	80 Nos	1 mld	1 lakhs	chlorination

Source: KWA

Table 3.28 Scarcity Details

Sl. No.	Ward	Extend of Scarcity					
		No Scarcity	6hrs Supply / day	3hrs supply / day	1hr supply / day	Once in 2days	Once a week
1	Municipal area ward 1 to 21		√				

Source: Water Authority/Local Body/ Discussion with Stake Holders

3.6.2 SEWERAGE

Domestic waste water and liquid waste from hotels and other trade establishments are flowing to the open drains. There is no plant for treating the liquid waste in Perumbavoor town. The major portion of the liquid waste joins in rivers paddy fields and other water bodies. This practice offers high degree of health hazard and environmental pollution and leads to

deterioration of quality of life. In Perumbavoor town 100% of the total houses have septic tanks. Table No. 3.29 shows the type of sanitary facilities of Perumbavoor town.

Table 3.29 Sanitary facilities in Perumbavoor Town

Sl. No.	Type of latrines used	Total number of houses	percentage to total
1	Septic tank	5983	100

Source: Municipal Office, Perumbavoor

3.6.3 STORM WATER DRAINAGE

Existing open drains are the major storm water carriers in the town. Drains are constructed not based on any pre-determined plan. In certain places drains are not continuing. The major road in the town has drains, and most of them join in rivers, paddy fields and other water bodies. Perumbavoor has the advantage of having the network of natural drains and flooding is found to be negligible due to the topographical condition.

3.6.4 SOLID WASTE MANAGEMENT

The solid waste management in the town is the responsibility of Municipal council of Perumbavoor municipality. The primary sources of solid waste generation are households, commercial establishments, industries, markets, hotels, restaurants and hospitals. The total quantity of waste generated per day is about 9 tons. Per capita solid waste generation in Perumbavoor town is 258 gms/ day. The present system of waste collection storage and transportation in the municipality is not in compliances with Municipal Solid Waste (MSW) rules 2000. 90% of the waste is collected daily and remaining 10% is disposed of in the house premises. In Perumbavoor municipality community level collection of Solid Waste Management is adopted. At the household level door to door collection of waste is practiced. The Perumbavoor municipal council practices open disposal of waste without undertaking any pretreatment of waste and collected waste is being dumped in the Panchayat that lies in the out skirts and the waste is also being used for land fill which is against the prevalent paddy and wetland act 2008.

Table 3.30 Details of solid waste collection system

Sl. No	Type of the System (Centralized , Partially centralized, community level)	Source of solid waste (Area/ Ward)	Total quantity of solid waste generated (T)	Total quantity of solid waste collected (T)	Coverage Area/ ward	Collection details			
						Location of Collection point	Workers employed	Frequency of collection	Vehicles used
1	Community Level	Ward	9 ton	8 ton	Ward	4	65	Daily	3

Source: Local Body

Table 3.31 Details of Secondary Storage space of Solid Waste

Sl.No	Secondary Storage Space (location and extent)	Frequency of Collection (in days)
1	Nil	Nil

Source: Local Body

Table: 3.32 - Details of Final Disposal Method of Solid Waste

Sl.No	Method of Disposal (land fill, Composting, Incineration, Burned openly Open dump Digestion)	System for separation of solid waste (Y/N)	Location	Significant public protest against the location (Y/N)
1	Land filling	No	N.A	N.A

Source: Local Body

3.6.5 POWER

The Kerala State Electricity Board is responsible for maintaining Electricity distribution system. Table No.3.33 shows the consumer wise classification of connections in Perumbavoor town in 1995. From the table it can be seen that domestic consumers constitute bulk of the total consumers.

Table 3.33 Consumer wise No. of electric connections

Category	No. of connections	Average monthly consumption in K.W
Domestic	6287	6,73,084
Commercial	3670	5,16,638
Industrial	451	8,10,436
Irrigation/Water Works	320	29,719
Street lighting	2270	33,421
Others	316	8,825
TOTAL	13,314	20,72,123

Source: Kerala State Electricity Board -1995

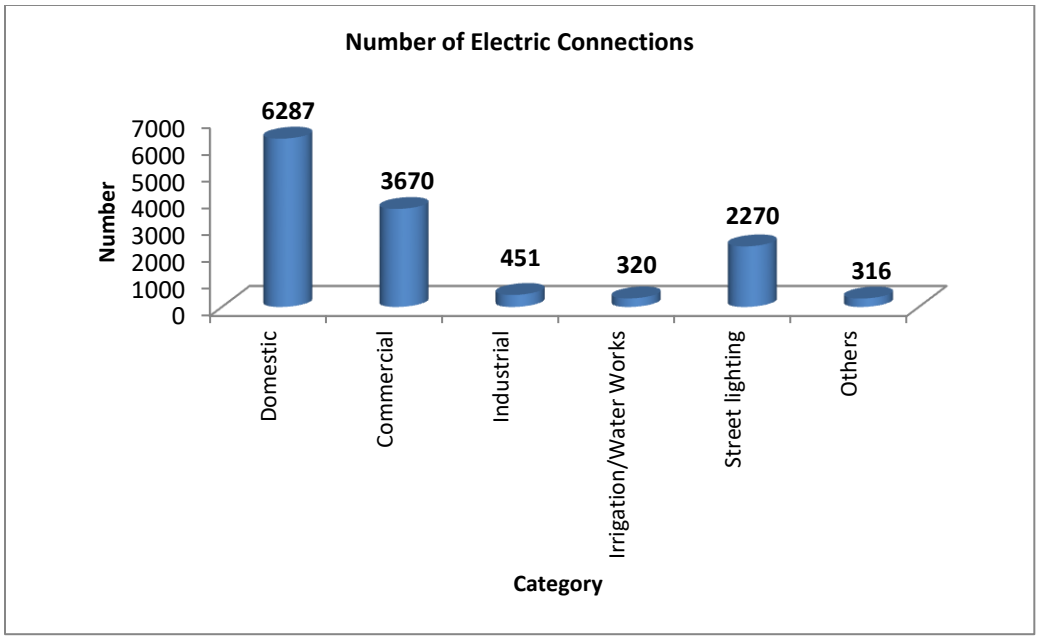


Figure 3.38 Consumer wise No. of electric connections

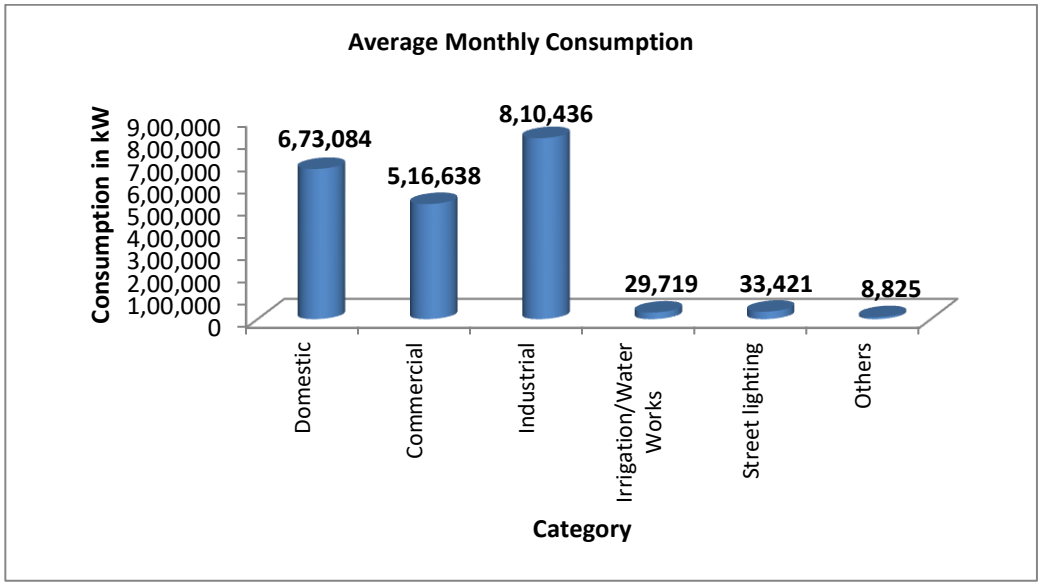


Figure 3.39 Average Monthly consumption

3.6.6 SOCIAL INFRASTRUCTURE FACILITIES

3.6.6.1 EDUCATIONAL FACILITIES

There are four High Schools in Perumbavoor town; three of them are in the public sector and one in the private sector. A higher Secondary Vocational School is also functioning in the

town. In additions to the High Schools, there are four U.P Schools and 6 L.P. Schools in this town. Table No.3.34 shows the facilities for education in School level.

Table 3.34 Details of existing educational institutions in the town – 2001

Sl No.	Category of schools	No. of schools	Total No. of students
1	L.P. Schools	6	1230
2	U.P. School	1	208
3	High Schools	4	3099
4	Higher Secondary	3	427
5	C.B.S.E School	2	1490
6	ICSE School	1	191

Source: Educational Department

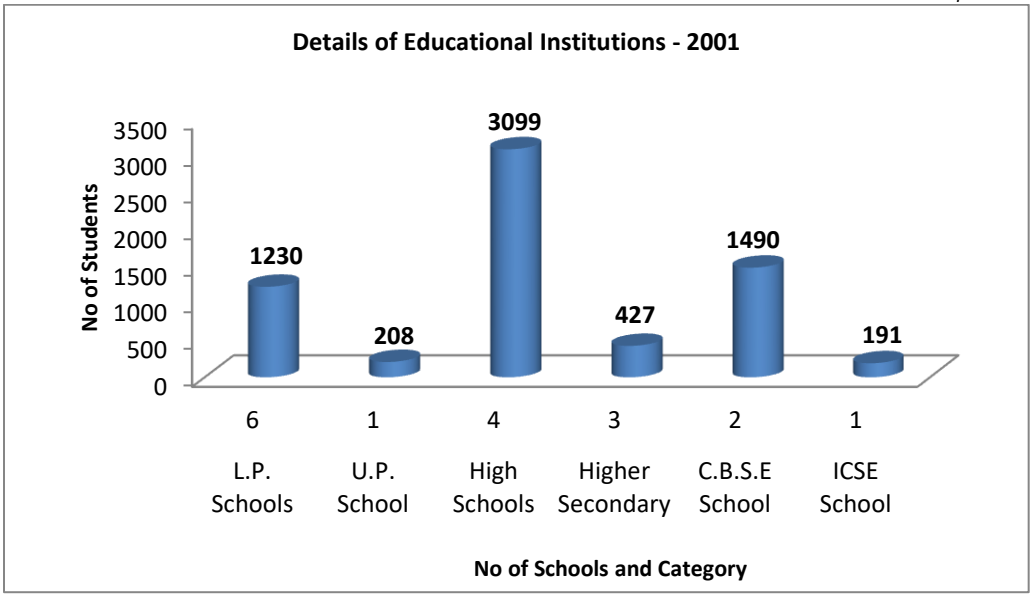


Figure 3.40 Existing educational Institutions

As far as facilities for higher education is concerned, there are two Colleges in the town, Marthoma College for women and the Arabic College near the Travancore Rayons. There is no Professional Colleges in Perumbavoor town. But this facility is available in the nearby local bodies. Most of the students are depending on colleges in the nearby local bodies for their higher educations.

3.6.6.2 MEDICAL FACILITIES

The Taluk Hospital caters to the need of the people of Perumbavoor and the surrounding Panchayaths. The bed strength is 161 in Government sector and 392 in the private sector. The total bed strength in Allopathic Hospitals comes to 553. 15 nos. of Ayurvedic

Dispensaries in the private sector and one Government hospital with bed strength of 20 are functioning in Perumbavoor town.

3.6.6.3 RECREATIONAL FACILITIES

There are three Cinema theatres in the town. The capacity of these units is 2758.In addition to the above there is a Mini Open Air Stadium with an extent of 1.15 ha located in the heart of the town. Further, open spaces and playgrounds are attached to the educational institutions. There is one Children's Park attached to the Municipal Library. There are four auditoria within the town which are managed by private sector. There is no town hall or any such indoor Assembly Halls for conducting public functions.

The present recreational facilities are insufficient to cater to the need of the populations. List of facilities are given below:-

Table: 3.35 – List of facilities in Perumbavoor Municipality

Facilities	No. Of Facilities
Post Office HO	1
Sub post office	1
Telephone exchange	1
Banks(National/scheduled/cooperative bank)	10
LP and UP	7
HS	4
HSS/VHSS	3
Arts & Science College	1
ITC/ITI	2
Markets	3
Taluk Hospital	1
PHC	2
Hospital with IP facility	9
Park/Tourist centres	3
Stadium	8
Police station	2
Veterinary Hospital	1
Fire station	1
Cremation centre	1
Warehouses	1
Bus stand	2
Port and harbour	0
Cinema Theatre-A	2
Cinema Theatre-B	1
Cinema Theatre-C	0
Airport	0
University	0
Flat/apartment	1

Source: Panchayat Level Statistics 2006, Local body

INFERENCE

As per the present population the educational infrastructure of Perumbavoor is good enough to provide basic standard of education. Majority of the youth in Perumbavoor depends on adjacent Panchayat and Municipalities for higher education.

The existing Taluk hospital caters to the need of the people in Perumbavoor town and also to the surrounding Panchayat. Majority of the population in Perumbavoor depends upon the neighboring centers especially Kochi for Multi speciality Medical aid.

The town has provided only minimum recreational facilities. Major drawback is the absence of a town hall and no indoor assembly halls for conducting public functions. The present recreational facilities are insufficient to cater to the needs of population.

At Present water supply scheme covers almost the entire town area and supply is limited to 6hrs/day. Most of the houses have well. People uses well water also.

In the case of Solid Waste Management, community level collection and open disposal system is adopted. There is no land allocated for waste disposal and the collected waste is dumped into the outskirts of municipal land.

Due to the topographical condition flooding is not found to be a serious problem. The storm water and domestic waste water joins in the open drain and flows into the low lying land and paddy fields. No treatment is done there.

3.6.7 TOURISM AND HERITAGE

Perumbavoor Town acts as a corridor for Tourism development. Perumbavoor and its adjoining areas have been identified as areas with tourism potential notably places such as Kodanad the Elephant training centre, the Paniyeli poaru, Iringole Kavu. Kallil jain temple (an old jain temple, 13km from Perumbavoor) and Kalady (The Birth place of Sri. Sankaracharya) are the important destination for tourism in Perumbavoor and nearby Panchayats.

Kodanadu located on the high ranges of Southern bank of Periyar River. This beautiful place in Kerala is well known for elephants and it is the training ground for elephants. Elephants here are trained for safaris and provided with saddles for riding. This place is also well known for the beautiful river banks and the sidewalks along the riverside. This gives a

magical and refreshing experience to the visitors on tour to Kodanad. A mini zoo with species like crocodile, snakes, birds etc is another attract.




Kodanadu Elephant training centre

Paniyeli is a place for adventurous travelers. It forms part of the Periyar River. It has natural Water falls, Small River let's, offshore surrounded by rich flora and fauna. The crystal clear water of the lovely river "Periyar" flowing in between two main land's Malayattoor in the North and Paniyeli in the South, provides a panoramic view to visitors.




Paniyeli Poru and Iringole Kavu

Iringole is a thick forest existing in the South east corner of the town with 3000 years old temple in the middle known as Iringole Kavu. The fantastic sight and scenery of the area attracts so many Indian and foreign tourist throughout the year. Iringole is considered as a heritage area with an extent of 8.21 hectres.

INFERENCE

Even though Perumbavoor act as a corridor for these tourist destinations, it does not act as a potential accommodation centre, nor does it provide any entertainment facilities for the tourist thereby making them select other developed town centre as places of accommodation.

CHAPTER 4. POTENTIALS AND CONSTRAINTS FOR DEVELOPMENT

4.1 POTENTIALS FOR DEVELOPMENT

- ⇨ The draft Master Plan for Kochi City Region identifies Perumbavoor as a major urban centre for intense development so as to cater to the needs of a large catchment area which includes the Municipality and the surrounding Panchayats.
- ⇨ The proximity of the town to Kochi and Aluva offers a large market for industrial products of the town and at the same time offers easy access to highest order facilities and services.
- ⇨ Two major State Highways (M.C Road and A.M Road) which passes through the town provides good regional connectivity.
- ⇨ The proposed Sabari Railway line and a Railway station in the town will also enhance the regional connectivity and may boost the economic development of the town.
- ⇨ A number of wood based industries are already in the town for years and there is scope for further industrial development.
- ⇨ The proximity of Periyar river provides a reliable and adequate source of drinking water supply to the town.
- ⇨ The town has plenty of vacant and under developed land for supporting further development of the town.

4.2 CONSTRAINTS FOR DEVELOPMENT

- ⇨ A large share of the Municipality is under wet lands and uncultivated paddy lands. This possesses a constraint in making available large chunk of land to urban uses.
- ⇨ Though plenty of undeveloped lands are available in the town, prohibitive land cost still pushes many of the land intensive uses to outside the town limits.
- ⇨ Kochi is the commercial and industrial hub of Kerala and a major provider of employment. Easy access and the difference in scale of services between Kochi and other urban centres make people prefer Kochi than the small towns like Perumbavoor.

CHAPTER 5. POPULATION PROJECTION AND ASSESSMENT OF REQUIREMENTS

5.1 POPULATION PROJECTION

The population will have to be estimated with due regard to all the factors governing the future growth and development of the town in the industrial, commercial, educational, social and administration spheres. Population projections are necessary for setting employment targets, for manpower planning, for planning productivity increases, for opening schools, for teachers' training, for planning expansion of hospitals, for supply of goods and services of various types, for providing inputs to agriculture and industry, for arranging finances, for planning distribution system , for planning energy supply needs, housing construction programmes, transportation needs etc. Special factors causing sudden immigration or influx of population should also be foreseen to the extent possible.

The structure and vitality of the urban economy and the employment opportunities which the economy generates are the means of gauging the growth potentialities of an urban area.

Studies of population given an indication of the overall dimensions of the growth of the town. The introduction of the time element and estimation of future trends of population size provide the basis for estimating future space requirements.

Perumbavoor town was elevated to the status of Municipality in 1953. Hence the growth rate of population is available for the decades of 1951-61, 1961-71, 1971-81 and 1981-91, 1991-2001.

From the population study of Perumbavoor town it is seen that the population has been steadily increasing over the past few decades. An estimate of the population to be accommodated in the town by 2031 is 42213. Proper facilities should be provided for the projected population for satisfactory living conditions.

5.1.1 POPULATION GROWTH BY DIFFERENT METHODS

Arithmetic and Geometric projections are not considered appropriate for projecting the future population of Perumbavoor municipality, as a constant growth rate is not anticipated in

this town. The logistic method is also not utilised, as there are no obvious special local factors, which would indicate that the population would reach a saturation limit ultimately.

After examining the various populations forecast methods outcomes and examining the existing scenario of economic development, the forecast based on incremental increase method is perceived to be appropriate. The population of the town depends upon the growth of the district in which it is located. Hence Ratio method also has to be considered. On comparing the two methods, it would be better to take the future population as the average of the population by two methods.

Incremental increase method

Ratio method

Incremental increase method:- In this method, the per decade growth rate is not assumed to be constant as in the arithmetic or geometric progression methods; but is progressively increasing or decreasing, depending upon whether the average of the incremental increases in the past data is positive or negative.

Ratio method: - This proceeds on the assumption that the population of the town depends upon the growth of the district in which it is located. Thus, if the future population estimates of the district are available, then by examining the trend of past ratios of the town population to that of the district the required projections for the town can be made.

Table 5.1 Incremental Increase Method

Year	Population	Increase in population	Incremental increase
1971	20888		
1981	23064	2176	
1991	24667	1603	-573
2001	26547	1880	277
TOTAL		5659	-296
AVERAGE		**1886**	**-148**

$$P_n = P_0 + n\bar{x} + \frac{n(n+1)}{2} . \bar{y}$$

Where $P_n =$ $Population\ after\ 'n'\ decades\ from\ present\ (i.e., last\ known\ census)$

$\bar{x} =$ $Average\ increase\ of\ populations\ of\ known\ decades.$

$\bar{y} =$ $Average\ of\ incremental\ increases\ of\ the\ known\ decades.$

Table 5.2 Population during the years 2011, 2021 & 2031

Year	Population
2011	28285
2021	29876
2031	31318

Table 5.3 Ratio Method

Year	Population		Ratio
	Ernakulam (X)	Perumbavoor(Y)	y/x
1971	2383178	20888	0.0088
1981	2535294	23064	0.0091
1991	2817236	24667	0.0088
2001	3105798	26547	0.0085
2011	3414894	29189	
2021	3792214	32414	
2031	4237756	36222	

Table 5.4 Population Projection

Year	Incremental increase	Ratio method	Average
1971	20888	20888	20888
1981	23064	23064	23064
1991	24667	24667	24667
2001	26547	26547	26547
2011	28285	29189	28737
2021	29876	32414	31145
2031	31318	36222	33770

In addition to this an increase of population due to migrations & floating is taken into account to arrive at the future population. The data in this regard for this town is not readily available. But from the local enquiry and in consultation with the officials, 20% of the population is found to be migrated people. Hence this component is added to the natural growth. 1% of total population is also added to the natural growth as floating population.

Table 5.5 Migrated workers in Perumbavoor Town

Category	Migrated
Plywood Industries	3000
Veneer Sandal	1500
Rice Mill	300
Plastic	30
Agricultural work	500
Total	5330

Source: Local Enquiry – Consultation with officials

The final projected population of the town shown below.

Table: 5.6 - Total Projected Population

	2011	2021	2031
Projected Population	28737	31145	33770
Migration	5747	6852	8105
Floating	287	311	338
Total Projected Population	34771	38308	42213

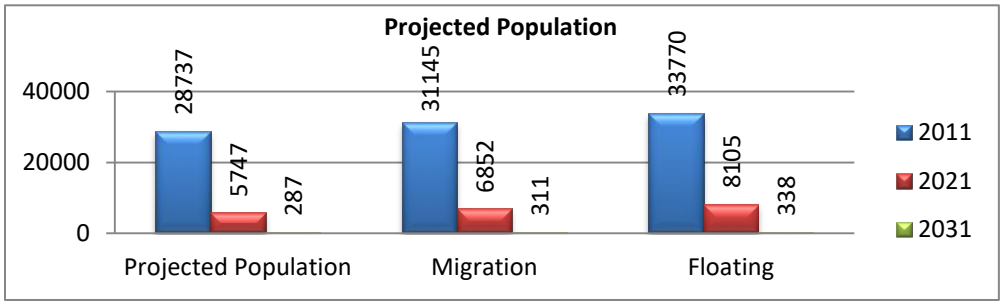


Figure 5.1 Projected Population

5.2 PROJECTION OF LABOUR FORCE IN 2031

5.2.1 WORK FORCE PARTICIPATION IN 2031

The projected population of Perumbavoor town including migration and floating population will be 42213 in 2031. Work participation rate of this town in 2001 was 33.11. For the purpose of computing the labour force in 2031, the work participation rate has been taken as 40.13. Accordingly the total number of workers is worked out as 16939 persons.

5.2.2 LABOUR FORCE IN PRIMARY SECTOR

According to 1981 census the total No. of cultivators and agricultural labourers are 947, which is 15.65% of labour force. In 2001 the total No. of cultivators and agricultural labourers are 464 which form 5.9% of total working force.

The decrease of that category during the above decade was 9.75%. A section of the people engaged in agricultural sector would have turned to some other jobs. The actual number of people in agriculture as part time or full time has now decreased. Mining and quarrying which also comes under primary sector was negligible.

The percentage of workers engaged in primary sector is expected to be 10.69% of the total labour force in 2031.

5.2.3 LABOUR FORCE IN SECONDARY SECTOR

The share of workers in the secondary sector was 25.71% of the total labour forces in 1991. Of this, 21.22% was in other than household sector.

The share of the workers in household industry was 1.63% of the total labour force in 2001. The scope for increase in this sector is also not much. There is a boom in construction sector now, which may last for less than a decade. We can expect considerable increase in the percentage of industrial workers during the plan period.

The share of workers in secondary sector is expected to be 28.10% in 2031.

5.2.4 LABOUR FORCE IN TERTIARY SECTOR

Perumbavoor town has good communication link with its hinterland and serve as a collection and distribution centre. The town will flourish in whole-sale commercial activities of consumer goods.

The share of workers in tertiary sector was 54.29 % of the total labour force in 1991. The percentage of the workers engaged in tertiary sector is expected to be 61.21% in 2031.

Table 5.7 Detailed distribution of Labour Force in Perumbavoor Town by 2031

Sl No	Sector / Subsector	% of Total labour force	No. of workers
1	**Primary sector**		
	a) Cultivators and agricultural labourers	7.51	1272
	b) Livestock, Forestry, Fishing , hunting, plantation, Orchards and allied activities	2.7	457
	c) Mining and quarrying	0.48	81
2	**Secondary sector**		
	a) Household industry	1.33	225
	b) Other than household	23.68	4012
	c) Construction	3.09	523
3	Tertiary sector		
	a) Trade & Commerce	25.25	4278
	b) Transport, Storage and Communication	11.54	1954
	c) Other services	24.42	4137
	Total		**16939**

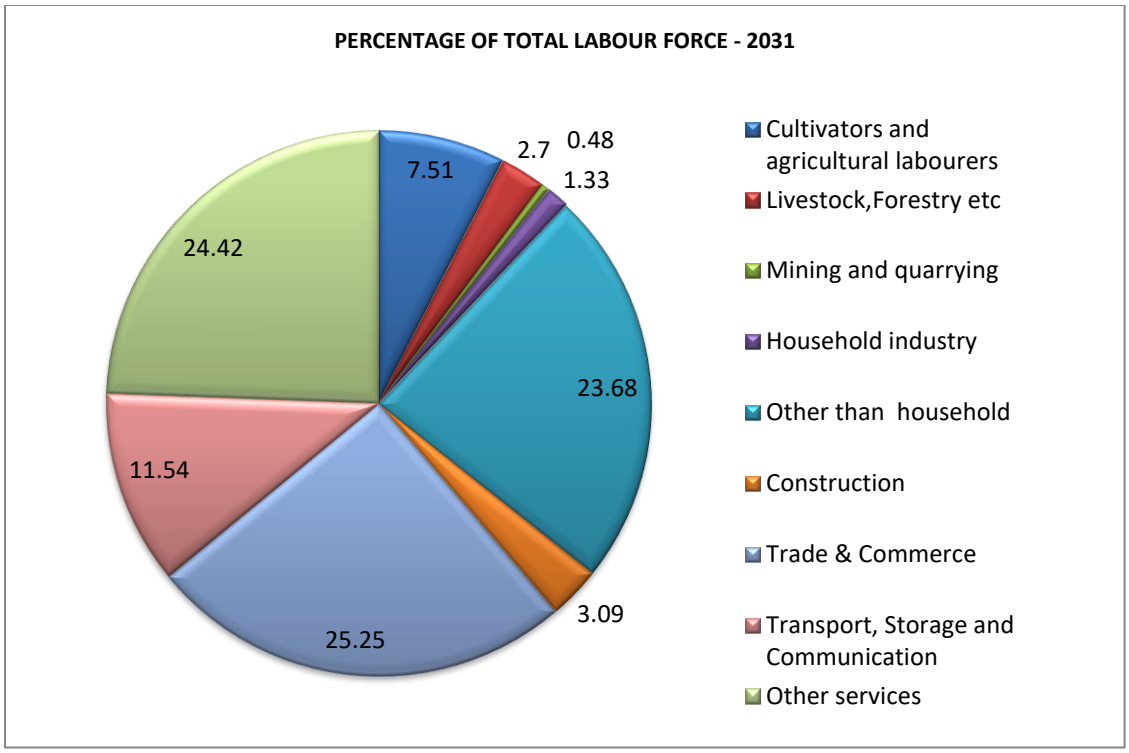


Figure 5.2 Percentage of Total Labour Force

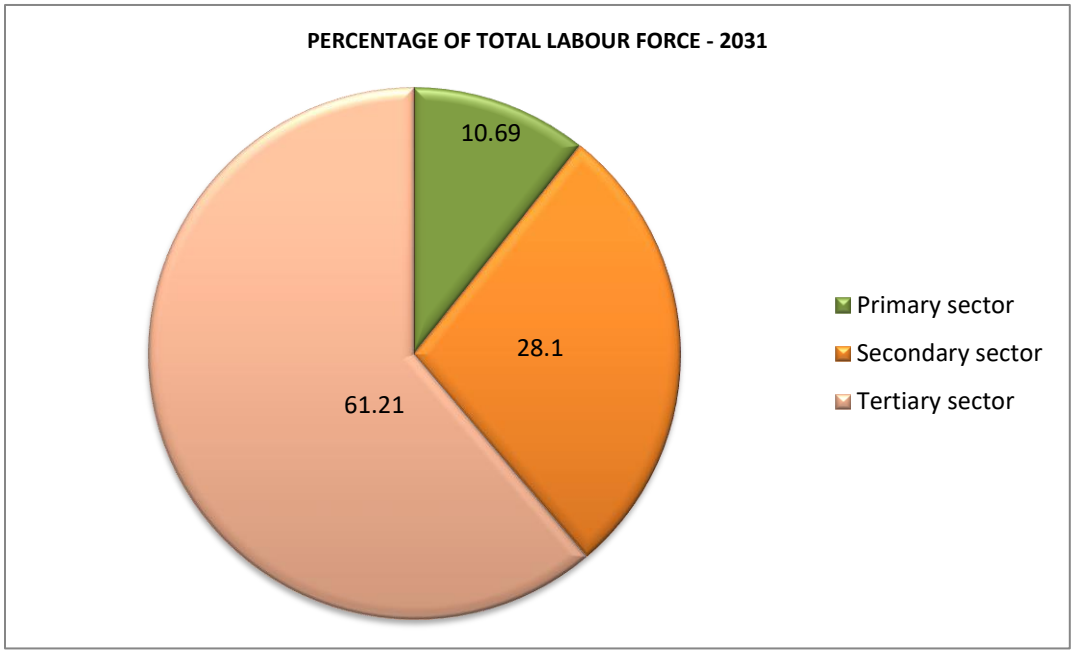


Figure 5.3 Percentage of Total Labour Force

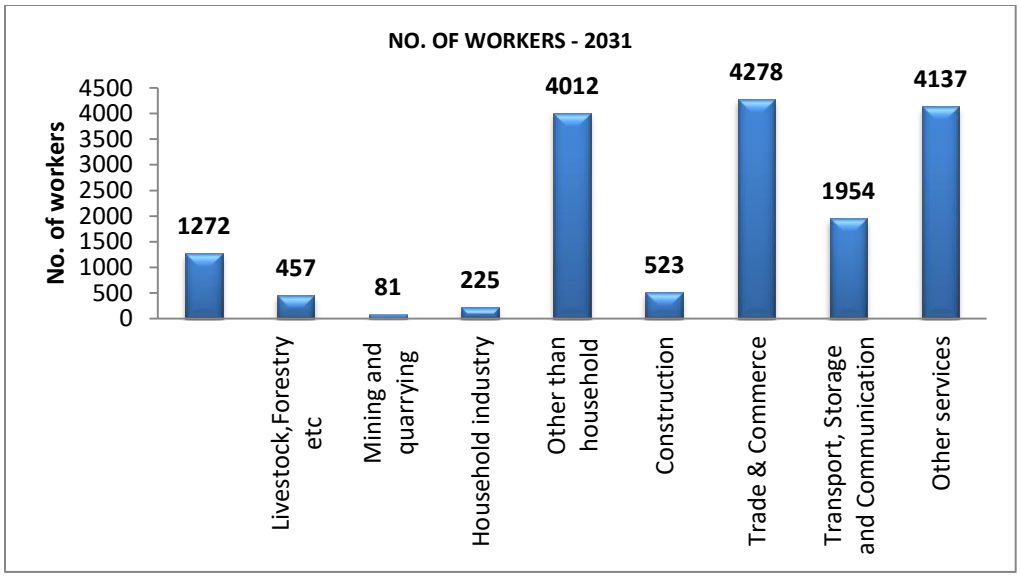


Figure 5.4 Number of workers

5.3 COMPUTATION OF AREA REQUIREMENT FOR VARIOUS USES BY 2031

5.3.1 INDUSTRIAL AREA REQUIREMENTS (MANUFACTURING INDUSTRIES)

According to land use analysis the total area under industrial use in Perumbavoor town is 57.06 hectares. As compared to other towns in Ernakulam, Perumbavoor has better potential for timber based industrial units. As per planning norms, 20% of the total workforce in a small and medium town could be assumed to be engaged in industries. Based on this the industrial work force in Perumbavoor by 2031 could be estimated to be 4123. Developed area in the town, as per land use analysis, is 1170.98 Ha. As per UDPFI Guidelines, for a small town, the proposed land under industrial use could come in the range of 8 to 10 % of developed land. Considering the industrial potential of Perumbavoor, the upper limit of 10 % is assumed in assessing the land required to be earmarked under preferred industrial use zone.

5.3.2 HOUSE HOLD INDUSTRIES

The household industry is an industry operated by the members of a house within their residential premises. No additional area is thus earmarked for the household industries.

5.3.3 COMMERCIAL USE

Perumbavoor Town has at present 1.94 % (22.76 hectare) of the total developed area under commercial use. The major commercial activity is concentrated along the two stretches of AM road and MC road especially at their intersection at Kalady Junction which forms the town centre. The planning norms recommend 2 to 3% of the total developed area of the town under commercial uses. Considering the regional importance of Perumbavoor as a service and commercial centre, the upper limit of 3% of the total developed area is proposed under commercial use. This use is satisfied through proposed Town centre and Sub centres.

5.3.4 AGRICULTURE USE

The policy of this plan is to retain the land under agricultural use to the maximum. Any change in this policy shall be subjected to the provisions in the Kerala Conservation of Paddy Land & Wet land Act, 2008.

5.3.5 PUBLIC AND SEMI PUBLIC USE

This land use includes the land under schools, hospitals, government and semi government offices, library, community hall, burial ground, religious institutions etc. At present the land under all these uses comes to 3.93 % (46.07 hectares) of the developed area. As per the planning norms 6 to 8% of the existing net area (development area) could come under public and semi public use.

5.3.6 TRANSPORTATION

The area under road net work and related facilities is about 7.7 % of the developed land area (90.17 hectares). It includes land occupied by KSRTC bus stand and municipal bus stand. The proposed Sabari Railway line also passes through the northern end of this town. As per the UDPFI guidelines, 10-12 % of the developed land area should come under transportation use.

5.3.7 PARKS, PLAY AREAS ETC.

It is estimated that the land under this category is 0.18% of the developed land area (2.06 Ha) which is grossly inadequate when compared with planning norms. As per planning norms 12-14% of the developed area should be given for recreational use. Bringing the share of

recreational use spaces to accepted standards requires concerted and great effort from the Municipality. In this Master Plan a more practical proposal of only 2 % of developed land under this use is suggested considering the fact that many of the wetlands, paddy lands and the sacred forests would fill up the gap.

5.3.8 RESIDENTIAL AREA

Residential area is computed by deducting the area of non-residential uses from the total. Thus an extent of 692.68 Ha is available for residential use in the town for a population of 42213 for the plan period of 2031. This gives an average density of 61 pph, which is lower than the planning norms suggested in the UDPFI guidelines for small towns. This suggests that there is no need to expand the boundaries of the Municipality for the horizon year 2031 and that there is ample scope for accommodating more population.

Table 5.8 Estimated land requirement for various uses in the Perumbavoor

Sl. No.	Landuse	Estimated Area in Ha	% of Total Area	% of Developed Land
1	Residential Use	692.68	50.97	59.46
2	Town Centre	88.19	6.49	7.57
3	Sub Centre I , II & III	19.94	1.47	1.71
4	Industrial Use	60.32	4.44	5.18
5	Public and Semipublic Use	29.15	2.14	2.5
6	Parks and Open Spaces Use	9.72	0.72	0.83
7	Transport and Communication Use	134.81	9.92	11.57
8	Heritage Zone	8.21	0.60	0.7
9	Dry Cultivation Use	121.85	8.97	10.46
10	Paddy / Wet Land to be retained	137.91	10.15	
11	Water bodies to be retained	56.22	4.13	
Total		**1359**	**100**	

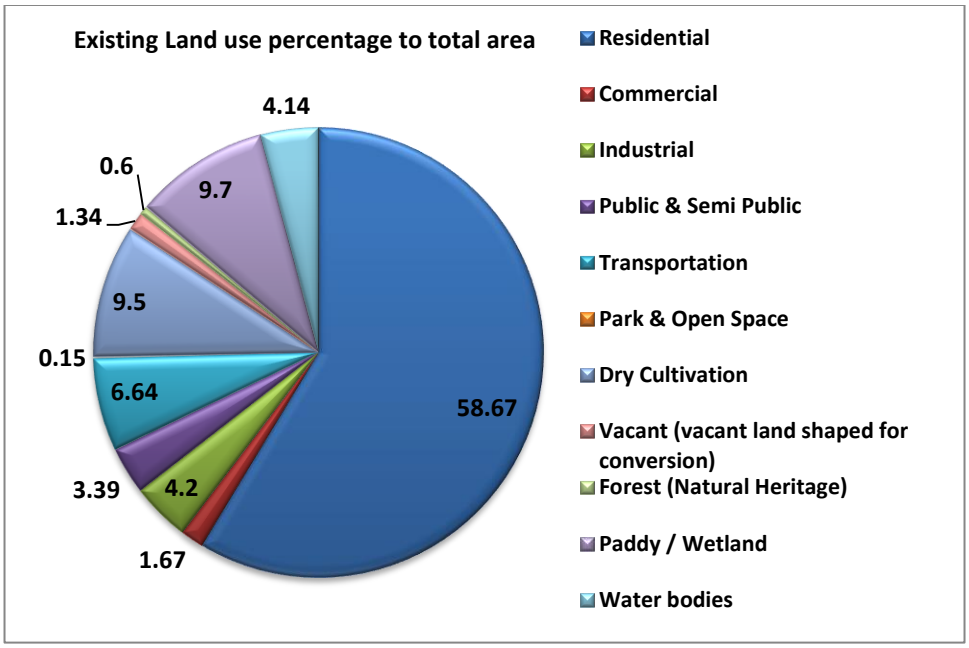


Figure 5.5 Percentage of Developed Land in Existing Landuse

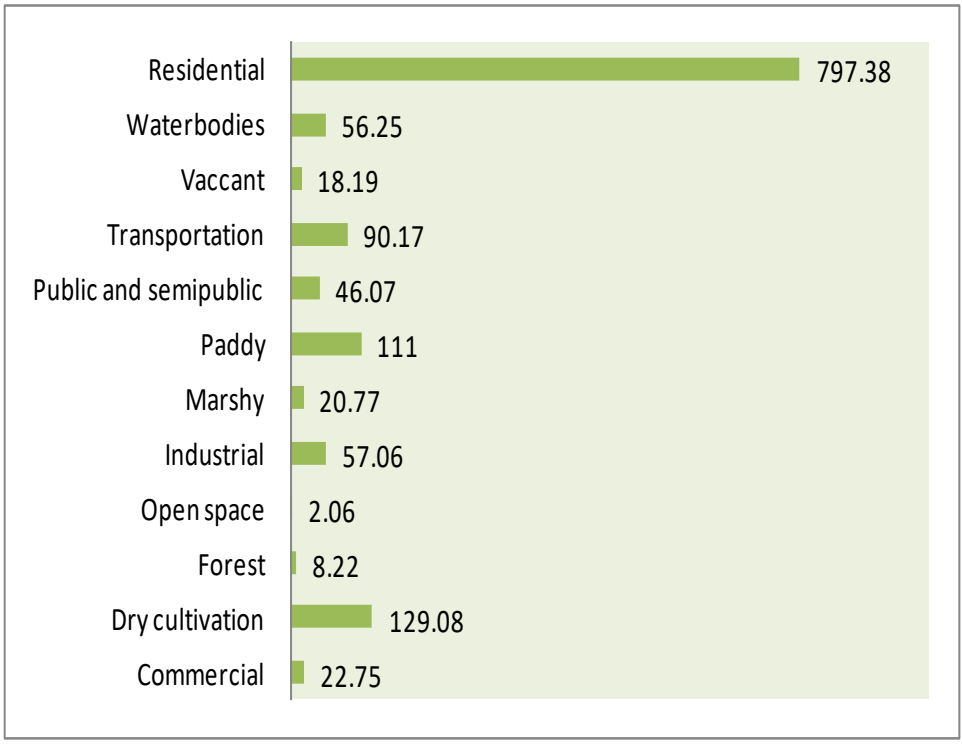


Figure 5.6 Existing Landuse Area in Hectare

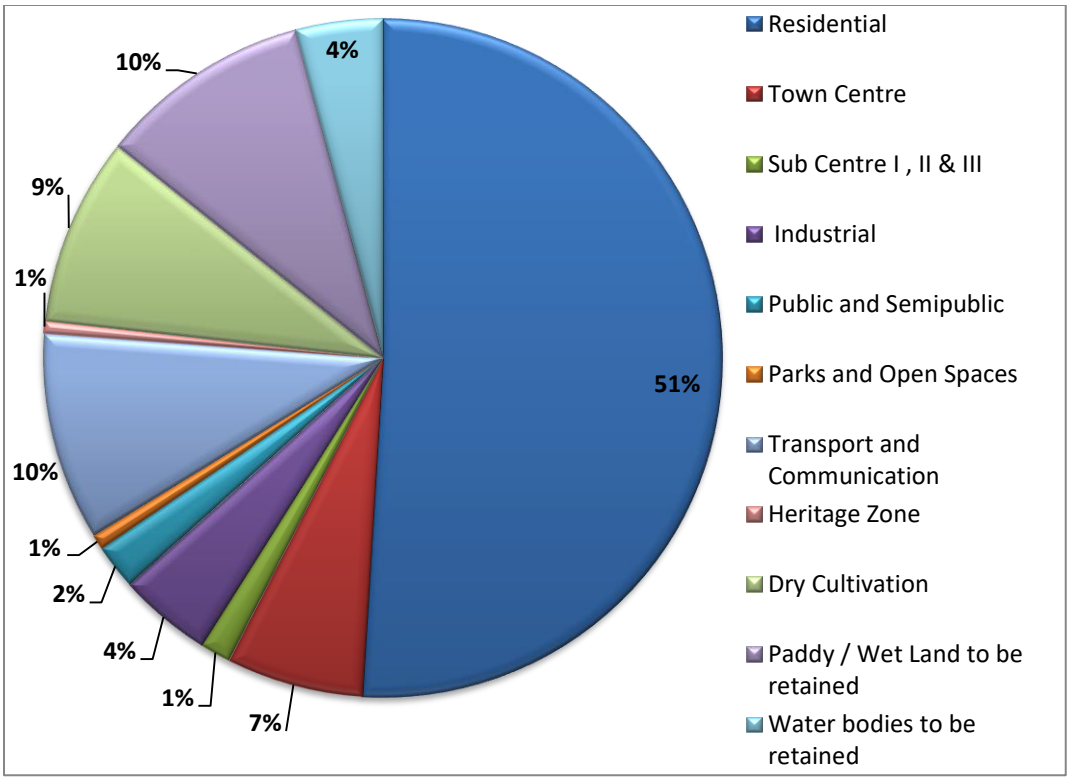


Figure 5.7 Estimated Landuse Percentage to Total Area

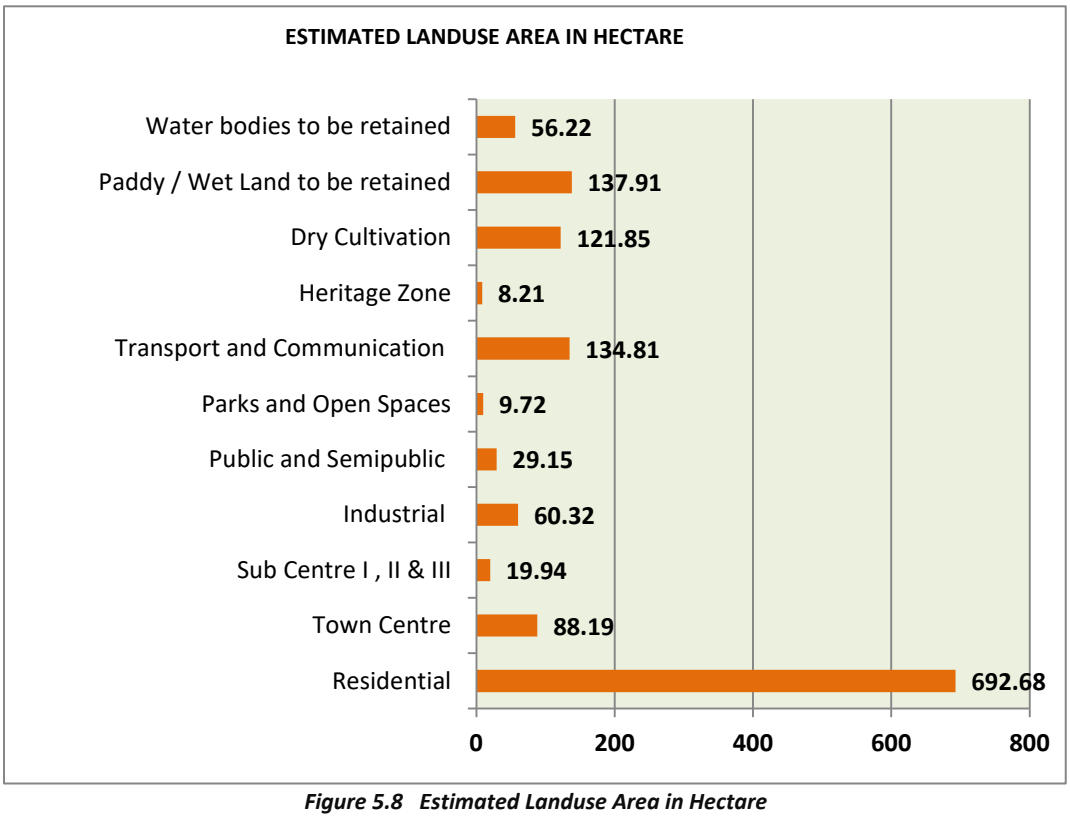


Figure 5.8 Estimated Landuse Area in Hectare

5.4 HOUSING NEEDS BY 2031

Estimation of Housing Needs

The existing housing backlog in Perumbavoor Town has been estimated as 644 units as discussed in Chapter 3 of this report. The present household size is 4.38. It is expected that by 2031 the household size will continue as 4.38.

The table below shows the computation of housing needs during the plan period.

Table 5.9 Housing needs in Plan period

	2001	2011	2021	2031
Population	26,547	34,772	38,308	42,213
Additional population in 2011	-	8225	-	-
Additional population in 2021	-	-	3536	-
Additional population in 2031	-	-	-	3905
Household size	4.38	4.38	4.38	4.38
Housing units to be added during the plan period	-	1878	807	892
Total housing units to be added = 644+1878+807+892 = 4221				

Thus by 2011, 1878 new houses to be constructed to accommodate the increase in population and by 2031, 892 more houses have to be constructed for the increase in population during the decade 2021 to 2031. Adding back log of 644 at present, additional households to be constructed in private and public sectors comes to 4221.

The current rate of construction of residential houses in Perumbavoor is very low. It comes to an average of 125 per annum. At this rate the total no. of houses that would be constructed in private sector from 2001 to 2031 would be 3750. Only 633 houses need the additionally constructed. Govt. may take urgent steps to extent necessary financial assistance for house construction. The financial assistance provided under the public housing scheme is inadequate to satisfy their requirement. Public housing scheme in present form therefore need some realistic change. LSG's can actively involved in housing construction. Housing projects for Economically Weaker Section can be incorporated in the development programme of LSGI's.

Encourage various stake holders to participate in the delivery of housing and infrastructure by providing further expansion of fiscal concessions and incentives as insisted in the Kerala housing and habitat policy 2007.

Promote and incentivize private sector and co-operatives in undertaking housing and infrastructure. Devise programme to meet housing shortage and augment supply of land housing particularly for vulnerable group.

Specific action plan would be prepared by municipality to meet the housing needs of landless including the migrant labours from other states. The action plan would be based on a habitat approach with participatory planning in design of public housing programme in consultation with end uses. This plan can be integrated with poverty alleviation scheme. The financial resources and managerial skills of LSGI'S will have to be substantially supplemented by State Plan schemes and implemented through Kerala State Housing Board and Kerala State Nirmithi Kendra and housing programme promoted should be cost effective and with environment friendly technologies. The concept of green buildings will be propagated.

5.5 ESTIMATION OF PROJECTED TRAFFIC VOLUME

The projected traffic volume and volume-capacity ratio on the proposed network for various horizon years is presented in Table 5.10.

Table: 5.10 – Projected peak hour traffic volume on proposed roads in Perumbavoor town

Sl. No.	Name of survey location	Length (m)	Proposed capacity *	2010 Existing		2015		2020		2025		2030	
				Volume**	V/c Ratio	Volume**	V/c Ratio	Volume**	V/c Ratio	Volume**	V/c Ratio	Volume**	V/c Ratio
	I. RING ROAD - A												
1	Gandhi Square on AM road to MO Jn	80	2,250	671	0.3	898	0.4	1,067	0.47	1,236	0.55	1,365	0.61
2	MO Jn to Oushadi Jn on MC road (Court road)	250	2,250	888	0.39	1,188	0.53	1,411	0.63	1,635	0.73	1,806	0.8
3	Oushadi Jn on MC road to Hospital Jn on AM road	845	2,250	1,416	0.63	1,894	0.84	2,250	1	2,608	1.16	2,880	1.28
4	Hospital Jn on AM road to KSRTC station] (Union Bank Road)	500	1,250	545	0.44	729	0.58	866	0.69	1,004	0.8	1,109	0.89
5	KSRTC station to MC road (Jacobite Church Road)	300	1,250	677	0.54	906	0.72	1,076	0.86	1,248	1	1,377	1.1
6	MC road to PP road (Cattle market Road)	475	1,250	651	0.52	912	0.73	1,083	0.87	1,255	1	1,386	1.11
7	Cattle market road to Gandhi Square (PP road) - Part of North south linkage No. 16	-											
	II. RING ROAD - B												
1	AM road to Parapuram Jn (Karothu Lane)	400	1,250	564	0.45	754	0.6	896	0.72	1,038	0.83	1,147	0.92

2	Parappuram Jn to Old Vallam road (Colony road)	900	1,250	584	0.47	782	0.63	929	0.74	1,077	0.86	1,189	0.95
2(a)	Old Vallam Road - Colony Road Junction to Thrikkaparambu Junction (part of EW4)												
3	Old Vallam road to MC road (Thrikkaparambu road)	275	750	335	0.45	449	0.6	533	0.71	618	0.82	682	0.91
3(a)	MC Road - Thrikkaparambu junction to Kanjirakkad Junction (part of NS6)												
4	Kanjirakkad Jn on MC road to Pooppanipalam on Pooppani road	1,150	750	307	0.41	447	0.6	531	0.71	616	0.82	680	0.91
4(a)	Pooppani Road - Pooppani Palam to Pooppanipara Junction (part of NS 7)												
5	Pooppani Para on Pooppani road to Alparakkavu Junction on AM road via Alppara Temple	1,175	750	437	0.58	638	0.85	758	1.01	878	1.17	970	1.29
6	Alparakkavu Junction to Marudu Jn (A M Road) – Part of East-west linkage No.6)	-											
7	Marudu Jn on AM road to Vattaikattupady on MC road- New alignment	1,530	2,800	995	0.36	1,628	0.58	1,933	0.69	2,241	0.8	2,475	0.88
8	Vattaikattupady Jn on MC road to Saddam Road Junction on AM road	2,240	2,800	1,333	0.48	1,946	0.7	2,312	0.83	2,680	0.96	2,959	1.06
9	Saddam Road junction to Millupady junction on AM Road (Part of EW1)												
	III. LINK ROADS - North-South												

NS-1	Mudikkal on AM road to Choondivallam on MC road via Travancore Rayons (Gandhi Nagar road & Rayon road)	2,725	1,750	729	0.42	1,064	0.61	1,263	0.72	1,465	0.84	1,617	0.92
NS-2	AM road to Kuzhipilli temple (Library road)	275	750	391	0.52	499	0.67	593	0.79	687	0.92	759	1.01
NS-3	Kuzhipilly temple to MC road (G K Pillai road)	375	750	379	0.51	484	0.65	575	0.77	666	0.89	736	0.98
NS-4	G K Pillai Rd junction on MC rd to Kanjirakkad (Temple west rd & CT rd)	900	750	125	0.17	191	0.25	227	0.3	263	0.35	290	0.39
NS-5	Govt Girls High School on AM road to TB Jn	150	750	498	0.66	636	0.85	756	1.01	876	1.17	967	1.29
NS-6	Kalady Jn to Choondivallam (MC road)	2,775	1,750	748	0.43	1,093	0.62	1,298	0.74	1,504	0.86	1,661	0.95
NS-7	Pooppani road	1,550	1,250	584	0.47	853	0.68	1,013	0.81	1,174	0.94	1,296	1.04
NS-8	BOC road Jn on AM road to Municipal Border (BOC road & Karattupallikkara Road)	1,900	750	129	0.17	370	0.49	440	0.59	510	0.68	563	0.75
NS-9	Onnam Mile Jn on AM road to Municipal Border (Konnamkudy road)	1,000	750	104	0.14	330	0.44	392	0.52	454	0.61	501	0.67
NS-10	Pattal Jn on AM road to Municipal Border (Quarry road)	800	750	107	0.14	335	0.45	398	0.53	462	0.62	510	0.68
NS-11	Iringol Jn to Municipal Border via Iringol temple (Iringol Kavu road)	1,350	250	162	0.65	196	0.79	233	0.93	271	1.08	299	1.19
NS-12	Pattal Jn on AM road to Pankulam road (Pattal-Pankulam road)	825	250	115	0.46	140	0.56	166	0.66	193	0.77	213	0.85
NS-13	AM road to KSRTC station (Thottunkal road)	550	1,750	609	0.35	916	0.52	1,088	0.62	1,261	0.72	1,392	0.8
NS-14	Pushpa Jn on AM road to Municipal border via KSRTC station (Old Moovattupuzha road)	1,400	1,750	605	0.35	809	0.46	961	0.55	1,114	0.64	1,230	0.7

NS-15	Kalady Jn to Vattakkattupady Junction (MC road)	1,150	1,750	818	0.47	1,194	0.68	1,418	0.81	1,643	0.94	1,814	1.04
NS-16	Gandhi Square on AM road to Municipal Border (pp Road)	600	1,750	1,145	0.65	1,301	0.74	1,545	0.88	1,792	1.02	1,978	1.13
	IV. LINK ROADS - East-west												
EW-1	Palakkattuthazham to Kalady Jn (AM road)	1,500	2,250	2,038	0.91	2,479	1.1	2,944	1.31	3,413	1.52	3,769	1.67
EW-2	Gandhi Nagar Jn to MO Jn via Parappuram, Kareri-Kollamkudy Road, T B Road	3,050	1,750	1,210	0.69	1,472	0.84	1,749	1	2,027	1.16	2,238	1.28
EW-3	Colony road to CT road (Chenganattu Road& Broadway)	900	750	188	0.25	252	0.34	299	0.4	346	0.46	382	0.51
EW-4	Kaduval Jn on MC road to Rayons road (Old Vallam road up to Choola Road junction & Choola Road)	500	750	341	0.45	457	0.61	542	0.72	629	0.84	694	0.93
EW-5	Alppara temple to Konnamkudy road	900	250	180	0.72	284	1.14	337	1.35	391	1.56	432	1.73
EW-6	Kalady Jn to Municipal Boundary (AM road)	3,000	1,750	777	0.44	1,134	0.65	1,347	0.77	1,561	0.89	1,724	0.98
EW-7	Iringol Kavu Temple to KSRTC Jn via Pankulam, Marudu Kavala, Vrindavan Road	1,900	750	404	0.54	492	0.66	584	0.78	677	0.9	747	1
EW-8	Old Moovattupuzha road to MC road (Marthoma Church Road)	300	750	322	0.43	392	0.52	465	0.62	539	0.72	596	0.79

Source: -Traffic projection by NATPAC, 2010

Note:

* Capacity - Peak hour capacity in PCU

** Volume - Peak hour volume in PCU

5.6 ESTIMATION OF FUTURE REQUIREMENTS OF FACILITIES AND AMENITIES

5.6.1 INFRASTRUCTURE FACILITIES

Education: - It is evident from chapter 3, that the strength of students in schools continues to be almost static. The existing schools are equipped with adequate space, to accommodate if there is any marginal increase in the student strength in future. In this circumstance, additional schools are not proposed during the plan period.

The only college functioning within the town is the Marthoma College for Women. At present facilities for higher education are available at the nearby towns of Kothamangalam, Muvattupuzha and Angamaly and Kalady Panchayath. A Sanskrit university is functioning in the nearby Kalady Panchayath. And also an Engineering colleges in the nearby Panchayath. From this it is evident that for higher level educational facilities the people are depending on nearby local bodies. As per the district urbanisation report and according to the proposals of Master Plan for Kochi city region Perumbavoor is to be developed to a self contained second order settlement. In order to facilitate this provision for higher level educational institutions are to be envisaged in this plan.

Medical Facilities: - Perumbavoor is the head quarters of Kunnathunadu Taluk. Hence the town has to cater to the medical needs of the population of hinterland as well. Assuming a reasonable standard of 6 beds per 1000 population, the requirement for of beds for the town's population will be 253 in 2031. According to survey conducted by the Town Planning Department, the total bed strength available both in the Government and private hospitals in Perumbavoor town amount to 573 Nos. which works out to a 16 beds per 1000 population which is much higher than the requirements. But since being a Taluk headquarters, the facilities in the town will have to cater to the communities in the surrounding hinterland. Even though there is no shortage of beds in the hospitals, what is not satisfactory is the super specialty facilities. The hospitals will have to be equipped with modern equipments and super specialists so that the problem of health care could be solved within the town itself.

Marketing Facilities: - The existing fish market along with the slaughter house is functioning very near to private bus stand. It is proposed to construct a modern slaughter house in that area.

Water Supply: - The water supply demand by 2031, assuming a demand of 200 LPCD is estimated to be 8.44 MLD per day. Considering 20% leakage losses at various levels the total demand by 2031 is estimated to be 10.13 MLD. Even though at present, notable deficiency in water supply is not felt here and additional quantity of 3.13 MLD is required by 2031.

Electricity: - The total electric power requirement of Perumbavoor town estimated for the year 2031 is shows below in table No. 5.11.

Table 5.11 Requirement of Electric Power for 2031

Sl No	Location	No. of persons served	Energy (KWH/day/Person)	Power requirement KWH/day
1	Town Centre	12233	1	12233
2	Industrial zone	4123	4	16492
3	Remaining area	25857	0.4	10343
Total		42213		39068

Location and capacity of transformer centres have to be decided based on the above projections.

Sewerage: - As per the socio-economic survey conducted by Town Planning Departments, out of a total number of 5060, 4102 houses have sanitary facilities leaving a deficiency of 958 units. Hence a network of sewers with treatments plant will involve very high per capita expenditure. During the plan period total number of houses that will be constructed is 4383 in private sector. All houses are to be insisted to have septic tank.



Drainage: - At present only major roads have side drains. As a measure against the flooding of roads after rains, it is proposed to provide all the roads with drains of adequate section and slopes. The flood water can be left off to the Pathipalam thodu.

Garbage Disposal: - Houses in large plots can dispose off the solid waste within the plot itself. Municipality has to identify certain areas to establish biogas plant where in waste from any areas can be collected and used to produce biogas which can in turn be used for useful purpose like lighting.

Burial Ground: - There are two burial grounds within the town, which are exclusively for two classes of people. In addition to these, the Municipality has acquired about 70 cents of land and

another burial ground has been established. This is in co-operation with Rayamangalam Panchayath.

Other Facilities: - As there is no facility for public meeting, a Municipal Town Hall is a necessity of Perumbavoor Town. 159 cents of land owned by Municipality, near municipal library is suggested for this purpose.

CHAPTER 6. VISION, DEVELOPMENT CONCEPTS & DEVELOPMENT STRATEGIES

6.1 DEVELOPMENT CONCEPTS

Perumbavoor Municipality is an important second order settlement in Kochi region. The second order settlements of the region are to be strengthened by promoting higher order facilities and service to enhance the job opportunities in that settlement and thereby reduce the influx of floating population.

Proximity to forest areas and land availability are potentials for forest based development. Optimum utilisations of these potentials to be ensured.

Different tourist centres are scattered around this town and the town area act as a corridor for tourism development. For the economic development of the town tourism potentials also explore.

Optimum utilisation of Mass transport corridor to ensure the economic relations with the higher order settlements in the region.

Enhance transportation and other infrastructure facilities and decentralise the activity to peripheral area.

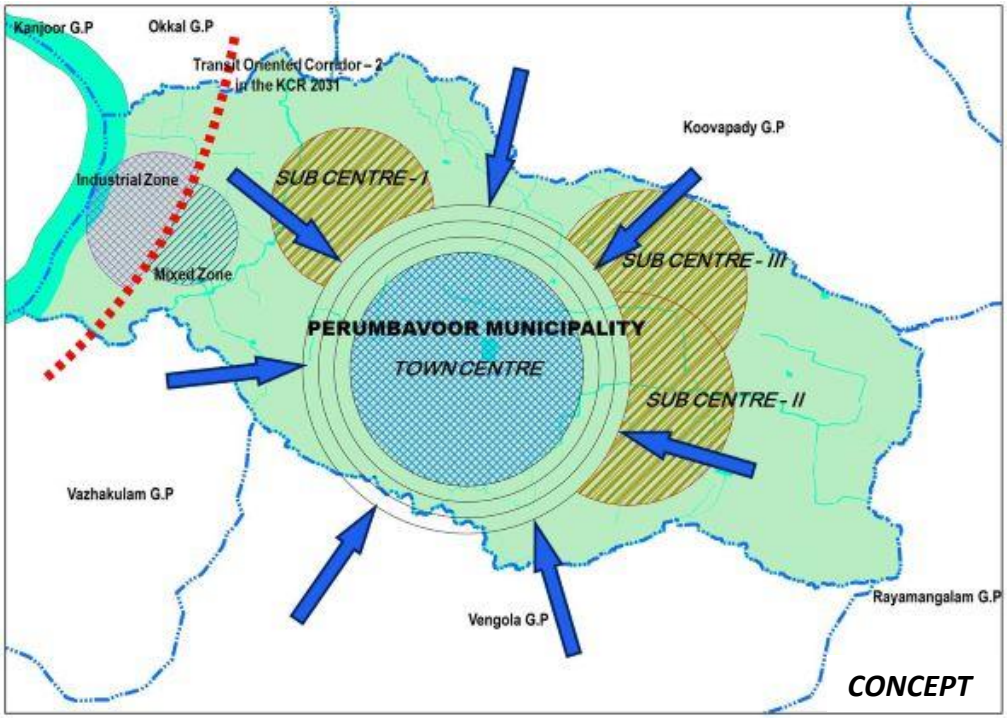
Activities of the informal sector shall be accommodated at specific designated areas within the town.

6.2 DEVELOPMENT STRATEGIES

The development concepts evolved for the town to be translated to proposals through specific strategies. These strategies are intended to be tools to detail out and translate the concepts into proposals. The development strategies to be adopted are detailed below.

1. Strengthening of second order settlement can be done by providing higher order rural facilities and middle order urban facilities.
2. Small scale industries and Medium type wooden industries may be developed in Perumbavoor due to proximity to forest and land availability.
3. For good industrial development and its growth high quality infrastructure facilities (Road, Electricity & Tele communication) may be developed.

4. In the case of Tourism Sector, develop Perumbavoor as a potential accommodation for tourist with entertainment facilities and made local facilities to tourist and also create awareness to the tourist.
5. The town shall have all facilities and amenities possess as per planning standards. The hierarchy of such facilities and amenities shall be well maintained in the Master Plan.



Source: Author generated

CHAPTER 7. DEVELOPMENT PROPOSALS

The development proposals in this chapter are to be read in conjunction with the proposed land use map of the Master Plan (Map No - 2). Proposals relating to infrastructure development are to be detailed out separately for implementation. It is expected that the proposals contained in this plan will be implemented in the plan period itself. Any projects taken up by the municipality under the plan funds should be framed within the framework of this Master Plan proposal.

7.1 LAND USE PROPOSALS

The Land use proposals in this plan are aimed at ensuring an orderly development of the town. Various uses are proposed to be restricted to locations best suitable for the same; and at the same time it is proposed that mixed use to a certain level be encouraged in all the use zones to provide flexibility for the Master Plan. The broad land use zones proposed in this plan are Residential use zone, Mixed use zone for Town Centre and Sub Centres, Dry Cultivation use zone, Industrial use zone M1 (Existing industries), Preferred Industrial use zone M2, Paddy and Wetland to be retained, Water Bodies, Public and Semi Public zone, Parks and Open Spaces, Transport and Communication and Heritage zone. Paddy lands and wet lands in the area are to be retained as such and these areas could be used to any other purpose subject to the provisions of Kerala Conservation of Paddy Land and Wet Land Act, 2008 only. The land use proposals will be enforced through the set of development control regulations provided separately in chapter 8.

7.1.1 RESIDENTIAL USE ZONE

Presently of land representing of developable land in the town are under residential use. The net population density of the town is 32pph which is not very high and indicates that more population could be accommodated within the existing areas under residential use. It is estimated that by the end of the planning period the town will have to accommodate a population of 42213, these many people if accommodated in the existing area under residential use will result in a population density of 55ppha which is within acceptable planning norms. However for the balanced development of the town other uses such as Parks and Open Spaces,

Commercial, Industrial, Public and Semi Public etc. are to be provided from the existing residential use zone and this would result in reducing area under residential land use from the present figures. Thus an extent 692.06Ha (50.92% of total land area) is earmarked under residential use in the Master Plan.

Though of land is earmarked under residential use, other uses are also permissible if they are incidental to the residential use or not incompatible to the residential use. More over all existing non-confirming uses except unauthorized industries are also permitted to continue subject to getting clearances under other relevant Acts as and when required. Thus a mixed use development is ensured within the predominant residential use zones.

7.1.2 MIXED USE ZONE FOR TOWN CENTRE AND SUB CENTRES

Area of the town at present is 13.59sq.km only and the population of the town as per 2001 Census is 26547 and the projected population for 2031 is 42213. As seen in the analysis part of the report, Perumbavoor caters not only the resident population of the town but a wider hinter land for higher order facilities and services. The study on Urbanisation conducted by the Department of Town and Country Planning in 2010 reveals that Perumbavoor caters the nearby panchayaths of Mudakuzha, Rayamangalam, Okkal, Kanjoor, Malayattoor –Neeleswaram, Koovappady, Vengoor, Kalady, Sreemoolanagaram, Vengola and Vazhakulam. In the draft Master Plan for Kochi City Region also, Perumbavoor is proposed to be developed as a major urban centre with higher order facilities catering to a large catchment area. Presently most of the commercial activities and higher order facilities in the town are concentrated in an area around the intersection of the two State Highways i.e. the Main Central (M.C) Road and the Aluva –Munnar (A.M) Road. This area functions as Town Centre for all practical purposes. For a population of the size of Perumbavoor this Town Centre should have been sufficient for a long period. However, considering the regional importance of the town and the dispersed low density residential population throughout the town area, this Master Plan envisages expansion of the Town Centre as well as three Sub Centres, Sub Centre I is near Rayons Hospital Junction on western side of the town, Sub Centre II is on the eastern part near Pattal Junction and Sub Centre III is near the proposed Sabari Railway Station. The expanded Town Centre is expected

to accommodate major higher order facilities including commercial, public and semi-public and recreational facilities.

7.1.2.1 TOWN CENTRE

High intensity mixed use is proposed for the Town Centre. Though presently congested with inadequate open spaces and circulation network, suitable spatial incentives could induce redevelopment of the area to accommodate higher order facilities. Consolidation of smaller holdings and reconstitution of plots may have to be promoted for the intended result. Development Control Regulations for this area are separately dealt in Chapter 8. Along with other uses, residential uses are also permissible in this area. Ensuring proper pedestrian facilities is important for the effective functioning of the Town Centre as an activity hub. 117.53 Ha of land (8.65 % of total land area) is earmarked as Town Centre.

7.1.2.2 SUB CENTRE I

The draft Master Plan for Kochi City Region emphasizes the need to promote growth of second order urban centres accommodating higher order facilities. Perumbavoor is one such centre. The Master Plan also proposes a new Development Corridor connecting Kodungallur, Angamaly, Perumbavoor, Kolencherry, Piravam, Thalayolaparambu and Cherthala. This Development Corridor passes through the western part of Perumbavoor town starting from Choondi Vallom junction and continuing to Rayon Road and then to Gandhi Nagar road up to the Southern part of Municipal boundary. This stretch already accommodates considerable non-residential activities, especially industrial and with the coming up of the proposed widening of the existing roads, this area offers good potential for high density residential as well as high intensity mixed use development. Exploiting this potential, a Sub Centre of the town is proposed near Rayons Hospital Junction. This Sub Centre also is expected to provide higher order facilities and services but at a lower level compared to the Town Centre till the Development Corridor is fully developed. Once the Corridor is fully developed, this Sub Centre could offer facilities and services par with the Town Centre. 10.52 Ha of land (0.77 % of total land area) is earmarked as Sub Centre I.

7.1.2.3 SUB CENTRE II

At present, there is a large unserved population in the eastern part of the town. Facilities are to be provided to cater to the needs of this unserved population. Considering the proximity to the proposed Sabari Railway Station, Moffusil Bus Stand and the tourist destination of Iringol Kavu,

another Sub Centre is proposed near Pattal Junction . This Sub Centre is proposed to accommodate services and facilities at a lower scale compared to the Town Centre. Mixed uses of commercial, public and semipublic, transportation and recreational spaces are proposed along with low density residential development in this area 14.71 Ha of land (1.08 % of total land area) is earmarked as Sub Centre II.

7.1.2.4 SUB CENTRE III

A railway station is proposed at north-east part of the municipality (for the proposed Sabari railway line). The area near to this proposed railway station is proposed on Sub Centre III. Once the railway station come into function, this area would offer services and facilities at a lower scale compared to the Town Centre. An area of 3.22Ha (0.24% of the total land area) is ear marked as Sub Centre III.

7.1.3 DRY CULTIVATION USE ZONE

An area of 162.56Ha (11.96% of total land area) is earmarked as dry cultivation use zone in this plan. To discourage conversion of this area to non-agricultural use, only low density residential development as described in the Development Control regulations will be permitted.

7.1.4 INDUSTRIAL USE ZONE M1 (EXISTING INDUSTRIES)

Major economic base of Perumbavoor is the Plywood industries functioning in the town. Due to unplanned growth of industries these industries become cause of major environmental issues in Perumbavoor. So no additional area is proposed for polluting industries. Only existing industries are ear marked as industrial use zone M1 (existing industries). An area of 26.79Ha(1.97% of total land area) is ear marked as Industrial Zone M1(existing industries).

7.1.5 INDUSTRIAL USE ZONE, M2 (PREFERRED INDUSTRIAL USE ZONE)

Travancore Rayons was one of the major industries located in Perumbavoor. Though defunct now, a number of industries especially household industries exist in this area. Considering the potential for industrial development in Perumbavoor, the area obtained by Travancore Rayons is earmarked as Preferred Industrial use Zone. Industrial use is not the only use permissible in this area. But with spatial incentives and favourable development regulations, it is expected that new non-obnoxious and non-nuissance type of industries including IT and ITES could be

attracted to this area. An area of of 23.55 Ha of land(1.73% of total land area) is earmarked as Preferred Industrial Use Zone.

7.1.6 PUBLIC AND SEMI-PUBLIC USE ZONE

No zone has been earmarked solely for Public and Semi Public uses in the Master Plan. However, Public and Semi Public Uses are permissible in Mixed Use zone for Town Centre and Sub Centres and Residential Use zone at different scales. All existing Public and Semi public uses are permitted to be continued subject to getting clearances under other relevant Acts as and when required.

7.1.7 PARKS AND OPEN SPACE USE ZONE

At present an area of 2.60Ha (0.19 % total land area) only is under parks and open spaces and that too mostly in the form of play fields of schools and Nagancheri Mana park . As per accepted planning norms this figure is grossly inadequate.

7.1.8 PARKS AND OPEN SPACE (PROP) USE ZONE

New recreational areas are proposed near Pooppani Para junction and Pattal Junction to solve the inadequacy of park and open space . The Municipality shall acquire and develop the parks and stadium as proposed above on priority basis. 4.08Ha and 1.83Ha of lands are earmarked at Pooppani Para junction and Pattal Junction resp. as proposed park and open spaces.

7.1.9 TRANSPORT AND COMMUNICATION USE ZONE

The Master Plan proposes widening of existing narrow roads, opening up of missing links by providing ring roads and number of North – South and East- West radial roads, Sabari railway line and railway station. An area of 78.35Ha (5.77% of total land area) is earmarked for transport and communication use, in this Plan. Though no land has been earmarked for providing pedestrian facilities, development of pedestrian facilities is proposed as a priority intervention from the part of the Municipality in this Plan.

7.1.10 HERITAGE ZONE (KAVU)

Iringol Kavu in the south-eastern part of the town is the only heritage precinct in the town proposed for conservation in this plan. It covers an area of 8.22Ha. Presently the facilities

available for visitors to this area are minimal. There is an urgent need to augment these facilities. Majority of the Kavu is under forest area and this area needs to be conserved as such through proper development regulations.

7.1.11 PADDY & WET LAND TO BE RETAINED

At present there are 124.55Ha of land under paddy land & wetland within the municipality. Conversion of these lands for urban use has been a feature of the town for the last few decades. This has paved the way for supply of developable land on one hand and on the other hand resulted in environmental degradation. Conservation or development of this land will have to be as provided under the Kerala Conservation of Paddy land and Wetland Act, 2008.

7.1.12 WATER BODIES

At present water bodies constitutes 56.25Ha of total land area within the town. Considering the ecological and environmental benefits of these, protecting existing water bodies are envisaged through this plan. Proposed land use map is shown in figure 7.1. Proposed land use break up is shown in table 7.1 and figure 7.2.

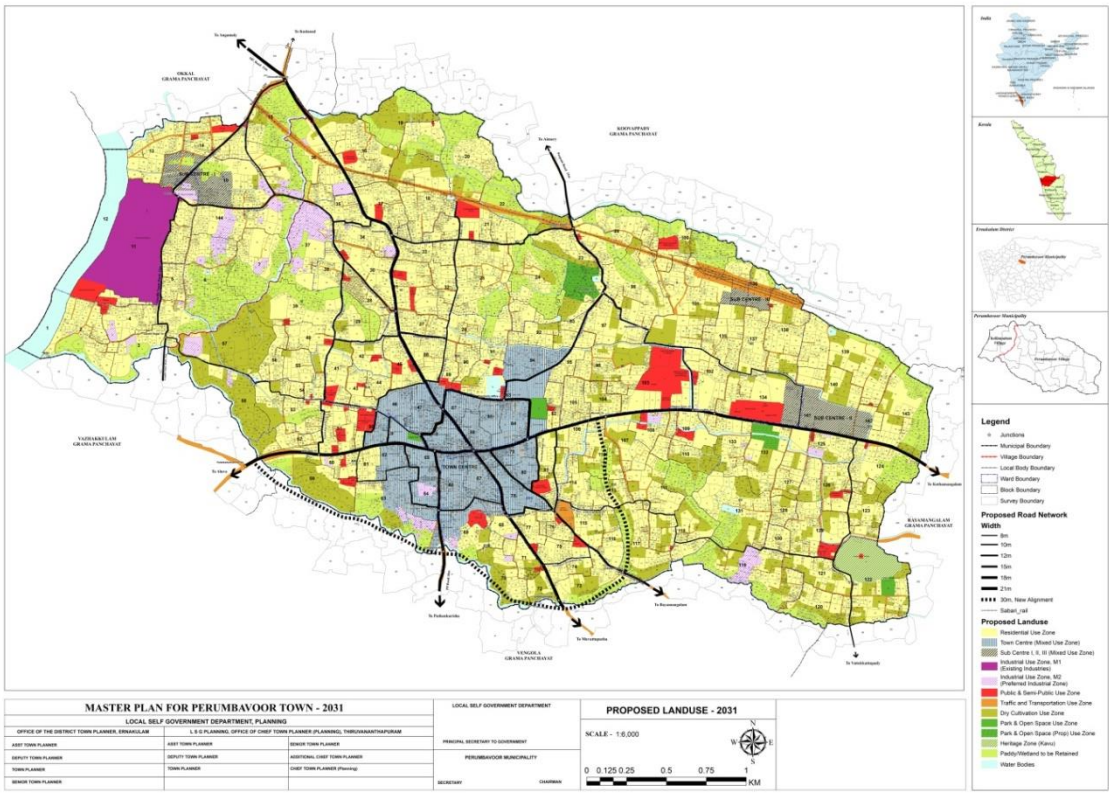


Figure 7.1 Proposed Landuse 2031 of Perumbavoor Town (Refer Map 2 for detailed view)

Table 7.1 Proposed land use break up of Perumbavoor

Proposed Land Use - 2031		
Land Use	**Area in Ha**	**Percentage**
Residential Use Zone	692.06	50.92
Sub Centre I, II, III (Mixed Use Zone)	28.45	2.09
Town Centre (Mixed Use Zone)	117.53	8.65
Dry Cultivation Use Zone	162.56	11.96
Industrial Use Zone, M1(Existing industries)	26.79	1.97
Industrial Use Zone, M2(Preferred industrial zone)	23.55	1.73
Public & Semi-Public Use Zone	32.18	2.37
Park & Open Space	2.60	0.19
Park & Open Space (Prop)	5.91	0.44
Traffic and Transportation Use Zone	78.35	5.77
Heritage Zone (Kavu)	8.22	0.61
Paddy/Wetland to be retained	124.55	9.16
Water Bodies	56.25	4.14
Total	**1359.00**	**100.00**

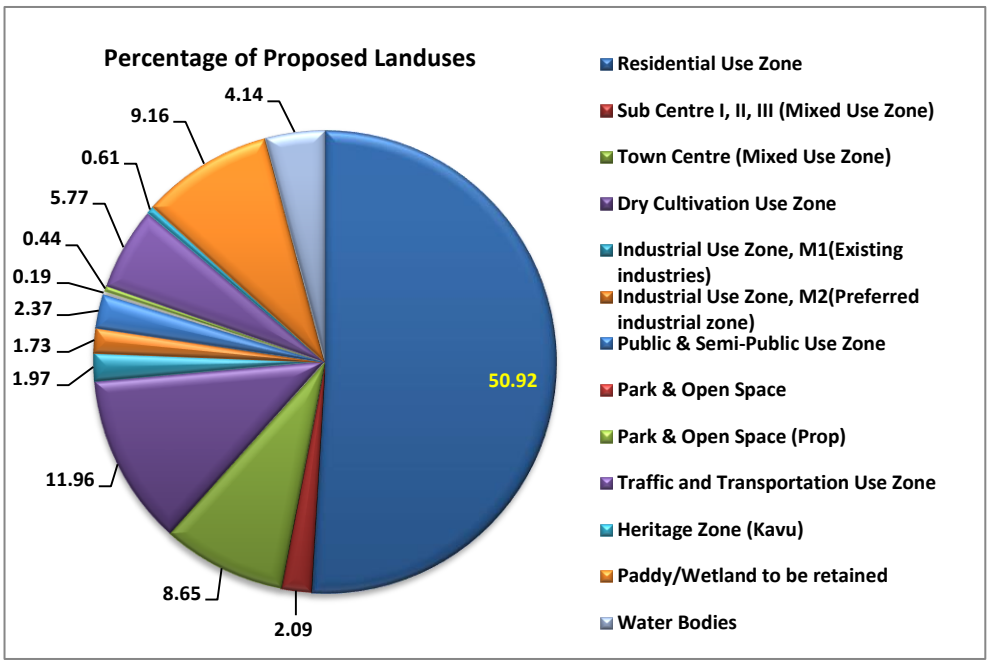


Figure 7.2 Proposed Land Use Break up of Perumbavoor

7.2 TRAFFIC AND TRANSPORTATION PROPOSALS

Considering the acute traffic problems at the Town Centre and the long-term perspective for development, a combination of grid-iron and 'ring-and-radial' pattern of road network is proposed for Perumbavoor town. It consists of two ring roads, and a number of

north-south and east-west radial roads. Major intersections located on the proposed road network are also identified.

Justification and proposed function of Inner Ring Road (A) and Outer Ring road (B)

As per the study of Urbanisation Report and as per Draft Master Plan for Kochi City Region, Perumbavoor is proposed to be developed as a major urban centre with higher order facilities catering to a large catchment area. Considering the regional importance of the town, this Master Plan envisages expansion of town centre and the expanded Town Centre is expected to accommodate major higher order facilities including Commercial, Public & Semipublic and Recreational. In this aspect the existing roads in the Town Centre have to be developed hence Inner Ring Road (A) proposes for the same.

Area other than the central part does not have a proper road network and the population density in this area also is low. The thrust of the plan was thus decongesting the central area by developing three Sub Centres by providing adequate infrastructural facilities. Outer Ring Road (B) proposes for providing good infrastructural facilities including connectivity to proposed Sabari Railway Station.

The Master Plan for Kochi region emphasizes the need to propose a new development corridor connecting Kodungallur, Angamaly, Perumbavoor, Kolenchery, Privaom, Thalayolaparambu and Cherthala. This development corridor passes through the western part of the Perrumbavoor Town starts from Choody Vallam junction and continue to Rayon road and then to Gandhinagar road upto southern part. The way-out and way in of the traffic corridor through the Ring Road (B) provides a solution to the traffic and transportation problems of the town in the plan period.

The details of the proposed road network with details such as its length and width are presented in Table 7.2. As per the decision of Municipal Council, on the recommendations of special committee based on the objection and suggestion received for the published draft Master Plan, the proposed transportation network has been modified including the changes given below. The width of NS -8, BOC road jn on AM road to Municipal Border (BOC road & Karattupallikkara road), NS - 9, Onnam mile jn on AM road to Municipal Border (Konnamkudy road), NS – 12, Pattal jn on AM road to Pankulam road (Pattal –Pankulam road) are retained as

such. To maintain the continuity in numbering, those roads are included in the road list shown in table 7.2. Name of EW-2, Gandhi nagar jn to MO jn via Parappuram, Kareri – Kollamkudy, T B road is changed to Gandhi nagar jn to MO jn via Parappuram, Karialy road, Parappuram - T B road and EW- 5, Alppara temple to Konnamkudy road changed as Marthoma College – Telephone Exchange road. EW- 9, the new road connecting Pooppani Palam jn to Kunnamkudy church road is omitted from the plan. EW – 10, changed as NS - 17 and renamed as connection road from PP road via existing bus stand to AM road and existing Sophia college road is proposed to widen to a width of 8 m as per the decision of Municipal Council and named as EW - 10.

The proposed road network for Perumbavoor town is illustrated in Figure 7.3. Salient features of the proposed road development proposals network are given below:

Table 7.2 Details of proposed road network

Sl. No.	Name of road	Existing ROW (m)	Proposed ROW (m)
	I. INNER RING ROAD (A)		
1	Gandhi Square Junction on AM road to MO Junction	12	21
2	MO Junction to Oushadi Junction on MC road	12	21
3	Oushadi Junction on MC road to Hospital Junction on AM road	12	18
4	Union Bank Road connecting Hospital Junction on AM road to OM road.	8	15
4a	OM road (Union bank road Junction at OM road to KSRTC Junction)	6	15
5	KSRTC Junction to MC road (Jacobite Church Road)	6	15
5a	Part of MC Road connecting Jacobite church road Junction to Penta Bye Pass road Junction on MC road - Part of North south linkage No. 15	8	21
6a	Penta Bye Pass road - part of road connecting MC road to PP road	8	10
6b	Cattle market Road- part of road connecting MC road to PP road	8	12
7	Cattle market road Junction to Gandhi Square (PP road) - Part of North south linkage No. 16	12	18
	II. OUTER RING ROAD (B)		
1	Millupady Junction on AM road to Parapuram Junction (Karothu Lane)	6	12
2	Parappuram Junction to Colony road Junction on Old Vallam road (Colony road)	5 to 8	12
2(a)	Old Vallam Road - Colony Road Junction to Meeting point of Thrikkaparambu road (part of EW4)	8	12

3	Thrikkaparambu road from Old Vallam road to MC road	6	12
3(a)	Part of MC Road connecting meeting point of Thrikkaparambu road to Kanjirakkad Junction (part of NS6)	18	21
4	Kanjirakkad LPS Road- Kanjirakkad Jn on MC road to Pooppanipalam Junction on Pooppani road	6 to 8	12
4(a)	Pooppani Road - Pooppani Palam junction to Pooppanipara Junction (part of NS 7)	8 to 10	15
5	Pooppani Para Junction on Pooppani road to Alparakkavu Junction on AM road via Alppara Kavu Road	8 to 12	10
6	Alparakkavu Junction to Marudu Jn (A M Road) – Part of East-west linkage No.6)	18	21
7	Western side of Marudu Jn on AM road to southern side of Vattaikattupady on MC road – New alignment	--	30
8	Southern side of Vattaikattupady Jn on MC road to between Palakkattuthazham junction and Eastern municipal boundary on AM road	--	30
9	From Eastern municipal boundary on AM Road to Millupady junction on AM Road (Part of EW1)	16 to 19	21
	III. LINK ROADS - North-South		
NS-1	Gandhi Nagar road & Rayon road to Choondivallam junction on MC road via Travancore Rayons	5 to 12	12
NS-2	Library road - from AM road to Kuzhipilli junction	7	12
NS-3	G K Pillai road- from Kuzhipilly junction to MC road	6	10
NS-4	Temple west road & CT road – from G K Pillai Road junction on MC road to Kanjirakkad and ends near Chakkarakkattukavu temple	6	10
NS-5	Govt Girls High School road –from AM road to TB Junction	6	12
NS-6	MC road- Kalady Jn to Choondivallam	18	21
NS-7	Pooppani road	8 to 10	15
NS-8	BOC road Jn on AM road to Municipal Border (BOC road & Karattupallikkara Road)	6 to 8	No widening
NS-9	Onnam Mile Junction on AM road to Municipal Border (Konnamkudy road)	6	No widening
NS-10	Quarry road - from Pattal Junction on AM road connecting to Marthoma College- Telephone Exchange road	8	8
NS-11	Iringol Kavu road – from Iringol Junction to Municipal Border via Iringol kavu	8	8
NS-12	Pattal Junction on AM road to Pankulam road (Pattal-Pankulam road)	6	No widening
NS-13	Thottunkal road- from AM road to KSRTC junction	8	12
NS-14	OM Road (Old Moovattupuzha road) – from Pushpa Junction on AM road to Municpal boundary via KSRTC station	8 to 12	15
NS-15	MC road- from Kalady Junction to southern Municipal boundary	18	21
NS-16	PP Road – from Gandhi Square junction on AM road to southern Municipal boundary.	12	18

NS-17	Connection road from PP road to AM road via existing private bus stand.	6	12
	IV. LINK ROADS - East-west		
EW-1	AM road – from western Municipal boundary to Kalady Junction	16 to 19	21
EW-2	Karialy Road and Parappuram - T B Road - from Gandhi Nagar Junction to MO Junction via Parappuram.	6	8
EW-3	Chenganattu Road and Broadway – from Colony road to CT road/ Temple west Road	6 to 10	12
EW-4	Old Vallam road upto Choola Road junction & Choola Road – from Kaduval Junction on MC road to Rayons road	5 to 7	10
EW-4a	Old Vallom road- from Choola road junction to Rayons junction	6	8
EW-5	Marthoma College – Telephone Exchange road	6	8
EW-6	AM road- from Kalady Junction to eastern Municipal Boundary	18	21
EW-7	Iringol Kavu – KSRTC Junction Road- from Iringol kavu to Thottungal Road (NS7) via Pankulam, Marudu Kavala, Vrindavan Road	8	8
EW-8	Marthoma Church Road- from OM road to MC road	6	8
EW-9	Road connecting Pooppani Palam Junction to Kunnamkudy Church road	New road	omitted
EW-10	Sophia College road	6	8

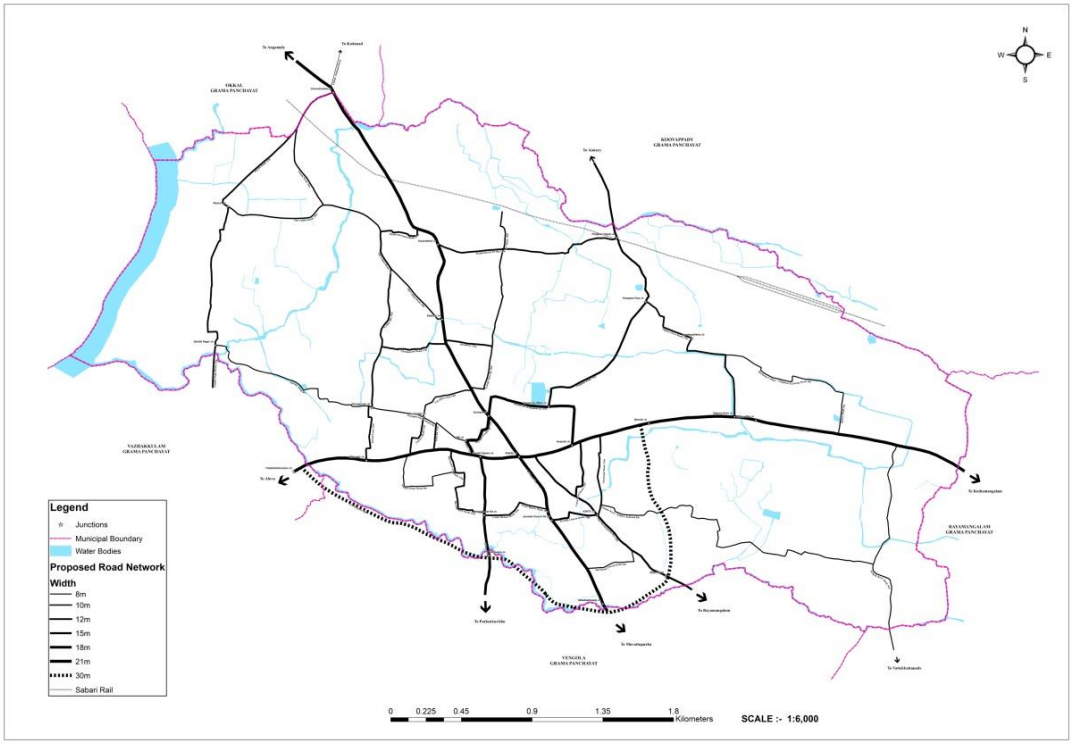


Figure 7.3 Proposed Road Network

Inner Ring road (A)

Inner Ring road (A) insulates Kalady Junction from the traffic convergence with the following alignment.

Gandhi Square – MO Junction – Oushadi Junction – Hospital Junction – Union Bank road – KSRTC Junction – Jacobite Church Road – MC Road- Penta Bypass Road-Cattle market road – PP road - Gandhi square. The modified width is as follows.

Ring road (A) has a length of about 2.42 km. The ROW of the ring road is proposed as 21m on the northern side of AM road between Gandhi Square jn and Oushadi jn on MC road and 18m between Oushadi jn on MC road and Hospital Junction on AM road. Continuing with 15m width for Union Bank road, part of OM Road and Jacobote Church road, the inner ring road reaches Jacobote Church road junction on MC road. A portion of MC road with ROW of 21m forms part of the Inner Ring road. Penta Bye Pass road and Cattle market road, the road between PP road and MC road is proposed to a width of 10m and 12m. A portion of PP road with ROW of 18m forms part of the Inner Ring road. All the segments of Ring road currently exist with inadequate ROW and needs to be widened to the specified width. As this ring road is utilized to its full capacity, it needs to be supplemented by another ring road.

Outer Ring road (B)

Outer Ring road (B) covers the entire town centre of the town and has the following alignment.

Millupadi Junction on AM road - Karothu Lane - Parappuram Junction - Colony road – Colony Road junction- Part of Old Vallom Road- Thrikkaparambu road – Part of MC Road- Kanjirakkad Junction- Kanjitrakkad LPS Road - Pooppani Palam Junction – part of Pooppani road - Pooppani Para Junction - via Alppara Kavu Road to Alparakkavu Junction (AM road) – New road alignment starts from western side of Marudu Junction in AM road - the southern side of Vettaikattupady Junction in MC road –passes through the southern peripheral areas of the town and reaches between Palakkattuthazham junction and Eastern municipal boundary on AM road - Part of AM road -Millupadi Junction on AM Road. The modified width is as follows.

Outer Ring road (B) will have a length of about 7.65km, which includes existing roads and a new road alignment connection as shown in the proposed road network map. The ring road is proposed to have a ROW of 12m on the north-west side of AM road between AM road and MC road, 12m and 15m on the north-east side, and 30m on the southern side of AM road. The portion of outer ring road on the southern side of AM road will be a new alignment from western side of Marudu Jn on AM road to sothern side of Vattaikattupady Jn on MC road, running mostly along the town boundary. Most of the existing roads under the above alignment do not have adequate ROW and need to be widened as specified in the report. Portions of AM road, MC road, and Pooppani road will form part of Outer Ring road (B).

North-South Linkages

North-South linkages are proposed for Perumbavoor town which link the ring roads and the two major roads passing through the central business area of the town. They together with the East-West linkages form grid-iron pattern of network. The south-north linkages modified and proposed for the town are as follows:

NS-1 Gandhi Nagar road & Rayon road to Choondivallam junction on MC road via Travancore Rayons

NS-2 Library road - from AM road to Kuzhipilli junction

NS-3 G K Pillai road- from Kuzhipilly junction to MC road

NS-4 Temple west road & CT road – from G K Pillai Road junction on MC road to Kanjirakkad and ends near Chakkarakkattukavu temple

NS-5 Govt Girls High School road –from AM road to TB Junction

NS-6 MC road- Kalady Jn to Choondivallam

NS-7 Pooppani road

NS-8 BOC road Jn on AM road to Municipal Border (BOC road & Karattupallikkara Road)

NS-9 Onnam Mile Junction on AM road to Municipal Border (Konnamkudy road)

NS-10 Quarry road - from Pattal Junction on AM road connecting to Marthoma College-Telephone Exchange road

NS-11 Iringol Kavu road – from Iringol Junction to Municipal Border via Iringol kavu

NS-12 Pattal Junction on AM road to Pankulam road (Pattal-Pankulam road)

NS-13 Thottunkal road- from AM road to KSRTC junction

NS-14 OM Road (Old Moovattupuzha road) – from Pushpa Junction on AM road to Municpal boundary via KSRTC station

NS-15 MC road- from Kalady Junction to southern Municipal boundary

NS-16 PP Road – from Gandhi Square junction on AM road to southern Municipal boundary.

NS-17 Connection road from PP road to AM road via existing private bus stand.

No widening is proposed for NS-8, NS-9 and NS-12. The total length of north-south linkages comes to around 14.27 km and the proposed ROW ranges between 8m to 21m.

East-West Linkages

East-west linkages are proposed for Perumbavoor town as detailed below:

EW-1 AM road – from western Municipal boundary to Kalady Junction

EW-2 Karialy Road and Parappuram - T B Road - from Gandhi Nagar Junction to MO Junction via Parappuram.

EW-3 Chenganattu Road and Broadway – from Colony road to CT road/ Temple west Road

EW-4 Old Vallam road upto Choola Road junction & Choola Road – from Kaduval Junction on MC road to Rayons road

EW-4a Old Vallom road- from Choola road junction to Rayons junction

EW-5 Marthoma College – Telephone Exchange road

EW-6 AM road- from Kalady Junction to eastern Municipal Boundary

EW-7 Iringol Kavu – KSRTC Junction Road- from Iringol kavu to Thottungal Road (NS7) via Pankulam, Marudu Kavala, Vrindavan Road

EW-8 Marthoma Church Road- from OM road to MC road

EW-9 Road connecting Pooppani Palam Junction to Kunnamkudy Church road

EW-10 Sophia College road

The EW-9 new road connection is omitted from the linkage as per the decisions of the Municipal council. Total length of the east-west linkages comes to 13.18km with the ROW ranging between 8 and 21 m.

7.2.1 SUMMARY OF ROAD DEVELOPMENT SCHEMES

As per the road network plan proposed for Perumbavoor town, a total of 37.51 kms of roads are proposed for widening or new construction. Of these, 12.12kms of roads will be widened to 21/30m ROW. 18 m ROW is proposed for 1.51kms of roads and 15 m ROW for 3.57 kms. Roads with the status of distributor or collector road with a ROW of 12 m and 10 m are proposed for a length of 8.99km and 3.37km resp. All other roads should be treated as local roads with a minimum ROW of 8m.

7.2.2 INTERSECTIONS IDENTIFIED FOR DEVELOPMENT

Major intersections located on the proposed network need to be properly designed so as to facilitate smooth flow of traffic on all directions. Land required for the development of the intersections should be identified and earmarked in this regard. The details of intersections identified are given below;

Aluva-Munnar road

1. Palakattuthazham from where proposed bypass for Perumbavoor town deviates
2. Millupady Junction
3. Kalady Junction
4. Hospital Junction
5. Onnam Mile Junction
6. Marudu Junction from where proposed bypass for Perumbavoor town deviates

Main Central road

7. Choondiavallam Junction
8. Kanjirakkad Junction where Outer Ring Road (B) intersects
9. Oushadi Junction
10. Jacobite Church road Junction
11. Vattaikattupady Junction where bypass for Perumbavoor town intersects MC road

Perumbavoor-Pattimattam road

12. Cattle Market Road Junction
13. Pathipalam Junction where bypass for Perumbavoor town intersects MC road

Old Moovattupuzha road

14. KSRTC Junction
15. Bypass Junction where for Perumbavoor town intersects Pooppani road
16. Electricity Office Junction from where Pooppani road originates
17. Poppani Para Junction
18. Poppani Palam Junction

Others

19. MO Junction
20. Gandhi Nagar Junction on NS-1
21. Parappuram on Outer Ring road (B)
22. Kuzhipilly Junctionon NS-2
23. Karattupallikara Junction on Ring Road (B)

7.3 LAND USE PROPOSALS WITH RESPECT TO MASTER PLAN OF KOCHI CITY REGION

As part of the study of Master Plan for Kochi city region 2031, the towns of Angamaly, Perumbavoor, Paravur, Aluva, Kodungalloor, Moovattupuzha and Kothamangalam shall be strengthened as major second order urban centres. These centres are expected to accommodate major facilities viz. Centres of Excellence, Super Specialty hospitals, non-polluting Industries, Major Employment Centres, Tourist attractions and uses ancillary to these uses apart from other facilities expected of a second order centre. Growth of other major centres in the district shall also be given impetus for the balanced development of region.

As part of opening up new areas for development of region, a new development corridor shall be promoted. As per the Kochi city region Master Plan the corridor connects centres like Kodungallur, Angamaly, Perumbavoor, Kolenchery, Piravom, Thalayolaparambu and Cherthala and shall be developed as a transit oriented development corridor to accommodate major developments. Intense development shall be permitted around the transit centres along this corridor. Hence apart from the roads proposed by the NATPAC, a transit oriented corridor 45m width is proposed for rayons road and Gandhi nagar road and shall be developed in such a way that MRTS could be introduced in this corridor at a later stage.

7.4 INFRASTRUCTURE FACILITIES

7.4.1 EDUCATIONAL FACILITIES

It has been concluded that during the plan period the additional student population could be accommodated in the existing schools. The only college functioning within the town is the Marthoma College for Women. At present facilities for higher education are available at the nearby towns of Kothamangalam, Muvattupuzha and Angamaly and Kalady Panchayath. A Sanskrit university is functioning in the nearby Kalady Panchayath. And also there are few Engineering colleges functioning in the nearby Panchayaths.. From this, it is evident that for higher level educational facilities the people are depending on nearby local bodies. As per the district urbanisation report and according to the proposals of Master Plan for Kochi City Region, Perumbavoor is to be developed to as a self-contained second order settlement. In order to facilitate this provision, higher level educational institutions are to be envisaged in this plan. Upgradation of existing schools and provision of facilities and additions of kindergarten sections are the requirements to be undertaken. Kindergartens could be located within residential areas and therefore no separate locations are proposed.

7.4.2 MEDICAL FACILITIES

Medical facilities are seen to be sufficient during the plan period. Hence no additional area is earmarked for this purpose. But improvement of the facilities and extension of specialty services are essential. So the hospitals will have to be equipped with modern equipment and super specialists so that the problem of health care could be solved within the town itself.

7.4.3 MARKETING FACILITIES

It is proposed to construct a modern slaughter house near the existing one after shifting the existing fish market in that area to the southern area. The existing vegetable market is also proposed to be shifted to the southern end of the Sub Centre type I. It is also proposed to develop a cattle market near the new fish market. The new vegetable market situated along the side AM road is not fully functioned and it will be sufficient for the future period.

7.4.4 WATER SUPPLY

The demand for protected water supply by 2031 at the rate of 200 LPCD is 10.13 MLD, whereas the present system of public water supply has a capacity of 7 MLD. A proposal for 10 MLD plant at Kanjirakkad is suggested by Kerala Water Authority to meet the future demand.

7.4.5 ELECTRICITY

Requirement of electric power for an urban population will increase with the growth of economy and hence this involves careful analysis of the ultimate requirements in respect of various such as domestic, commercial industrial etc. The total requirement of power for this town during the plan period is tentatively estimated at 39068kwh/day. The Kerala State Electricity Board will have to take note of this future demand while drawing out their future plans.

7.4.6 SEWAGE DISPOSAL

It is assumed that in future also septic tank methods of waste disposal continue.

7.4.7 DRAINAGE

Due to the presence of Periyar River and large open canals along the boundaries and due to existing topographical condition no flood symptoms are experienced here and drainage of drain water is generally good here. In the central area or the proposed sub centre- I, scientifically planned drainage system for disposal of storm water is to be provided. Primary treatment plant has to be placed and location has to be identified by the municipality. It is proposed to improve the existing network of channels to handle the problem of storm water drainage. The undulating terrain and intermittent paddy fields of the town are a relief from the point of storm water drainage.

7.4.8 GARBAGE DISPOSAL

Effective method to overcome the problem now facing is the decentralization of Solid Waste Management. Municipality has to identify certain areas to establish biogas plant, where in the waste from many areas can be collected and used to produce biogas which can in turn be used for useful purposes of lighting. The same idea can be implemented in a smaller scale keeping

local families in mind. The implementation can be made easier by providing financial help through subsidies to these families. This idea will be effective especially when the cost of cooking gas is skyrocketing.

7.4.9 BURIAL AND CREMATION GROUND

The existing two burial grounds in the town and the one established by the Municipality (70 cents) in the Rayamangalam Panchayath will serve the purpose. Proposed land use plan is appended.

CHAPTER 8. DEVELOPMENT CONTROL REGULATIONS (DCR)

1. The implementation and enforcement of the Master Plan shall be in conformity with the development control regulations prescribed hereunder. These regulations shall guide decisions on the granting or rejecting of applications for land development and buildings.

2. All future constructions and developments within the plan area shall also conform to the Kerala Municipal Building Rules in force, if not otherwise specified in these regulations, regulations and control if any enforced by the Cochin International Airport Authority, Kerala conservation of Paddy and Wet land Act 2008 or any other legislation applicable to the planning area.

In this Master Plan, the following use zones are identified for the implementation and enforcement of the proposals

I. Residential use zone
II. Sub centre I, II & III (Mixed use zone)
III. Town Centre (Mixed use zone)
IV. Dry cultivation use zone
V. Industrial use zone, M1 (Existing Industries)
VI. Industrial use zone, M2 (Preferred Industrial zone)
VII. Public and semi public use zone
VIII. Parks and open spaces use zone
IX. Parks and open spaces (Prop) use zone
X. Traffic and Transportation use zone
XI. Heritage zone
XII. Paddy and Wet land to be retained
XIII. Water bodies

Details regarding the nature of uses “permitted”, uses “restricted” and uses “prohibited” in each zone are given in the accompanying sheets. These regulations shall be enforced in conjunction with other specific provisions if any mentioned elsewhere in the plan and in accordance with the other statues applicable.

Uses "permitted" in a zone cover the uses that can be normally accommodated in the relevant zone. Such uses may be permitted by the Secretary, Perumbavoor Municipality, hereinafter referred to as the Secretary.

In some cases it may be possible to permit some other uses also, which are not likely to affect the quality and environment in a zone specified for a particular use. Such cases have to be individually studied based on their performance characteristics and special locational factors. Such cases which come under this category are classified as "Uses Restricted". Uses Restricted-1 category deals with the uses that shall be restricted by the Secretary, with the concurrence of the District Town Planner. Uses Restricted-2 category deals with the uses that shall be restricted by the Secretary with the concurrence of the Chief Town Planner of the Department of Town and Country Planning, Kerala.

"Uses Prohibited" enlists the various objectionable uses in each zone which shall not be permitted under normal circumstances.

3. If any part/portion of a zone is put to a "Uses Prohibited" as stated in para 2, before the sanctioning of the Master Plan, such use shall be termed as non-conforming use. A non-conforming use except unauthorized industrial use may be allowed to continue in its existing location and essential repairs and maintenance for the structure may be permitted by the Secretary, provided that the said use create no adverse environmental influence in the zone. Addition, alternation or reconstruction, if found necessary as part of any mitigation measures may be permitted for such uses by the Secretary with the concurrence of the Chief Town Planner concerned.

4. Existing areas and structures of archeological importance, agriculture uses and religious uses shall be permitted to continue in all the zones and shall not constitute non-conforming uses.

5. Regulation of constructions and / or land development on the sides of new roads / roads proposed for widening as per the plan shall be governed by the distance from the centre line of the road, unless otherwise specified in the plan or in any detailed road alignment approved by the Chief Town Planner concerned.

6. Constructions and / or land developments, if any, in paddy lands and in wet lands, shall be in conformity with the Paddy land and Wet land Act in force in the state.

7. The Government shall have the power to issue clarifications in respect of technical interpretations, if any, required in any of the provisions of the plan in consultation with the Chief Town Planner concerned.

8. Any use not specified either in the "uses permitted" or "uses restricted" category of a particular use zone, but which is of a similar nature to any use permitted or restricted in that particular use zone, can be considered by the Secretary, with the concurrence of the Chief Town Planner concerned.

Para No.	Uses Permitted	Uses Restricted-1	Uses Restricted-2	Uses Prohibited
8	**RESIDENTIAL USE ZONE**			
8.1	Residential buildings consisting of single or multifamily dwellings, residential flats /apartments, residential quarters, night shelters, orphanages, old age homes, dharmasala, associated parks and play grounds	Asram, Mutt, Madrasa, Place of worship		Any other uses not specified
	Shops, professional offices, commercial offices, banks & other financial institutions, restaurants, canteen, hotels – floor area up to 200 Sq.m.	Solid waste management facilities		
	Cottage Industries, Service Industries of non-nuisance nature (See Annexe-I), with number of workers limited to 6 without power or 3 workers with power limited to 5 HP	Cremation ground/ Crematorium , burial ground / Common vault		
	Educational institutions essentially serving the needs of residential community such as Day care, creche, nursery schools, kindergartens and schools offering general education (up to high school level) not exceeding 500 sqm.	Vehicle fuel retailing station.		
	Health institutions essentially serving the needs of the residential community such as dispensaries, clinics, Diagnostic Centres, nursing homes etc. and having floor area upto 200 Sq.m.			
	Community facilities such as community halls, recreational clubs, Social welfare centres, gymnasium/yoga centers, swimming			

	pool, libraries, reading rooms etc. – Floor area upto 200 Sq.m.			
	Public utility areas and Public Utility buildings, Utility installations and civic amenities essentially serving the needs of residential community such as post office, police station, telephone exchange, electric substation, fire station, totlots parks play grounds, water treatment plants below 5 MLD			
	Plant nurseries, Storage of Agricultural produces and seeds, pump house, wells and irrigation ponds incidental to community needs			
	Transmission / Telecommunication towers / Wireless stations			
8.2	**Provided that the access road has a width of 5m minimum**.			
	Shops/professional offices, banking and financial institutions – floor area limited to 500 sq m., Automobile workshops for two/three wheelers - floor area upto 200 sqm			
8.3	**Provided that the access road has a width of 8 m minimum.**			
	i. Hospitals with 5 beds	LPG distribution centers, excluding bottling plants and bulk storage limiting the floor area to 50 sqm.		
	ii. Convention Centres/ Auditorium/ Wedding Halls/ Community halls/Exhibition Centers and Art Gallery - floor area upto 1000 Sq.m	Educational institutions of Higher order such as colleges/ universities/ general education institutions/ research and development institutions		
	iii. Educational institutions upto Higher secondary schools.			
9	**SUBCENTRES I, II & III (MIXED USE ZONE)**			
9.1	Zoning Regulations of Residential use zone shall be applicable. In addition following uses shall be permitted.			
9.2	All shops including shopping complexes, shopping malls, hypermarkets restaurants, hotels, markets.	Dairy & Dairy Farm, Poultry Farm, Smoke House.	Multiplex	Any uses not specified
	Professional offices, commercial offices & establishments, banking and financial institutions, IT software units, IT Hardware/electronic industries	Fuel filling stations		
	Godowns / warehouse / storage of	Saw Mills with / without		

	Non-hazardous materials, stacking yards	Timber Yards		
	Auditorium , Movie halls, Wedding Halls, Community Halls floor area limited to 500sqm	Auditorium, Movie Halls, Wedding Halls, Community Halls floor area limited to 1000sqm		
	Gymnasium/ Yoga centres, Day care, Creche, Nursery / Kintergarten, schools up to higher secondary level,expansion of existing educational institutions	Slaughter Houses.		
	Cottage industries, automobile workshops, automobile service stations, cold storage, service industries of non-nuisance nature with number of workers limited to 19 without power or 9 workers with power limited to 30HP(See Annexe-II), saw mills, weigh bridges, printing press, IT hardware / electronic industries, marble and granite storage / cutting centres.			
	Government (Local / State / Central) or Public Sector Offices, Other public utility areas & Public utility buildings.			
	Social welfare centres, library and reading rooms, exhibition centres, art gallery, museum, convention centres, swimming pools.			
	Places of worship			
9.3	**Provided that the access road has a width of 5m minimum**			
	Fair grounds, open air theatres, Indoor games stadium			
	Parking plaza, Transport terminals			
9.4	**Provided that the access road has a width of 8m minimum**			
	Clinics, diagnostic centres and hospitals with number of beds limited to 50			
	Uses prescribed here under for Sub Centre I could be changed to those under Town Centre once the proposed 45m Transit Orient Development (TOD) Corridor is fully developed.			
10	**TOWN CENTRE (MIXED USE ZONE)**			
10.1	Zoning Regulations of Sub Centres (Mixed use zone) shall be applicable. In addition following uses shall be permitted.			
10.2	Secondary/ Higher Secondary Schools, Junior Technical Institutions			Any other uses not specified
10.3	**Provided that the access road has a width of 8m minimum**			
	Educational Institutions of Higher order such as colleges/universities/general			

	education institutions/ specialised/ professional education institutions/ research and development institutions. Hospitals with no. of beds more than 50			
	Weigh Bridge			
	Automobile workshops/ Automobile Service stations - Heavy Vehicles			
	Movie Halls/ Auditorium/ Wedding Halls/ Community Halls - floor area upto 1000 sqm			
10.4	**Provided that the access road has a width of 12m minimum**			
	Movie Halls/ Auditorium/ WeddingHalls/ Community Halls - floor area above 1000 Sq.m .		Bus terminal/lorry stand	
10.4	**Provided that the access road has a width of 18m minimum**			
			Container Terminal	
11	**DRY CULTIVATION USE ZONE**			
11.1	Agriculture, horticulture and fodder cultivation, pastures, grazing ground, and other types of cultivation including social forestry	Places of worship		Any other uses not specified
	Transmission/Telecommunication towers and wireless station.	Piggery farm, smoke house		
	Dairy farms, fish farms, seed farms, poultry farms, plant nursery, pump house, pools, wells and irrigation ponds and buildings incidental to above use	Public utility areas and buildings like water supply and electrical installations, sewage treatment plant etc.		
	Indvidual Residential building floor area upto 500 Sq. m.	Saw mills with / without timber yard		
	Orphanages, old age homes, dharmasala , ashram/mutt, madrassa with floor area upto 1000 sqm	Cremation ground / crematorium, burial ground, common vault		
	Clinics (Outpatient) and diagnostic centres- floor area upto 200 Sq.m.	slaughter house		
	Shops, professional offices, commercial offices/establishments, banking and financial institutions, Gymnasiums/ Yoga Centres, restaurants/ canteens – floor area upto 200 sq.m	Fuel filling stations		
	Police Post/Police Station, Post and Telegraph office, Fire Post/ Fire station, Telephone Exchange	Gas Godowns, Dumping yard		
	Educational institutions essentially serving the needs of residential community such as Day care, creche,			

	nursery schools, kindergartens and schools offering general education (up to high school level) not exceeding 200 sqm.			
	Library and Reading Rooms			
	Storage , processing and sale of farming products and seeds, Stacking yards, Godowns/ warehouses/ Storage – non hazardous – floor area upto 200 Sq.m.			
	Cottage industries, Service industries of non-nuisance Nature (See Annex-I) engaging not more than 6 workers without power or 3 workers with power limited to 5HP			
	Automobile workshops for 2/3 wheelers			
	Tot lots/Parks/Play Grounds			
	service and repairing of farm machineries and sale of agricultural supplies			
	Botanical garden, zoological parks, bird sanctuary			
11.2	**Provided that the access road has a width of 5m minimum**			
	Residential flats / Apartments , Residential quarters, Residential building- floor area greater than 500 sqm	Stacking yards, Godowns/ Warehouses/Storage -non hazardous materials upto 500 sqm.		
	Educational institutions upto Higher secondary schools having total floor area upto 1000sqm.	Dumping yard		
11.3	**Provided that the access road has a width of 8m minimum**			
	Auditorium/Wedding Halls/Community halls floor area upto 500 Sq.m.	Higher educational institutions		
	Hospitals & Health Centers - with area upto 500 sqm	Health care facilities including diagnostic centres, clinics, hospital		
	Educational institutions up to Higher secondary schools.	Storage of explosive and fire works		
	Markets			
12	**INDUSTRIAL USE ZONE M1(EXISTING INDUSTRIES)**			
12.1	All industries which are earmarked as existing industries in the master plan shall be considered as existing industries and here modernization of equipment and existing facilities can be allowed without changing the	Ashram, Mutt, Madrasa, Place of worship		Any other uses not specified

	capacity and floor area.			
	Information Technology buildings and Information Technology Parks:- Information Technology buildings refers to building occupied by industries and other business establishments, whose functional activities are in the field of Information Technology, Information Technology Enabled Services (IT/ITES) and Communication Technology. Information Technology buildings in the Information Technology Parks would be constructed for the purpose of carrying out the activities set out in the definition given above for information technology building and the remaining buildings in the information technology park are meant to play a complementary role, supporting the activities in the information technology buildings. In the Information Technology Parks, 70% of the land area is to be set aside for the construction of Information Technology buildings and the remaining land area could be utilized for all the supporting activities. The buildings for the supporting activities could include residential buildings, recreational facilities, educational facilities, convention centers, hospitals, hotels and other social infrastructure meant to support the activities in the information technology buildings and Information Technology Parks.	Convention centres, hospitals, hotels and other social infrastructure facilities subject to a total floor area of 300 sqm		
	Transport Terminals incidental to industrial use	Fuel Filling Stations		
	Residential uses incidental to the industrial use.			
	Storage and sale of goods incidental to the manufacturing activity			
	Individual Residential buildings up to 500 sqm floor area and associated			

	parks , play grounds other recreational facilities.			
	Public utility installations Religious buildings up to 100 sqm floor area			
	Shops, Professional Offices, Commercial Offices, Banks & other financial institutions, restaurants, canteen, hotels - floor area up to 200 sqm			
	Transmission / Telecommunication towers / Wireless stations			
	Government or Public sector offices			
	Libraries and reading rooms			
	Educational institutions essentially serving the needs of residential community such as Day care, crèche, nursery schools, kindergartens and schools offering general education (up to Lower Primary School level) not exceeding 200 sqm			
	Plant nurseries, Storage of Agricultural produces and seeds, pump house, wells and irrigation ponds incidental to community needs			
12.2	**Provided that the access road has a width of 5 m minimum.**			
	Automobile workshops for 2/3 wheelers			
		Shops, Professional Offices, Commercial Offices, Banks & other financial institutions, restaurants, canteen, hotels - floor area up to 500 sqm		
12.3	**Provided that the access road has a width of 8 m minimum.**			
		LPG distribution centers, excluding bottling plants and bulk storage limiting the floor area to 50 sqm.		
13	**INDUSTRIAL USE ZONE M2 (PREFERRED INDUSTRIAL AREA)**			
13.1	Cottage industries, service industries of non-nuisance nature (See Annex -II), weigh bridge, automobile workshops & automobile service stations, spray painting workshops, saw mills with/without dumping yards, ice factory, cold storage, printing press, water treatment plants, marble and granite storage / cutting centers.	Other Public Utility Areas and Public Buildings		

	industrial estates & industrial parks of non-obnoxious and non-nuisance type industries	Cremation Ground / Crematorium, Burial Ground, Common Vault.		
	Information Technology buildings and Information Technology Parks:- Information Technology buildings refers to building occupied by industries and other business establishments, whose functional activities are in the field of Information Technology, Information Technology Enabled Services (IT/ITES) and Communication Technology. Information Technology buildings in the Information Technology Parks would be constructed for the purpose of carrying out the activities set out in the definition given above for information technology building and the remaining buildings in the information technology park are meant to play a complementary role, supporting the activities in the information technology buildings. In the Information Technology Parks, 70% of the land area is to be set aside for the construction of Information Technology buildings and the remaining land area could be utilized for all the supporting activities. The buildings for the supporting activities could include residential buildings, recreational facilities, educational facilities, convention centers, hospitals, hotels and other social infrastructure meant to support the activities in the information technology buildings and Information Technology Parks.	LPG distribution centers excluding bottling plants and bulk storage go down.		
	Godowns /Warehouses/Storage of non-hazardous material, stacking yards, weigh bridge.	Storage of Explosives and Fire Works, Gas Godowns, Crusher Unit		
	Storage and sale of goods/ commercial and business offices incidental to the manufacturing activity	Sewage Treatment Plants, Dumping Yard.		

	Plant nurseries, Storage of Agricultural produces and seeds, pump house, wells and irrigation ponds incidental to community needs	Slaughter House		
	Dairy and Dairy Farms, Dairy related Industries, Poultry Farms, Piggery Farm, Smoke House.	Following uses subject to compatibility to surrounding developments: **a.** Retail shopping, commercial buildings, banks and professional offices not exceeding a total floor area of 300 sq.m, **b.** Individual residential building not excee ding a total floor area of 500sqm. **c.** Educational facilities, convention centres, hospitals, hotels and other social infrastructure subject to a total built-up area of 300 sq.m.		
	Markets			
	Dry Cleaning Plants, Power Plants, Sub Stations			
	Government or Public Sector Offices			
	Transmission & Telecommunication Towers, Wireless Stations.			
	Parking plazas, other parking areas (incidental to industrial use)			
	Residential Uses incidental to the industrial Use. Any other activity essentially incidental to industrial use.			
	Libraries and reading rooms			
	Educational institutions essentially serving the needs of residential community such as Day care, creche, nursery schools, kindergartens and schools offering general education (up to Lower Primary School level) not exceeding 200 sqm			
	Tot lots, Parks and Play Grounds attached to incidental residential use.			
13.2	**Provided with an access width of 12 m minimum**			
		Transport Terminals		
13.3	**Provided with an access width of 18 m minimum**			
		Container Terminals		

14	**PUBLIC AND SEMI PUBLIC USE ZONE**			
	Local/State/Central-Government/Public-Sector Offices and Other Related Public Buildings	Cremation Ground, Crematorium, Burial Ground, Common Vault.		Any other use not specified
	Residential Quarters incidental to public and semi-public use, Ashram, mutts	Parking plazas/ parking areas		
	Public Utility Areas and Buildings.			
	Transmission/ Telecommunication towers / Wireless stations			
	Additions and alterations to the existing public and semi-public buildings including addition of new blocks without altering the use.			
	Buildings for incidental uses with floor area limited to 500 sqm			
	Note: Existing areas under public and semipublic use only are zoned as Public and Semi Public Use Zone. Future expansion of the existing public and semipublic uses may be permitted in adjacent plots under the same ownership even if it comes under other use zones.			
15	**PARKS AND OPEN SPACES USE ZONE**			
	Any construction/land development essential for the development/ improvement of open air recreational facilities not exceeding 5% of the total area.	Gymnasium , Aquarium, social and cultural establishments covering up to 10% of the area, restaurant with plinth area up to 100 sqm which will not affect the character of the area		Any other use not specified
	Snack bars, stalls and booths incidental to above use and catering to the public not exceeding a total floor area of 50 sqm.			
16	**PARKS AND OPEN SPACES (Prop) USE ZONE**			
	Any construction/land development essential for the development/ improvement of open air recreational facilities not exceeding 5% of the total area.	Gymnasium , Aquarium, social and cultural establishments covering up to 10% of the area, restaurant with plinth area up to 100 sqm which will not affect the character of the area		Any other use not specified
	Snack bars, stalls and booths incidental to above use and catering to the public not exceeding a total floor area of 50 sqm.			
17	**TRAFFIC AND TRANSPORTATION USE ZONE**			
	Transport terminals including	fuel filling stations		Any other

	constructions that form an integral or essential part of the terminal. ATMs, Comfort stations , Weigh bridge Shops incidental to main use not exceeding 50 sqm.			use not specified
	Automobile service stations , garage incidental to main use			
	Residential use and night shelters not exceeding 25 sqm			
18	**HERITAGE ZONE**			
	Iringol kavu shall be conserved as such as a heritage site. Any development or redevelopment in this area shall be with the concurrence of the art and heritage commission of Govt of Kerala. However any work required to be carried out for the structural safety of temple or ancillary building or any ancillary use to support the main use shall be permitted subject to the condition that total floor area shall not be increased by 10% of the present total floor area.	Any facility to facilitate the tourist/pilgrims to the site such as transportation, refreshment facilities, shops incidental to the main use.		Any other use not specified
19	**PADDY AND WETLAND TO BE RETAINED**			
	Construction or land development in conformity with the conservation of Paddy Land and Wetland act in force in lands designated as paddy land or wet land under the said act.			
20	**WATERBODIES TO BE RETAINED**			
	All existing water bodies shall be conserved. Bridges, side protection walls, bathing ghats, jetty, floating jetty and facilities related to river tourism may be permitted.			Any other use not specified

GENERAL GUIDELINES

1. Zoning regulations of the Master Plan will prevail over the provisions in Kerala Municipality Building Rules in Force.

2. The provisions of Kerala Conservation of Paddy Land Wet Land Act 2008 and Coastal Regulation Zone notifications will prevail over all the provisions in the Master Plan.

3. Subject to the zoning regulation of the respective zones, more than one uses may be combined in a building, provided that the total floor area on all floors of such a building shall not exceed the maximum floor area permitted for any of such use in that zone. Also the floor area of the individual uses shall be limited to that prescribed by the zoning regulation for the zone.

4. Irrespective of zoning regulations, Public utility areas and buildings can be implemented anywhere in the planning area except at Heritage Zone.

5. Future expansion of the existing public and semipublic uses may be permitted in adjacent plots under the same ownership even if it comes under other use zones subjects to restrictions imposed under other acts and rules.

6. For the purpose of these regulations, floor area means the total floor area of the building in all floors.

7. In the dry cultivation zone the specified zoning regulation shall be controlled with respect to the plot size as given below:

For plots upto 25 cents the permission can be given by Municipal Council. Above 25 cents and upto 0.50 hectares concurrence from Senior Town Planner, Ernakulam and above 0.50 hectares concurrence from Chief Town Planner is needed and permission shall be subject to the provision of prevailing rules and regulations.

8. Regulations of Town Centre (Mixed use zone) shall also be applicable in land to a depth of 100m on either sides of roads having an existing or proposed width of 12m & above and in land to a depth of 50m on either sides of roads having existing or proposed width of 10m & above in Residential use zone, Subcentres I, II & III (Mixed use zone) and Dry agriculture use zone.

9. For availing mixed use benefit based on the road width, if a plot lying beyond the specified distance from the road, if 50% or more of the extent of the plot falls within the specified mixed use zone, the benefit of mixed use will apply to the entire plot.

10. Silence Zone, as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000 under the Environment (Protection) Act, 1986 and its subsequent amendments, shall be applicable to the area under this Master Plan.

GENERAL GUIDELINES FOR LARGE SCALE PROJECTS

Large Scale development proposals in an area not less than 2 hectares, exceeding an investment of Rs.50 crores, which provide direct employment (after commissioning of the project) to the tune of not less than 500 may be permitted in all zones other than Heritage and Park & Open space, subject to the recommendation of a committee to be constituted by the Government for this purpose, under the Chairmanship of the Secretary, Local Self Government Department, consisting of Chief Town Planner of Kerala State Town and Country Planning Department and Secretary , Perumbavoor Municipality as members and the Senior Town Planner, Regional Town Planning Office, Ernakulam being the convener and satisfying following conditions:-

1. The developer shall produce project cum feasibility report and environmental impact assessment report, if required, of the project to the convener of the committee, 15 days in advance of the committee meeting.
2. The developer shall produce before the committee, all required clearances from the State and Central Government agencies concerned.
3. Adequate provision shall be made for supporting infrastructure such as water supply, Sewerage, Solid Waste Management etc. Separate sewage treatment plant and solid waste management measures shall be provided and maintained by the developer at his /her cost.
4. Adequate Memorandum of understanding between the developer and Secretary of Local body concerned shall be undertaken to bring this into effect.
5. Maximum Floor Area Ratio shall be 2 and minimum access width 12 meter.
6. The project shall be completed within a period of 3 years if not specified otherwise.

CHAPTER 9. PHASING OF DEVELOPMENT

9.1 PHASING

Master Plan is prepared for a twenty year a period. Since the plan is finalized in 2011 the phasing is worked out for 2011-2031. Phasing the action programme is essential to dovetail the same with the National Five Year Plan. Phases are as follows.

Phase-I	2012-2017
Phase-II	2017-2022
Phase-III	2022-2027
Phase-IV	2027-2031

9.1.1 PHASE I (2012-2017)

Transport and Communication

1. Construction of the following Roads

1	Hospital Jn on AM road to KSRTC station (Union Bank Road)
2	KSRTC station to MC road(Jacobite Church Road)
3	MC road to PP road(Cattle Market Road)
4	Cattle Market Road to Gandhi Square(PP road)-Part of North south linkage No.16
5	Maradu Jn on AM road to Vattaikkattupady on MC road- New alignment
6	Vattaikkattupady Jn on MC road to Saddam Road junction on AM road
7	Saddam road junction to Millumpady junction on AM road (Partf EWI)
8	Mudickal on AM road to Choondivallam on MC road via Travancore Rayons (Gandhi Nagar road & Rayon road)
9	Kuzhippilly temple to MC road(GK Pillai road)
10	Govt. Girls High School on AM road to TB Junction
11	Kalady Junction to Choondivallam (MC road)
12	AM road to KSRTC station(Thottunkal road)
13	Pushpa junction on AM road to Municipal border via KSRTC station(Old Muvattupuzha road)
14	Gandhi Square on AM road to MO junction
15	MO junction to Oushadi junction on MC road(Court road)
16	Oushadi Junction on MC road to Hospital junction on AM road
17	Kalady Junction to Vattaikkattupady junction(MC road)
18	Gandhi Square on AM road to Municipal border(PP road)
19	Palakkattuthazham to Kalady junction(AM road)
20	Kalady junction Municipal boundary - AM road
21	Old Muvttupuzha road to MC road(Marthoma Church road)

2. Development of Defunct Rayons factory.
3. Development of Sub Centre Type –I
4. Junction improvement.
5. Decentralisation programme of Solid Waste Management.
6. Improvements in water supply and Drainage System, Augmentation of existing water supply.

9.1.2 PHASE II (2017-2022)

Transport and Communication

1	AM road to Parapuram Junction (Karothu Lane)
2	Parappuram Junction to Old Vallam road (Colony road)
3	Old Vallam road -Colony road junction to Thrikkaparambu junction (Part of EW4)
4	Old Vallam road to MC road (Thrikkaparmbu road)
5	MC road-Thrikkaparmbu junction to kanjirakkad junction (part of NS6)
6	GK Pillai road junction MC road to Kanjirakkad(Temple west road & CT road)
7	Pattal junction on AM road to Municipal border (Quarry road)
8	Iringole junction to Municipal border via Iringole temple (Iringole kavu road)

1. Development of Sub centre Type II
2. Development existing KSRTC bus stand.
3. Development of goods terminal.
4. Junction improvements.
5. Proposals of water supply and sanitation.
6. Monitoring of the proposed scheme in the first phase.

9.1.3 PHASE III (2022-2027)

Transport and Communication

1	Kanjirakkad junction on MC road to Pooppanipalam Poopani road
2	Pooppani road-Pooppani Palam to Pooppanipara junction (Part of NS-7)
3	Pooppanipara on Pooppani road to Alpparakkavu junction on AM road via Alppara Temple)
4	Alpparakkavu junction to Maradu junction (AM road)Part of East-West linkage No.6)
5	AM road to Kuzhippilly temple(Library road)
6	Poopani road

7	BOC road junction on AM road to Muncipal Border(BOC road & Karattupallikara road)
8	Onnam Mile junction on AM road to Municipal Border (Konnamkudy road)
9	Pattal junction on AM road to Pankulam road(Pattal- Pankulam road)
10	Gandhi nagar junction to MO junction via Parappuram Kareri-Kollamkudy road, TB road
11	Colony road to CT road (Chenganattu road & Boradway)
12	Kaduval junction on MC road to Rayons road(Old Vallam road upto Choola road junction & Choola road)
13	Alppara temple to Konnamkudy road
14	Iringole kavu temple to KSRTC junction via pankulam, Marudu Kavala, Vrindhavan road
15	Sophia College road

1. Development of Sub Centre Type –III
2. Completion of inner ring road.
3. Development of recreational facilities at Peringalam Puncha.
4. Junction improvement.
5. Development of Stadium.
6. Solid Waste Management Programme.

9.1.4 PHASE IV (2027-2031)

1. Outer ring road completion.
2. East west and North South linkage completion.
3. Completion of transit orients corridor and transit station.
4. Preparation of DTP Scheme for transit station at TOD corridor.
5. Up gradation of educational and medical facilities to be completed.
6. Completion of recreational facilities programmed to required standards.
7. Modernization of agriculture irrigation schemes to be completed.
8. Water Supply augmentation schemes to be completed.

ANNEXE I

Type of non-obnoxious and non-nuisance type of service or light industries permissible in Residential Use Zone, Commercial Use Zone & Dry Cultivation Use Zone

1. Flour Mills
2. Embroidery and Lace manufacturing
3. Gold and silver smithy
4. Watch, pen and Spectacle repairing
5. Laundry, dry cleaning and dying
6. Photo and picture framing
7. Manufacture and repair of musical instruments
8. Automobile servicing (excluding repair)
9. Radio servicing and repairing
10. Cotton and silk printing
11. Bakeries
12. Confectioneries
13. Cold storage
14. Aerated waters and fruit beverages
15. Manufacture of tobacco products
16. Garment making/tailoring
17. Electroplating
18. Bamboo and cane products
19. Sports goods
20. Card-board box and paper products
21. Domestic electrical appliances
22. Toy making
23. Furniture without machinery
24. Wooden electrical accessories
25. Copper, brass and metal utensils
26. Small foundries
27. Padlock
28. Sanitary fittings and other similar industries

ANNEXE II

List of non-obnoxious and non-nuisance type of service or light industries

1. Aerated water and fruit beverages
2. Apparel making
3. Assembly of air coolers and conditioners
4. Assembly of bicycles, baby carriage and other small non motorized vehicles
5. Atta – chakkies
6. Ayurvedic medicinal formulations, Ayurvedic health club
7. Bakery products , biscuits, confectionaries
8. Bamboo and cane products(only dry operations)
9. Block making for printing
10. Card board or corrugated box and paper products (paper or pulp manufacturing excluded)
11. Carpet weaving
12. Cement and concrete products(where crusher is not used)
13. Chilling plants and cold storage
14. Coir(without bleaching / dyeing)
15. Concrete batching plants
16. Cotton and woollen hosiery/ Cotton and silk printing
17. Electro plating
18. Electronics and electrical goods
19. Electronics equipment(Assembly)
20. Engineering workshop and general fabrication works (without any chemical treatment)
21. Embroidery and lace manufacturing
22. Flour mills(job work only)
23. Foam bed, latex thread
24. Foot wear(Rubber and PVC)
25. Furniture making
26. Fountain pens
27. Garment stitching , tailoring
28. Gold and silver smithy

29. Gold and silver thread saree work
30. Ice cream or ice making
31. Insulation and other coated papers(paper or pulp manufacturing excluded
32. Jobbing and machining
33. Light engineering
34. Laundry, dry cleaning and dyeing
35. Manufacturing of formulated synthetic detergent products
36. Manufacture of soaps involving process without generation of trade effluents (saponification of fat and fatty acids only)
37. Mineralized water
38. Musical instruments manufacturing
39. Oil ginning /expelling
40. Optical frames
41. Paint(by mixing process only)
42. Paper pins and U-clips
43. Power looms/ handlooms(without dyeing and bleeching)
44. Photo and picture framing
45. Pressure testing units
46. Printing Press
47. Rice mullors
48. Rope(Cotton and plastic)
49. Rubber gloss other than that for surgical and medical purpose
50. Rubberized coir mattresses
51. Scientific and mathematical instruments
52. Sports goods
53. Steeping processing of grains
54. Small foundries
55. Tissue culturing
56. Toys
57. Water softening and demineralization plants
58. Watch, Pen and spectacles repairing