

LANDUSE URBAN FORM AND PATTERN OF KARAPAKKAM CHENNAI METROPOLITAN AREA

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Abstract— *The Study focuses on Karapakkam is situated in the Chennai metropolitan area zone 198, which is a rapidly evolving hub encompassing IT, industrial, and commercial sectors, particularly along the bustling Old Mahabalipuram Road (OMR). This area shares proximity with prominent localities such as Sholinganallur, Thoraipakkam, Pallaikaranai, and Injambakkam, amplifying its strategic significance. Analysis of Primary Survey A Comprehensive Land Use and Land Cover (LULC) reveals a dominant residential sector and study on the age of buildings. Analysis of how IT and Industrial blooms like micro and macro industries affect the residential zone and urban sustainable pattern of Karapakkam. During the transition, agricultural areas have vanished. The notable institutions and industries in Karapakkam are KCG College, Higher Secondary Government School, Sanmar, and Emerson. Over the years, the open space has witnessed a decline from 2010 to 2023, impacting the overall landscape. The region boasts diverse Okkiyam Maduvu stands as the largest river contributing to the diverse water bodies in the region of Karapakkam. Commercial Sectors are concentrated along SH 49A, and with expectations of further expansion in these areas, promoting mixed-use development provides more than one use in a building. Policies and proposals for future development and their impacts on the growth of the Urban pattern of Karapakkam are also examined.*

Keywords— LULC, Commercial Sector, Residential Sector, Water bodies

I. INTRODUCTION

‘Urban form’ refers to the physical characteristics of an urban area and its design, structures, building settlement layout, street planning, open space, recreation space, and infrastructure. ‘Land use’ refers to the land utilization in an area, including residential, mixed-use, commercial, institutional, industrial, recreation, and open space. The difference between ‘Urban form’ and ‘Land use’ is complex interrelating parts and dynamics. Land use can be affected by high density and a mix of land use within a particular area can affect street layout and access to the amenities. Optimizing urban planning can create land use and urban forms for sustainable and liveable cities. This involves mixed-use, TOD, sustainable practices, green infrastructure buildings, and pedestrian and cycle pathway design to make functional and livable cities. Land use and urban form relate to the shaping of the urban environment. Urban form deals with the origin and development of settlement patterns, density, land use zoning, transportation, infrastructure, Social and economic culture, and demographic patterns of growth.



Map 1. Boundary map

Map 1. Refers to the boundary map of Karapakkam, CRZ II, Aquifer recharge area, and the neighborhood of Karapakkam.

Land use classification in Karapakkam addresses the challenges faced by the rapid development of IT corridors and Industrial zones. Karapakkam is significant in the Aquifer recharge area CRZ II regulations in the eastern part of Karapakkam. Karapakkam has developed towards residential, commercial, mixed-use, It sector, and Industrial zones have Intricate and dynamic development, This research deals with the sustainable and functional Urban planning of Karapakkam.

II. AM

Analysis of Urban Form and Rapid Development of Karapakkam relates to the layout and zoning of Karapakkam.

III OBJECTIVE

The main objective is to understand the urban form of Karapakkam and the Land use classification of various sectors.

IV KARAPAKKAM STUDY AREA BOUNDARY

Karapakkam is a rapidly developing residential cum commercial suburb of Chennai. Prominent areas such as Sholinganallur, Thoraipakkam, Pallaikaranai, and Injambakkam are located nearby. Karapakkam is strategically located close to Old Mahabalipuram Road (OMR). Residential:

- Karapakkam is dominated by 66% of Residential buildings. All income group classes found in Karapakkam ie. MIG, LIG, EWS, and HIG.
- Institutional: KCG College and the Higher Secondary Govt school are the major educational institutions in the Karapakkam
- Commercial: Commercial activities are found in the SH 49A.
- Industrial: Sanmar and Emerson are the major Industrial sectors in the Karapakkam.
- Open space: Open spaces are found among the residential neighborhoods, and large parcels of vacant land are present in the eastern part of Karapakkam

- Water bodies: Okkiyam Maduvu is the largest river in karapakkam, and other water bodies are Gangai Amman Pond, Karumanchavadi Kulam, and Vendrasi Amman Kulam.

AREA	2.89 SQ KM
WARD:	198
DIVISION:	Chennai south
DISTRICT:	Chennai
TALUK:	Solinganallur
NORTH:	Industrial and Institutional
SOUTH:	Commercial and Mixed Residential East
EAST:	Water body Buckingham Canal
WEST:	Industrial, Residential, and commercial zones.

Table 1. Karapakkam

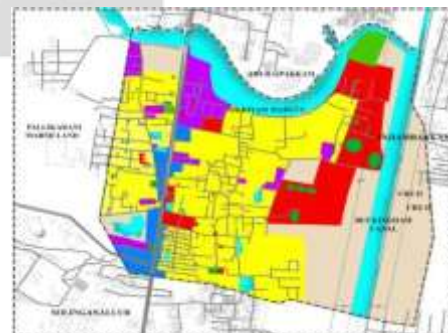
Table 1: total area of Karapakkam 2.89 SQKM. Ward number 198 comes under the Chennai south division, Solinganallur taluk.

V EVOLUTION MAP OF KARAPAKKAM

In 1971, the total area of Karapakkam was about 3.6 sq km. In 1991, the area of Karapakkam decreased to 2.4 sq km, and in 2001, the area was about 2.44 sq km. In 2011 area increased to

2.89 sq km. There is an increase in residential and commercial areas due to the development of commercial and industrial sectors along the state highway.

V LAND USE MAP



Map 2. 2010 Land use map



Map 3. 2023 Land use map

Maps 2 and 3 refer to the land use map, which includes residential, commercial, mixed-use, institutional, and industrial sectors, open space, and water bodies

VII LULC CHANGES FOR 2023

LULC CHANGES	2023	
LAND USE TYPE	SQM	%
Residential	2133889.95	61%
Mixed use	7140.74	1%
Commercial	39265.14	3%
Institutional	126989.57	7%
Industrial	96380.41	5%
Open Space	355165.61	12%
Water Body	336588.58	11%

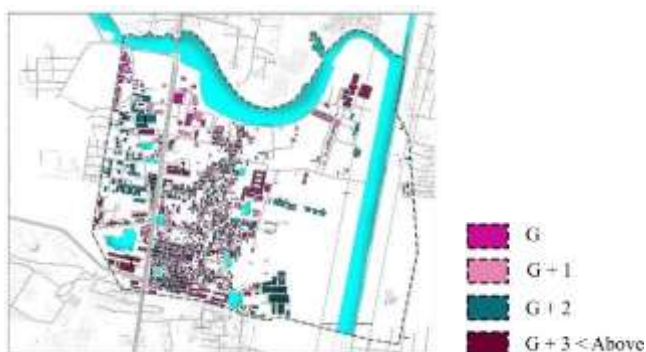
VIII METHODOLOGY

The basic input data for this study includes land use, building height, and land value in Karapakkam which required a field survey. The classification of buildings upon:

SL.NO	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL	MIXED USE
1	Apartment	Office buildings	Factory	Educational	Residential + Commercial
2	Bungalow	Hotels	Small manufacturing units	Government offices	Residential + Institutional
3	Tenement	Shopping buildings		Religious buildings	Commercial + Institutional
4	HIG, MIG, LIG, EWS individual residential buildings	Shop + office		Bank and ATM	Residential + Commercial + Institutional
		Others		Hospital	

Table 3. Building types of classification

IX BUILDING HEIGHT



Map 4. Building height

Map 4: Represent the Building height of Karapakkam.

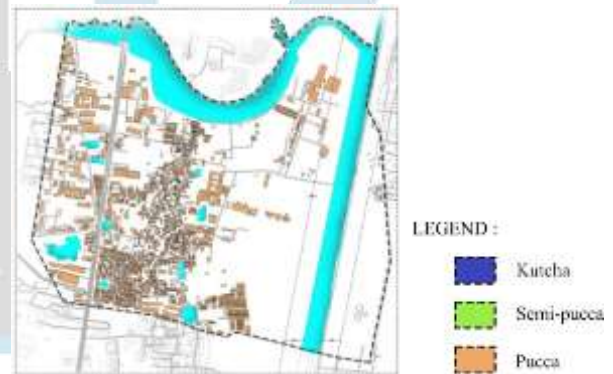


Fig 1 Capgemini

Fig 1: Capgemini is an American company that has a G+17 floor.

X HOUSING TYPOLOGY

It is been observed that Karapakkam has developed in infrastructure and has fewer kutcha and semi-pucca houses; most of the dwelling units are pucca houses in Karapakkam. Some residence is destroyed during natural disasters PMAY schemes are implemented to reconstruct the buildings.



Map 5. Housing typology

Map 5 represents the Housing typology of Karapakkam. Kutcha houses are made of mud and straw, semi-pucca temporary roof structures, and pucca houses are permanent structures.

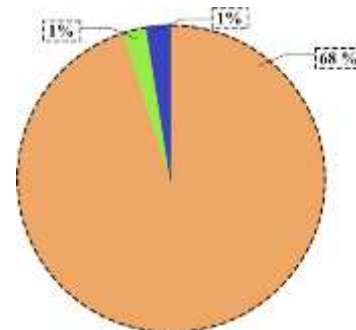


Chart 1. Percentage assessment of Housing type

Chart 1 represents the percentage value of kutcha, semi-pucca, and pucca houses.

XI COMMERCIAL ACTIVITIES



Map 6. Commercial activities

Map 6: Represent the commercial sector along state highway SH 49 A

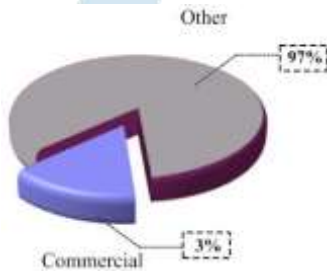
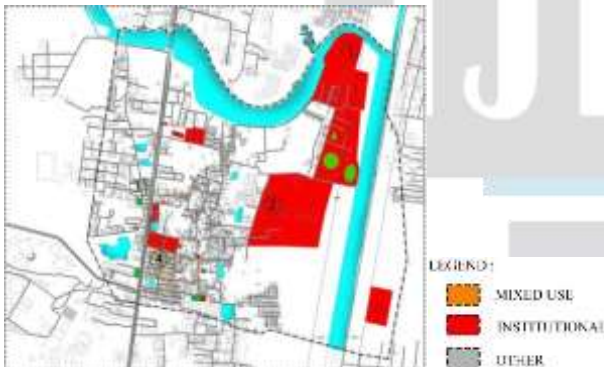


Chart 2. Overall commercial percentage

Chart 2 Represents the percentage of the commercial sector compared to other sectors of residential, mixed-use, institutional, and industrial.

XII MIXED USE AND INSTITUTIONAL BUILDING



Map 7 Mixed land use and institutional buildings

Map 7 represents mixed land use and institutional buildings. refer to Table 3 for mixed-use classification.

XIII GUIDELINE VALUE AND MARKET VALUE



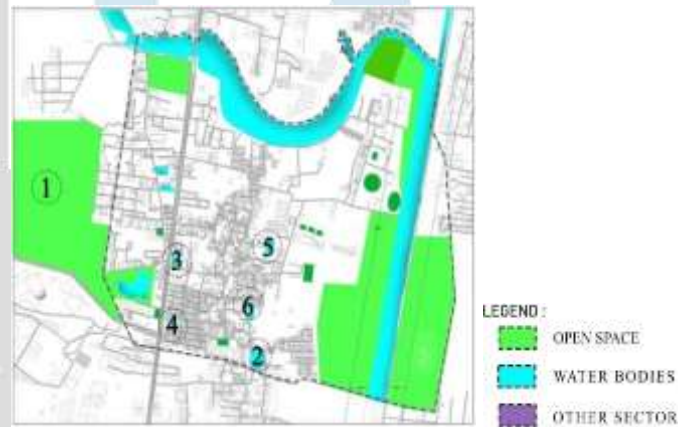
Map 8. Guideline value and market value

ROAD	GUIDELINE VALUE	MARKET VALUE
	1000/SQFT	3,897 /-
	1500/SQFT	5887 /-
	2000/SQFT	7500 /-
	2500/SQFT	8426 /-
	3000/SQFT	8,650 /-
	4000/SQFT	9,000 /-
	4250/SQFT	9,550 /-
	7500/SQFT	10,250 /-

Tab 4. Guideline value and market value

Map 8 and tab 4 represent the Guideline value according to the government land value and the market value.

XIV OPEN SPACE AND WATER BODIES



Map 9 Open space, Park, and Water bodies



Fig 2. Karumanchavadi Kulam

XV PROPOSAL

Karapakkam 2006 land use growth shows commercial activities centered around the State Highway. The rest of the areas were dominated by residential activities. However, the present 2023 condition shows the extensive growth of commercial activities also traces along wider roads of State Highway, Gangai Amman Kovil, Anna St, and Easwaran Street.

The land use proposal is to change the category of land use. The conversion of residential areas into commercial zones along the State Highway. By doing changes, an increase in tax revenue will be generated. This will result in a positive income source for the Municipality. Also changing the land use into commercial along the State Highway 49A and another major internal road of Karapakkam.



Fig 3 Gangai Amman Pond



Fig 4. Vindrasi Amman Pond



Fig 5. Oori kuttai 1



Fig 6. Oori kuttai 2

Fig 2,3,4,5,6 Represent Ponds in Karapakkam



Map 10 Commercial sector and future development

PROPOSED COMMERCIAL AREAS			
S.NO	AREA NAME	AREA in sq.m	AREA in sq.ft
1	Gangai amman st	4706.2	50657.11
2	Anna street	1538.54	16560.70
3	Kalaingar Karunanithi st	1343.72	14463.68
4	DR. MGR st	1317.02	14176.28
5	Barathiyar st	1408.96	15165.91
6	State Highway 49A	4966.2	53455.73
	Total	15280.64	164479.44

Tab 5 Proposed commercial areas

Tab 5. The proposed future commercial sector will be in the following streets.

A. Tax increase on built space

Based on the Primary survey done, the average cost of tax in Residential areas is Rs 4/ SQFT. Whereas the average cost of commercial enterprises is Rs 20/ sqft. The difference between the two categories is Rs 16/ sq.ft.

Considering 12% of open space reservations and 5% of open spaces from parking and setbacks, the total buildup area is 83% of 164479.44 sq. ft = 136517.93 sq. ft

An increase in the sqft rate of property tax will generate an income of $136517.93 \text{ sq.ft} \times 16 = 21,84,286/-$

B Calculation regarding premium FSI for potential future development areas and vacant land

Area	= 1,35,317.39 sqm.
State Highway road width	= 30m
Premium FSI for 18m & above	= 50%
Permissible FSI	= 2
Excess FSI	= 3 (including premium FSI)
Guide line value	Rs.7500/sq.m
The premium FSI charges shall be collected at the rate of 40%	
Guideline value for the excess FSI area over and above normally permissible FSI are for High rise Building and 50% for non high rise building:	
Area	= 1,35,317.39 sqm.
Permissible FSI	= 2,70,634.78 sqm.
Premium FSI for 18m & above	= 4,05,952.17 sqm.
Excess FSI	= 4,05,952.17 sqm.-2,70,634.78 sqm.
Excess area	= 1,35,317.39 sqm
Formula: Excess area x G.L.V x 40%	
= 1,35,317.39 sqm x Rs 7500/sq.m x 40%	
= 40,59,52,170/-	

Karapakkam has always been a residential-dominated area. An increase in commercial activities is being developed in the area's urban growth. The proposal of an increase in FSI and an increase in the commercial sector will generate revenue. The areas proposed for change are currently practicing commercial activities. Therefore, the conversion is justified.



Fig 6. Future development area

XVI CONCLUSION

The research started with the aim of sustainable planning and Karapakkam deals with rapid development. Providing proper zoning of the It sector, Industrial zone, Institutional commercial, and mixed-use can make a proper settlement layout. The proposal of an increase in FSI and an increase in the commercial sector will generate revenue for Govt, Improving Parks, and ponds creates community development and social gathering space.

XVII REFERENCE

- Chennai Metropolitan Development Authority
- Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines
- Development Regulations
- Tnreginet.gov.in – Guide line value
- 99 acres of real estate – Market value