

Master Plan for Rajapalayam LPA 2041

GIS Based Plan Under AMRUT Guidelines

Master Plan

June 2023

Volume
1 / 2



Directorate of Town & Country Planning
Government of Tamil Nadu

Master Plan for Rajapalayam LPA 2041

GIS Based Plan Under AMRUT Guidelines

Master Plan Volume 1 of 2

June 2023

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GIS Based Master Plan
Rajapalayam LPA - 2041

Draft Master Plan

Directorate of Town and Country Planning
June 2023

MASTER PLAN FOR RAJAPALAYAM LPA

L.P.A. Reference No. : Roc No.703/2020/VNR
Virudhunagar District Office

D.T.C.P. Reference No : Roc. No. 17398/2015-MPI

Master Plan for : Rajapalayam Local Planning Area

Rajapalayam Local Planning Area : Consented in G.O. (Ms). No.
Housing & Urban Development
Department Dt:

Deputy Director

District Town and Country Planning
Virudhunagar District

Assistant Director

Directorate of Town and Country Planning
Chennai

Joint Director

Directorate of Town and Country Planning
Chennai

Director

Directorate of Town and Country Planning
Chennai

PRINCIPAL SECRETARY TO THE GOVERNMENT

Housing and Urban Development Department
Government of Tamil Nadu

PROFORMA

Name of the Office : District Town And Country Planning Office,
Virudhunagar District

Name of the LPA : Rajapalayam Local Planning Authority

I. PROPOSAL

1. Letter No. and date of DTCP in which :
proposals submitted to Government

II. NOTIFICATION

2. The G.O details of Notification : G.O (Ms) No. 2012 R.D. & LA dt. 20.09.1973
Under Section 10(1)

3. The G.O. details which confirmation : G.O. (Ms) No. 1374 R.D. & LA dt. 30.05.1974
was ordered under section 10(4)

4. The G.O. details of Notification : G.O. (Ms) No. 204 H&UD dt. 30.12.2011
Under section 10(1)(b)

5. The G.O. details which confirmation : G.O. (Ms) No. 168 H&UD [UD4(21)] dt. 20.11.2014
was ordered under section 10(4)

III. CONSTITUTION

6. The G.O details in which :
Rajapalayam appointment
of members

IV. CONSENT

7. The G.O details in which the :
Government Accorded consent.
Under Section 24(2)

V. PUBLICATION

8. Notification in form No.1 in the :
Tamil Nadu Government Gazette
Under Section 26
9. Notification in form No.1 in District :
Gazette under Section 26(1)
10. Letter no. and date in which Director :
of Town and Country Planning has
given advice on O&S under Section 26(2)
11. Resolution no. and date in which the :
Rajapalayam approved the
Draft Master Plan

VI. APPROVAL

12. Submission of Master Plan to :
Government for final approval
Under Section 28
13. The G.O. details in which :
Government accorded its
Approval under Section 28

VII. PER PUBLICATION DETAILS OF APPROVAL IN

14. The Tamil Nadu Government Gazette :
Under Section 30
15. The notice board of the Local Body :
16. One or more leading daily Newspaper :
Circulation in the Rajapalayam
Local Planning

Deputy Director
District Town and Country Planning
Virudhunagar District

Rajapalayam Local Planning Area Master Plan – 2041

CERTIFICATE

It is certified that,

- All the procedures prescribed in the Master Plan are prepared, published and sanctioned.
- The boundary of Rajapalayam Local Planning Area is reframed.
- Reports with the Master Plan are annexed and authenticated.
- The categorization in zoning map and the categorization in zoning regulation are tallied and found correct.
- The numbers found missing are duly acknowledged and verified by the concerned department.

Deputy Director
District Town and Country Planning
Virudhunagar District

RAJAPALAYAM LOCAL PLANNING AREA

Name of the Local Planning Authority : Rajapalayam Local Planning Authority

Rajapalayam Local Planning Authority
Reference No. : Roc. No. 703/2020/VNR

Directorate of Town and Country Planning : Roc. No. 17398/2015 - MPI
Chennai Reference No.

Deputy Director of :
District Town and Country Planning,
Virudhunagar District

Assistant Director

Directorate of Town and Country Planning
Chennai

Joint Director

Directorate of Town and Country Planning
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Director

Directorate of Town and Country Planning
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PRINCIPAL SECRETARY TO THE GOVERNMENT

Housing and Urban Development Department
Government of Tamil Nadu

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Acronyms

AD	:	Anno Domini (Latin for “in the year of the lord”)
AGC/WRO	:	Assistant Geo-Chemist/ Water Resources Organisation
AMRUT	:	Atal Mission for Rejuvenation & Urban Transformation
ASI	:	Archaeological Survey of India
BDO	:	Block Development Officer
BIS	:	Bureau of Indian Standards
BOD	:	Bio-Chemical Oxygen Demand
BOV	:	Battery Operated Vehicles
BWG	:	Bulk Waste Generators
C&D	:	Construction and Demolition Waste
CCC&AR	:	Centre for Climate Change and Adaptation Research
CDI	:	Child Development Index
CDP	:	Comprehensive Development Plan
CFL	:	Compact Fluorescent Light Bulb
CGST	:	Central Goods and Services Tax
CGWB	:	Central Ground Water Board
CHC	:	Community Health Centre
cm	:	Centimetre
COD	:	Chemical Oxygen Demand
CPCB	:	Central Pollution Control Board
CPHEEO	:	Central Public Health & Environmental Engineering Organization
Cr	:	Crores
CSC	:	Community Service Centres
CT	:	Census Town
cu.m	:	Cubic Metre
cu.m/sec	:	Cubic Metre per Second
CWSS	:	Combined Drinking Water Supply Scheme
Db(A)	:	A-weighted decibel
DDMP	:	District Disaster Management Plan
DDP	:	Detailed Development Plan
DIC	:	District Industries Centre
DM&RHS	:	Directorate of Medical and Rural Health Services
DNA	:	Directorate of Medical and Rural Health Services
DO	:	Dissolved Oxygen
DPR	:	Detailed Project Report
DRDA	:	District Rural Development Agency
DSP	:	Deputy Superintendent of Police

DTCP	:	Directorate of Town & Country Planning
DTM	:	Digital Terrain Model
E&F	:	Environment and Forest
EC	:	Electrical Conductivity
ELSR	:	Elevated Level Storage Reservoirs
En	:	Endangered
ESR	:	Elevated Storage Reservoirs
ESRs	:	Elevated Service Reservoirs
ESZ	:	Eco-Sensitive Zones
ETDC	:	Eco-Tourism Development Committees
EUA	:	Extended Urban Area
EWS	:	Economically Weaker Section
FIR	:	First Information Report
FSM	:	Faecal Sludge Management
GEC	:	Ground Water resource Estimation Committee
GHG	:	Green House Gas
GI	:	Galvanised Iron
GII	:	Gender Inequality Index
GIS	:	Geographical Information System
GO	:	Government Order
Gol	:	Government of India
GoTN	:	Government of Tamil Nadu
GSR	:	Ground Storage Reservoir
GW	:	Ground Water
Ha or Hec	:	Hectare
Ham	:	Hectare Meter
HDI	:	Human Development Index
HDPE	:	High Density Polyethylene
HH	:	House Hold
HHI	:	House Hold Industries
HIG	:	High Income Group
HP	:	Horsepower
HR & CE	:	Hindu Religious & Charitable Endowments Department
HSC	:	House Service Connections
HUDCO	:	Housing and Development Corporation
IEC	:	Information, Education & Communication
IGC	:	Indian Geoinformatics Centre
IGST	:	Integrated Goods and Services Tax
IMA	:	Indian Medical Association
IMD	:	India Meteorological Department.

IMR	:	Infant Mortality Rate
INR	:	Indian Rupee
IPHS	:	Indian Public Health Standards
IRC	:	Indian Road Congress
IS	:	Indian Standards
ISRO	:	Indian Space Research Organisation
IUCN	:	International Union for Conservation of Nature
IUDP	:	Integrated Urban Development Project
Kg	:	Kilogram
KLD	:	Kilo Litres per Day
Km	:	Kilo metre
KV	:	Kilo Volt
Leq	:	Equivalent continuous sound level
LIG	:	Low Income Group
LL	:	LL
LPA	:	Local Planning Area
LPCD	:	Litres Per Capita per Day
lps	:	Litres per Second
m	:	Metre
(M)	:	Municipality
M. Corp	:	Municipal Corporation
m/sec	:	Metres per Second
MAV	:	Multi Axle Vehicle
mbgl	:	Meter below ground level
MCC	:	Micro Composting Centre
MCM	:	Million Cubic Meters
MDR	:	Major District Roads
Mg/L	:	Milligrams per Litre
MIG	:	Middle Income Group
MLD	:	Million Litres per Day
mm	:	Millimetre
MoUD Affairs)	:	Ministry of Urban Development (Now Referred to as Ministry of Housing and Urban Affairs)
MPI	:	Multidimensional Poverty Index
MSK	:	Medvedev–Sponheuer–Karnik (seismic intensity scale)
MSL	:	Mean Sea Level
MSME	:	Micro, Small & Medium Enterprises
MT	:	Mega Tonne
MW	:	Mega Watt
N/A	:	Not Applicable

NBC	:	National Building Code
NGO	:	Non-Governmental Organisation
NH	:	National Highways
NHAI	:	National Highways Authority of India
NRDWP	:	National Rural Drinking Water Programme
NRSC	:	National Remote Sensing Centre
NRW	:	Non-Revenue Water
NT	:	Near Threatened
NTCA	:	National Tiger Conservation Authority
NTU	:	Nephelometric Turbidity Unit
O&M	:	Operation & Maintenance
OCC	:	On-site Composting Centers
ODR	:	Other District Roads
OHT	:	Over Head Tank
PACS	:	Primary Agricultural Credit Society
PCU	:	Passenger Car Unit
pH	:	potential of hydrogen
PHC	:	Public Health Centre
PRDC	:	Poultry Research and Development Centre
PVC	:	Polyvinyl Chloride
PWD	:	Public Works Department
PWD-WRO	:	Public Works Department - Water Resource Organisation
(R)	:	Rural
RCC	:	Reinforced Cement Concrete
RD	:	Rural Development
RDLA	:	Rural Development & Land Affairs
RDO	:	Revenue Divisional Officer
RF	:	Reserved Forest
RIRCOM	:	Rajapalayam International Radio Communicators Club
RJPM	:	Rajapalayam
RLBs	:	Rural Local Bodies
RO	:	Reverse Osmosis
RoW	:	Right of Way
Rs.	:	Rupees
RTO	:	Regional Transport Office
SCs	:	Sub-Centres
SDG	:	Sustainable Development Goals
SGST	:	State Goods and Services Tax
SH	:	State Highways
SIDCO	:	Small Industries Development Corporations

SIHS	:	Subsidised Industrial Housing Scheme
SLIP	:	Service Level Improvement Plans
SM	:	Sanjeevi Malai
SMTR	:	Srivilliputhur Megamalai Tiger Reserve
SOE	:	State Of Environment
SP	:	Sappani Parambu
SPM	:	Sundakka Perumal Malai / Vada Malai
Sq.km	:	Square Kilometre
SRTM	:	Shuttle Radar Topography Mission
SST	:	Summer Storage Tank
STP	:	Sewage Treatment Plant
SWM	:	Solid Waste Management
SWOT	:	Strength Weakness Opportunity Threats
TACTV	:	Tamil Nadu Arasu Cable TV Corporation Limited
TAEI	:	Tamil Nadu Accident & Emergency Initiative
TANGEDCO	:	Tamil Nadu Generation and Distribution Corporation Limited
TANUVAS	:	Tamil Nadu Veterinary and Animal Sciences University
TDEF	:	Tropical Dry Evergreen Forest
TDS	:	Total Dissolved Solids
TN	:	Tamil Nadu
TNAU	:	Tamil Nadu Agricultural University
TNEB	:	Tamil Nadu Electricity Board
TNeGA	:	Tamil Nadu E-Governance Agency
TNHB	:	Tamil Nadu Housing Board
TN-IAMWARM	:	Tamil Nadu - Irrigated Agriculture Modernization and Water bodies Restoration and Management
TNPCB	:	Tamil Nadu Pollution Control Board
TNPHC	:	Tamil Nadu Police Housing Corporation
TNSCCC	:	Tamil Nadu State Climate Change Cell
TNSTC	:	Tamil Nadu State Transport Corporation
TNUFIP	:	Tamil Nadu Urban Flagship Investment Program
TNUHDB	:	Tamil Nadu Urban Habitat Development Board
TPD	:	Metric Tons per Day
TPS	:	Town Planning Scheme
TWAD	:	Tamil Nadu Water Supply and Drainage
TWAD/SECR	:	Tamil Nadu Water Supply and Drainage/ Superintending Engineer Circle
UGSS	:	Under Ground Sewerage System
ULB	:	Urban Local Body
UN	:	United Nation
UNDP	:	United Nations Development Programme

URDPFI	:	Urban and Regional Development Plans Formulation and Implementation
VLE	:	Village Level Entrepreneurs
VOC	:	V.O.Chidambaranar port
Vu	:	Vulnerable
VUTRC	:	Veterinary University Training and Research Centre
WGDP	:	Western Ghats Development Programme
WPC	:	Wireless Planning and Coordination
WRD	:	Water Resource Department
WRO/RDC	:	Water Resources Organisation/ Regional Data Center
WTP	:	Water Treatment Plant



01

Preamble

1.1

Background

1.1.1. Purpose of Master Plan

The Tamil Nadu Town and Country Planning Act, 1971, an Act to provide for planning the development and use of rural and urban land in the State of Tamil Nadu, states the Master Plan may provide for any or all of the following matters:

- the manner in which the land in the planning area shall be used;
- the allotment or reservation of land for residential, commercial, industrial and agricultural purposes and for parks, play-fields and open spaces;
- the allotment and reservation of land for public buildings, institutions and for civic amenities;
- the making of provision for national highways, arterial roads, ring roads, major streets, lines of communication including railways, airports and canals;
- the traffic and transportation pattern and traffic circulation pattern;
- the major road and street improvements;
- the areas reserved for future development, expansion and for new housing;
- the provision for the improvement of areas of bad layout or obsolete development and slum areas and for relocation of population;
- the amenities, services and utilities;
- the provision for detailed development of specific areas for housing, shopping, industries and civic amenities and educational and cultural facilities;
- the control of architectural features, elevation and frontage of buildings and structures;
- the provision for regulating the zone, the location, height, number of storeys and size of buildings and other structures, the size of the yards and other open spaces and the use of buildings, structures and land;
- the stages by which the Master Plan shall be carried out; and such other matters as may be prescribed.

The URDPFI 2015 guideline describes Master Plan (Development Plan) in the following manner:

- The objective of the development plan is to provide further necessary details and intended actions in the form of strategies and physical proposals for various policies given in the perspective plan and regional plan depending upon the economic and social needs and aspiration of the people, available resources and priorities.
- Proposals of a development plan should be definite, supported by an implementation strategy and evaluation criteria.

- The time frame of these plans are generally valid over a period of 20-30 years and should be planned in phases of 5 years, for periodic reviews.

In addition to these, the Master Plan is also meant to identify areas required to be preserved, conserved and development of areas of ecological value, natural scenery and landscape together with preservation of features, structures or places of historical, architectural and scientific interest and environmental value.

1.1.2. AMRUT Scheme

Rajapalayam is one of 33 towns identified in Tamil Nadu under the AMRUT scheme for preparation of Master Plan. The Government of India (GoI) launched the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 2015, as a Centrally Sponsored Scheme for urban development. Besides creating infrastructure for basic amenities, the Mission also focuses on reforms and capacity building of the Urban Local Bodies (ULB). Urban Planning and City-level Plan is one of the 10 identified reforms. The sub-reforms under Urban planning and city-level plans are:

- Preparation of Master Plan using GIS
- Preparation of Service Level Improvement Plans (SLIP)
- Establish Urban Development Authorities
- Make an action plan to progressively increase the green cover in cities to 15% in 5 years
- Develop at least one Children's Park every year in AMRUT cities
- Establish a system for maintaining parks, playground and recreational areas relying on the People Public Private Partnership (PPPP) model
- Implementation of Parameters given in the National Mission for Sustainable Habitat

1.2 Need for the Master Plan

Urban areas in Tamil Nadu, as elsewhere, have grown both in size and complexity over the past decades and have become unmanageable. The need for a mechanism or a way forward to plan inclusively, to regulate and control the growth and development of urban areas has become all the more necessary. More than ever now the impact of development on the environment needs to be carefully studied. The Town and Country Planning Act, 1971, provides for preparation and implementation of Master Plans for urban areas, to ameliorate the situation in urban areas and make them a place for safe, healthy and sustainable development.

It is important to recall the fact that Rajapalayam has been a major hub for the textile industry and has a history of industrialization spanning from the 1930s. Moreover, the Rajapalayam LPA also has two reserved forests within it, and its western boundary

1.3

Master Plan for Rajapalayam LPA

is at the foothills of the eastern slope of Western Ghats, viz, Srivilliputhur Tiger Reserve. This unique mix of a long history of industrialization with a strong presence of eco-sensitive zones, existence of large acreage of water bodies, coupled with the town settlement dating back to more than 300 years makes it important to define how this growing urban settlement can responsibly steward and co-exist with the surrounding eco-sensitive zones.

The Directorate of Town & Country Planning (DTCP), Government of Tamil Nadu (GoTN) has taken up the task of preparation of a Master Plan for Rajapalayam LPA along with other towns in the State.

Rajapalayam municipal area was declared as Rajapalayam Local Planning Area (LPA) under section 10(1) of the Tamil Nadu Town and Country Planning Act, 1971 by the Department of Rural Development and Land Affairs (RDLA), Govt. of Tamil Nadu, through G.O. Ms. 2012 RDLA, dated 20th September 1973. This was later confirmed under section 10(4) of the Tamil Nadu Town and Country Planning Act, 1971 through G.O. Ms. No. 1374 RDLA, dated 30th May 1974. Rajapalayam LPA was constituted under section 11(1) of the Tamil Nadu Town and Country Planning Act, 1971 in G.O. Ms. No.650 RDLA, dated 8th April 1975.

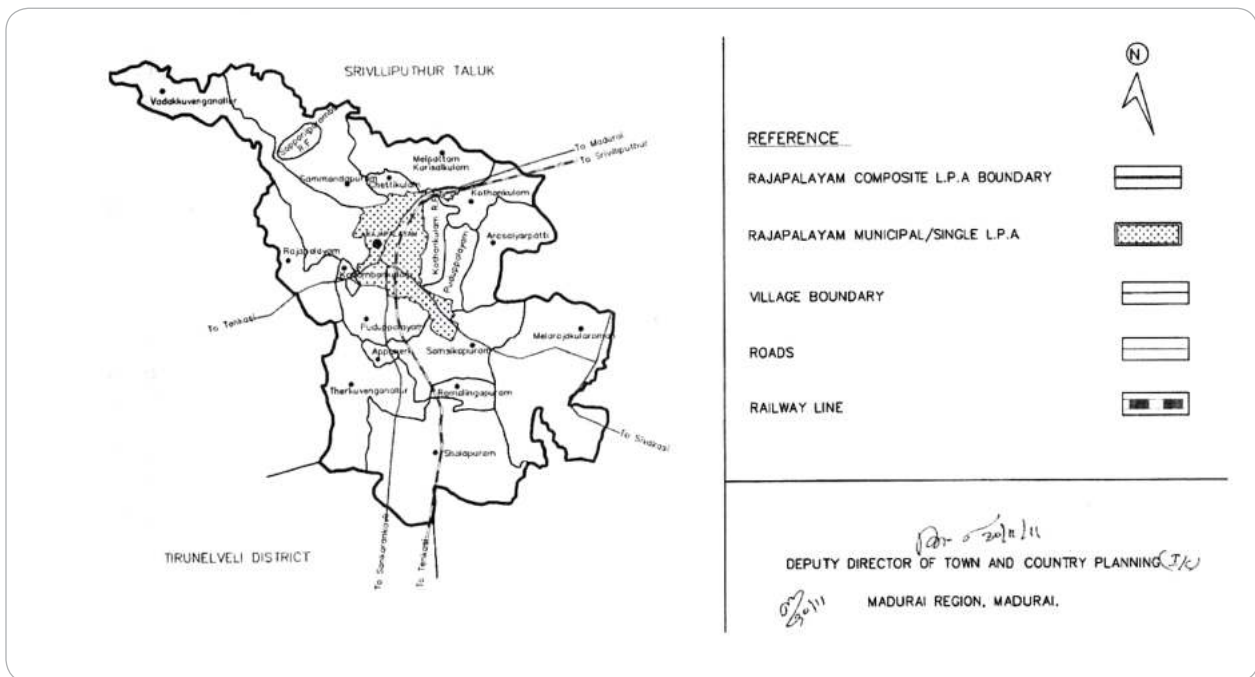
The intention to add additional areas to Rajapalayam Local Planning Area, with a view to control and channelize the development and growth in Rajapalayam and the surrounding villages was declared by issuing the G.O.(Ms). No. 2014 on 30th December 2011. This was issued under section 10(1) of the Tamil Nadu Town and Country Planning Act, 1971 by the Housing and Urban Development Department, Govt. of Tamil Nadu.

The intention notified additional areas were confirmed as part of the Rajapalayam LPA under section 10(4) of the Tamil Nadu Town and Country Planning Act, 1971 by issuing a G.O. (Ms). No. 168, on 20th November 2014 by the Housing and Urban Development Department, Govt. of Tamil Nadu. The boundary of the composite LPA with the villages and the municipal area approved by the DTCP as mentioned in the G.O. (Ms). No.168/ H&UD, dated 20.11.2014, is shown in **Fig. 1.1 & Map 1.1**. The revenue villages (numbers and names) included in Rajapalayam LPA apart from the Rajapalayam Municipality as per the G.O. are listed below:

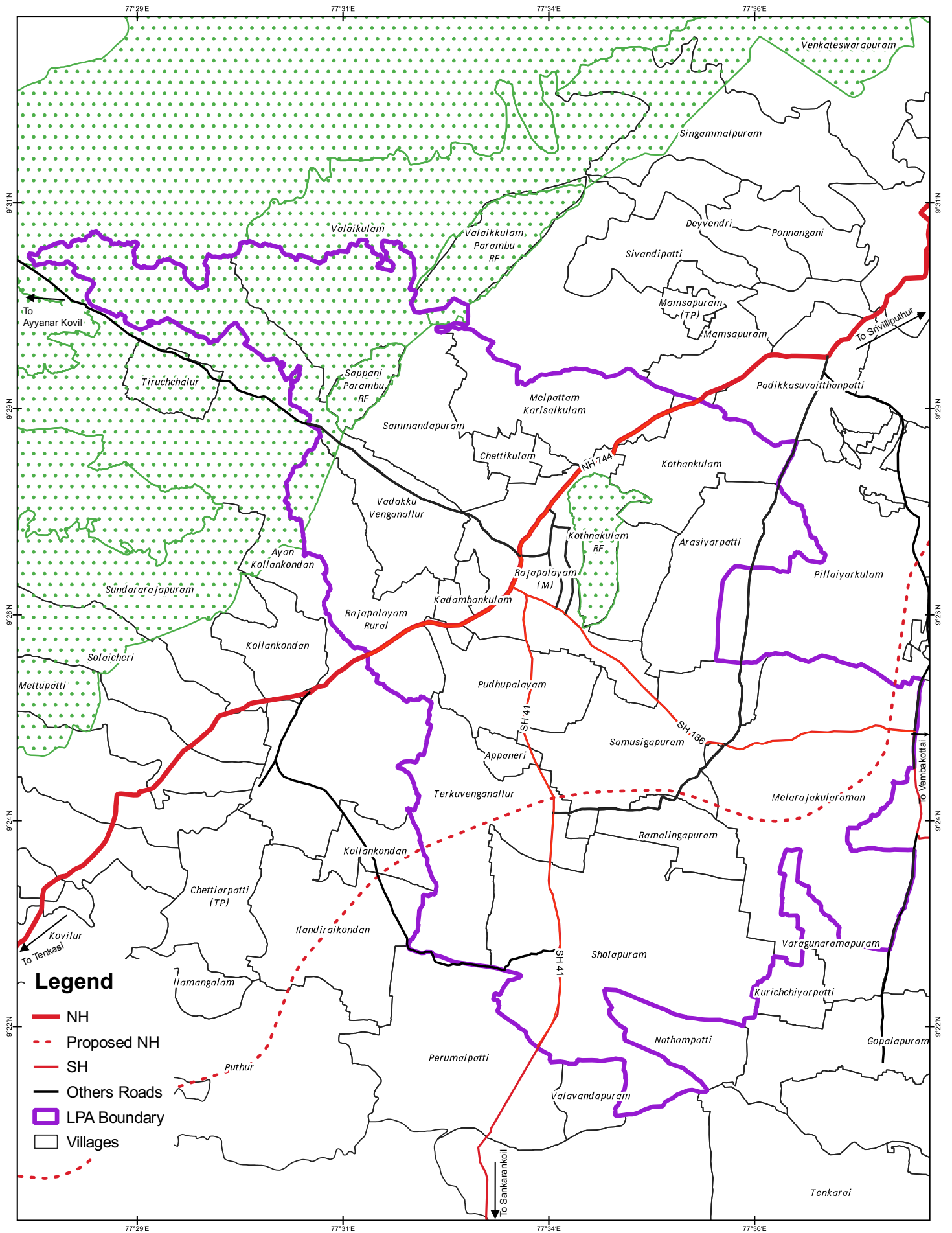
- 1 - Vadakku Venganallur (part)
- 23 - Sammandapuram (part)
- 24 - Melapattam Karisalkulam
- 25 - Kothankulam(part)
- 22 - Kadambankulam (part)

- 21 - Pudupalaiaam (part)
- 33 - Melrajakularaman
- 27 - Samusigapuram (part)
- 20 - Appaneri
- 19 - Terkuvenganallur
- 28 - Ramalingapuram
- 26 - Arasiyarpatti
- 29 - Sholapuram
- 11 - Kothankulam (RF)
- 4 - Rajapalayam
- 12 - Chettikulam (part)
- 6 - Sappani Parambu (RF)

Fig 1.1: Rajapalayam Composite LPA Map – DTCP



Source: Issued by DTCP dated 30th November 2011



Rajapalayam LPA Boundary with Surrounding Revenue Villages	Notes :	Data Credits Survey and Land Records; Forest Department Governments of Tamil Nadu	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

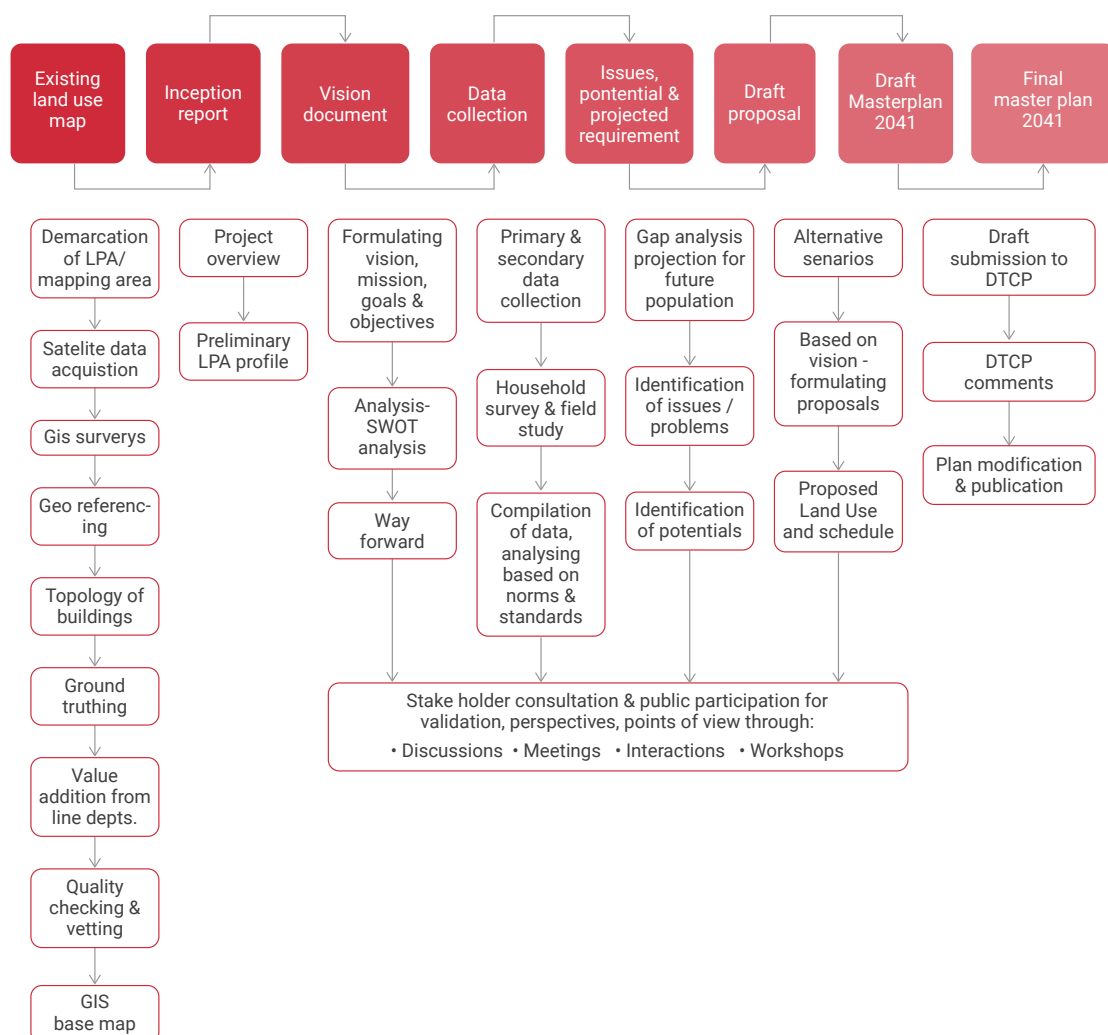
Map 1.1: Rajapalayam LPA Boundary with Surrounding Revenue Villages

1.4 Preparation of the Draft Master Plan 2021-2041

The Directorate of Town & Country Planning (DTCP), Government of Tamil Nadu (GoTN) has taken up the task of preparation of a Master Plan for Rajapalayam LPA along other towns in the State. The DTCP, Virudhunagar had appointed M/s. Tapasya Design Studio, Auroville (a Not-for-profit unit of the Auroville Foundation, Government of India) to provide the necessary technical assistance to prepare the AMRUT-based Master Plan for Rajapalayam LPA. Tapasya Design Studio led a consortium of experts namely Auroville Botanical Gardens for Environment, The Urban Lab for Mobility and Transport, DGS Infra for Infrastructure and GeTS for Aquifer Delineation and Total Ground Water Resources Estimation, to undertake the necessary studies and surveys, stakeholder consultations and prepare reports, maps and other necessary deliverables as per Master Plan Rules and AMRUT guidelines. Various companies of Ramco through the CSR initiatives were supportive in preparing the draft Master Plan.

The following was the process followed in preparation of the Draft Master Plan (Fig. 1.2).

Fig 1.2: Methodology Followed for Master Plan Preparation for Rajapalayam LPA



1.4.1. Existing Land Use Preparation

The Existing Land Use Map for Rajapalayam LPA was prepared by M/s. Indian Geoinformatics Centre (IGC) for DTCP as per AMRUT Guidelines using high resolution satellite images acquired from National Remote Sensing Agency (NRSC). The village maps with survey numbers (from the Survey and Land Records department) were used for preparing the cadastral framework by IGC. Differential Global Positioning System (DGPS) surveys were carried out for collecting Ground Control Points (GCPs) for georeferencing of the scanned paper maps by IGC. The survey boundaries were digitized as polygon features in the GIS database, along with the name of the village and the survey number by IGC.

Satellite data acquisition & Ground truthing – As per AMRUT guidelines, high resolution satellite images were acquired from the National Remote Sensing Centre (NRSC of ISRO). NRSC had prepared a preliminary land use map from the satellite images. Verification of land use map by ground truthing was later carried out by Indian Geoinformatics Centre (IGC) for DTCP.

GIS survey & Geo Referencing – The village maps with survey numbers (from the Survey and Land Records department) were used for preparing the cadastral framework. Differential Global Positioning System (DGPS) surveys were carried out for collecting Ground Control Points (GCPs) for georeferencing of the scanned paper maps. The survey boundaries were digitized as polygon features in the GIS database, along with the name of the village and the survey number. Government lands are to be marked at the sub-division level. For the Rajapalayam municipal area the ward maps were geo-referenced and polygons for each town survey number have been captured in the GIS database.

Quality checking and vetting – All the data generated in the GIS undergoes a quality assessment and checking for topological and attribute correctness by IGC. As the map data come from different sources, times and at different scales, it becomes pertinent to check the layers individually and against one another. Preparation of Base map – The Digital Terrain Model (DTM of SRTM) has been used to prepare the terrain and contours by IGC. The physical base map will show the topography, rivers, streams and tanks, in the LPA area.

1.4.2. Inception Report

The inception report stage involves preliminary analysis of the LPA as a whole based on available secondary data and preliminary stakeholder interactions. The Inception Report provides a contextual background, project need and scope, aims and objectives of the project, the approach and methodology to be undertaken and the project team and timeline; describes the LPA by providing a demographic profile of the LPA based largely on secondary data made available through the Census; presents the

land profile of the LPA based on the Existing Land Use Map 2021, economic details at the municipal, block and taluk and district level as available; discusses road network, connectivity, physical and social infrastructure status; and a brief about other prevailing sectors linked to planning, such as housing, infrastructure, environment, etc.

1.4.3. Vision Document

The visioning exercise, conducted as a day-long workshop on 21st Aug 2021, saw residents of Rajapalayam (comprising students, working professionals, homemakers, businesspersons, etc.) present their perspectives in a series of discussions, for which purpose they were randomly divided into 4 subgroups. The participants spanned across different genders, ages, and walks of life as well as social and professional backgrounds and included various residents of Rajapalayam comprising students, working professionals, entrepreneurs, and civil society members. The draft inception report, together with baseline data collected from relevant departments, formed the foundation for the visioning exercise. In turn, the ambition of the exercise was to analyse various aspects of the LPA such as the socioeconomic landscape, environment, housing situation, mobility, and so on, and deduce a commonly agreed-upon vision for Rajapalayam LPA. Further, the exercise will help formulate proposed policy reforms that can realise the vision in the coming 20-25 years. An additional ambition is the suggestion of alternative strategies and methods that could also help achieve the vision. The vision statement arrived at was validated in the household survey conducted in the next stage.

1.4.4. Data Collection

During this stage, the following activities were undertaken:

Secondary Data Collection - Secondary data was requested and obtained from around 48 government departments. Data from various other sources of secondary data were collected, for example, regarding climate change, etc.

Primary Data Collection - The following primary surveys were conducted:

1. A detailed household survey was conducted covering 554 households in municipal area and 462 households from the 15 revenue villages. The survey also covered details on social infrastructure, housing and physical infrastructure.
2. A biodiversity survey was conducted to identify various flora and fauna present within LPA.
3. An agriculture related survey was conducted covering all farming settlements to identify issues and potentials among the farming community.

4. A detailed transportation survey was conducted using the help of students from Ramco Institute of Technology (RIT) and PAC Ramasamy Raja Polytechnic.
5. A field data collection to map the underground water table / aquifer was undertaken.
6. A field data collection of various pollution levels was also undertaken at various points.
7. A mapping exercise of various places of cultural, historical and architectural character was undertaken.

Group Discussions - Group discussions were conducted covering topics such as Environment, Heritage & Culture among the local community.

The Data Analysis reports were submitted to the DTCP for review by the CERC committee. A stake holder meeting was conducted with Line departments under the Leadership of the District Collector to present the data analysis and to explore the various potentials, issues and possible proposals.

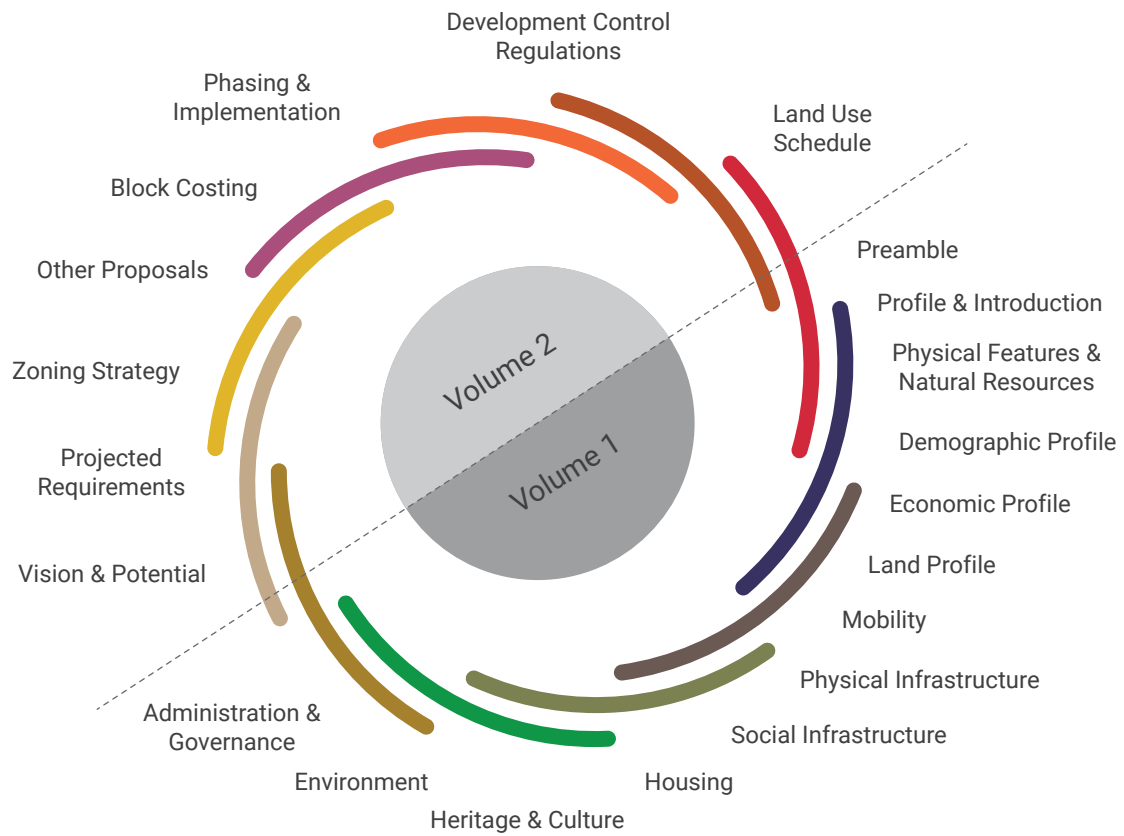
1.4.5. Issues, Potential, Projected Requirements & Draft Proposals

Based on the analysed data, the various discussions with the local community and as per the outcome of the stakeholder meeting held, a set of issues and potentials were identified. The current requirements were cross verified with various standards like URDPFI, Service Level Benchmarks, Environmental Parameters, etc. and the proposals were prepared accordingly. These were presented for discussion with the Chamber of Commerce in Rajapalayam. This was well attended with people from various associations and groups in Rajapalayam.

1.5 Report Structure

This report contains details of Rajapalayam, and the LPA based on both primary and secondary data collected and is structured as follows: (Fig.1.3)

Fig 1.3: Report Structure





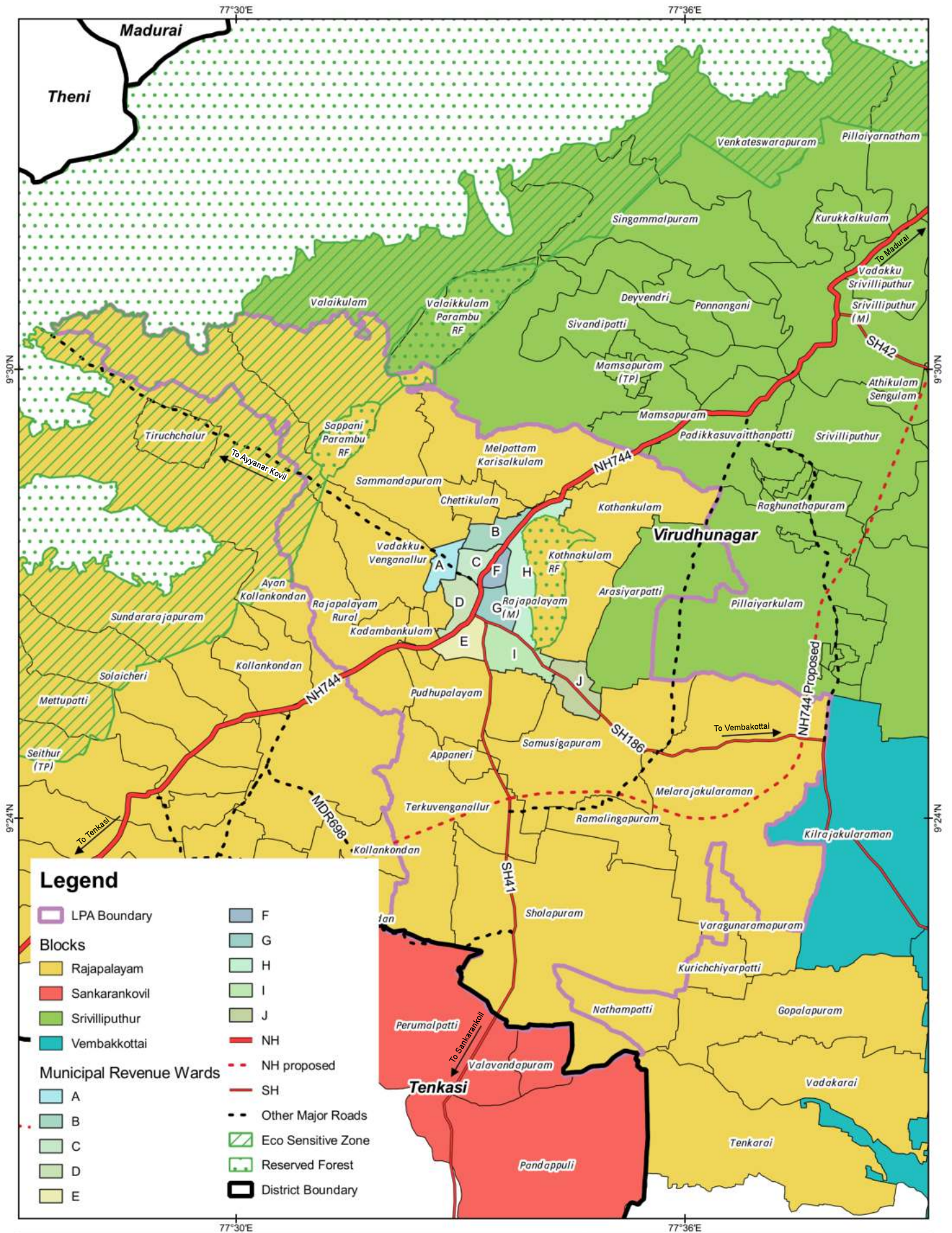
02

Profile and Introduction

2.1 Location and Regional Setting

Rajapalayam is the taluk headquarters of Rajapalayam Taluk, and an important town in the district of Virudhunagar within the State of Tamil Nadu (**Map 2.1**). There are a total of 7 municipalities in the district, of which Rajapalayam Municipality is the largest in terms of population at 1.3 lakhs total population, as per Census 2011. The town was upgraded to a Special Grade Municipality in 2008. Geographically, it is located at a latitude of 9.4515°N and longitude of 77.5543°E, and at an altitude of 167.64 m above sea level. GIS mapping of Rajapalayam Municipality, based on ward/block maps authenticated by the Assistant Director, Survey and Land Records, GoTN estimates the area of the town to be 9.59 sq.km.

Rajapalayam LPA, which includes Rajapalayam town, 15 surrounding revenue villages and 2 Reserved Forests, has a total population of 2.16 lakhs, as per the 2011 Census. The villages and the reserved forests are referred to as the 'Rest of the LPA' or 'Non-Municipal Area' in this document. GIS mapping of the LPA area based on revenue village maps provided by the Assistant Director, Survey and Land Records, GoTN estimates the total LPA area to be 149.06 sq.km. The LPA comprises the northern segment of the Rajapalayam Taluk and Rajapalayam Block. The LPA falls completely within the taluk boundary and constitutes approximately 62% of the taluk population listed as per Census 2011. In the context of Rajapalayam block, the entire LPA except Arasiyarpatti revenue village, falls within the block boundary. The administrative boundary of the LPA showing the Rajapalayam & Srivilliputhur blocks, the revenue villages and the DTCP wards of Rajapalayam Municipality is illustrated in **Map 2.2**.



Legend

- LPA Boundary
- Blocks
- Rajapalayam
- Sankarankovil
- Srivilliputhur
- Vembakkottai
- Municipal Revenue Wards
- A
- B
- C
- D
- E
- F
- G
- H
- I
- J
- NH
- NH proposed
- SH
- Other Major Roads
- Eco Sensitive Zone
- Reserved Forest
- District Boundary

Administrative Map of Rajapalayam LPA

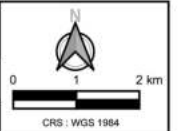
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :

Data Credits
Survey and Land Records Department; Forest Department, Govt of Tamil Nadu

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville



Map 2.2: Administrative Map of Rajapalayam LPA

2.2 Transport Network & Connectivity

Rajapalayam Municipality is situated 85 km southwest of Madurai City along Madurai–Kollam highway (NH-744). Virudhunagar, the district headquarters, is at a distance of 55 km. The town is located at an approximate distance of 12 km from the Western Ghats (western side) and is at the foot of the Sanjeevi Hills (eastern side).

Road Connectivity

The LPA is situated at about 560 km south-west of Chennai and 85 km south-west of Madurai City along Madurai–Kollam (NH-744). The major road networks in this region are (**Map 2.3**):

- NH-744 going north towards Srivilliputhur and south towards Tenkasi (Madurai–Kollam NH)
- SH-41 towards Sankarankovil in the south (Rajapalayam–Sankarankoil–Tirunelveli Road)
- SH-186 towards Sivakasi and Kovilpatti (Rajapalayam–Vembakottai Road)
- MDR-387 towards the north-west, terminates at the Western Ghats Reserved Forest area (Rajapalayam–Ayyanar Kovil Road)

The National Highways department has proposed to reroute the National Highway NH-744 via an alternate road which will bypass the Rajapalayam town. The project is being planned in two phases, Thirumangalam–Rajapalayam (71 km) and Rajapalayam–Shenkottai (80 km). This highway will provide crucial support for goods and transport logistics.

Rail Connectivity

Rajapalayam Railway station (RJPM) lies within the municipal limits, 2 km from the Municipal Office in the eastern side of the town. On the southern border of the LPA, there exists the abandoned Sholapuram Railway Station, which is now being demolished and repurposed as the Traction Sub-Station for the electrification of the Virudhunagar–Tenkasi Line. A railway line connects Rajapalayam to Kollam in Kerala and Madurai. The Tenkasi Junction–Virudhunagar Junction line passes through and bifurcates the LPA, including Rajapalayam town along the north-south axis. The LPA is well connected by rail to Chennai, Madurai, Kollam, Sengottai on a daily basis.

Air Connectivity

Madurai International Airport is the nearest airport at a distance of about 87 km from the town. The other airports in the surrounding region are the Tuticorin airport (130 km) towards the south-east and Trivandrum International Airport (175 km) towards south-west.

Sea Port

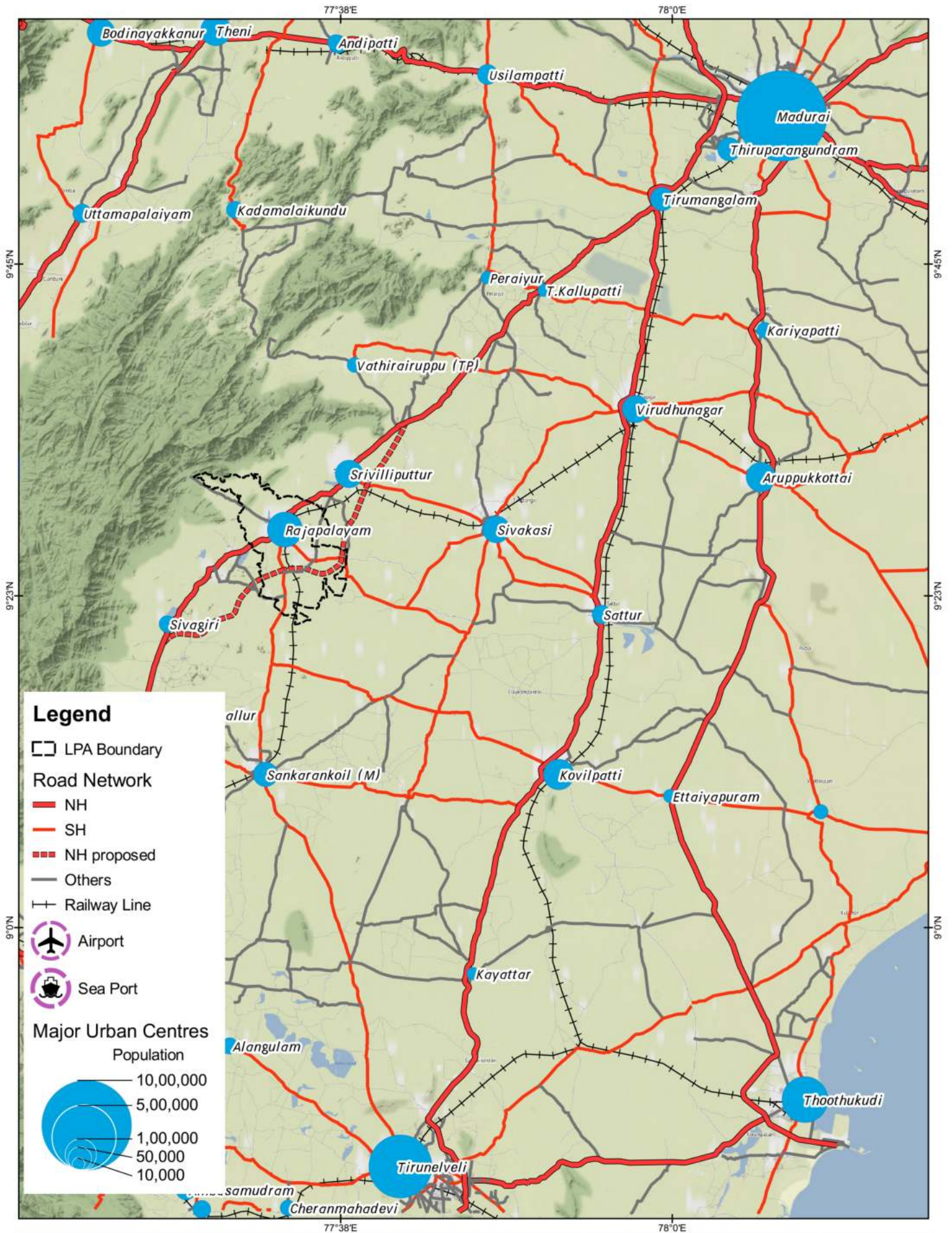
The nearest seaport, the V.O.Chidambaranar (VOC) port is located at Thoothukudi. It is one of the 13 major ports in India and is the third largest container terminal in India. The port is strategically located at the south-eastern tip of India. It is located about 120 km from Rajapalayam, providing quick access to the Indian Ocean shipping route. They have two, large container handling terminals with state-of-the-art technology. It is an artificial deep harbour. There is a huge potential for goods transport from Rajapalayam to the southern Thoothukudi port. Apart from this, the LPA is located at a distance of 190 km from Vizhinjam International Sea Port, which is been developed as a green field port; this is expected to compete with international port like Colombo, Singapore and Dubai.

Cargo and Logistics In and Around Rajapalayam LPA

Rajapalayam is located amongst other industrial towns and urban centres in the southern Tamil Nadu region. Sivakasi, an industrial town famous across the nation for its fireworks and matches industries, is located 30 km from Rajapalayam. Sivakasi is also home to many printing, packaging and polymer industries. The town of Aruppukottai, 70 km from Rajapalayam, Kovilpatti, located 60 km from Rajapalayam are all known for textile industries. Sattur, 49 km from Rajapalayam is known for its cottage industries that specialise in fountain nibs and steel rolling. All these towns, including Rajapalayam, are dependent on Thoothukudi Port for sea connection, and Madurai Airport for air connection for import and export purposes.

All these towns are majorly interconnected by a network formed by 4 National Highways i.e., NH-744 (Kollam–Tirumangalam) passing through Rajapalayam, Tenkasi; NH-44 (Srinagar– Kanyakumari) passing through Madurai, Virudhunagar, Sattur, Kovilpatti, Tirunelveli etc.; NH-38 (Vellore–Thoothukudi) passing through Madurai, Aruppukottai and NH-138 connecting Tirunelveli, to Thoothukudi. Major towns like Sivakasi that lie in the middle of these Highways are now interconnected by a network of state highways.

The V.O.Chidambaranar port, Thoothukudi is the second major port in Tamil Nadu next to Chennai and is the 6th major port in the country in terms of the amount of cargo handled in tonnage. The VOC port handled a total of 9.3% of the country's imports and exports between November 2021-2022. The major imported items in the port were thermal and industrial goods (which together constitute 1,16,64,425 tonnes) followed by fertilisers and container traffic. Whereas in the exports, the major exported items were container traffic with 80,53,710 tonnes of exports. This signifies that the industrial network in the area is contributing to the exports. Rajapalayam being one of the major textiles and spinning industrial towns, plays a crucial role in not only the town's economy, but also the larger region. With the ever-increasing import and export activities, it would also be very important to have the necessary cargo and logistics infrastructure along with road network offering seamless connectivity in and out of the town.



Regional Connectivity for Rajapalayam LPA	Notes : 1. Map Shows towns only having population of 10,000 or above according to Census 2011.	Data Credits Census of India 2011, Stamen Terrain WMS, Open Street Map	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 2.3: Regional Connectivity for Rajapalayam LPA

2.3 History of the Region

Rajapalayam LPA area and its surrounding region has been culturally connected and influenced by the historic town of Srivilliputhur, which lies just 12 km from Rajapalayam town and 7 km from the LPA boundary. The history of Srivilliputhur centres around the Srivilliputhur Andal Temple, dedicated to Goddess Andal dating back to more than 1,200 years. The cultural significance and the importance can be understood from the fact that Srivilliputhur was the birthplace of two of the twelve Vaishnava Alwar Saints, namely, Andal and Periyalwar. The Thiruppavai was composed by Andal here.

Thousands of people from the state and especially from Rajapalayam area participate in the “Aadi Pooram” festival celebrated in the Andal Temple, an important festival for the whole region. The temple Gopuram is the basis for the temple tower that is part of the State Symbol of Tamil Nadu and speaks volumes about the cultural heritage of the region (**Fig. 2.1**).

Srivilliputhur became popular during the reign of Thirumalai Nayak (1623–1659) and Rani Mangammal (1689–1706). During the Nayak period, choultries, water bodies, temple tanks and other developments were established. To restore law and order, the Raju community from Andhra were settled here in cantonments or “Palayams”. This region was famed for its rich paddy fields, cattle herds which used to forage the rich foothills of the Western Ghats and the water bodies along the Ghats. Later, this region fell into the hands of Nerkattumseval Palayakkarar Puli Thevar, Periyasami Thevar, Mohammed Yousoof Khan. Till 1850 the region came under the King of Travancore and finally under the British till Independence.

The 200 years old Hindu school and 130 years old Pennington Library provided the required educational infrastructure for the region and produced numerous notable alumni like Shri. P.A.C Ramasamy Raja, Shri. P.S. Kumarasamy Raja from Rajapalayam, who would in the future transform the region into an industrial hub.

Fig 2.1: **TN State Symbol & Srivilliputhur Andal Temple**



2.4 Overview of History of Rajapalayam LPA

2.4.1. History and Development of Rajapalayam Town

Rajapalayam lies just 12 km south-west of the historical and spiritual town of Srivilliputhur and was an important town during the rule of the Vijayanagar kings and especially during the Madurai Nayak period. Rajapalayam owes its name and origin to the 'Rajus', an enterprising community who settled here as Military units, during the reign of the Vijayanagara Kings in Madurai. The term Palayam denotes 'A cantonment or fort'. The settlement was originally called 'Palayapalayam' (at present the historical part of the town), later 'Rajupalayam' finally as 'Rajapalayam'. Rajus, the predominant community in the town, are originally from the erstwhile Vijayanagaram state. They initially settled at Keelarajakularaman, then moved to Palayapalayam in the 15th century. During the 17th century, when Vijayanagaram rule was established in Madurai, the descendants of the original migrants served under Chokkanatha Nayak, the Ruler of Madurai (1659 -1682). As a token of appreciation, the then clan leader, Chinna Raja and his four sons were granted 'Sasanam' (King's Free Grant/Charter) to establish a fort here, called the Palayapalayam fort. The latter-day migrants from Vijayanagaram settled at Pudhupalayam, a part of present day Rajapalayam Municipality and the town expanded. There are references to Rajapalayam in 1767 in the book "History of Tinnevely " written by Caldwell, that states Major Flint started first to Rajapalayam before the campaign on Fort of Panchalankurichi. Historical details related to the area are found in the book on Castes and Tribes of Southern India written by Edgar Thurston published in the year 1901.

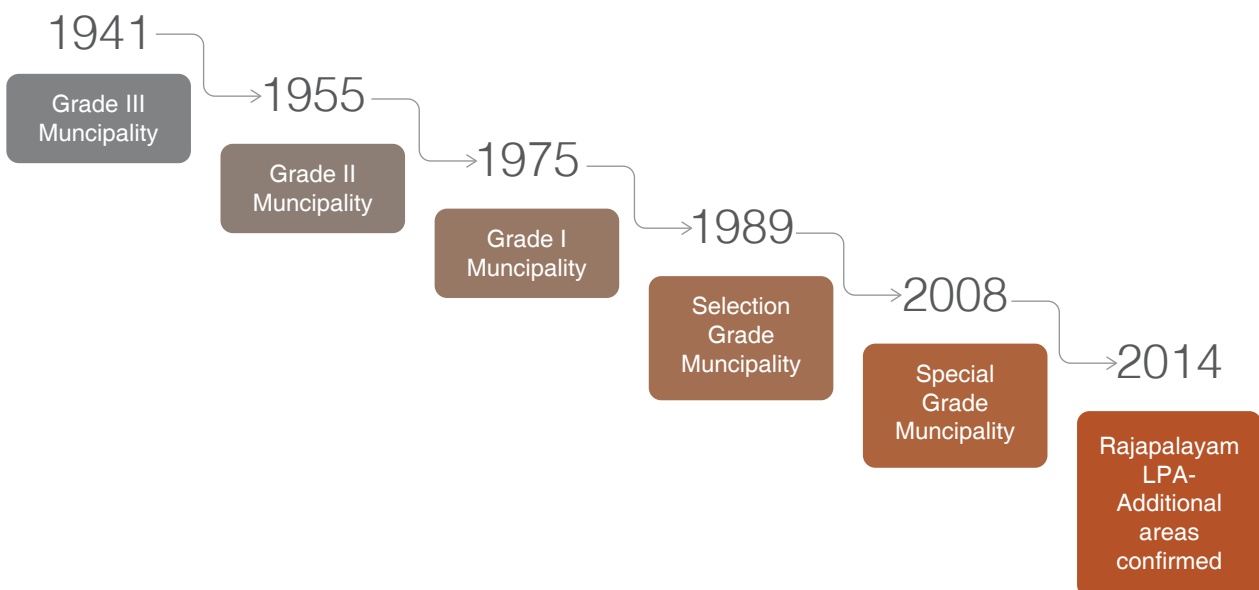
During the late British era and Post-Independence, Rajapalayam, under the able leadership of its rulers and their illustrious citizens, has become a pioneer in developmental projects such as industries, railway lines, education and infrastructure. Shri. P.S. Kumaraswamy Raja, the erstwhile Premier of Madras Presidency and former Governor of Orissa and Shri. PAC Ramasamy Raja, Founder of Ramco Group are notable personalities from Rajapalayam. Apart from the town, the Sanjeevi Malai (Hill) also designated as Kothankulam (RF) is an important natural feature, which has its own mythological legend associated with it. It is believed that when Hanuman carried the Sanjeevi hill to cure Lakshmana, a portion of the hill fell down here, and hence is called "Sanjeevi Malai".

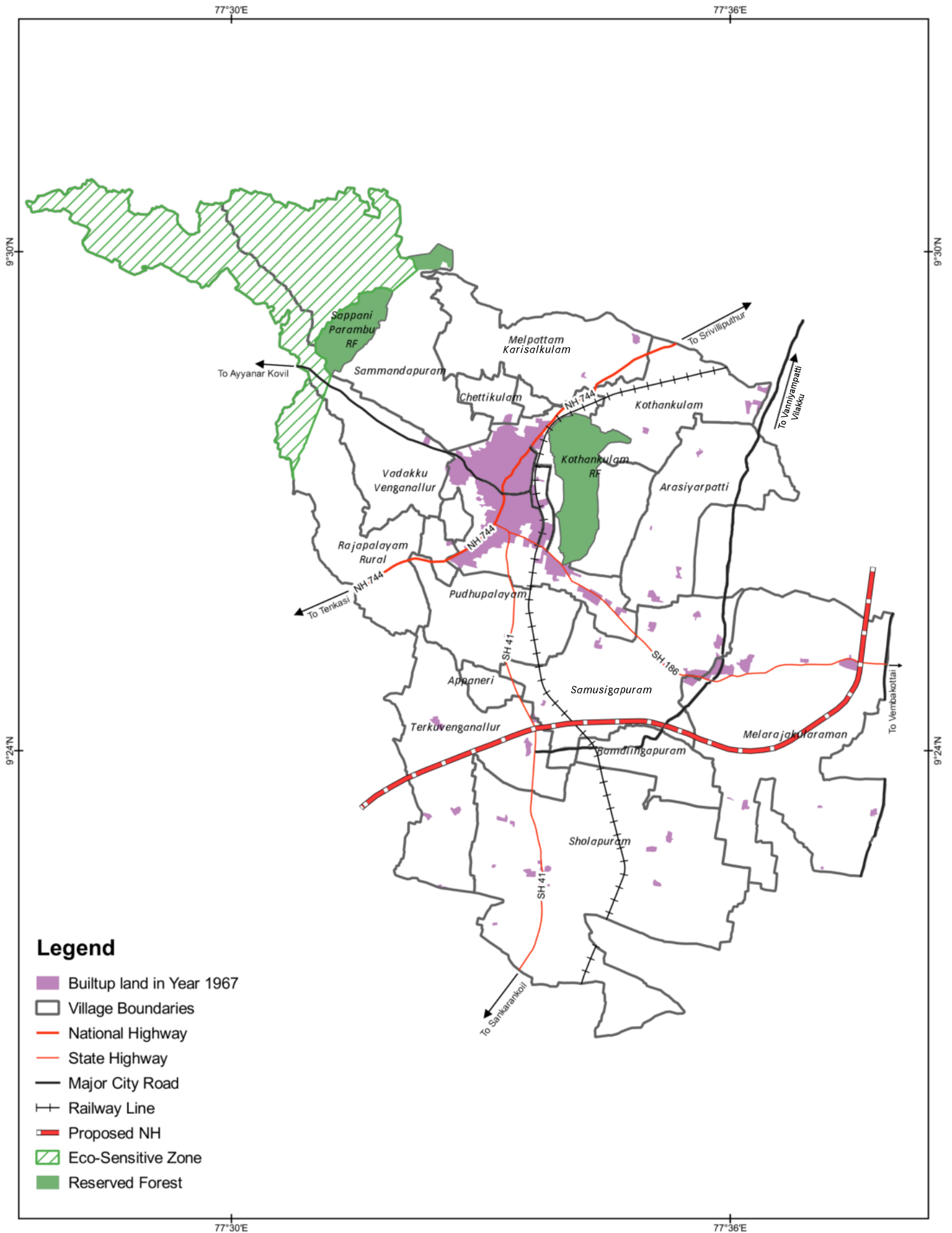
2.4.2. Rajapalayam Municipality

Rajapalayam Municipality lies at the centre of the delineated LPA. The town covers an area of 9.59 sq.km and the population as per the 2011 census is 1,30,442. Rajapalayam was constituted as a United Board in the year 1885. It became a Panchayat Board in 1930. Railway line was laid in the year 1927 and the area was electrified in 1937. On 1st October, 1941 Rajapalayam was constituted as a Grade III Municipality and has progressed rapidly (**Fig. 2.2**), as can be seen from the land use documented in 1967 (**Map 2.4**). Rajapalayam was re-classified as a Special Grade Municipality on the basis of having an average annual income exceeding Indian rupees 10 crores, as per G.O. (Ms) No. 238, Municipal Administration & Water Supply (Election) Department, dated 2nd December, 2008. Presently, the Municipality has re-notified the ward boundaries (**Map 2.5**).

The town consists of the following villages either in part or in full within its boundary – Rajapalayam rural, Inam Chettikulam, Sammandapuram, Vadakku Venganallur, Pudhupalayam, Samusigapuram, Kothankulam, Kadambankulam. Administratively, the town is divided into 42 administrative wards. The old municipal and ward boundaries and major roads within the town are illustrated in **Map 2.6**. This ward boundary has been used to do analysis as the demography has been based on 2011 Census data. However, for proposals the latest ward boundary (**Map 2.5**), which is in use from 2022, will be used. From the revenue perspective the municipal area is divided into 10 revenue wards consisting of 210 blocks (**Map 2.7**).

Fig 2.2: **Rajapalayam Town Development Timeline**





Legend

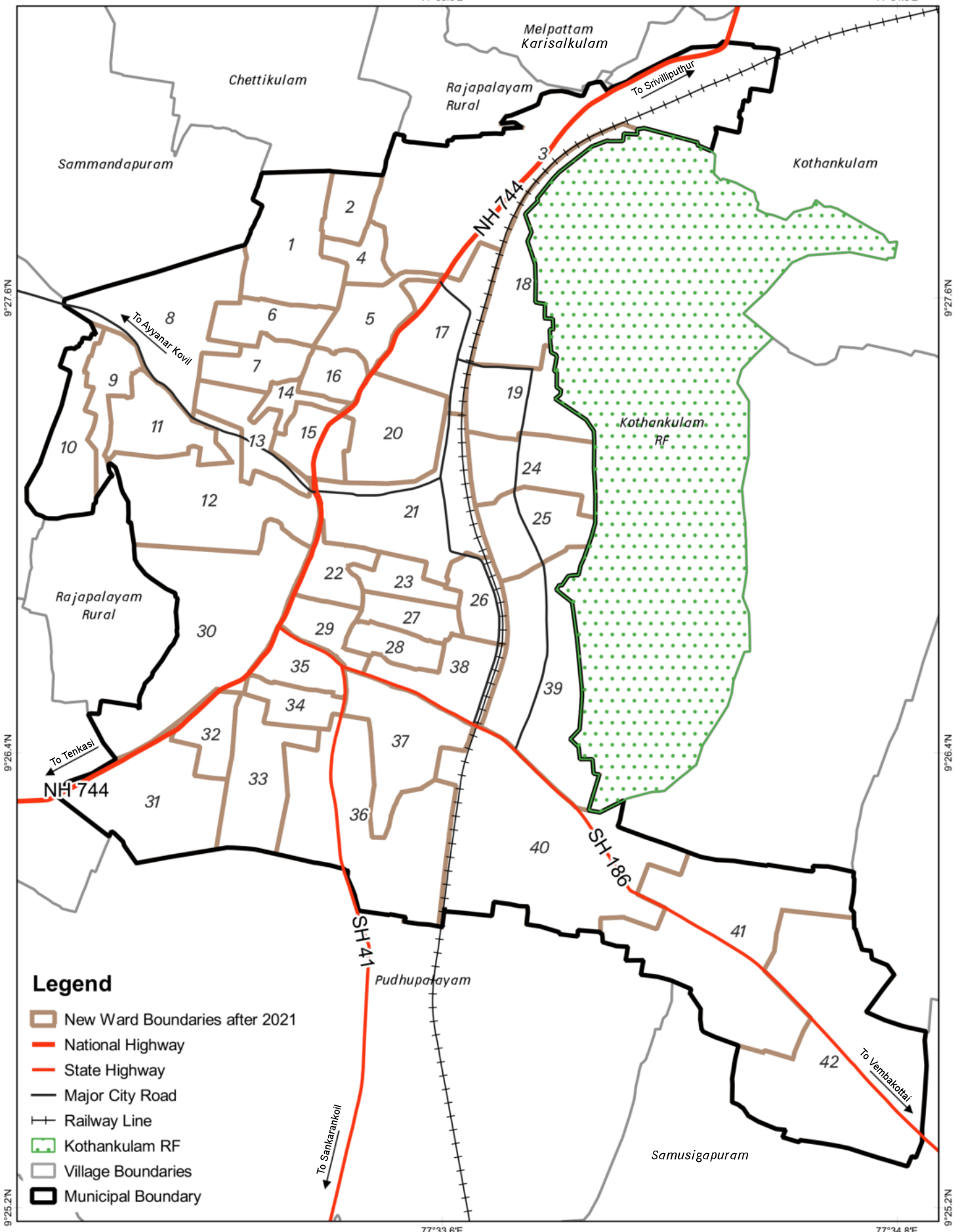
- Builtup land in Year 1967
- Village Boundaries
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- Eco-Sensitive Zone
- Reserved Forest

<p>1967 Built-up Land in Rajapalayam LPA</p>	<p>Notes : An Area of approximately 5.8546 Sq.Km was builtup on 1 April 1967. The built up land in the contiguous municipal area was 3.94 Sq.Kms</p>	<p>Data Credits Corona Satellite Imagery, USGS; IGC</p> <p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<div style="text-align: right;"> </div> <div style="text-align: right;"> </div> <p style="text-align: right; font-size: small;">CRS : WGS 1984</p>	

Map 2.4: 1967 Built-up Land in Rajapalayam LPA

77°33.6'E

77°34.8'E



Legend

- New Ward Boundaries after 2021
- National Highway
- State Highway
- Major City Road
- Railway Line
- Kothankulam RF
- Village Boundaries
- Municipal Boundary

New Ward Boundaries in Rajapalayam Municipal Area

AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :
The Ward numbers and their Extents are renofified by Rajapalayam Municipality prior to the Local Body elections held in February 2022.

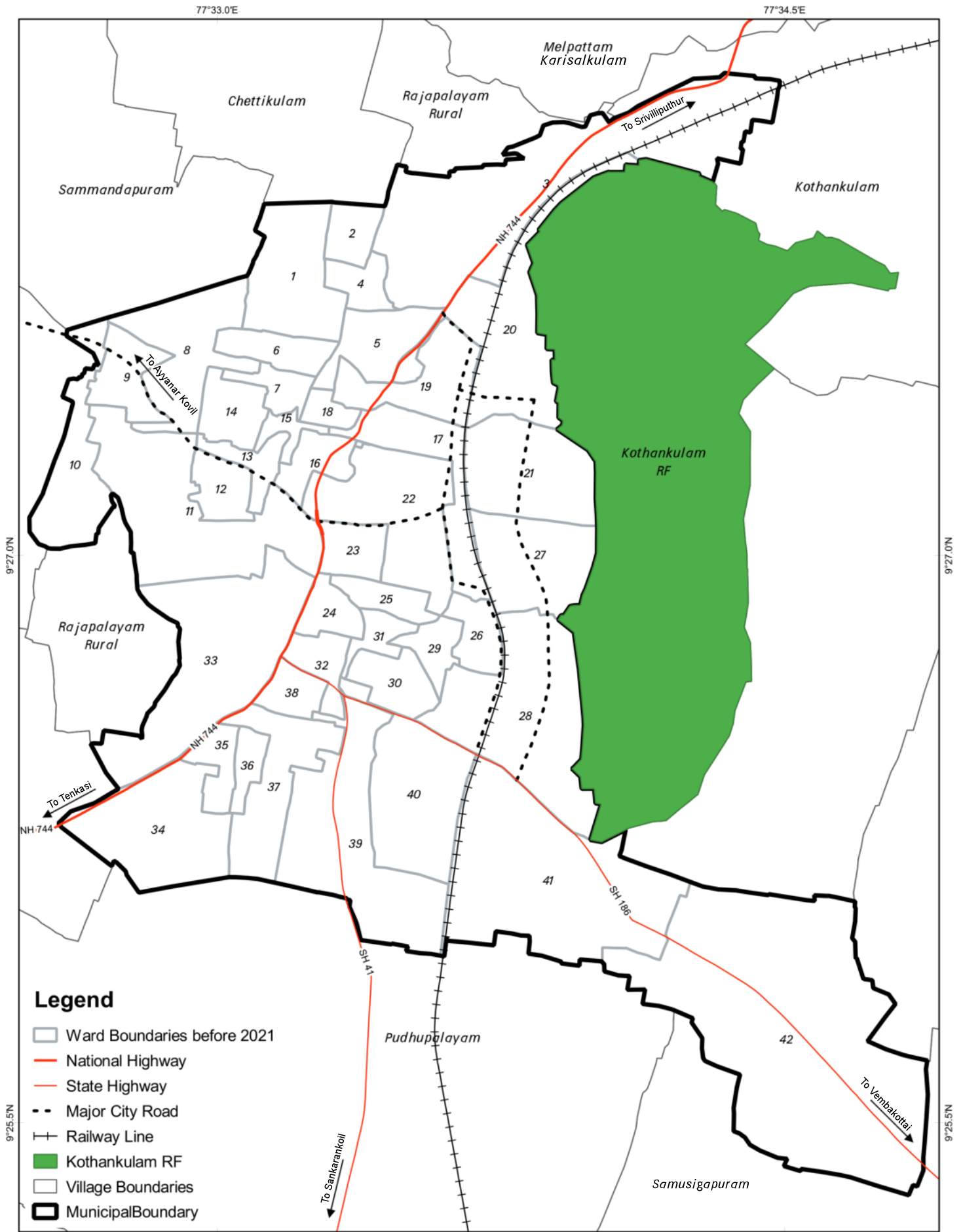
Data Credits
Rajapalayam Municipality

Client
DTCP Virudhunagar

Prepared By
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CRS : WGS 1984

Map 2.5: Current (New) Ward Boundaries in Rajapalayam Municipal Area



Legend

- Ward Boundaries before 2021
- National Highway
- State Highway
- Major City Road
- Railway Line
- Kothankulam RF
- Village Boundaries
- Municipal Boundary

Old Ward Boundaries in Rajapalayam Municipal Area

AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :

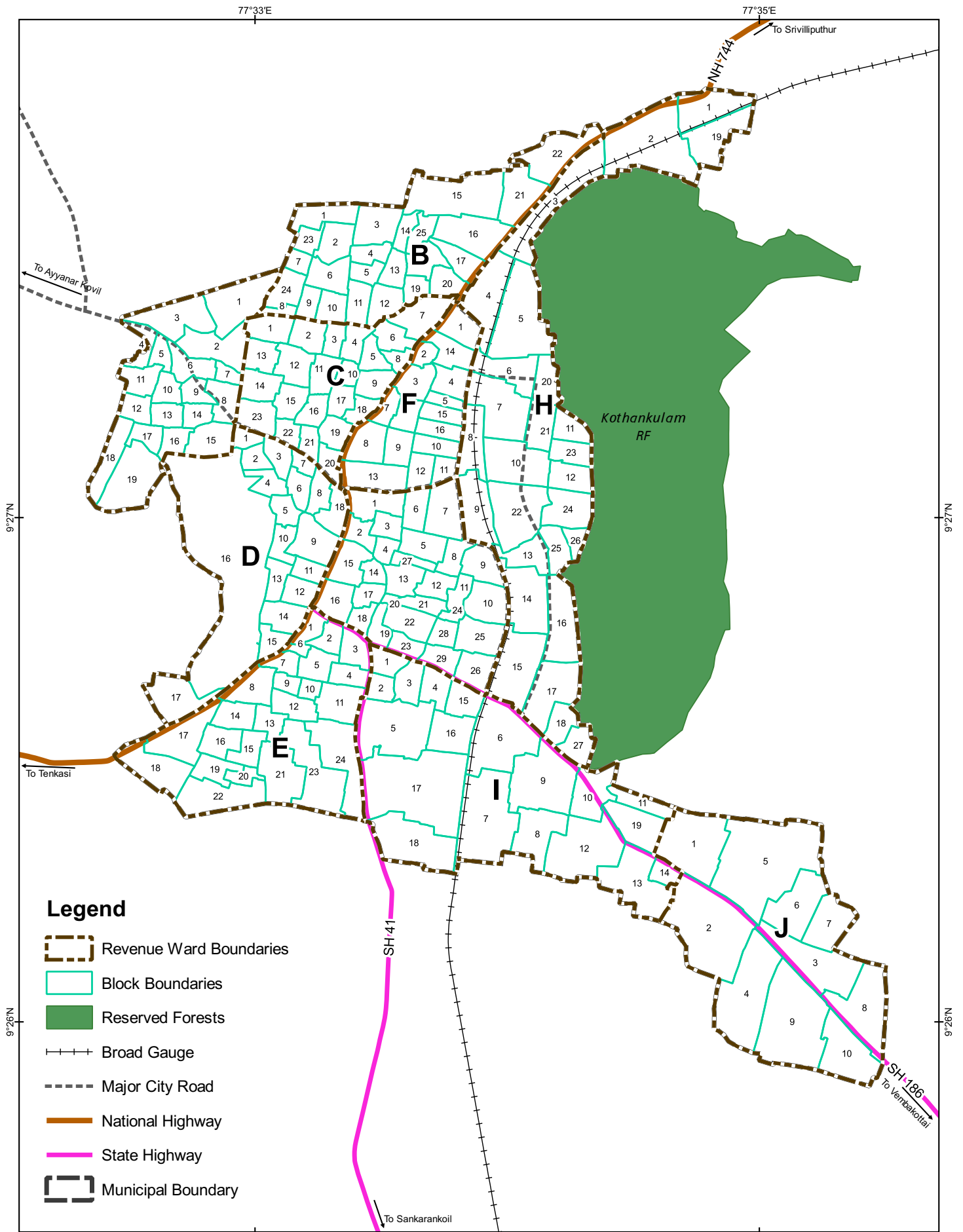
Data Credits
Rajapalayam Municipality

Client
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Map 2.6: Previous Ward Boundaries in Rajapalayam Municipal Area



Revenue Wards and Blocks
Rajapalayam Municipal Area

AMRUT Based Master Plan Preparation for
Rajapalayam Local Planning Area

Notes

Data Credits
Rajapalayam Municipality, Field Survey

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Prepared By
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CRS : WGS 1984

Map 2.7: Revenue Ward Boundaries in Rajapalayam Municipal Area

2.4.3. History and Development of Non-Municipal Area

There are very little historical records about the other settlements around the Rajapalayam town, even though there have been archaeological remains found in and around Rajapalayam inferring the presence of human settlements in the region from at least two thousand years ago. However, the developments in Chathrapatti, the next major cluster after Rajapalayam (rural) and Chettikulam can be traced to within last five hundred years. These have been documented in a Tamil book titled “The History of Rajapalayam”, authored by Mr. R. Vaithialingam and published in the year 1959.

The Vanniyampatti Road which passes through Chathrapatti was once called “Mangammal Road” named after Rani Mangammal, the 11th ruler of the Madurai Nayak Dynasty (1689-1704), who was renowned for her able administration and for carrying out infrastructure projects throughout her kingdom. This road historically connected Srivilliputhur to Sankarankoil. A choultry/ chatram was constructed here and hence the name Chathrapatti. In the 1967 built-up Map (**Map 2.4**), we can infer that Chatrapatti had the next significant cluster of development after Rajapalayam. Eventually Chathrapatti has turned into a hub for surgical cottons in India. It falls under Samusigapuram revenue village. It is interesting to note that in the British maps created pre-independence, Samusigapuram has been mentioned as “Samsheer Khan Puram”, which eventually would have become Samusigapuram.

Chettikulam village was noted to have been granted as an Inam by the Nayak kings to the Brahmin families to ensure that the “Pannguni Urchavam” festival of the Srivilliputhur Andal temple can be conducted.

2.5 Natural Settings of the Region

2.5.1. Srivilliputhur–Megamalai Tiger Reserve

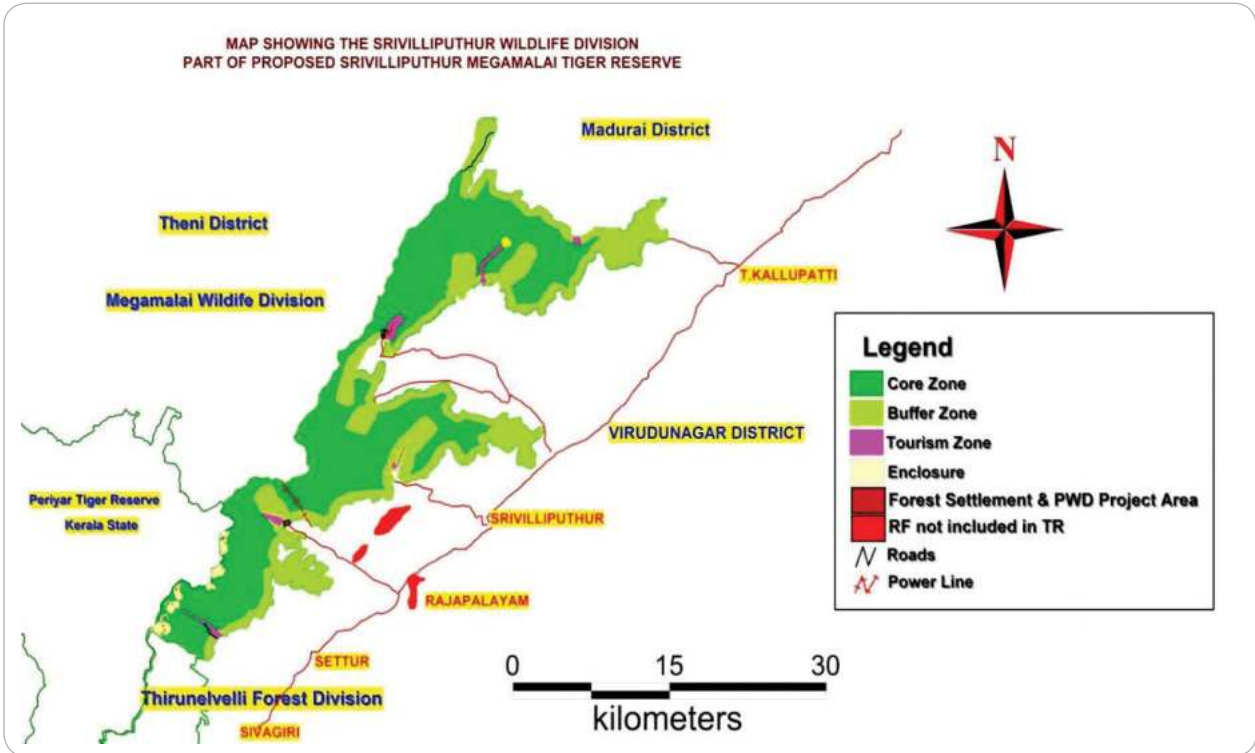
The Srivilliputhur – Megamalai Tiger Reserve (SMTR) was notified under Section 38 V of the Wildlife (Protection) Act, 1972 in accordance with the recommendation made by the Government of India, Ministry of Environment, Forest and Climate Change, National Tiger Conservation Authority. As per the GO, the Tiger Reserve will comprise of the existing Megamalai wildlife division and Srivilliputhur Grizzled Squirrel wildlife sanctuary (**Fig. 2.3**).

SMTR is a part of the Periyar–Agasthyamalai Landscape in Southern Western Ghats, which is ranked as one of the world's top 12 'Mega Biodiversity' hotspots. SMTR harbours large number of endemics, endangered and vulnerable flora and fauna viz., lion tailed macaque, nilgiris tahr, the giant grizzled squirrel, slender loris and has interspersing shola forests and meadow grasslands. It has a great diversity in forest type from dry umbrella thorny forest to evergreen forest and has significant population of charismatic species like the tiger and elephant. It is the source and catchment for rivers like Vaigai, Vaipparu and Suruli.

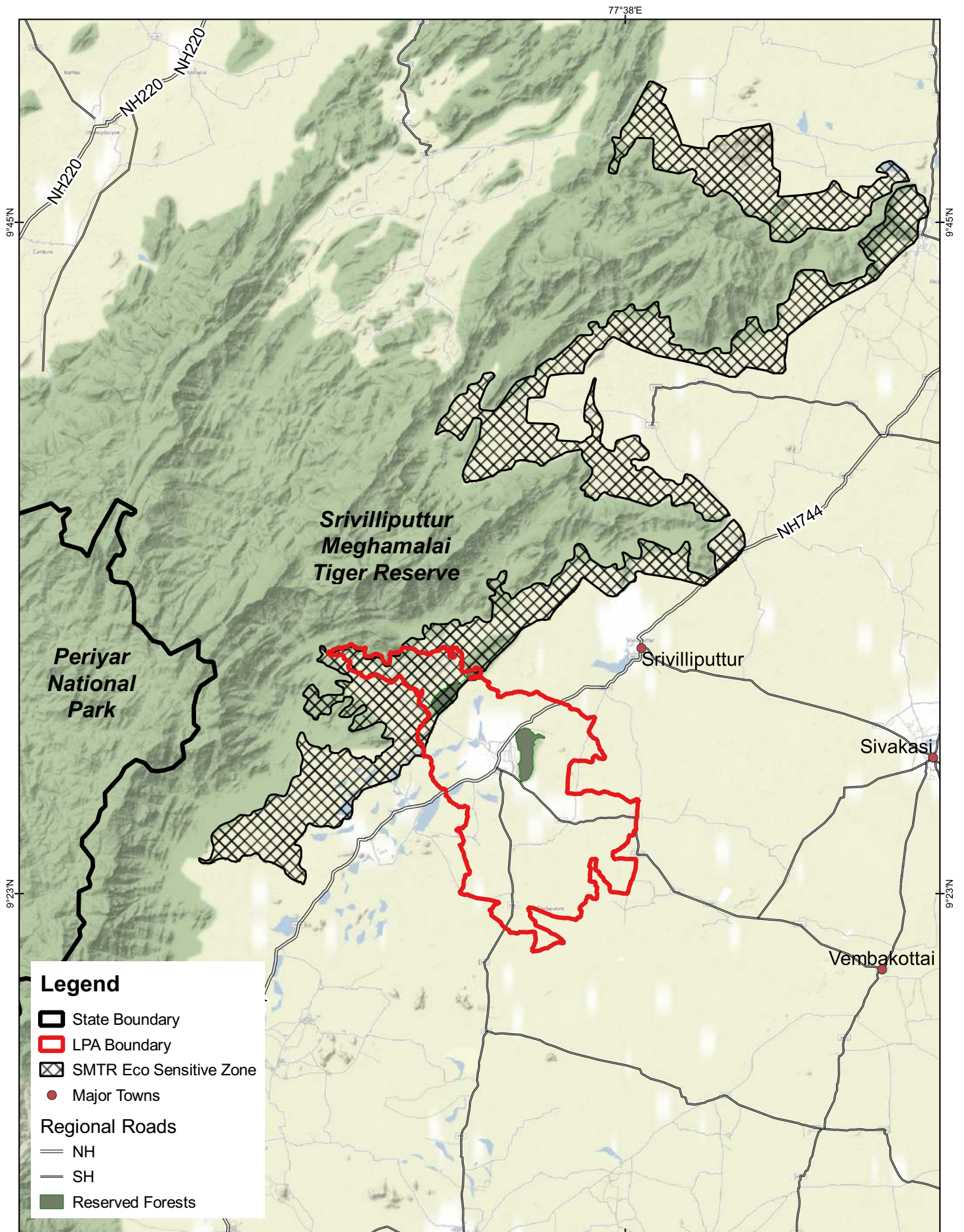
It is a critical Tiger Habitat and located in the critical tiger corridor ensuring gene flow in the landscape (Anamalai TR to KMTR). It has the only elephant corridor (Saptur corridor) of southern Western Ghats and has around 250 bird species and 118 endemic flora. The SMTR–Periyar Tiger Conservation Unit has been estimated to have the potential to hold a minimum viable population of 20 breeding female tigers. As per the 2015 census, the estimated population of leopard was 44 individuals in the Srivilliputhur Wildlife Sanctuary alone. The concept notes as mentioned in the G.O reads as follows – 'Tiger disperses in large areas. Such dispersals are important for the exchange of genes. This process is essential for long term growth of a population. In Tamil Nadu, Anamalai Tiger Reserve (ATR) provides one of the largest habitats for the tigers and other co-predators. However, environmental stress factors such as availability of prey, availability of potential males, and presence of human caused disturbances could make the tigers move and give rise to meta-populations that could generate more genetic resources for the populations to grow further. The forested habitats of the Srivilliputhur regions, which are largely uninhabited and undisturbed, provide excellent buffering grounds to the tigers of Periyar Tiger Reserve as much as they can offer excellent genetic exchange grounds for the tigers of Anamalai regions. Tiger is an ecosystem umbrella species - survival and growth of several of the co-predators and other species could be directly correlated to the growth of tigers.'

SMTR is spread over 1,016.5713 sq.km or 1,01,657.13 ha. As per the National Tiger Conservation Authority (NTCA), of the total 1.01 lakh ha, 64,186.21 ha will be under the core area and 37,470.92 ha will fall under the buffer zone. Of the total buffer zones earmarked, 1,600 ha falls under the LPA (Map 2.8). At present 12 tigers were camera trapped as of 2022 in the SMTR, out of which 3-4 were recorded in the Rajapalayam–Srivilliputhur division.

Fig 2.3: **Extent of Srivilliputhur–Megamalai Tiger Reserve**



(Source: Ministry of Environment, Forest and Climate Change website)



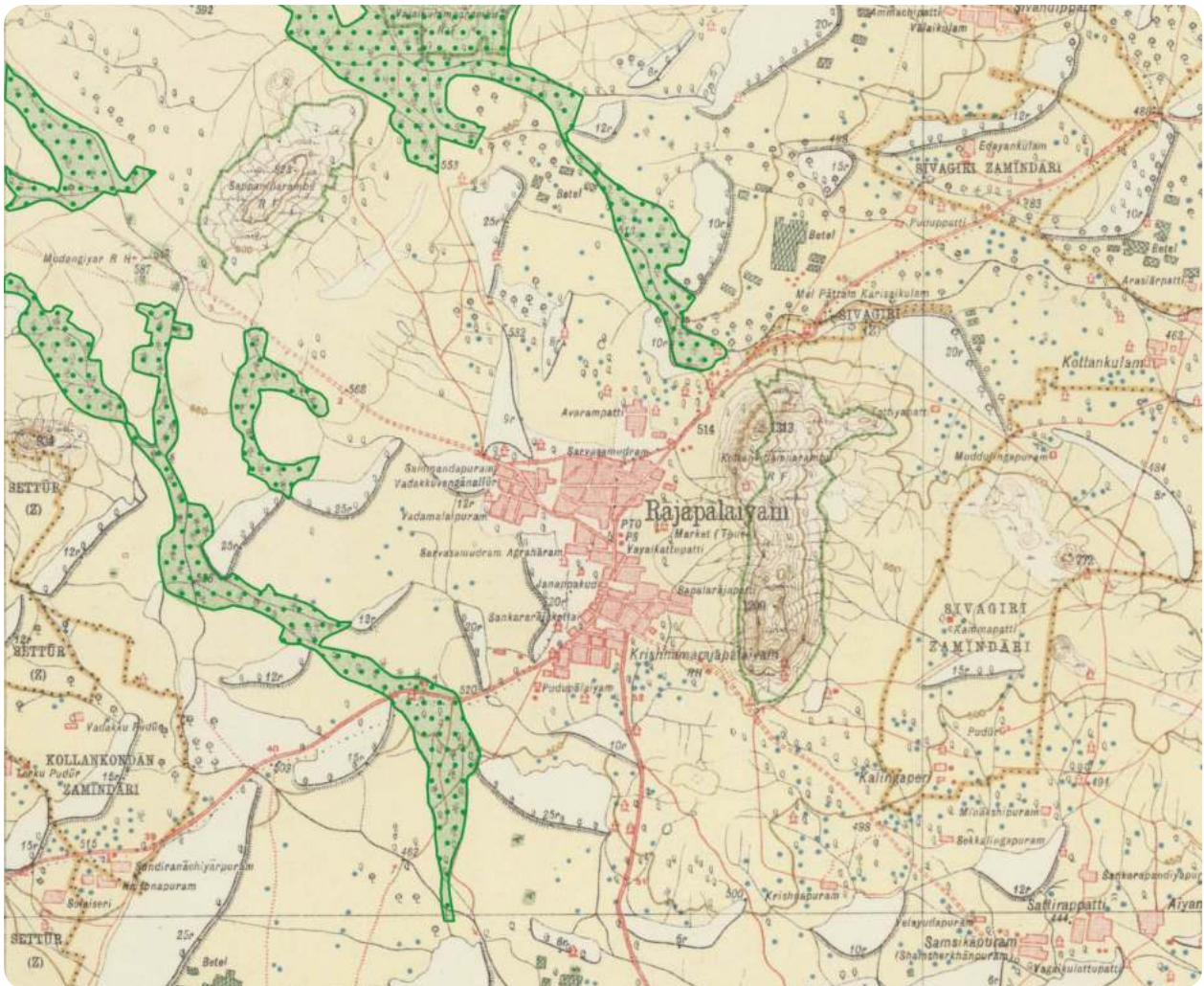
Extent of Eco Sensitive Zone in Rajapalayam LPA	Notes :	77°38'E Data Credits Forest Department, GoTN; Stamen Base Map	 0 2.5 5 km CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 2.8: Extent of Eco-Sensitive Zone in Rajapalayam LPA

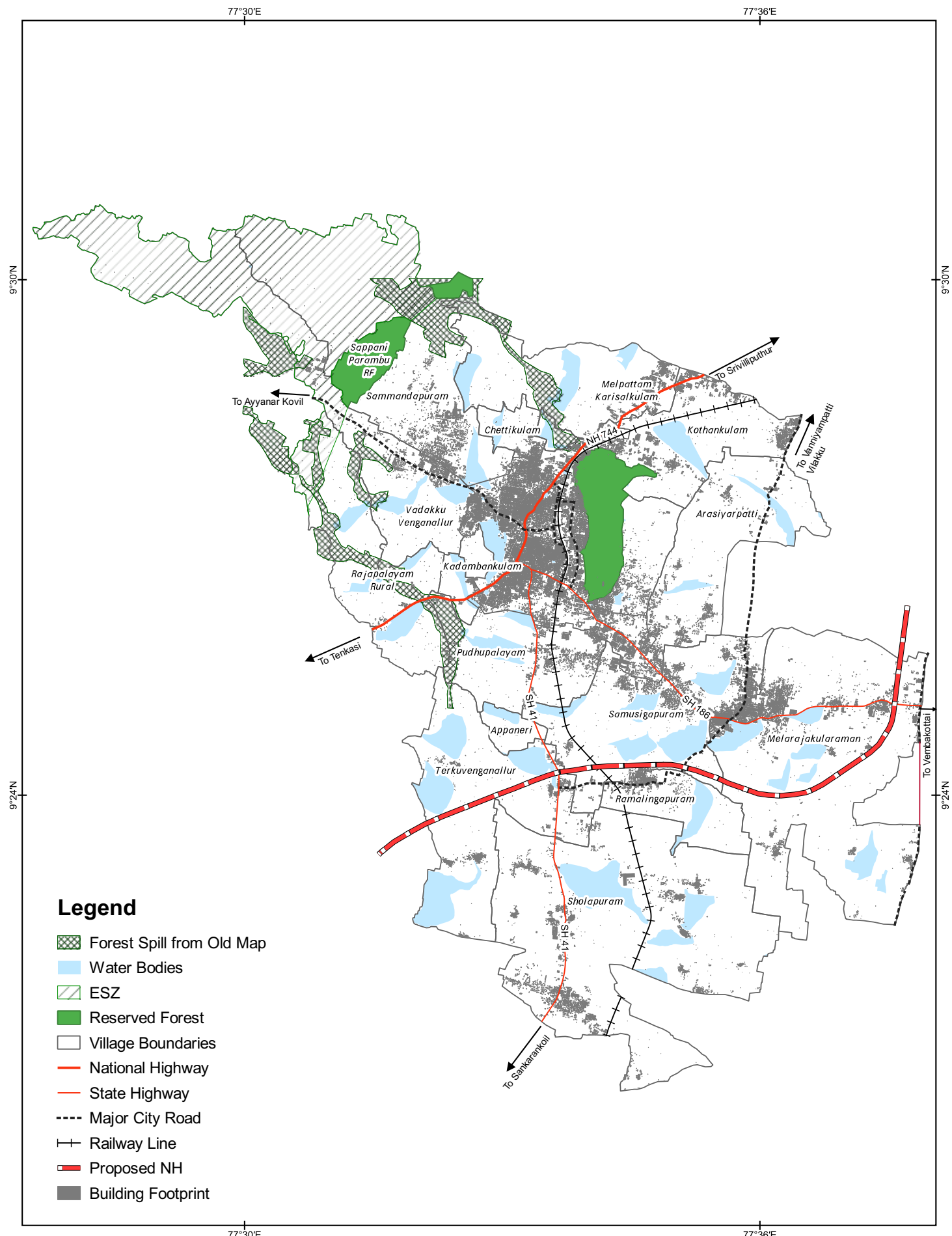
2.5.2. Ecological History of Rajapalayam

Rajapalayam is an area of outstanding natural beauty. The backdrop of the Western Ghats, the abundance of water bodies, the presence of iconic wildlife and the rich cultural associations to be found in connection to the local nature, Sanjeevi Malai being one such example, are pieces of the puzzle that make up the identity of Rajapalayam. From a historical perspective, the Survey of India toposheet from 1921 shows connections between the Western Ghats and the smaller hills like the Sanjeevi Malai and Sappani Parambu, which are part of the LPA (Fig. 2.4 & Map 2.9). These connections were existing along the rivers flowing out of the hills. It can be observed in the 1921 map that two strips of green corridors are crawling down into the existing LPA with the left strip almost extending past the Municipality on the left. The right strip can be seen extending till present municipal area.

Fig 2.4: 1921 Survey of India Map of Rajapalayam



(Green corridor stretches highlighted in green)



Vegetation Patch from SOI 1921 Map Overlaid on Rajapalayam LPA

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Notes :
The map has been taken from the Scotland Library Website, and is Georeferenced to digitise the extent

Data Credits
Scotland Library (maps.nls.uk)

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CRS : WGS 1984

Map 2.9: 1921 Vegetation Overlaid on Map of Rajapalayam LPA

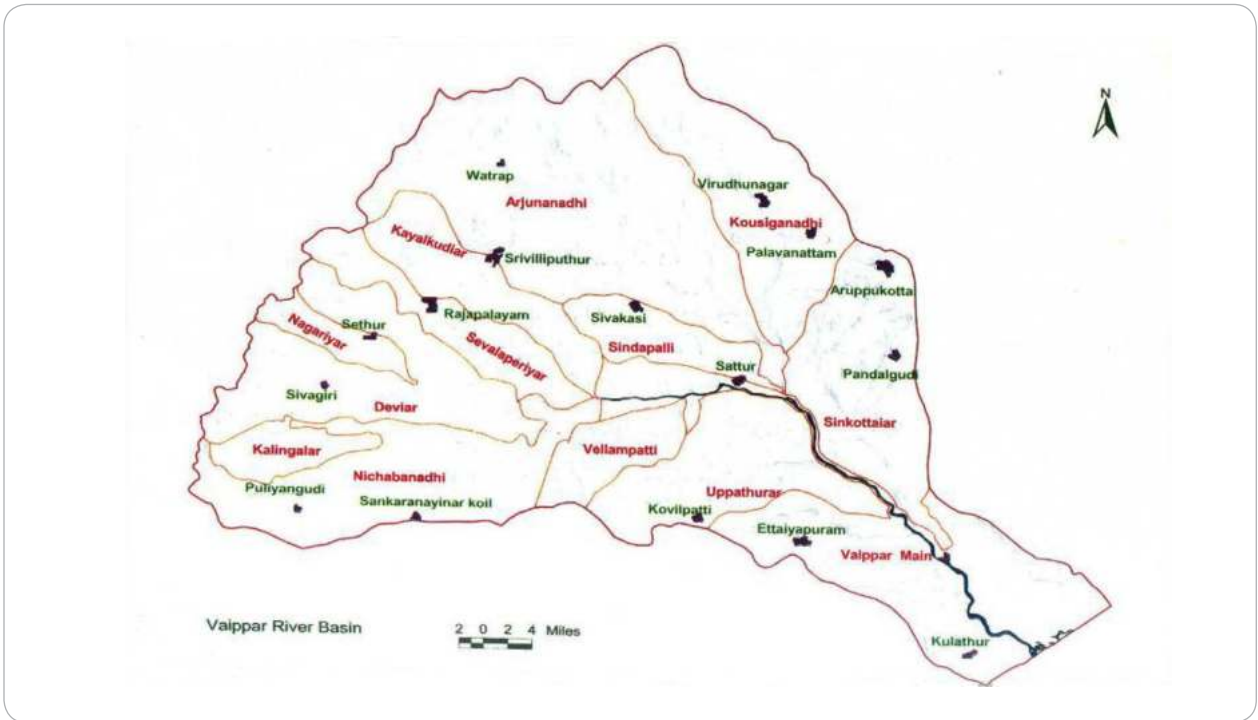
2.5.3. Vaippar Basin

Rajapalayam LPA is part of the Vaippar river basin and covers a significant portion of it. All the streams congregate closely near the town of Vembakottai, where a reservoir is constructed and then drains into the Bay of Bengal at the Gulf of Mannar. The Vaippar basin has 13 designated sub-basins namely Nishabanadi, Kalingalar, Deviar, Nagariyar, Sevalaperiyar, Kayalkudiar, Vallampatti odai, Sindapalli uppodai, Arjunananadhi, Kousiganadhi, Uppathurar, Sinkottaiyar and Vaippar (**Fig. 2.5**). The entire Rajapalayam LPA falls in the Vaippar river basin (**Map 2.10**).

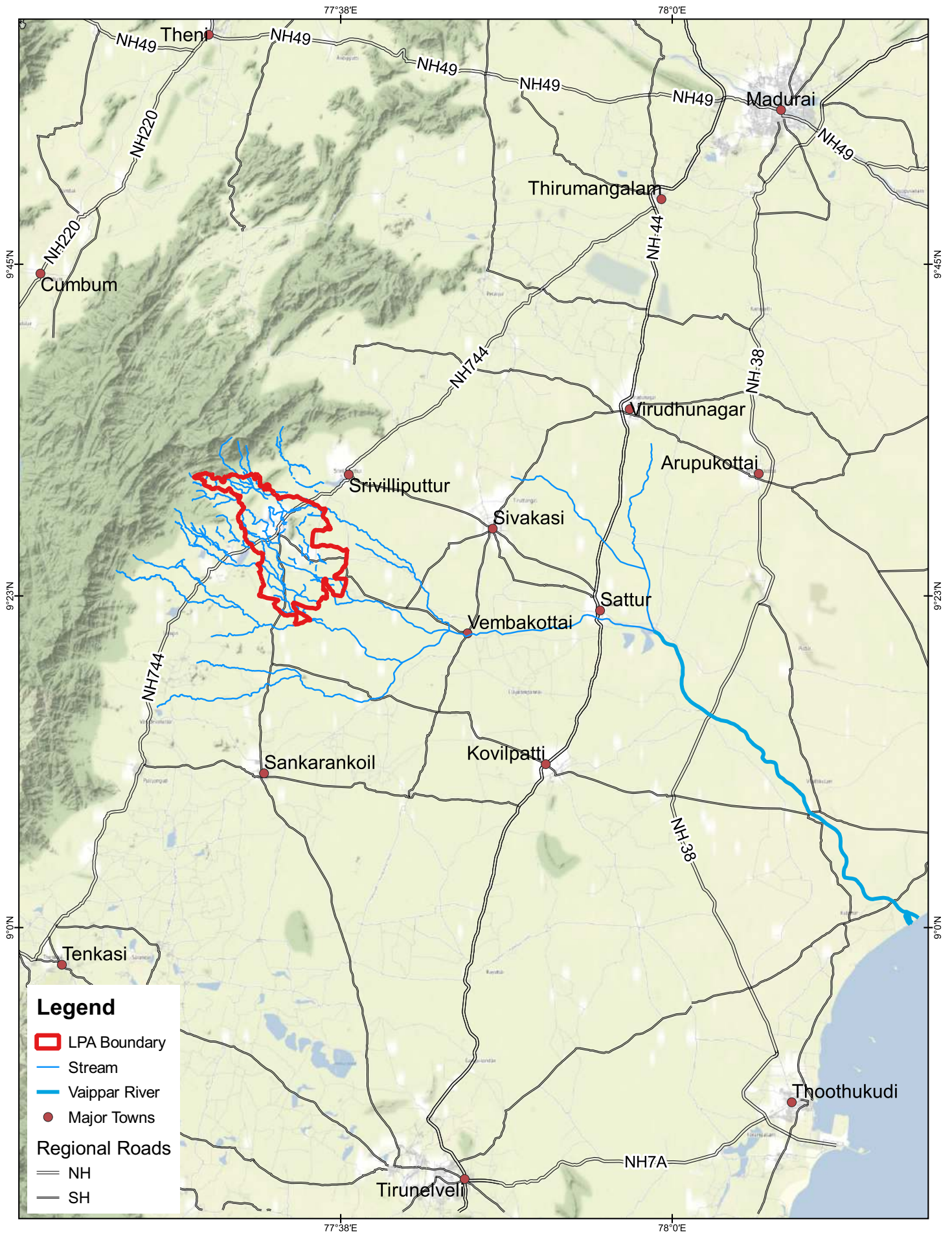
- The Mudangiyaru originates at Srivilliputhur RF, flows south-eastward until Sappani Parambu RF, and then it takes a turn to the south and flows through Rajapalayam rural and Terkuvenganallur.
- Kalar also originates from Srivilliputhur RF, flows within the LPA more or less parallel to the boundary of LPA on the north, and exits the LPA after Kothankulam. It joins the other streams and is called Kayalkudi River.
- The streams from Srivilliputhur RF that pass through the gap between Valaikulam RF and Sappani Parambu RF on the north-west of the LPA, crisscross the villages of Sammandapuram, Chettikulam and Melpattam Karisalkulam. They join together at Melpattam Karisalkulam village and continue to flow eastward into Kothankulam as Kayalkudi River.
- The Piravadi River originates in Settur RF, flows south-eastward and enters the LPA at Terkuvenganallur. They merge as one in Sholapuram and flow as the Sholapuram River. The Sholapuram River flows south-eastward and joins the Solaiseri River at the weir just north of Kil Sendthattiyapuram.

Sevalaperiyar sub-basin (also referred to as Sevalaperiyar–Mudangiyaru) is a tributary to Vaippar River. The total drainage area or basin area of this sub-basin is 225 sq.km, of which 49.5 sq.km comes under hilly catchment. The entire Rajapalayam Local Planning Area falls under this sub-basin. According to the DPR prepared for the sub-basin by Tamil Nadu Water Resource department, under TN–IAMWARM (Tamil Nadu - Irrigated Agriculture Modernization and Water bodies Restoration and Management) project, the river does not have any specified ayacut but the chain of tanks feeding into it act as the source of ayacut. Thus, any development related work especially regarding water bodies management in the Rajapalayam LPA has a major impact on the Vaippar Basin.

Fig 2.5: **Extent of Vaippar Sub-Basin**



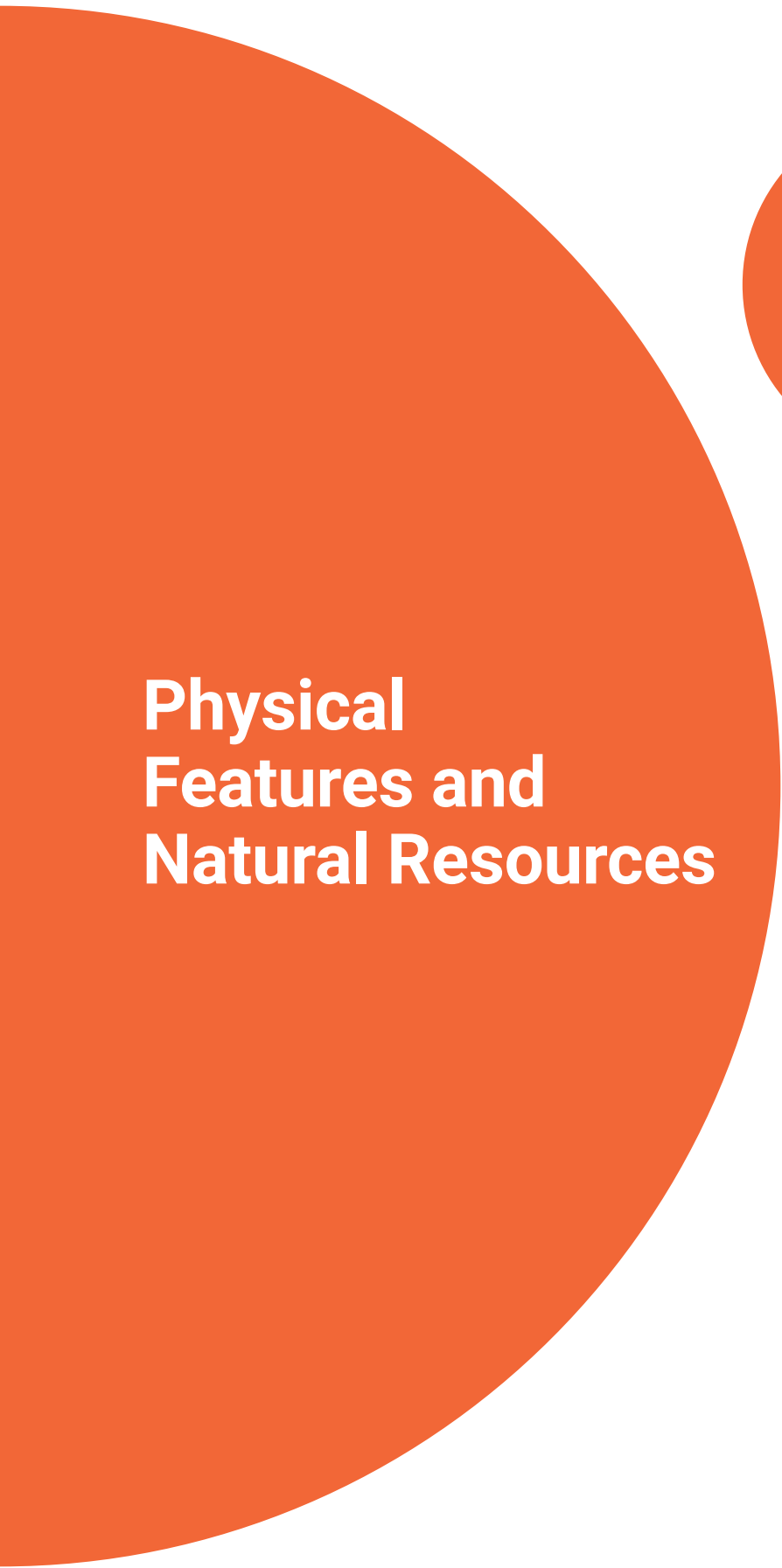
(Source: WRD)



<p>Vaippar River - Tributaries and Significance in Rajapalayam LPA</p>	<p>Notes : The Streams depicted are for representation purpose only and do not depict the stream orders in the catchment.</p>	<p>Data Credits Google Earth Imageey, TN IAMWARM Sub Basin Maps</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 2.10: Vaippar River Basin



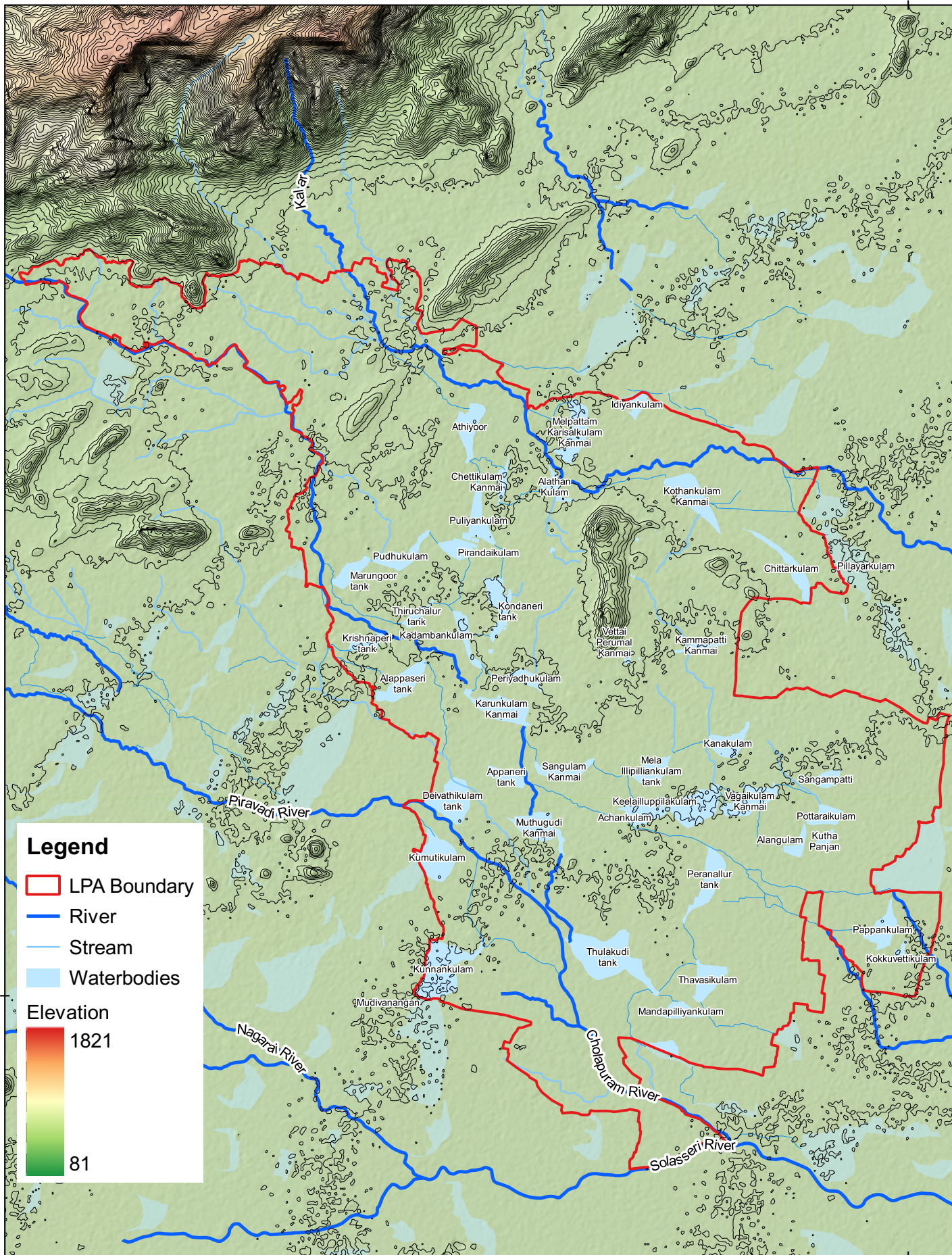


**Physical
Features and
Natural Resources**

3.1

Major Physical Features

- The LPA lies on the eastern foothills of the Western Ghats, at a distance of about 10-12 km. The town is located at a latitude of 9.4515° N and longitude of 77.5543° E, at an altitude of about 156 m to 175 m above MSL, while the minimum and maximum elevations within the LPA are 117 m and 401 m respectively.
- The terrain is mostly flat or with slight slopes, around hills like Sappani Parambu RF and Sanjeevi Hills (Kothankulam RF). The drainage is mostly from the north-west towards the south-east.
- Rocky outcrops and hillocks are major features within the LPA, prominent among them being the Sanjeevi Hills (Kothankulam RF) on the eastern side of the town, about 3 km in length along the north-south orientation, acting as the physical boundary of the town. The second Reserved Forest is the Sappani Parambu RF to the north-west of the town. These scrub forests are home to diverse flora and fauna like the Indian Jackals, Peacocks, etc.
- There are 41 irrigation tanks in the LPA (**Map 3.1**); they range in size from 6 to 120 ha. The total area covered by the tanks is 1,350 ha. 39 of the tanks are in use for agricultural purposes.
- The Kondaneri kanmai tank, an agricultural tank, lies on the western side of the town. Numerous small tanks, seasonal streams and agricultural fields mark the physical features in the rest of LPA.
- According to the Bureau of Indian Standards (BIS), Rajapalayam town falls under Zone III on the macro seismic intensity scale and the project area falls under MSK VII (Moderate Damage Risk Zone).
- The Srivilliputhur-Megamalai Tiger Reserve, an offshoot of the eastern slopes of the Western Ghats lies to the west of the LPA region. Ayyanar Kovil forest area, a scenic tourist area, is located 10 km west of Rajapalayam town, on the eastern slopes of the foothills of Western Ghats with streams, waterfalls, springs and a hill temple. Hill trekking in this forest area is one of the main recreations for Rajapalayam residents and people from neighbouring areas.
- The major rivers that originate in the Western Ghats pass through the LPA; they are Mudangiyaru to the north-west, Kalar river to the north and Piravadi River to the west. They are all tributaries of Vaippar River.



9°23'N

9°23'N

Physical Features in and Around Rajapalayam LPA
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :
 The Contours here are extracted using SRTM DEMs using GIS analysis

Data Credits
 SRTM Digital Elevation Model, USGS; IGC

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77°38'E

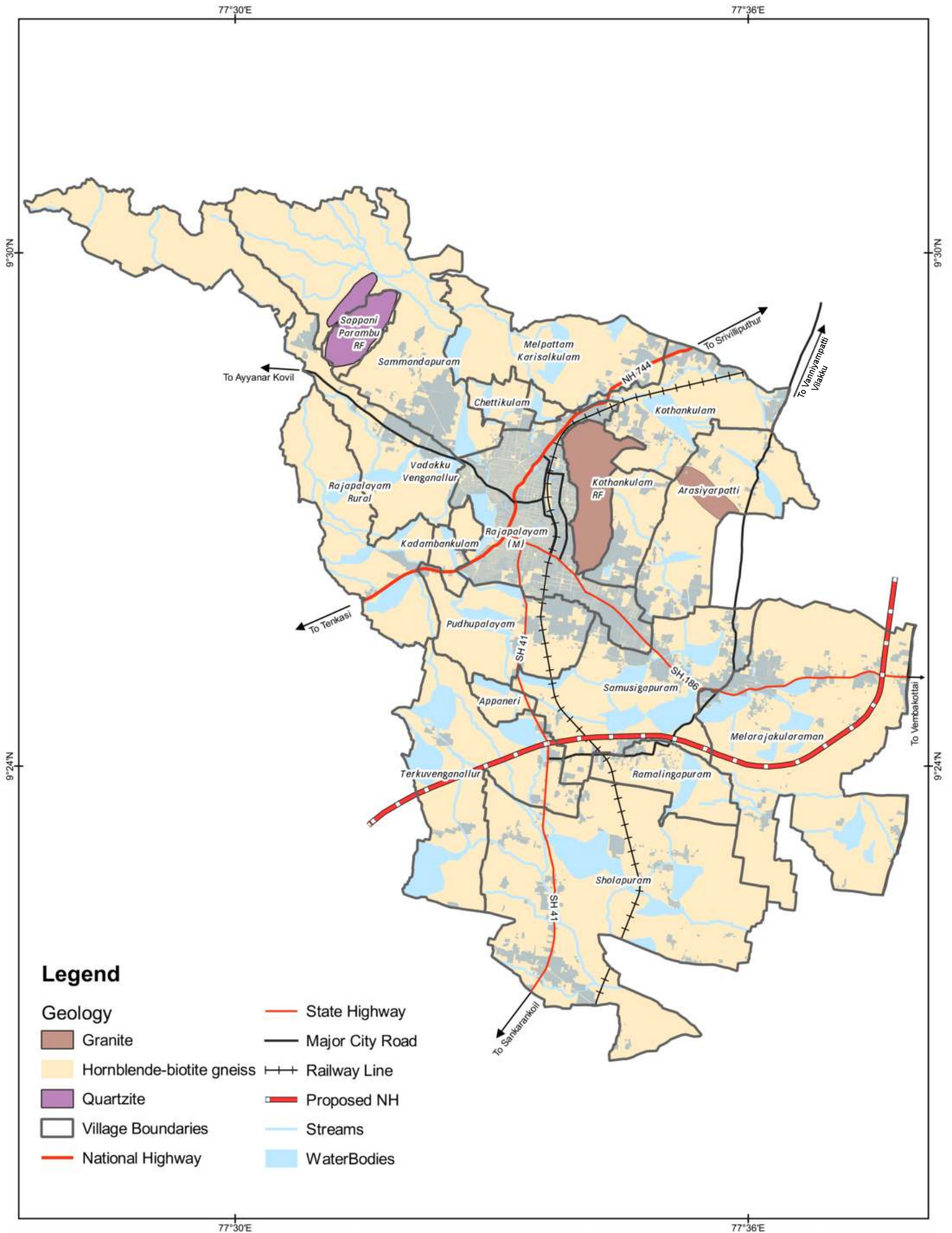
CRS : WGS 1984

Map 3.1: Physical Features of Rajapalayam LPA

3.2 Geology

The geology in the LPA is millions of years old. Geologically the bedrock is of hard-crystalline formation of Archean age. They fall in two area groups - the Archean (4,000 to 2,500 ma) and the Proterozoic (2,500 to 600 ma). The rocks, in increasing order of age, are the Granite in Proterozoic; and in the Archaean, the Hornblende-biotite gneiss, Charnockite (Hypersthene granite, rarely occurring in the LPA) and Quartzite. Almost 90% of the study area is of Hornblende-biotite gneiss, Sappani Parambu RF lies over Quartzite rock. The mythological Sanjeevi hill is of Granite origin and another small patch of granite is encountered on the western side of the Sanjeevi hill. The Granite in Sanjeevi Malai and adjoining patch are massive rocks.

The Hornblende Biotite gneiss is hard, foliated, easily weathered rock. The Quartzite occurs as hard, massive, layered rock with softer patches (**Map 3.2**). Aquifer systems of the area are mainly found in the Hornblende-biotite gneiss.



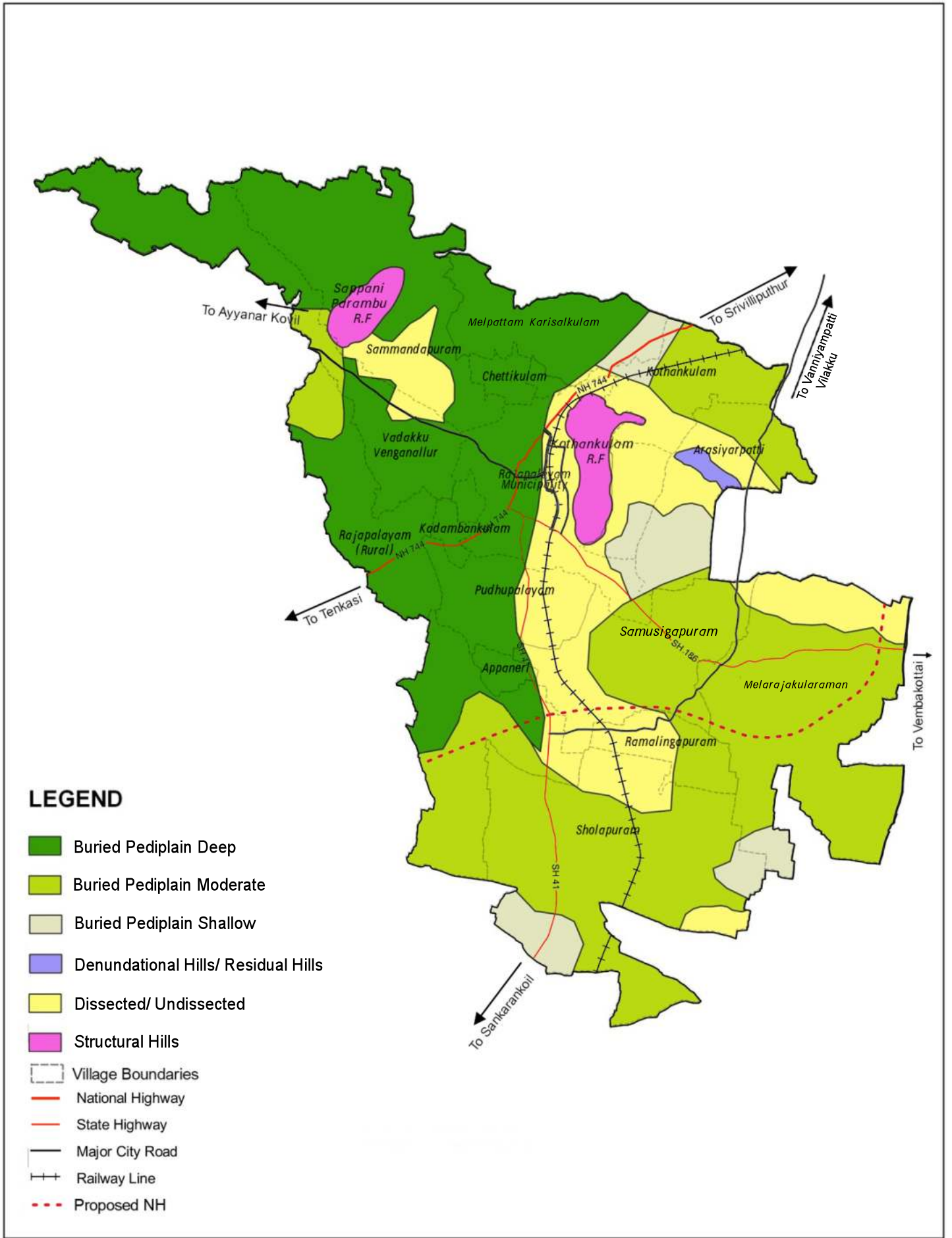
<p>Geology in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits Geological Survey of India</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 3.2: Geology of Rajapalayam LPA

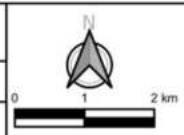
3.3 Geomorphology

Geomorphology for the study area was interpreted using the satellite image along with field verification and has been broadly classified as pediplain, denudational hill, dissected plateau and structural hill. More than 70% of the area falls under pediplain, the landform formed by the disintegration of country rock. The pediplain are further classified as buried pediplain deep, buried pediplain moderate and buried pediplain shallow based on the thickness of the soil. Generally, when thickness of soil ranges from 1 to 5 m it is buried pediplain shallow, if the soil thickness is between 5 to 10 m it is referred as buried pediplain moderate and when the thickness of the soil is more than 10 m it is called as buried pediplain deep.

Apart from the pediplain, the study area is covered by dissected/ un-dissected or less dissected topography predominantly found adjacent to the Sanjeevi hills. There are two structural hills and one denudation/ residual hill. Sanjeevi hill (Kothankulam RF) and Sappani Parambu RF are the two structural hills that lie in the study area. **(Map 3.3)**



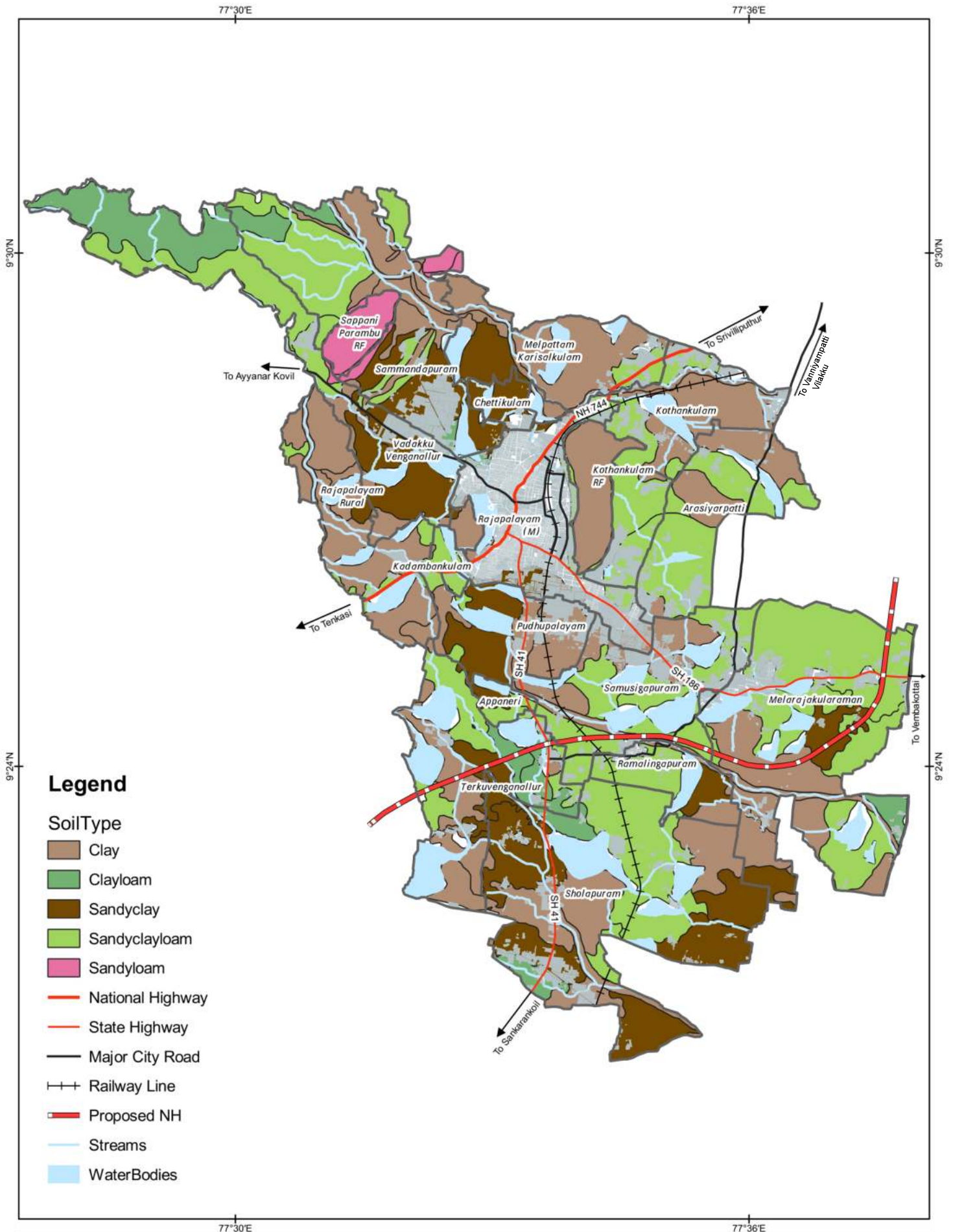
Geomorphology Map	Notes and Inferences :	Data Credits GeTS Consultants
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio



Map 3.3: Geomorphology of Rajapalayam LPA

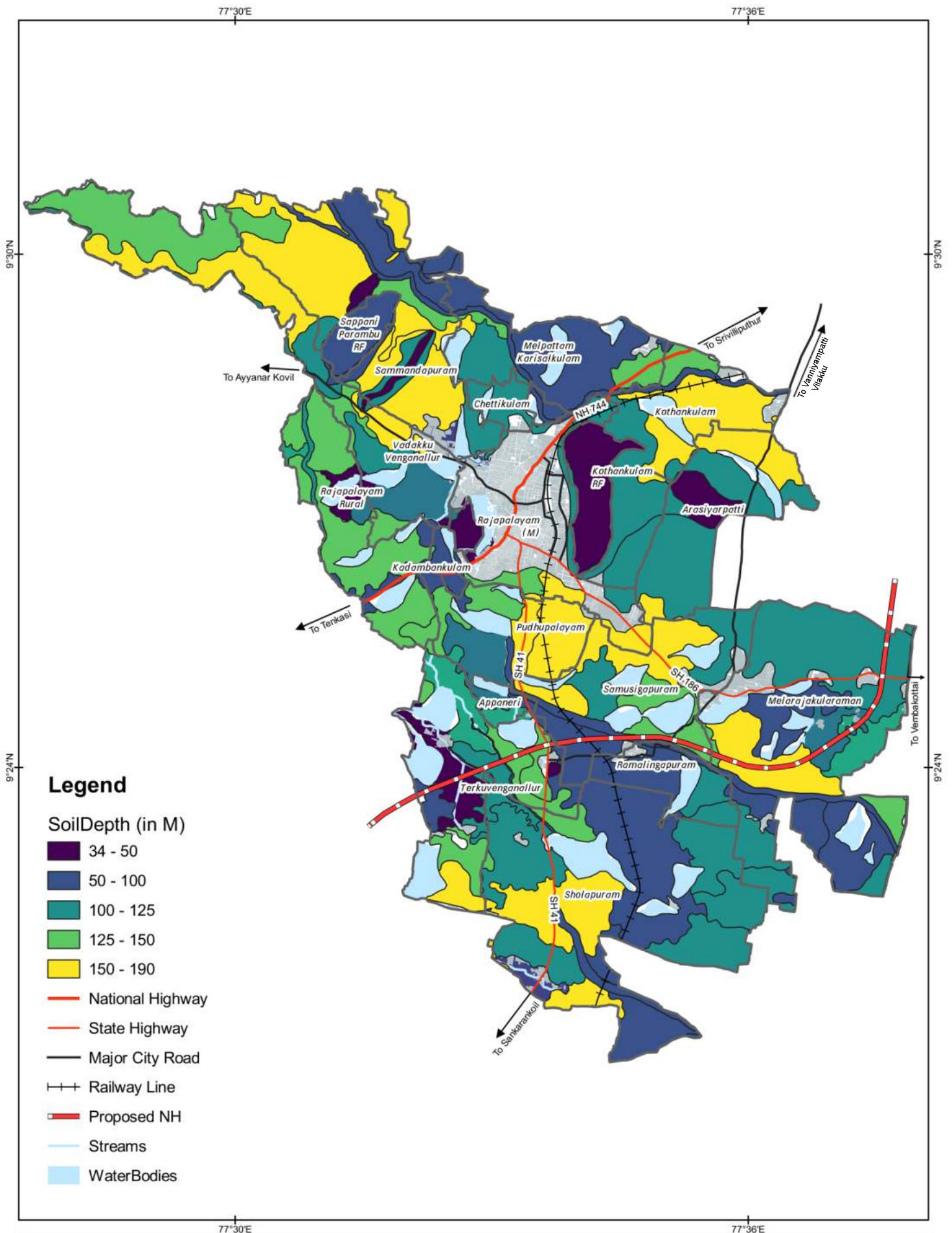
3.4 Soil Type

There are a variety of soils in the LPA. The soil along the streams is clayey in nature but the predominant soil type of the LPA is sandy and moderately well drained clayey soil. Gravelly clay soils are seen at the foothills of the Western Ghats (**Map 3.4**). Very deep clayey soils are interpreted near Ayyanar Kovil. Deep, well-drained clayey soils were found on the foothills on undulating lands. Loamy-skeletal mixed ustropepts were found in the central part of the study area, followed by a major portion of the area covered by loamy-mixed, lithic ustorthents. Gravelly loam soils were found on the southern part of the study area. Very small portions of Clayey soil on undulating land with fine mixed type rhodustalfs are observed in the western side. The soil depth ranges from 30 cm to about 2 m in this region (**Map 3.5**). There are no incidences of land subsidence in the project area.



Soil Type in Rajapalayam LPA	Notes	Data Credits TN Agriculture University, Geological Survey of India	 CRS : WGS 1984
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Map 3.4: Soil Types in Rajapalayam LPA



Soil Depth in Rajapalayam LPA	Notes	Data Credits TN Agriculture University, Geological Survey of India	  CRS : WGS 1984
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Map 3.5: Soil Depth in Rajapalayam LPA

3.5 Climatology

3.5.1. Temperature

The climate of the Rajapalayam block can be classified as a semi-arid, tropical monsoon type of climate as per the Koppen Climate Classification. Late April till early-June are the hottest months of the year. Temperature data from 2010 – 2020 shows similar temperature patterns with the hottest months being experienced between the end of March till early-June (**Fig. 3.1**). May 2019 is recorded as the hottest month in the last decade, with the maximum temperature reaching 39°C. The cooler months in a given year are from October till February, when the minimum temperature ranges from 16°C to 19°C (**Fig. 3.2**). Similarly, 2016 recorded 16°C as the lowest in the last decade. The average maximum temperature is 33°C and the average minimum temperature is 21°C.

Fig 3.1: 10-Year Temperature Data - Min & Max

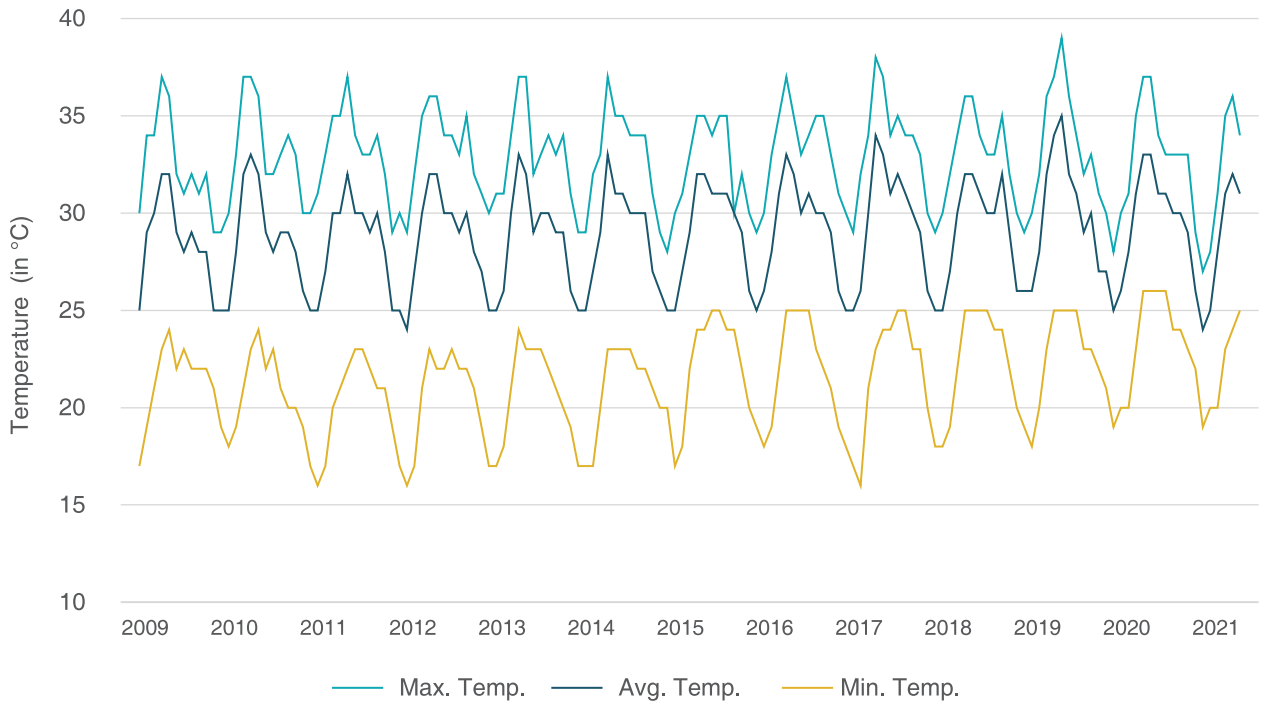
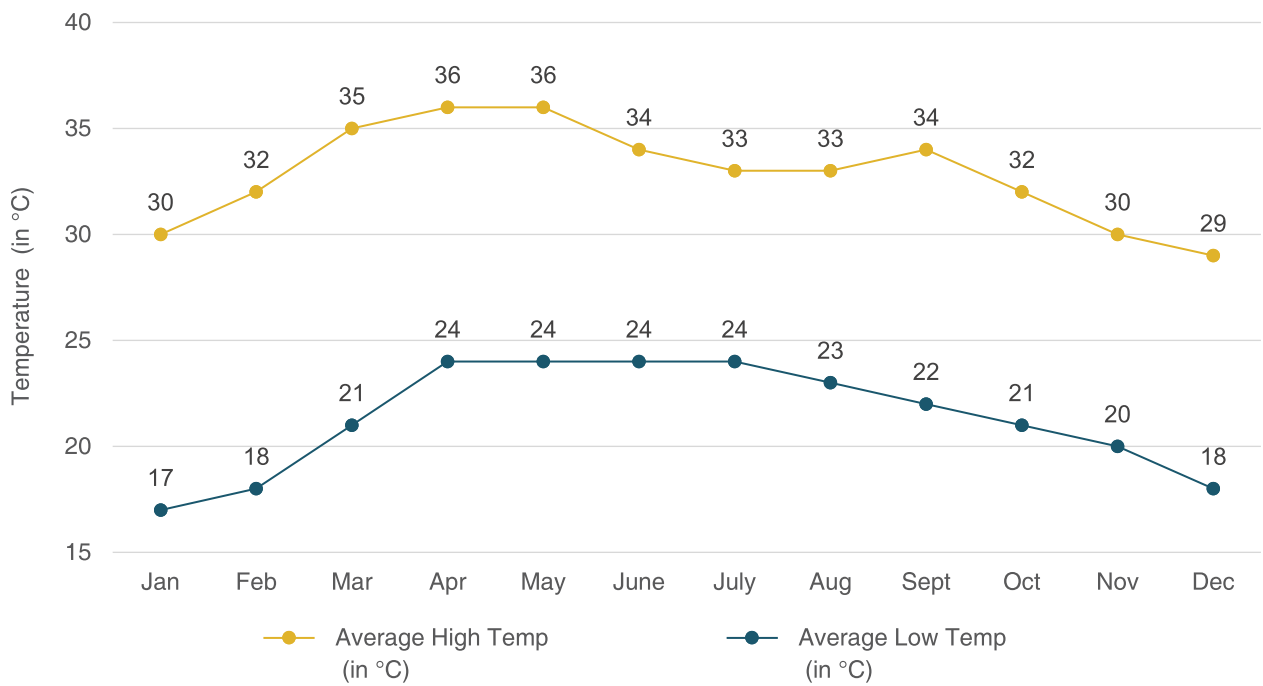


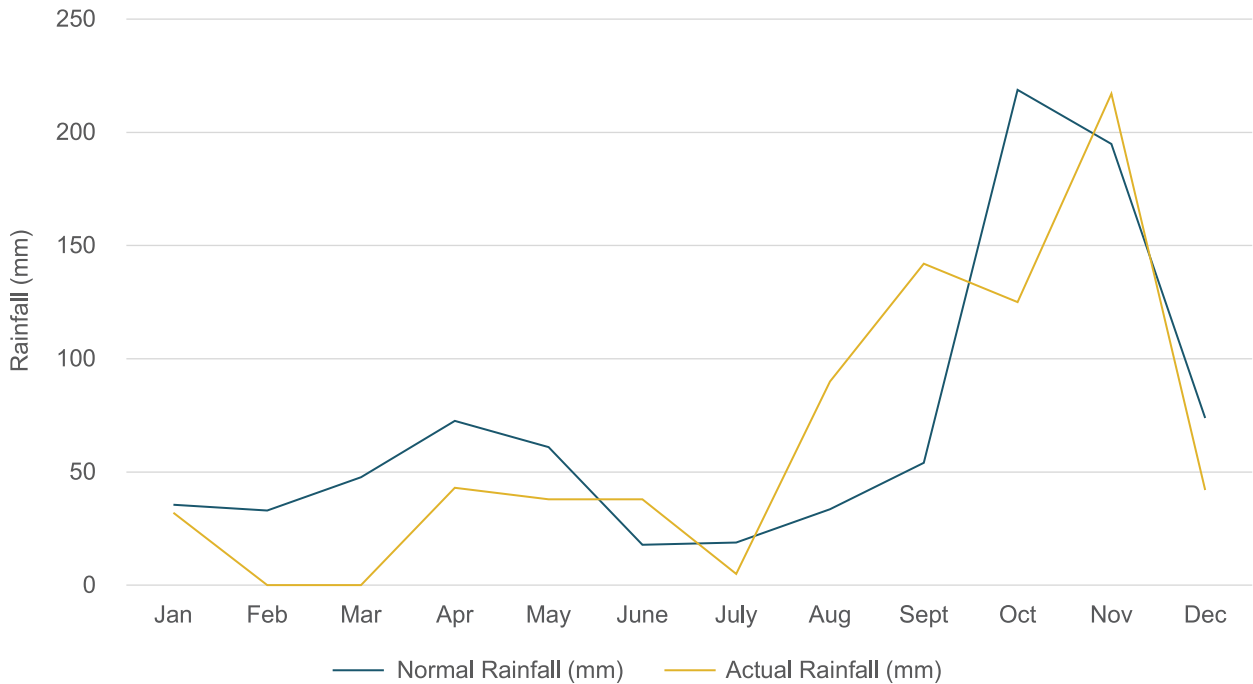
Fig 3.2: Average Temperature in 2019



3.5.2. Rainfall

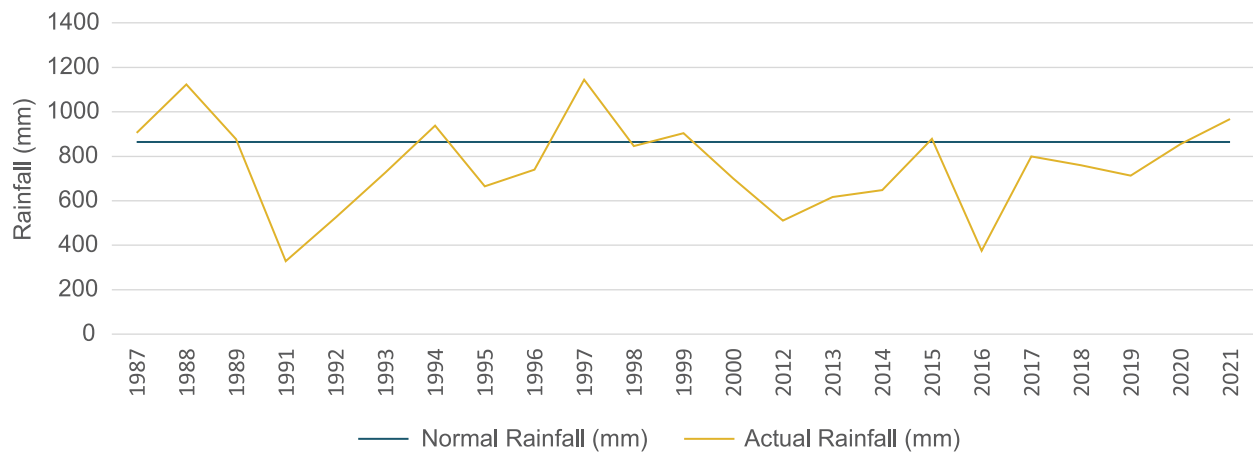
Rajapalayam block has two functioning rain gauge stations, one in Rajapalayam and the other in Devadanam, where rainfall data is recorded every day. There is also an automatic rain gauge station directly controlled by the IMD. Rainfall data was collected from the Indian Meteorological Department (IMD) and TWAD Board for the study area. The average Annual Rainfall for the study area is 865 mm. Rajapalayam receives rainfall from both monsoons, south-west (June–September) and north-east monsoon (October–December). The south-west monsoon brings scanty rain. The majority of the rainfall is normally received during the months of October to December (Fig. 3.3). Salubrious climate is experienced post-monsoon up to March.

Fig 3.3: Normal and Actual Annual Rainfall

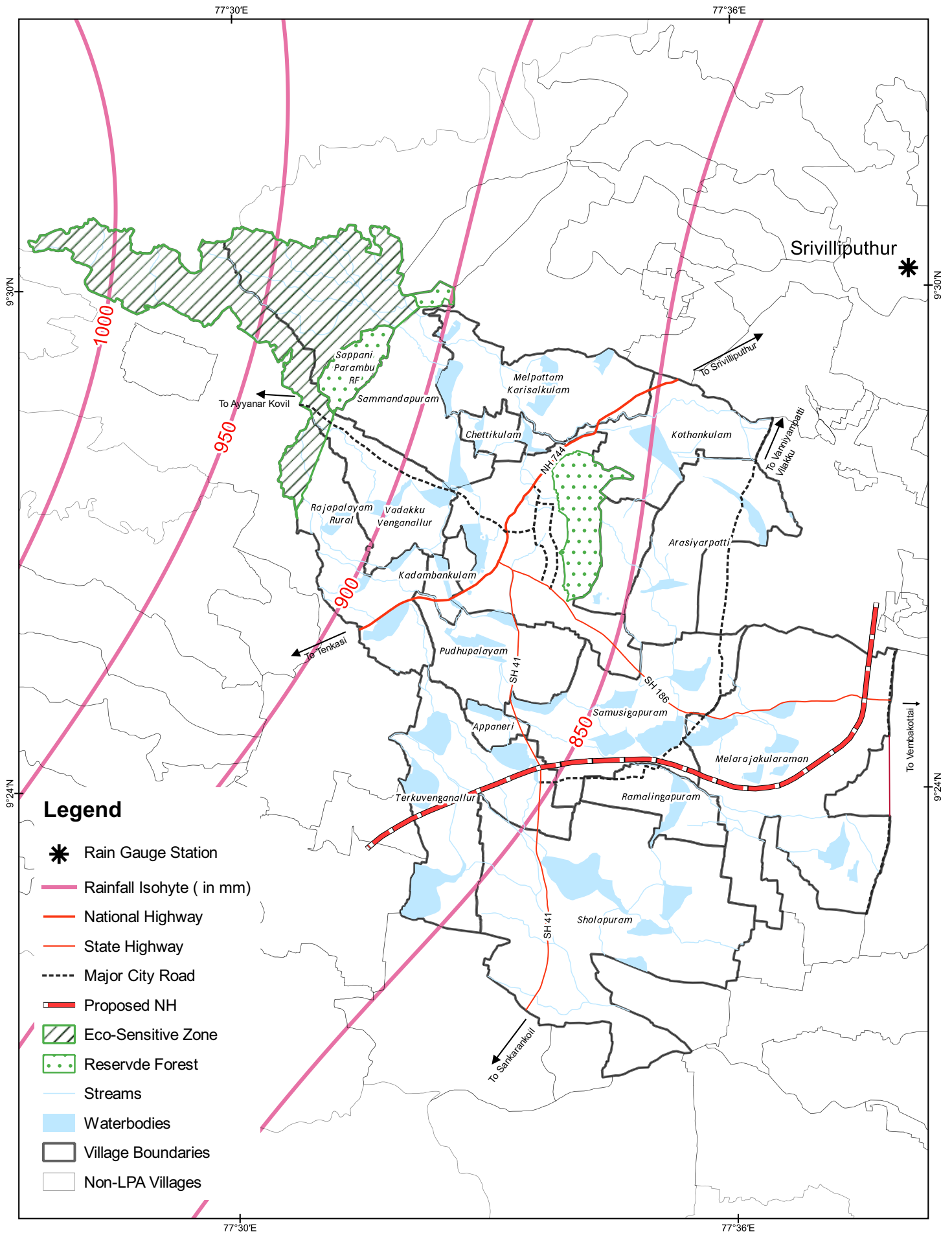


In the last 30 years, 1991 – 2020, the maximum rainfall of 1,145 mm was received in the year 1997 and minimum rainfall of 329 mm in the year 1991. The area receives maximum rainfall during the north-east monsoon with the maximum rainfall of 331 mm in November 2020 (Fig. 3.4).

Fig 3.4: 30-Year Annual Rainfall Pattern



The rainfall pattern varies in the LPA area from 830 mm in the east to 1,000 mm in the west i.e., at the foothills of Western Ghats (Map 3.6). The average Annual Rainfall for the study area is 865 mm. The climatic condition of the district has been conducive for cotton ginning and weaving industries, promoting the industrial bases at Rajapalayam, Chathrapatti, Mugavoor and Dhalavaipuram (the last two falling outside LPA).



Legend

- ✱ Rain Gauge Station
- Rainfall Isohyte (in mm)
- National Highway
- State Highway
- Major City Road
- Proposed NH
- ▨ Eco-Sensitive Zone
- ▤ Reserve Forest
- Streams
- Waterbodies
- ▭ Village Boundaries
- ▭ Non-LPA Villages

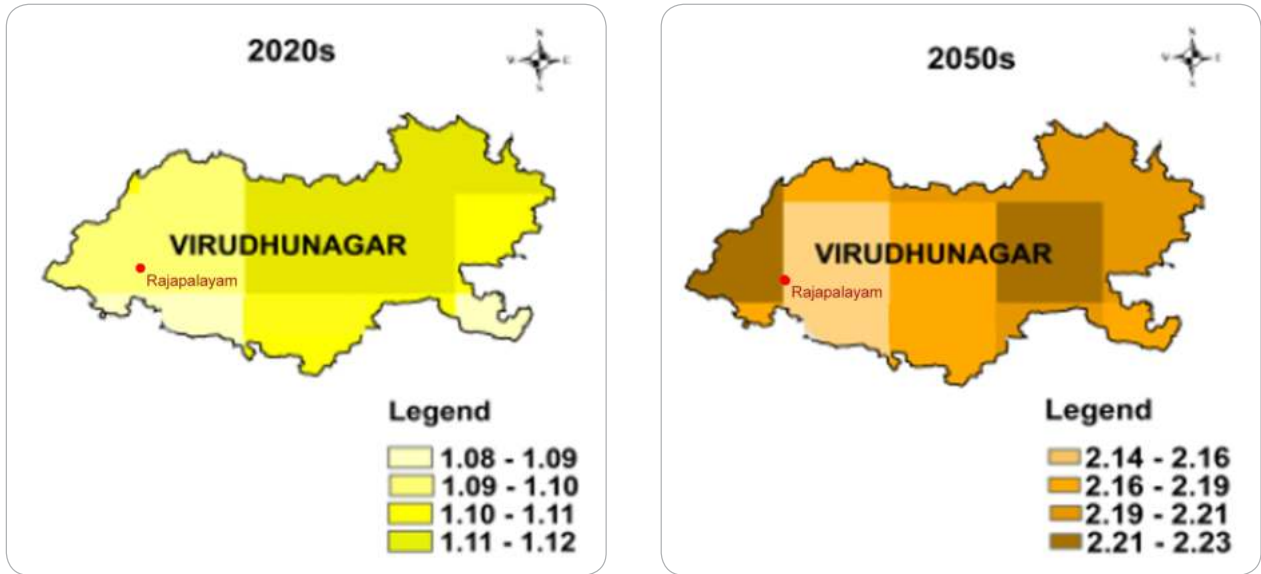
<p>Precipitation in Rajapalayam LPA</p>	<p>Notes : Isohytes are arrived based on the Interpolated data from the Rainfall Stations</p>	<p>Data Credits www.growndwaterinpwd.gov.in</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 3.6: Precipitation Map of Rajapalayam LPA

3.5.3. Climate Change

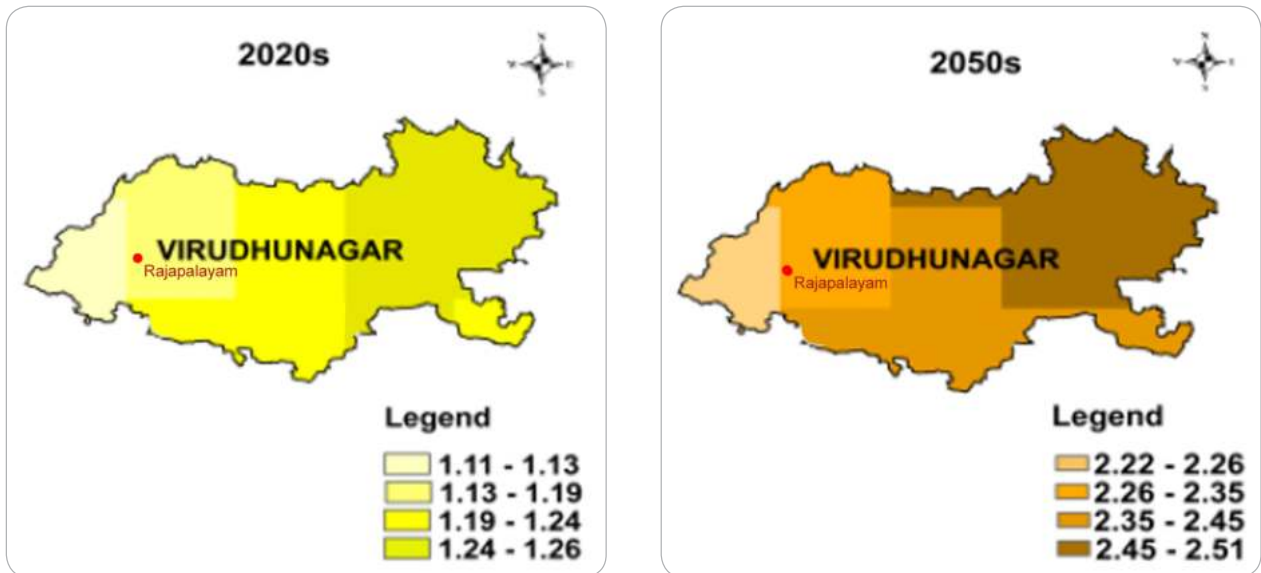
Climate change projections for the district of Virudhunagar (Figs. 3.5 & 3.6), prepared by the Government of Tamil Nadu (TNSCCC) in collaboration with Anna University (CCC&AR) projects an increase in temperature of up to 2°C by 2050; this will also have an impact on drought vulnerability.

Fig 3.5: Change in Maximum Temperature in Virudhunagar District



(Source: CCC&AR, TNSCCC)

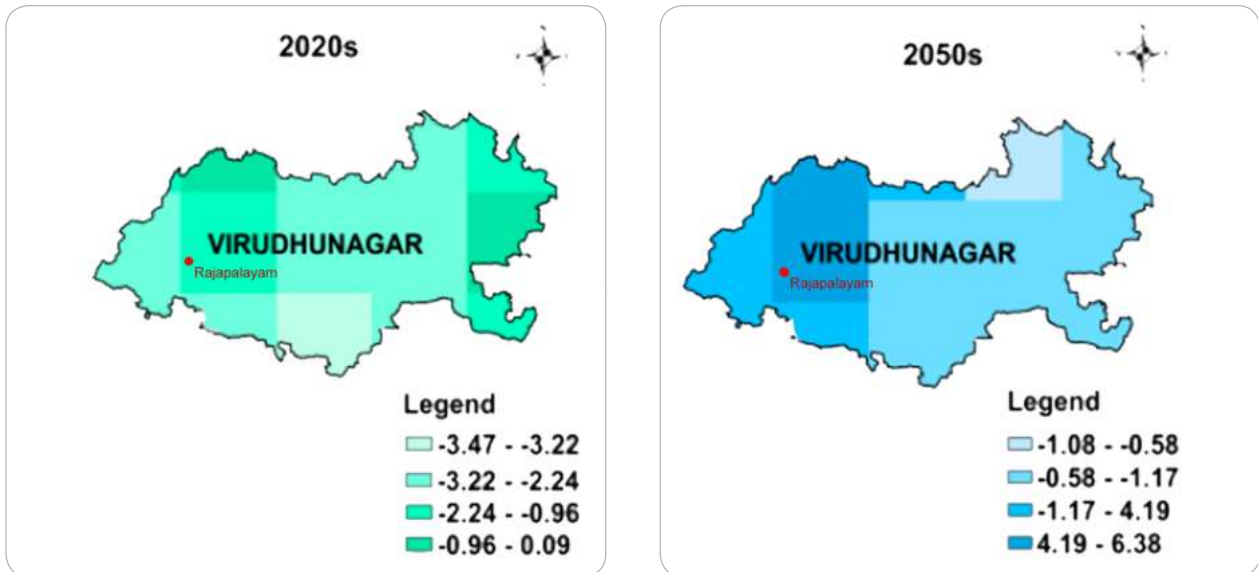
Fig 3.6: Change in Minimum Temperature in Virudhunagar District



(Source: CCC&AR, TNSCCC)

Climate change will also impact the surface water lakes, as there is an increase in intensity of rainfall events. This could actually be a boon for the area, if the lakes and channels are in good condition, as they will be highly suited to containing the additional water. As per projections for the district of Virudhunagar, a change in annual rainfall percentage from -2.0 % to +4.0% has been forecast for the periods between 2020s (2010-2040) to 2050s (2040-2070) (**Fig. 3.7**).

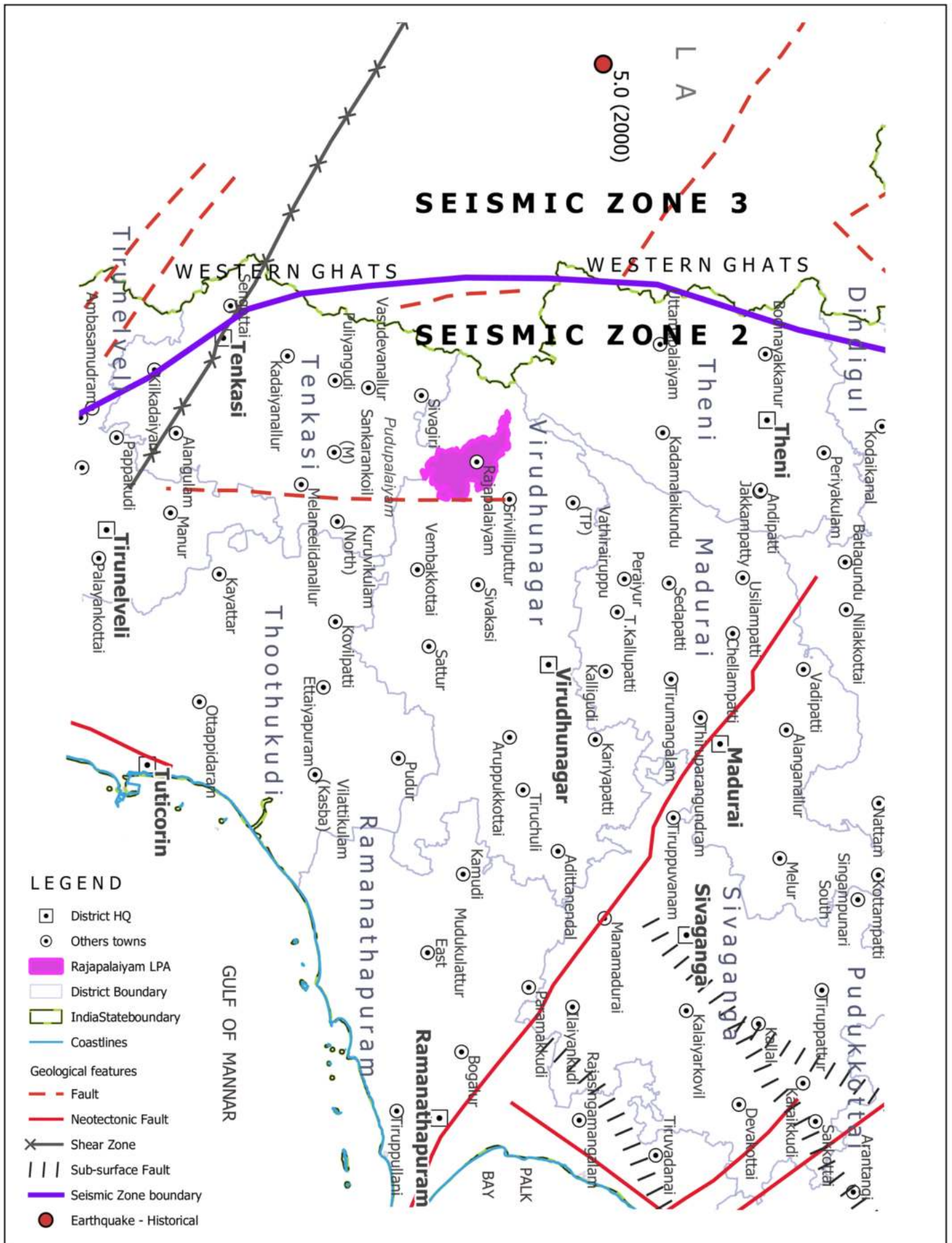
Fig 3.7: **Percentage Change in Annual Rainfall in Virudhunagar District**



(Source: CCC&AR, TNSCCC)

3.6 Seismic Zones

Rajapalayam falls under the Low Damage Risk Zone or Seismic Zone II. IS code assigns a zone factor of 0.10 for Zone 2. **Map 3.7** shows the seismic zone along with fault lines.

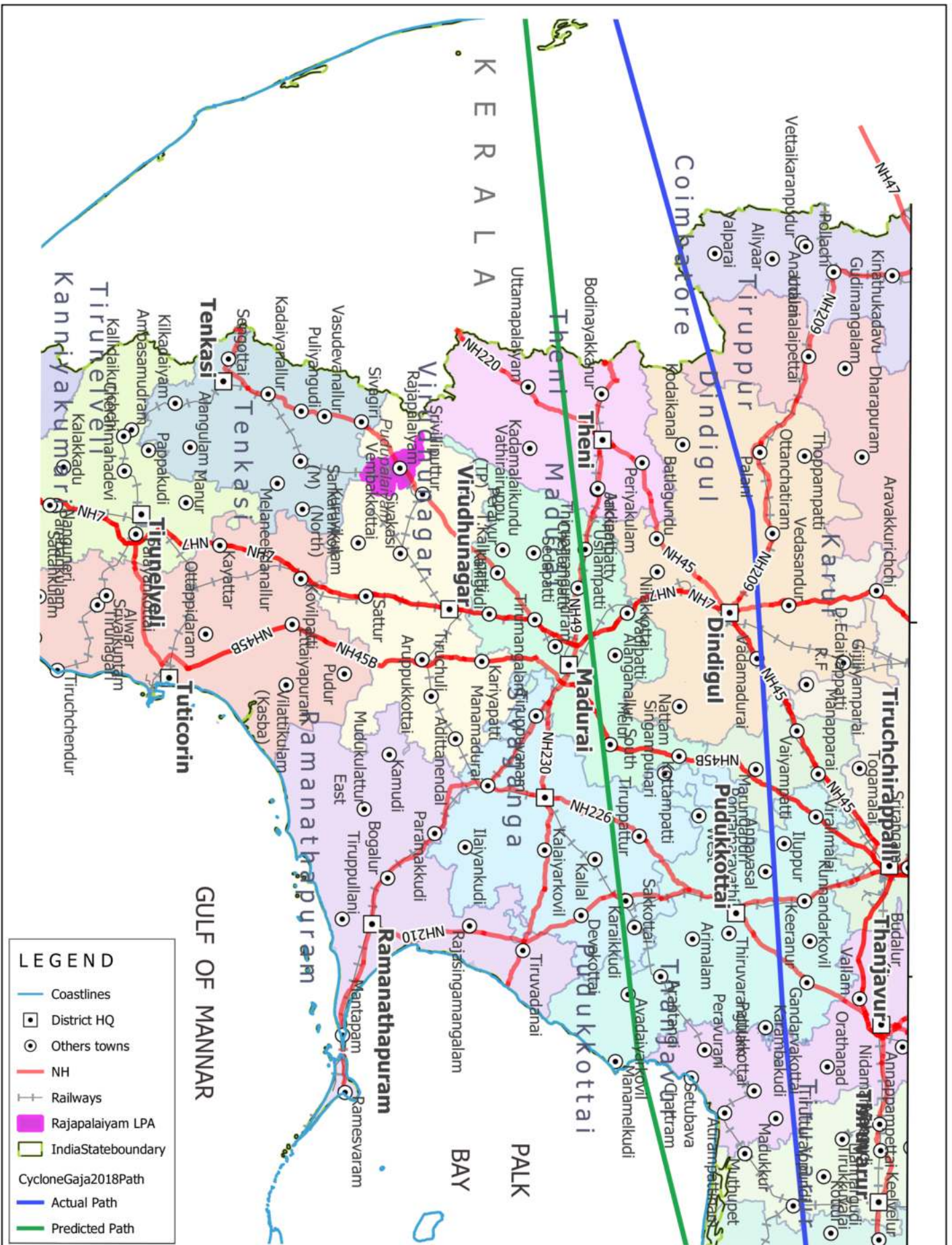


<p>Seismic Zones in Rajapalayam LPA</p>	<p>Notes :</p>	<p>Data Credits IGC, NDMA</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS: WGS 1984</p>

Map 3.7: Seismic Zone Map

3.7 Cyclone

There are no incidences of Rajapalayam being affected by cyclones. **Map 3.8** shows the path of the last Cyclone Gaja in 2018.



<p>Disaster from Cyclones - Cyclone Gaja Path in 2018</p>	<p>Notes :</p>	<p>Data Credits IGC, NDMA (www.ndma.gov.in)</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS: WGS 1984</p>

Map 3.8: Path of Cyclone Gaja in 2018

3.8 Water Resources

3.8.1. Surface Water Bodies

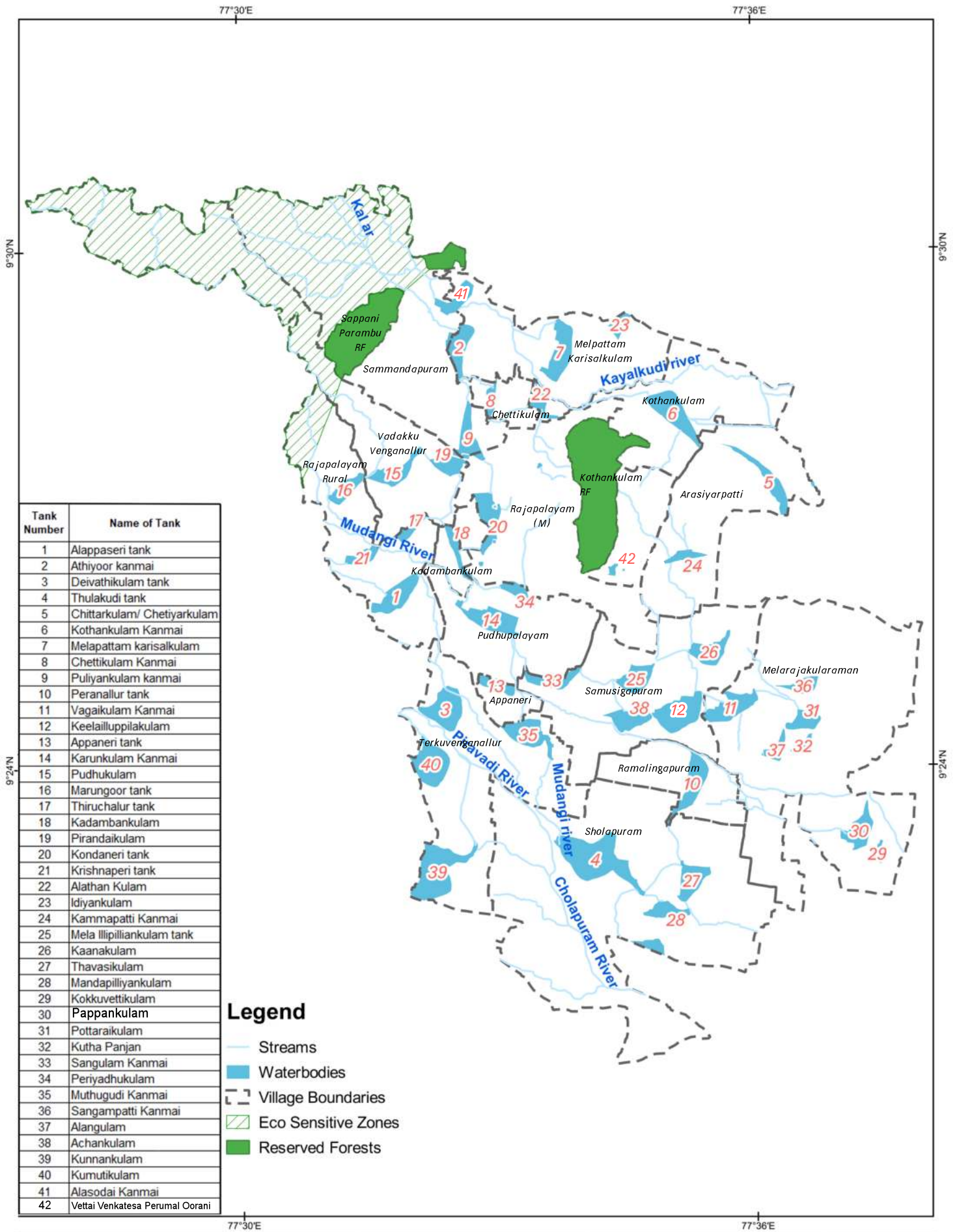
Rajapalayam LPA is endowed with large number of water bodies, which constitute around 13.27% of the total LPA area. They are majorly fed by streams originating from Western Ghats. However the runoff from Sanjeevi Malai (Kothankulam RF) feeds into Kammappatti water body (Tank no.24) and into Kothankulam water body (Tank no.06). Interestingly, Kothankulam is also fed by the streams as a part of Kayalkudi river. The water from Kammappatti waterbody overflows and fills the waterbodies in the Samusigapuram revenue village. These were life source for all these years and the agriculture was solely dependent on this till the advent of borewells. There are 41 major water bodies in LPA of which 39 are in use for agricultural purposes (**Map 3.9**). These water bodies form an important part of the catchment area of Upper Vaipparu river Basin. The water bodies are listed along with their capacity in **Table 3.1**.

Table 3.1: **List of Tanks & Their Capacities in Rajapalayam LPA**

Tank Number	Name of Tank	Area (Ha)	Capacity (MCM)
1	Alappaseri tank	35.85	0.47
2	Athiyoor kanmai	36.23	0.59
3	Deivathikulam tank	55.32	0.72
4	Thulakudi tank	130.3	2.03
5	Chittarkulam/ Chetiyarkulam	26.2	0.03
6	Kothankulam Kanmai	55.58	0.65
7	Melapattam karisalkulam	58.53	0.63
8	Chettikulam Kanmai	14.96	0.15
9	Puliyankulam kanmai	36.6	0.32
10	Peranallur tank	45.33	0.6
11	Vagaikulam Kanmai	46.78	0.64
12	Keelailluppilakulam	58.22	0.88
13	Appaneri tank	18.75	0.25
14	Karunkulam Kanmai	61.46	1.06
15	Pudhukulam	21.6	0.28
16	Marungoor tank	19.95	0.25
17	Thiruchalur tank	13.5	DNA
18	Kadambankulam	13.94	0.14
19	Pirandaikulam	18.55	0.18
20	Kondaneri tank	33.64	0.37
21	Krishnaperi tank	15.04	0.17
22	Alathan Kulam	17.4	0.13
23	Idiyankulam	16.1	DNA
24	Kammappatti Kanmai	13.6	DNA
25	Mela Illipilliankulam tank	37.00	0.25
26	Kaanakulam	36.74	0.29
27	Thavasikulam	34.2	DNA
28	Mandapilliyankulam	23.7	DNA

Tank Number	Name of Tank	Area (Ha)	Capacity (MCM)
29	Kokkuvettikulam	8.2	1.00
30	Pappankulam	32.8	0.99
31	Pottaraikulam	21.3	0.99
32	Kutha Panjan	7.5	1.60
33	Sangulam Kanmai	25.5	0.2
34	Periyadhukulam	15.2	DNA
35	Muthugudi Kanmai	18.4	0.62
36	Sangampatti Kanmai	16.13	0.16
37	Alangulam	16	DNA
38	Achankulam	56.45	0.56
39	Kunnankulam	82.92	0.96
40	Kumutikulam	45.99	0.59
41	Alasodai Kanmai	9.37	0.23

Apart from the above, there is one smaller water body, Vettai Venkatesa Perumal Oorani on the south-eastern foot hills of Sanjeevi Malai spanning 3.42 ha. This tank is under the HR & CE department, where as the above 41 all under WRD. It is to be noted that there are also 13 smaller water bodies in-side the municipal area which are under the control of various government agencies.



Waterbodies and Streams in Rajapalayam LPA	Notes :	Data Credits Field Survey	 CRS : WGS 1984
		Client DTCP Virudhunagar	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Prepared By Tapasya Design Studio ,Auroville	

Map 3.9: Waterbodies and Streams in Rajapalayam LPA

3.8.2. Ground Water

3.8.2.1. AQUIFER MAPPING

Based on the subsurface geology, the aquifer disposition of the area is demarcated (Figs. 3.8 & 3.9), which depicts the lateral and vertical configuration of the aquifers using Rockworks software. Two aquifer systems have been identified in the study area based on the groundwater occurrence and movement (Table 3.2). Aquifer-I (Map 3.10) is the weathered layer of all the three lithologies such as gneiss, granite and charnockite formation. Aquifer-II (Map 3.11) is found in the fractured layers of all three lithologies such as gneiss, granite and charnockite formation. The bottom of the aquifer-II is demarcated using the lower most fractured depth encountered in the borewell.

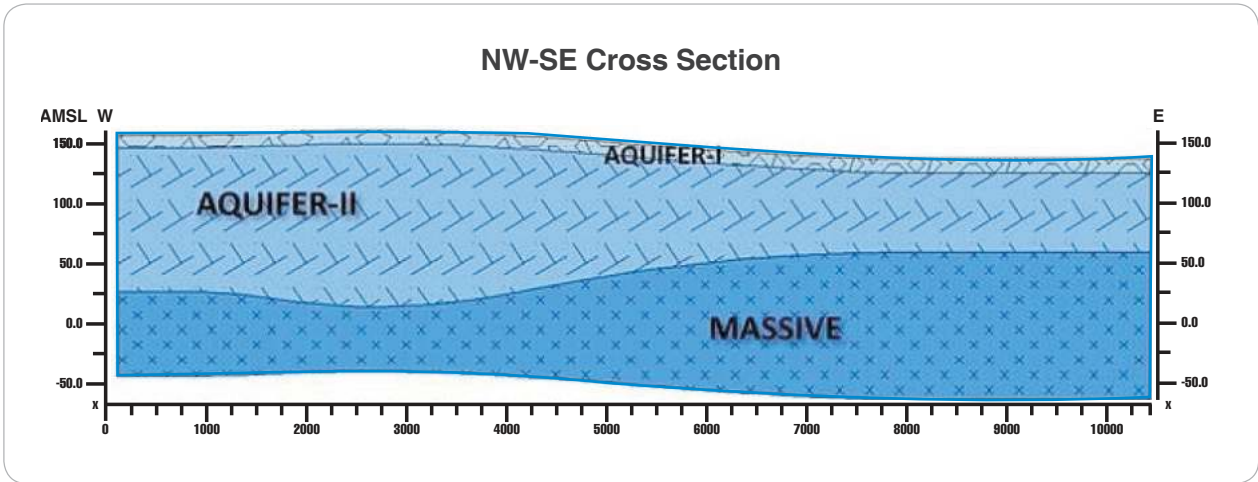
Table 3.2: Aquifer Potential

Type of Aquifer	Formation	Top of the Aquifers (mbgl)	Thickness (m)	Fracture (mgbl)	Range of Yield (lps)	Sustainability (hr/day)	Dynamic Resources (mcm/yr/ in storage (MCM))	Ground Water Quality
Aquifer - I	Weathered Gneiss	GL	10 to 17	-	0.5 to 1.5	Monsoon: 2-4 & Non-Monsoon: <1-2	18.6	Potable
Aquifer - II	Jointed & Fractured Gneiss	10 to 17	65 to 156	3 nos. of fractures encountered	0.5 to 4.5	Monsoon: 1-6 & Non-Monsoon: 1-3	0.3	Potable

Aquifer - I

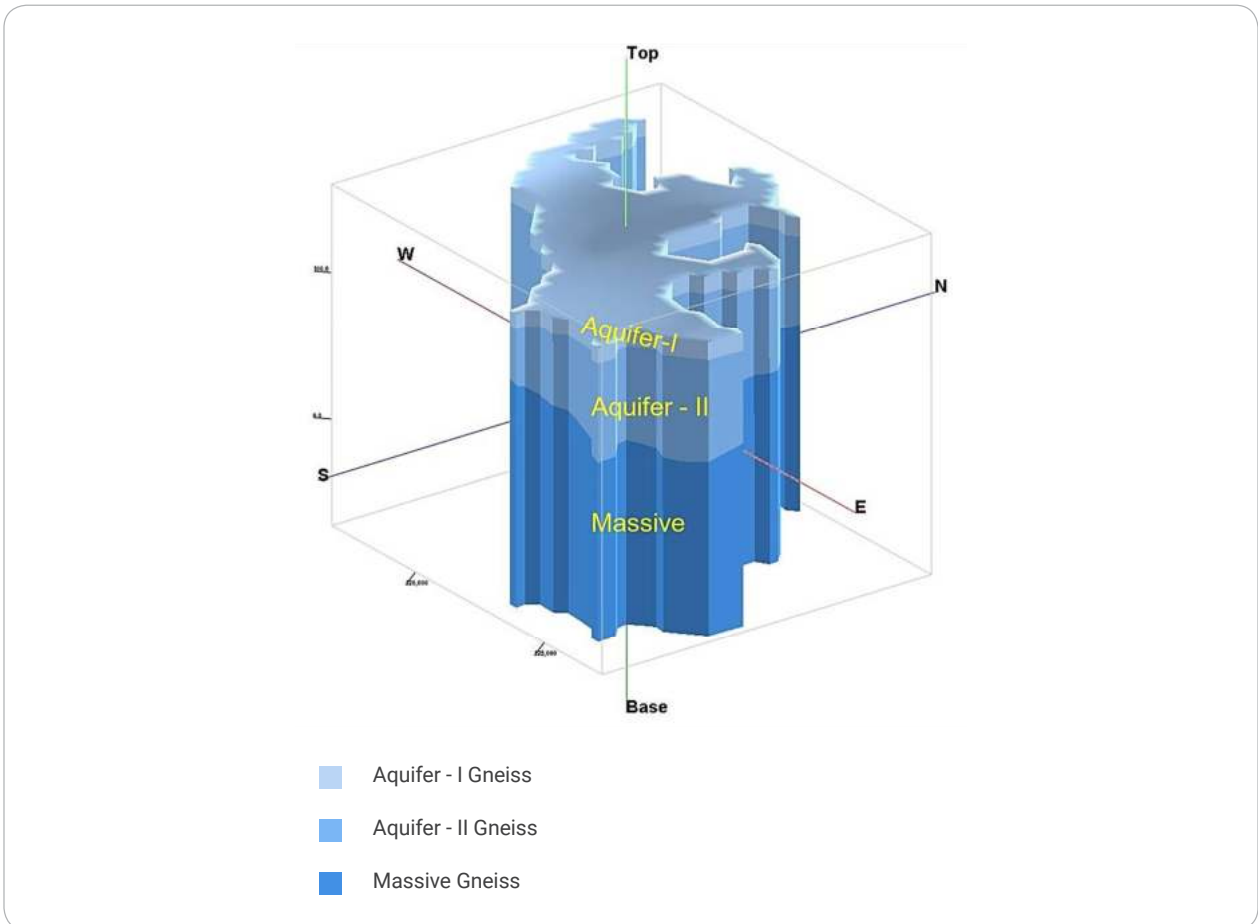
In general, the thickness of aquifer-I varies from 10 to 17 m (Fig. 3.8) with the average thickness of 13 m. Aquifer-I is found in the formation of weathered gneiss. The depth of aquifer-I ranges from ground level to 17 m (Map 3.10) and it is the potential resource for irrigation and domestic usage. The discharge of the aquifer transmissivity goes up to 53 m²/day, which can sustain 2 to 4 hours during the monsoon and during the summer, non-monsoon period <1 to 2 hours of pumping for ground water utilisation (Table 3.2). The specific yield (Sy) of aquifer-I ranges from 0.007 to 0.015%. Well yield and pumping duration increases during the monsoons. The groundwater in this aquifer is suitable except in industrial areas. The aquifer potential for Aquifer-I ranges from 0.5 to 1.5 lps.

Fig 3.8: 2D Cross-section of the Aquifers (meter)

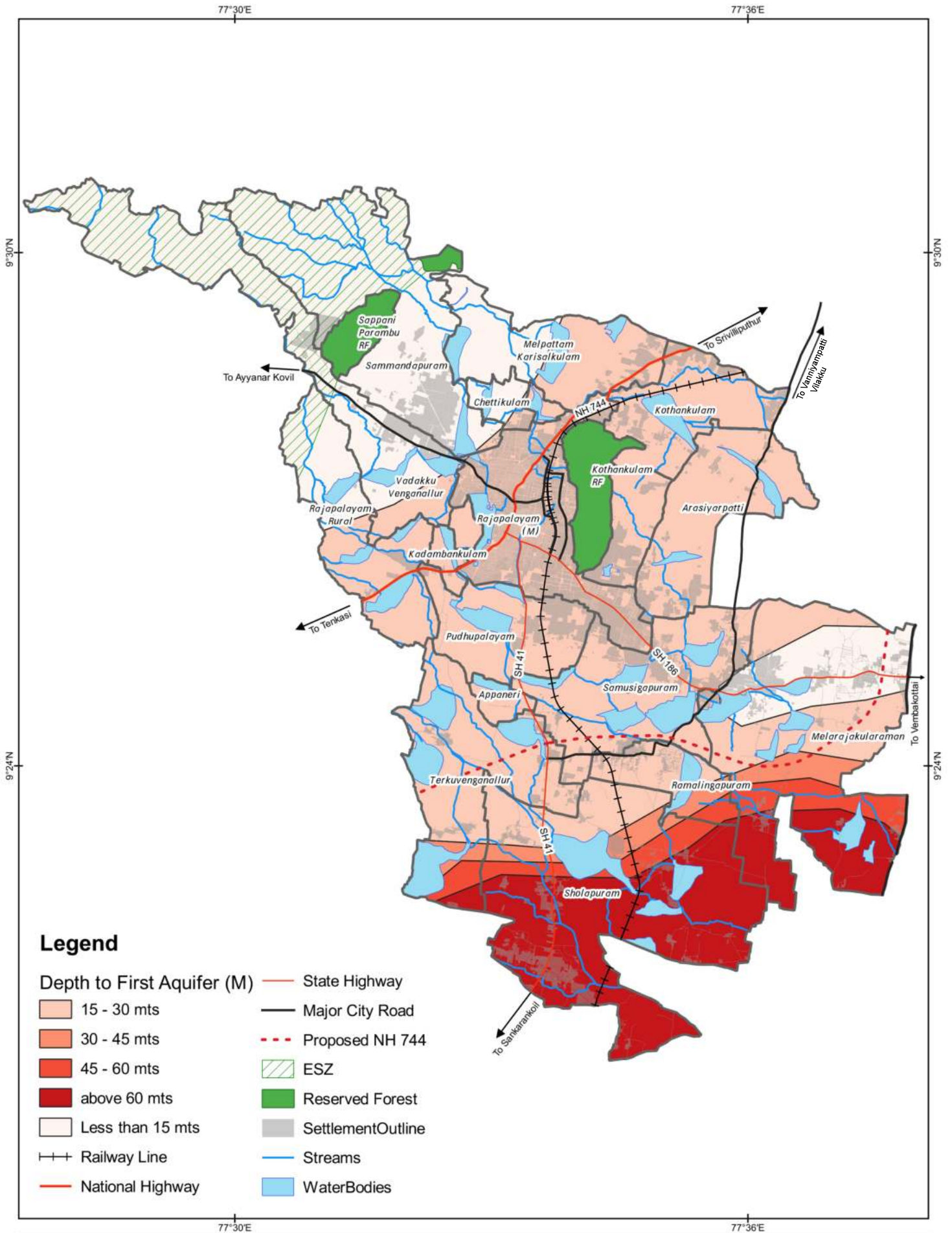


Source: CGWB

Fig 3.9: 3D Aquifer Disposition



(Source: CGWB)



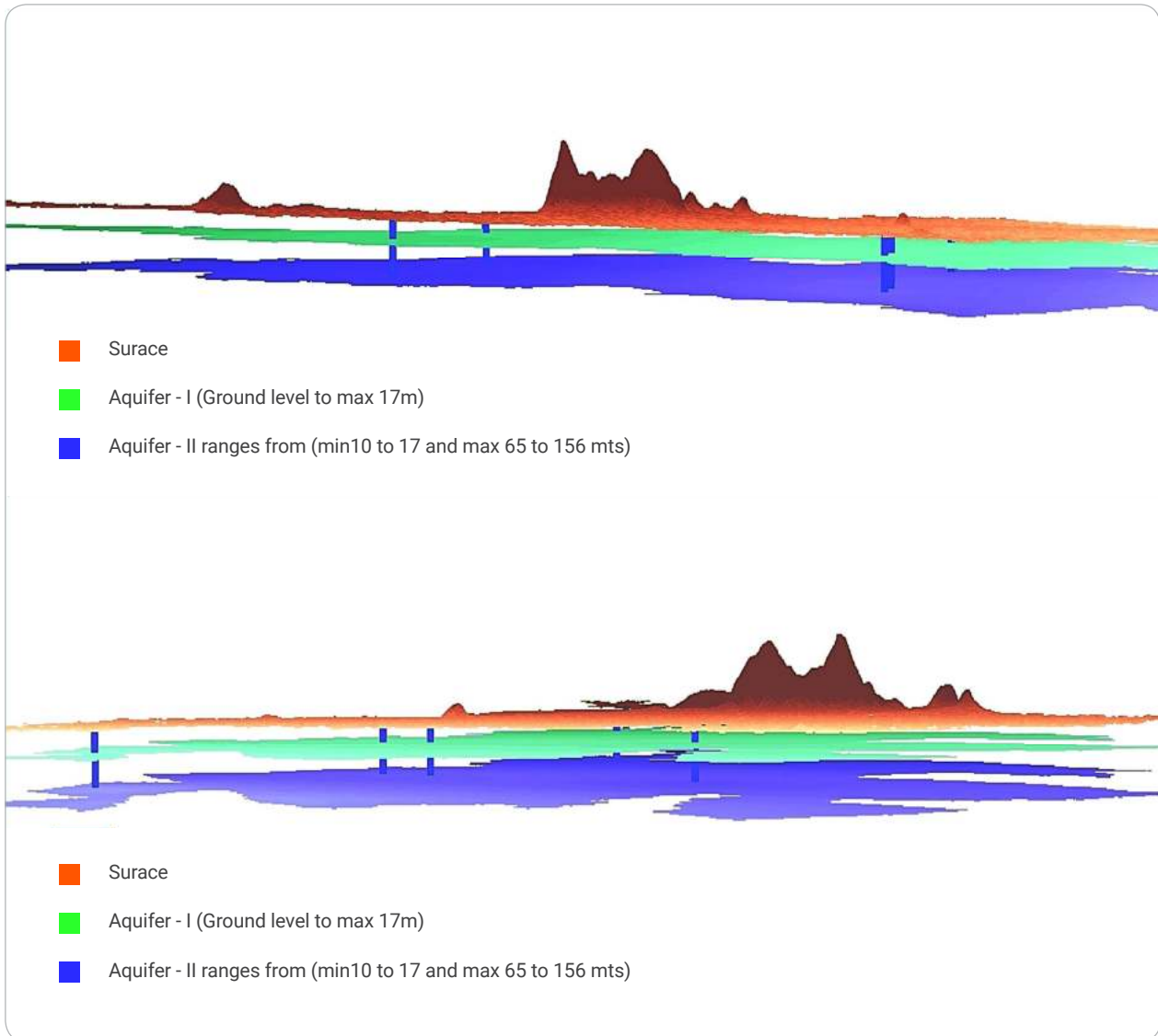
Depth to First Aquifer in Rajapalayam LPA	Notes	Data Credits GeTS Consultants	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	

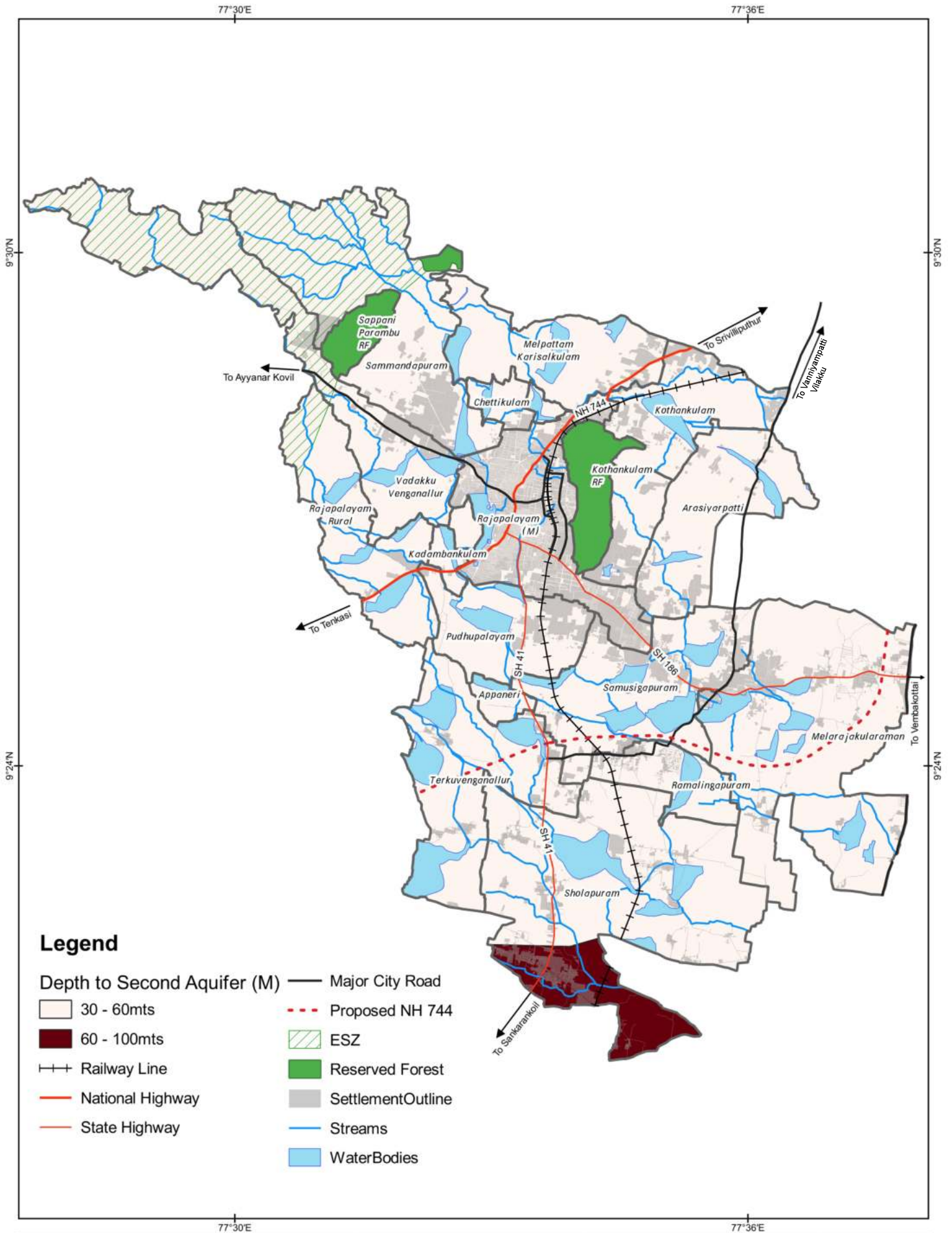
Map 3.10: Depth of Aquifer-I in Rajapalayam LPA

Aquifer - II

In general, the thickness of aquifer-II ranges from 65 to 156 m with the top layer at 10 to 17 m below ground level (**Fig. 3.10**). Aquifer-II is found on the formation of jointed and fractured gneiss. Aquifer-II encounters 3 fractures below ground level and the water is of potable quality. The depth of the well in aquifer- II varies from 15 to 200 m (**Map 3.11**). The discharge of the aquifer transmissivity goes up to 59 m²/day, that can sustain 1 to 6 hours during the monsoons and during the summer, non-monsoon period 1 to 3 hours of pumping for ground water utilisation (**Table 3.2**). The storativity (S) of this aquifer ranges from 3.7×10^{-5} to 4.5×10^{-5} . The aquifer potential for Aquifer-II ranges from 0.5 to 4.5 lps.

Fig 3.10: **3-Dimensional View of Water Level from South to North (TOP) & East to West (BOTTOM)**





Legend

- Depth to Second Aquifer (M)
 - 30 - 60mts
 - 60 - 100mts
- Major City Road
- Proposed NH 744
- ESZ
- Reserved Forest
- Settlement Outline
- Streams
- Water Bodies
- Railway Line
- National Highway
- State Highway

Depth to Second Aquifer in Rajapalayam LPA	Notes	Data Credits GeTS Consultants	 <small>CRS : WGS 1984</small>
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	
		Prepared By Tapasya Design Studio, Auroville	

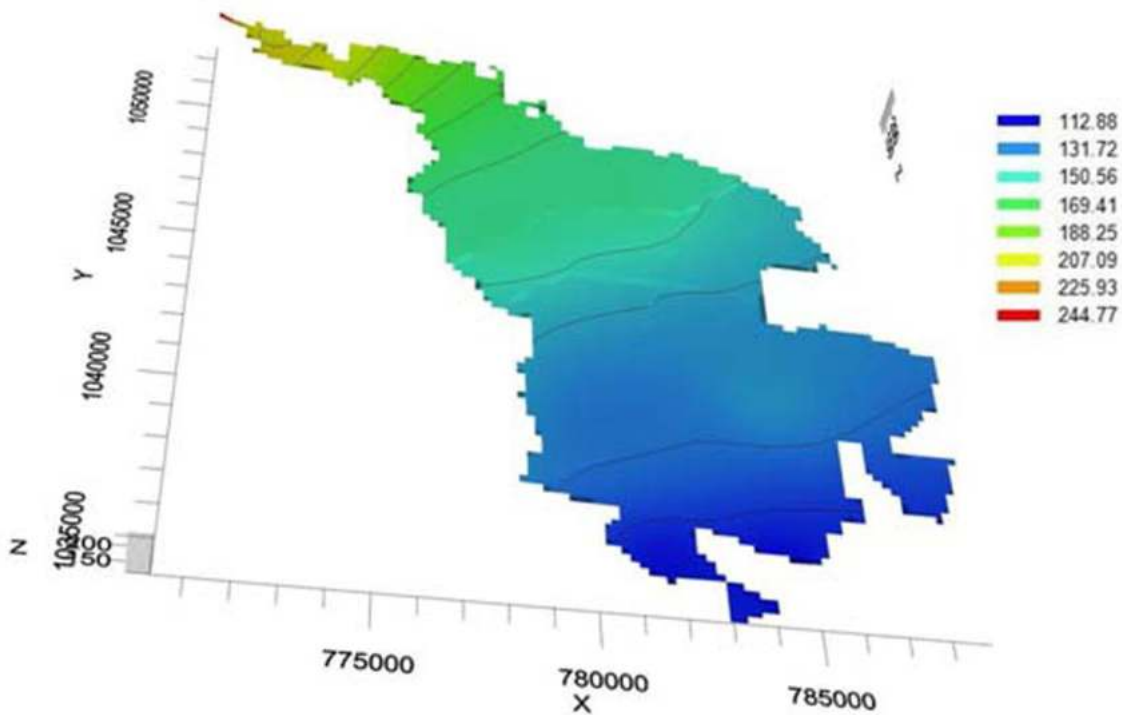
Map 3.11: Depth of Aquifer-II in Rajapalayam LPA

3.8.2.2. GROUND WATER FLOW PATTERN

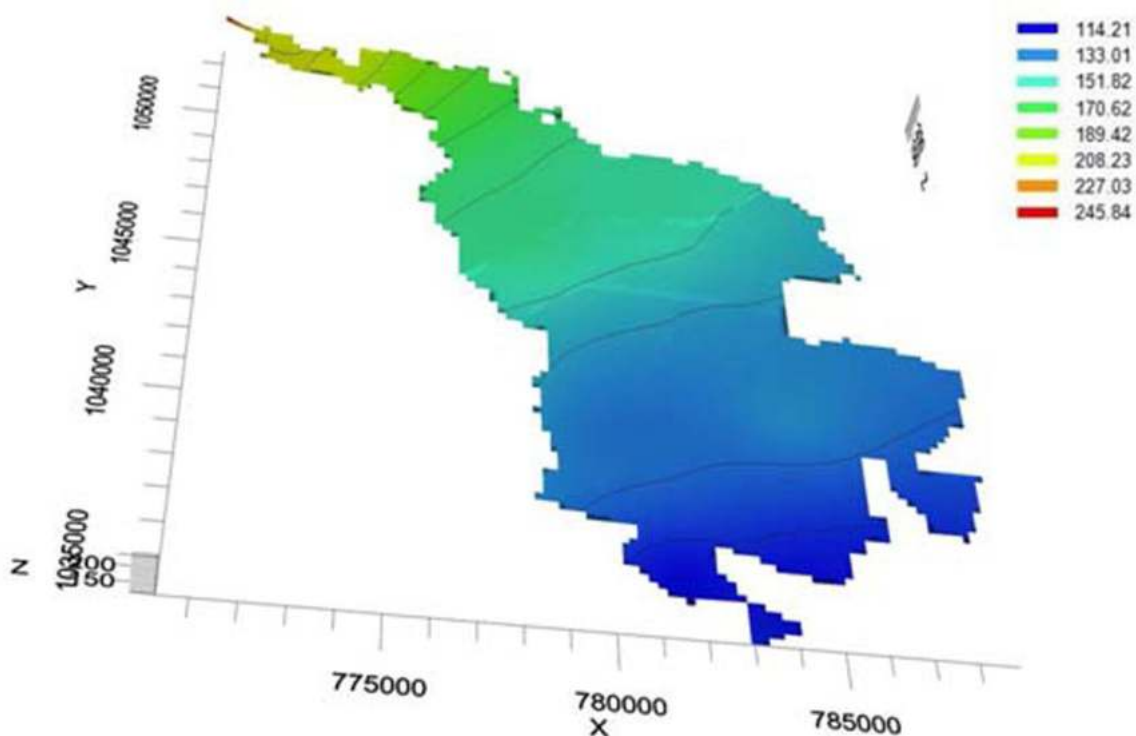
Post-monsoons the ground water flows with maximum value of 244.77 m at Ayyanar Kovil and gradually slows down in the southern part of the LPA. Pre-monsoon also the flow is at maximum at Ayyanar Kovil and gradually reducing towards the southern part (**Map 3.12**).


In Rajapalayam LPA, two aquifer systems have been identified based on the ground water occurrence and movement. Aquifer-I is the weathered layer of all the three lithology such as gneiss, granite and charnockite formation. Aquifer-II is found in the fractured layers of all three lithology such as gneiss, granite and charnockite formation. The bottom of aquifer-II is demarcated using the lower most fractured depth encountered in the borewell. Aquifer-I depth varies from ground level to 17 m below ground level and the thickness varies from 10 to 17 m. Aquifer-II depth varies from 15 to 200 m and thickness varies from 65 to 156 m. In general, the LPA slopes from the north-west to south-east, the ground water also flows from north-west to south-east.

POST MONSOON GROUND WATER FLOW



PRE MONSOON GROUND WATER FLOW

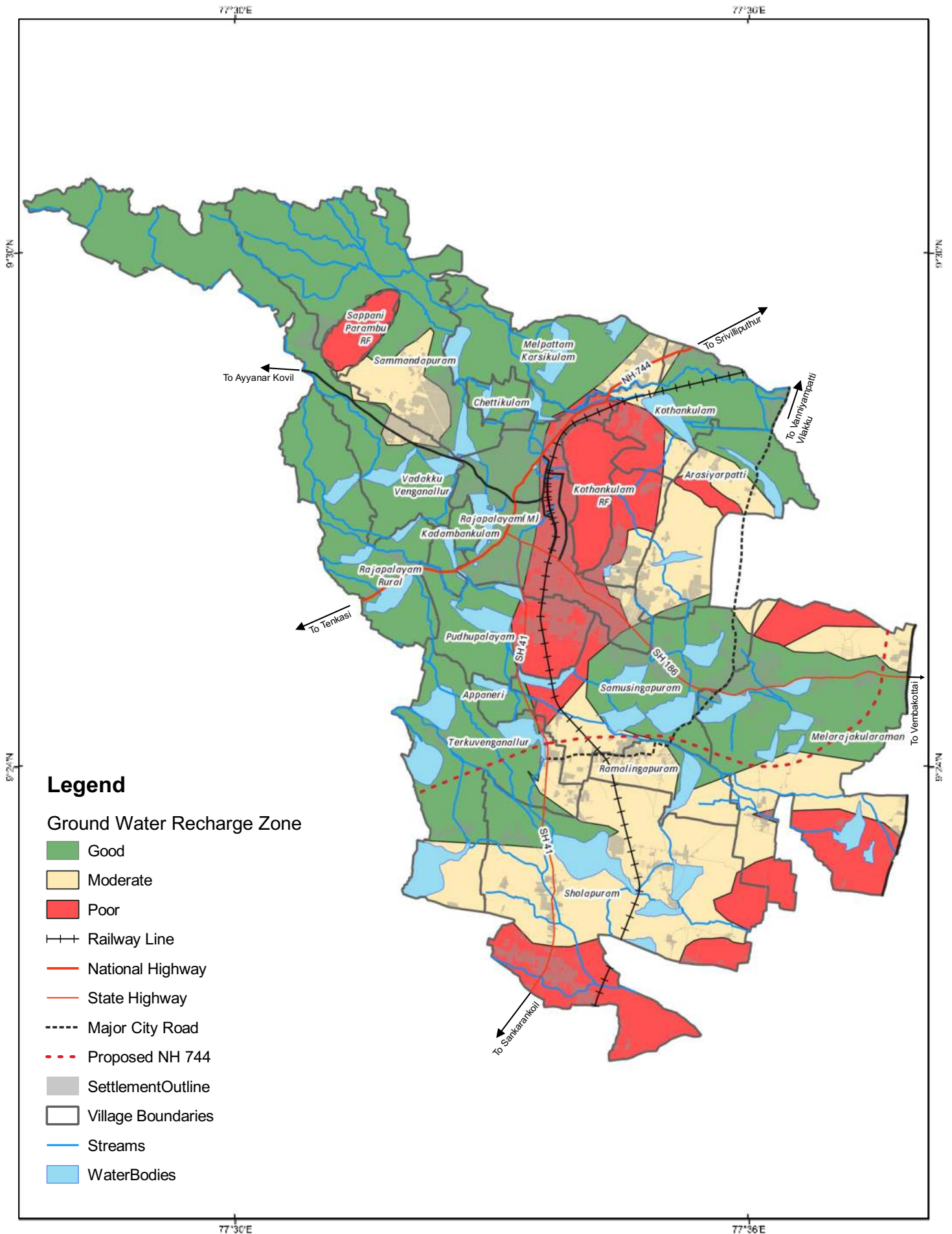


Spatial Representation of Ground Water Flow	Notes :	Data Credits GeTS Consultants	 CRS: WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 3.12: Spatial Representation of Ground Water Level Flow (from terrain level altitude) During Post-monsoon and Pre-monsoon

3.8.2.3. GROUND WATER RECHARGE AREAS

Remote Sensing and GIS techniques have been used to demarcate area suitable for artificial recharge. Geology, geomorphology, land use/ land cover, drainage and surface water body maps were prepared (Satellite data) / obtained (Various Govt. agencies). In addition to that water level and weathered zone thickness maps were prepared using samples from wells, and ground water monitoring wells. Weightage was assigned for each thematic layer and its classes. High priorities with higher weightage are given to geomorphology and geology layers as it plays a vital role in ground water recharge. All the layers were integrated, based on their weightages, spatially in GIS environment using overlay index model. The results are classified into categories/ zones as 1. Poor, 2. Moderate, 3. Good (**Map 3.13**).



Legend

Ground Water Recharge Zone

- Good
- Moderate
- Poor
- Railway Line
- National Highway
- State Highway
- Major City Road
- Proposed NH 744
- Settlement Outline
- Village Boundaries
- Streams
- Water Bodies

Artificial Recharge Zone Map	Notes	Data Credits GeTS Consultants
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar
		Prepared By Tapasya Design Studio, Auroville

CRS : WGS 1984

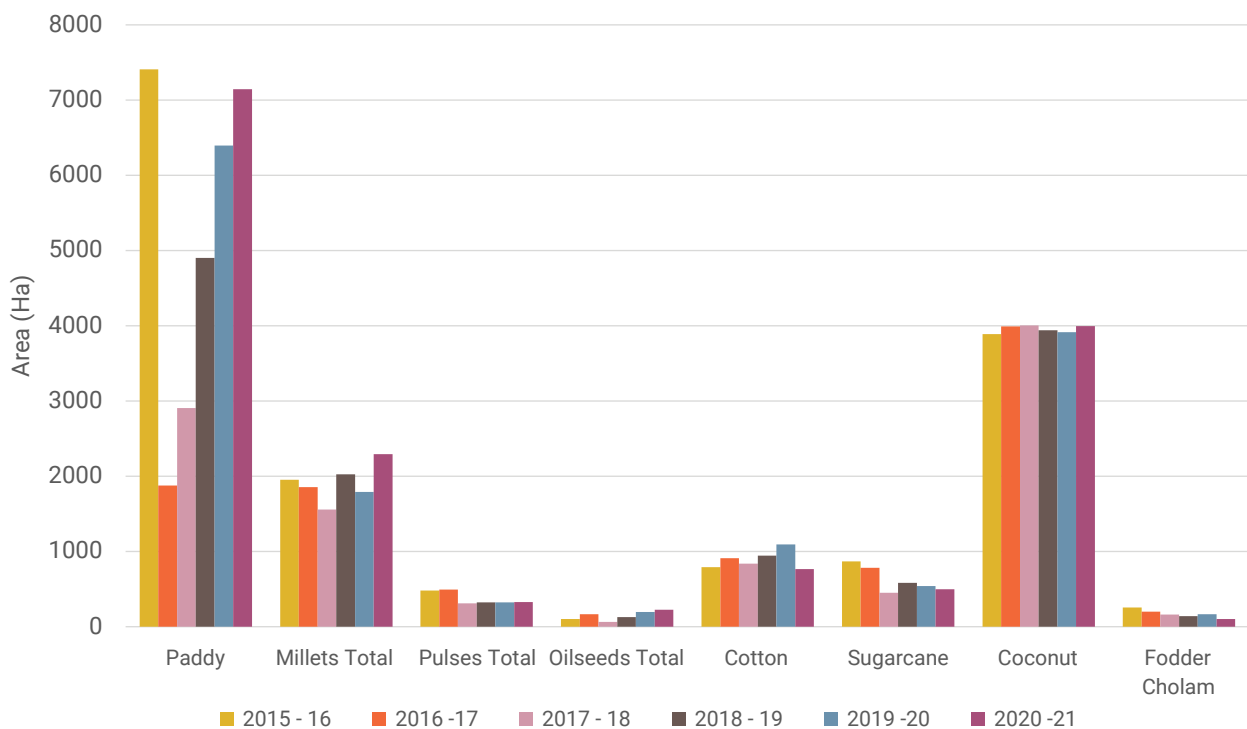
Map 3.13: Artificial Recharge Zone Map

3.9 Agriculture and Cropping Pattern

3.9.1. Rajapalayam Block

According to the data from the Department of Agriculture, Rajapalayam block in Virudhunagar district seems to have a major share of cereals (almost 50%) and food oil crops (almost 25%) in the cropping pattern (Figs. 3.11–3.14). Cereals include paddy, wheat, cholam, cumbu, ragi, maize, thinai, varagu, samai, kudiraivali, and pani varagu, where almost 80% of the share is under paddy crops. Food oil crops include groundnut, gingelly, coconut, soybeans, mustard, sunflower, and palm oil, where almost 95% of the share is under coconut crops. It is to be noted that the LPA only covers a part of the block and not its entirety.

Fig 3.11: Major Crop Coverage 2015-2021



*2016 drought year

In the cropping patterns during the years 2015-2021, note the drought year of 2016 dramatically affects the production, and in rice cultivation it takes a number of years to recover (Fig. 3.11). Paddy covers the largest area and has an output of around 20 MT. However, in terms of production, sugarcane is the highest, having an output between 80 to 100 MT (Fig. 3.12). In terms of surface water requirement (Fig. 3.13) and fertiliser consumption (Fig. 3.14), sugarcane is noted to be the highest.

Fig 3.12: Crop Productivity in Rajapalayam Block, 2014-20

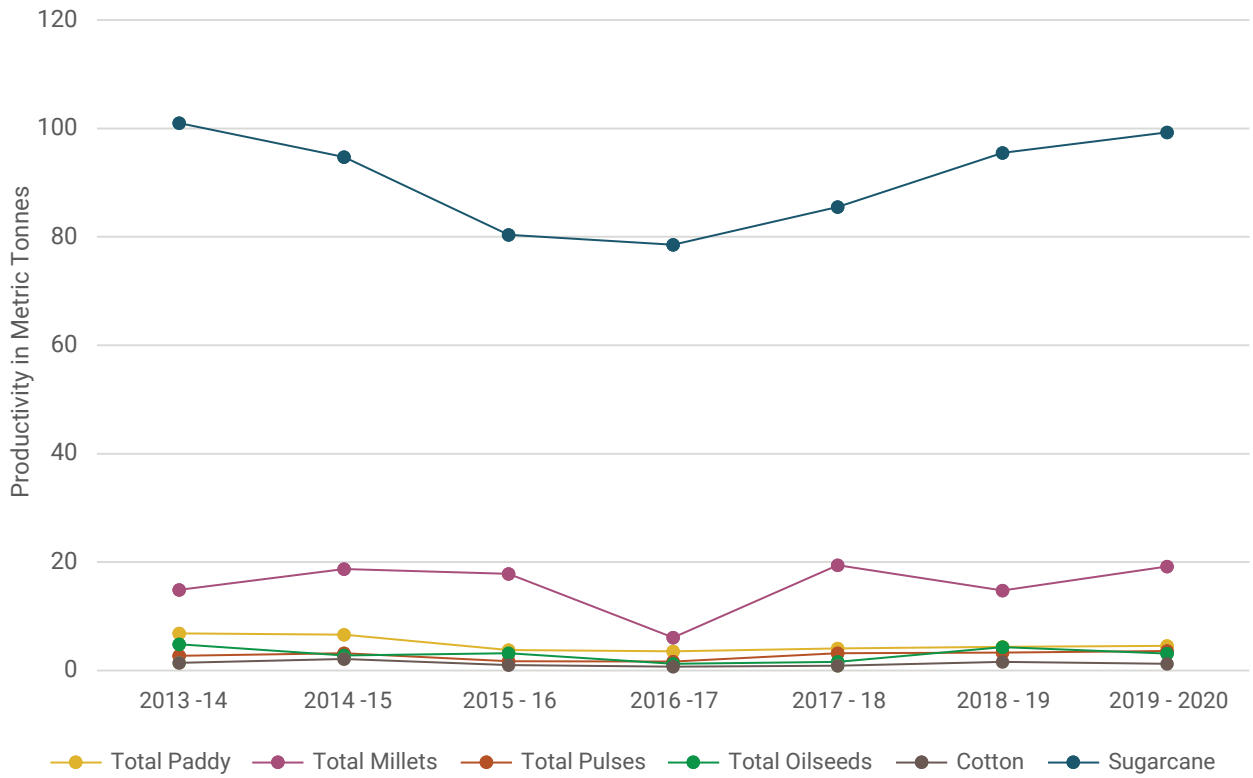


Fig 3.13: Water Requirements of Agricultural Crops in Surface Irrigation Methods

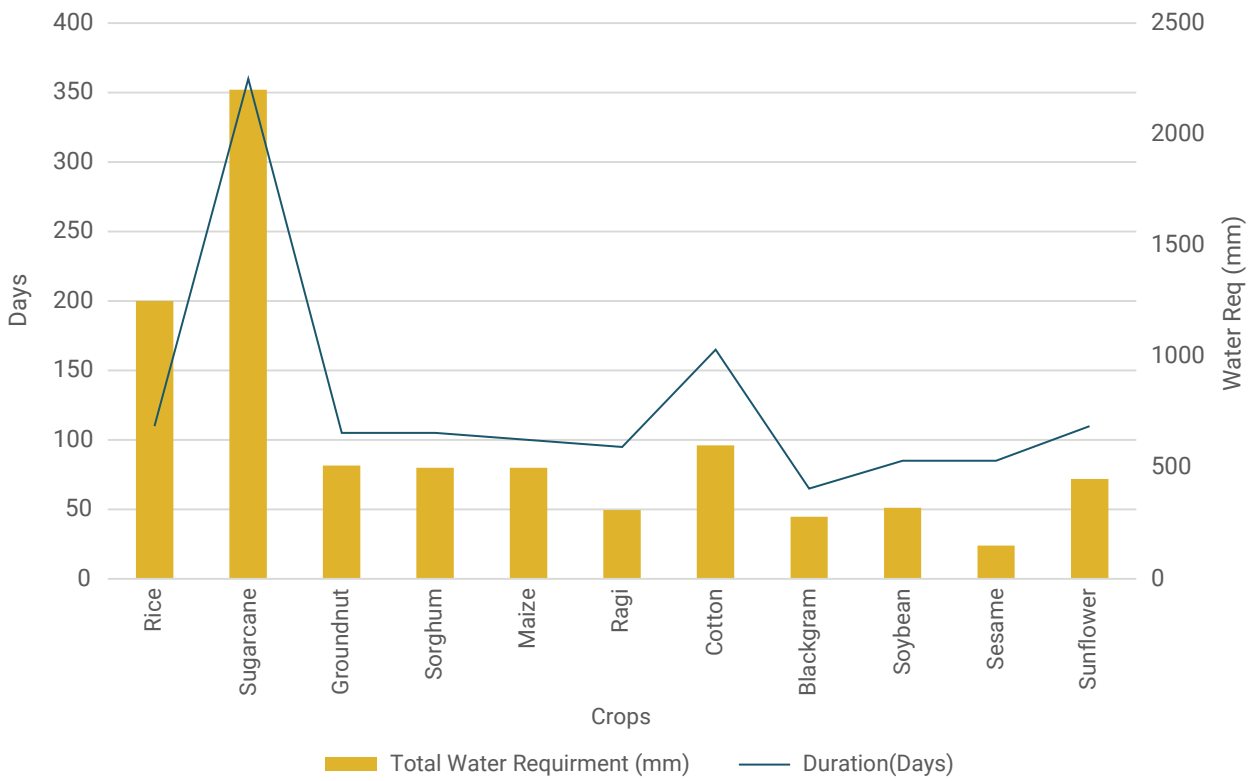
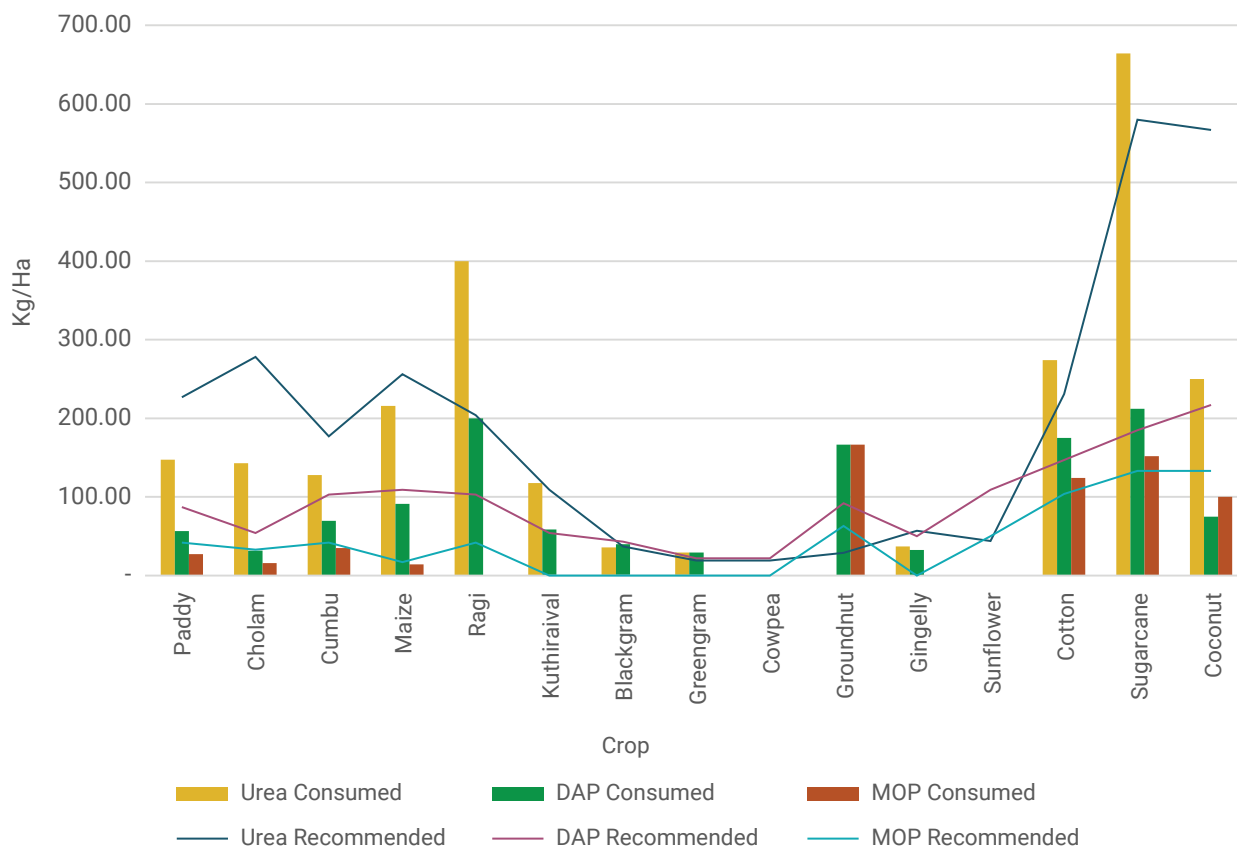


Fig 3.14: Crop-wise Fertilizer Consumed vs. Recommended



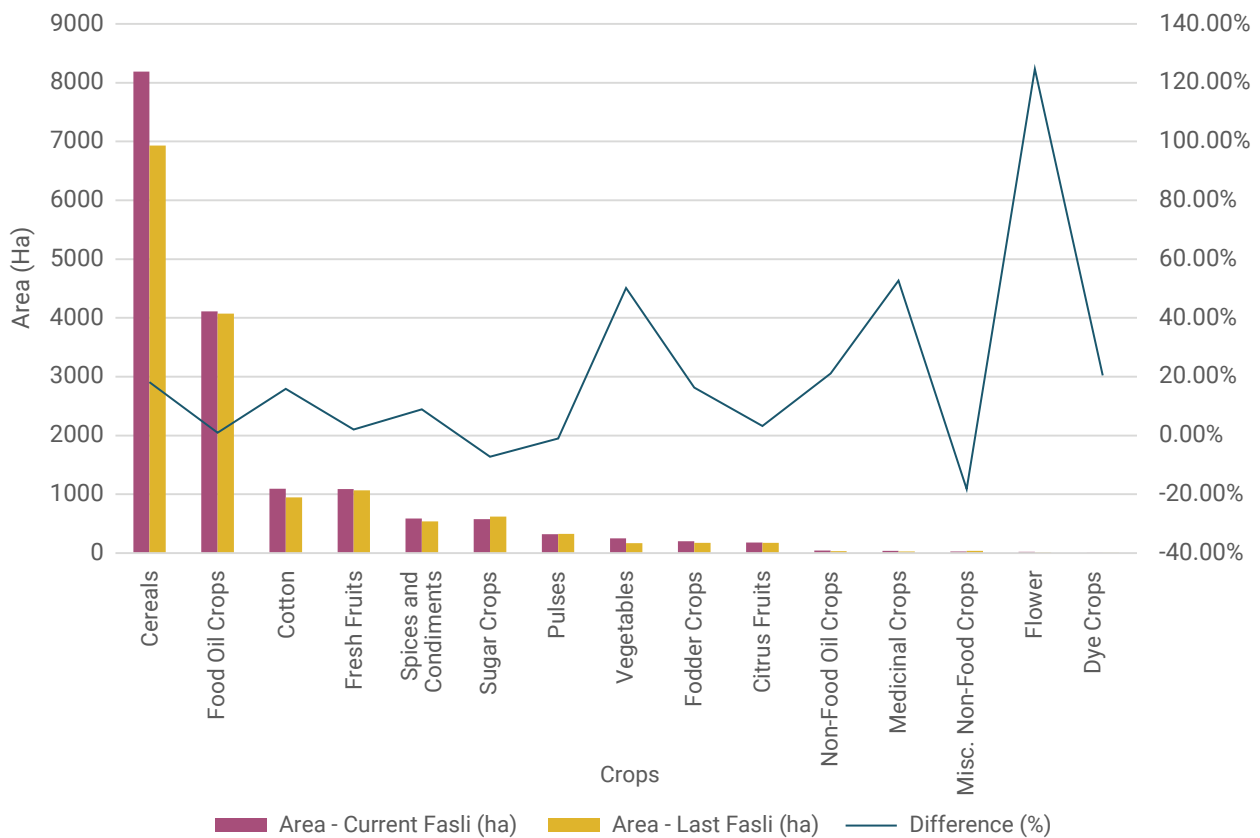
The crop details in the block in decreasing order of area under cultivation in the current fasli is tabulated in **Table 3.3 & Fig. 3.15**. Eventhough the area in terms of medicinal and flower cultivation is small, they are seeing major increase cultivation area. Medicinal crop cultivation are showing more than 50% increment and flower cultivation more than 120% from the previous to the current fasli. Cotton cultivation accounts for just 7 % in the block, even though there are a huge number of cotton-based industries. Although in comparison to the last fasli, there is a 16% growth in area under cotton cultivation, this can be looked into in detail while planning to support the industrial sector here. Also, flower cultivation is showing a tremendous growth in comparison to the last fasli i.e., almost a 120% increase.

Table 3.3: Crop Area Details in Rajapalayam Block, 2019-20

S.No.	Crops	Area - Current Fasli (ha)	Area - Last Fasli (ha)	Difference (ha)	Difference (%)
1	Cereals	8,190.19	6,928.78	1,261.41	18.21%
2	Food Oil Crops	4,108.14	4,071.24	36.90	0.91%
3	Cotton	1,095.19	945.01	150.18	15.89%
4	Fresh Fruits	1,087.44	1,065.75	21.69	2.04%
5	Spices & Condiments	589.37	541.36	48.01	8.87%
6	Sugar Crops	577.50	622.70	-45.20	-7.26%
7	Pulses	323.31	326.44	-3.14	-0.96%
8	Vegetables	252.99	168.49	84.50	50.15%
9	Fodder Crops	200.93	172.78	28.15	16.29%
10	Citrus Fruits	178.57	173.06	5.51	3.18%
11	Non-Food Oil Crops	42.59	35.17	7.42	21.08%
12	Medicinal Crops	40.69	26.66	14.03	52.64%
13	Misc. Non-Food Crops	29.49	36.07	-6.58	-18.24%
14	Flowers	21.07	9.38	11.70	124.75%
15	Dye Crops	4.72	3.92	0.80	20.43%

(Source: Department of Economics & Statistics, GoTN)

Fig 3.15: Crop Area Details in Rajapalayam Block, 2019-20



The cropping area distribution data shows that the major area occupied in the current fasli is by cereals production, almost 50%, followed by food oil crops, while cotton production although third in line, covers just 7% of the whole cultivated area (Table 3.4).

Table 3.4: **Block-level Major and Minor Crops**

Block	Major crops	Minor crop
Rajapalayam	Paddy, Cholam, Cumbu, Sugarcane	Coconut tree, Chilies, Cotton, Black gram, Red gram, Green gram

3.10 Biodiversity

The LPA consists of distinct ecological zones, with the most important areas being the Eco-Sensitive Zone on the western side adjoining the Srivilliputhur Wildlife Sanctuary and Sanjeevi Malai RF abruptly bordering the densely developed urban area on the east. Both of these areas will be very important to protect during the future development of the town as they provide habitat for a wide number of species. Additionally, the presence of a large number of water bodies within the area provides habitat opportunities for a wide number of water birds.

Currently the Eco-Sensitive Zone mainly consists of mango and coconut orchards, and as such allows the presence of forest animals such as bear, leopard, and deer to move through relatively freely as their needs require. This is apparent from these animals' presence in Sappani Parambu RF on the eastern side of the Eco-Sensitive Zone. It is important that in any future development plans the atmosphere of the Eco-Sensitive Zone is maintained to ensure that animals have the ability to migrate as freely as they do at the present time.

Sanjeevi Malai, although at present in a state of degradation, still has the potential to regenerate and function as both an amenity space and green lung for the growing town, an important carbon sink with respect to the challenges of climate change, and also a haven for important biodiversity both with respect to flora and fauna.

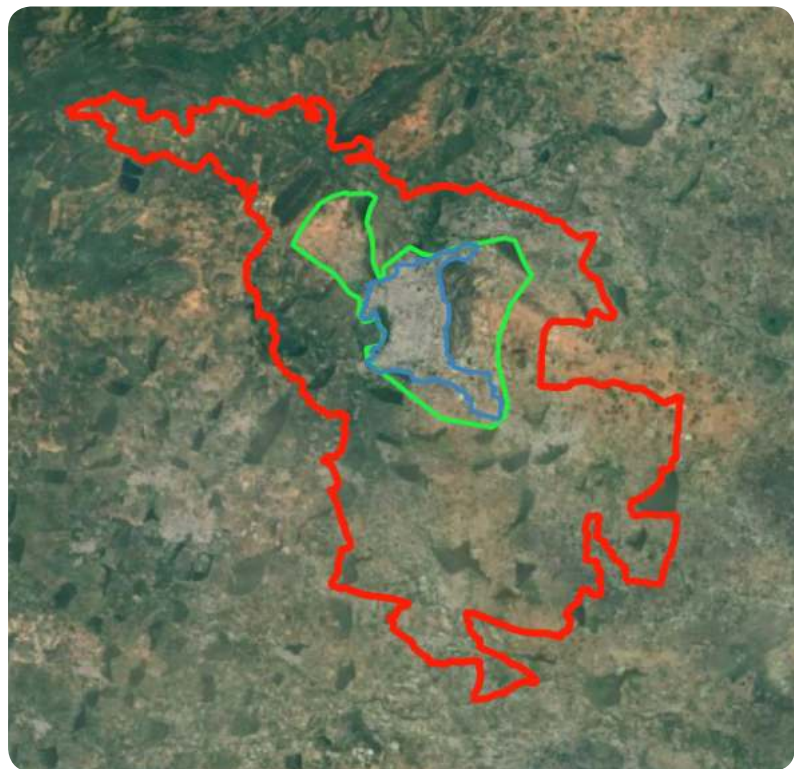
3.10.1. Current Status

For the flora of the LPA, surveys were carried out both pre and post monsoon, to ensure that maximum species diversity was captured for the specified areas. Ecological information about the frequency and the niche locations for each of the species was captured during the surveys.

For the fauna, the information gathered came from a workshop organised with the local wildlife groups. Amongst the members of these groups there are specialists with respect to the birds, mammals, and butterflies, as well as good general knowledge with respect to the reptiles and amphibians. The LPA was divided into 3 discrete habitat zones, to reflect the varying degree of urban development (**Fig. 3.16**). These 3 zones were:

- **Municipal area** – as defined by the existing municipal boundaries - In Blue.
- **Extended Urban Area (EUA)** – independently demarcated based on current developments spreading around the municipal area, which in the future will most likely become densely populated - In Green.
- **Remaining LPA** – the rest of the planning area, including many of the tanks and Reserved Forest areas - In Red.

Fig 3.16: **LPA Zones for Faunal Analysis**



Red line indicates LPA Boundary

Green line indicates Extended Urban Area – EUA

Blue line indicates Municipal zone

3.10.2. Flora

3.10.2.1. FOREST

Within the LPA there are 4 areas of natural vegetation (**Table 3.5**), two of which are reserved forests – Sanjeevi Malai and Sappani Parambu, the other two are panchayat forests – Sundakka Perumal Malai (Vadamalai) and Muthukudi - Snail Malai. All of the forests exhibit signs of significant disturbance, and it is imagined that there have been a number of different waves of extraction and exploitation that have been carried out in these areas over the last 400 hundred years by the local population. Hence it is difficult to assess what the original vegetation of the area would have looked like, and it is also highly probable that the soils have been degraded throughout the various cycles of extraction as the tree cover would have been removed, leaving the soils vulnerable to the erosive effects of intense monsoon rains.

Today where tree cover is left the specimens are of a very small stature, and of a limited species diversity. The conclusion that can be drawn is that these are secondary growth forests, of a relatively young age that we are observing. Unfortunately, there are no forest records for these areas that are available to view, and consequently we rely on supposition and inference to draw our conclusion.

Table 3.5: **Areas of Natural Vegetation in the LPA**

Name	Size in Hectares	Max Altitude - m	Altitude at Ground Level - m
Sanjeevi Malai	275	380	168
Sappani Parambu	258	250	181
Sundakka Perumal Malai /Vada Malai	52	230	172
Muthukudi	5	170	140

For the 4 different sites a species list of 252 species was generated, of which there were 54 trees, 67 shrubs or stragglers, 27 climbers, 102 herbs and grasses, and 2 ferns. Of these, 2 species of tree are highly significant as they are only found in this region of India, and they are not common species. *Albizia lathami* and *Maerua apetala*. Another 15 species are considered to be species of special interest as their presence in extremely small numbers (sometimes only one individual in an inaccessible location of the hill) gives a clear indication as to the original vegetation of the area, which is very different from the degraded vegetation type that is now prevailing due to the constant interference of the present day and extractive practices of the past. These species are characteristic members of the Dry Evergreen Forest, such as *Chionanthus zeylanica*, *Drypetes sepriaria*, and *Lepisanthes tetraphylla*.

Aside from these pockets of Evergreen species, the rest of the forest areas are dominated by deciduous species of trees such as *Acacia horrida*, *Albizia amara*, *Commiphora berryi*, *Dalbergia coromandeliana*, and *Wrightia tinctoria*. Sometimes these areas are in a closed canopy, intertwined with creepers and stragglers. At other times the areas have been significantly penetrated by the presence of non-native species, either planted, such as *Acacia planifrons*, or seeding exotic nuisance species – *Prosopis juliflora*.

Thus, the general state of the natural forest areas in the LPA is that of degradation, with the predominance of species associated with disturbance and recolonization. The canopy in many places is open, and the ground vegetation is dominated by *Cymbopogon citratus* – lemongrass, which has significant consequences for the ecosystem as it then becomes highly susceptible to fire due to the high oil content of the grass leaves. This can then become a negative loop as an increase in the frequency of fire leads to further degradation of the canopy cover and a greater presence of the lemongrass.

3.10.2.2. TREE SPECIES OCCURRENCE

To understand the pattern of occurrence of the tree species, especially on the roadside avenue plantations and other hotspots where trees of older age and species with higher ecological significance existed, the trees were documented in terms of species name, location, girth, height.

This data is helpful in terms of identifying tree hotspots with large number of tree occurrence and helps enabling informed decisions about conservation of said areas (**Map 3.14**). During biodiversity survey some commonly occurring tree species were tracked (**Table 3.6**). Among the list, the following are most common species found in the LPA – *Azadirachta indica* (Neem tree), *Borassus flabellifer* (Palm tree), *Delonix regia* (Royal Poinciana), *Ficus racemose* (Cluster Fig), *Lannea coromandelica* (Indian ash tree), *Pongamia pinnata* (Milletia pinnata), *Tamarindus indica* (Tamarind Tree). It is of interest to note the presence of an African Baobab tree here (**Fig. 3.17**), which is inferred to be more than 700 years old. This could be among one of the oldest trees in Tamil Nadu.

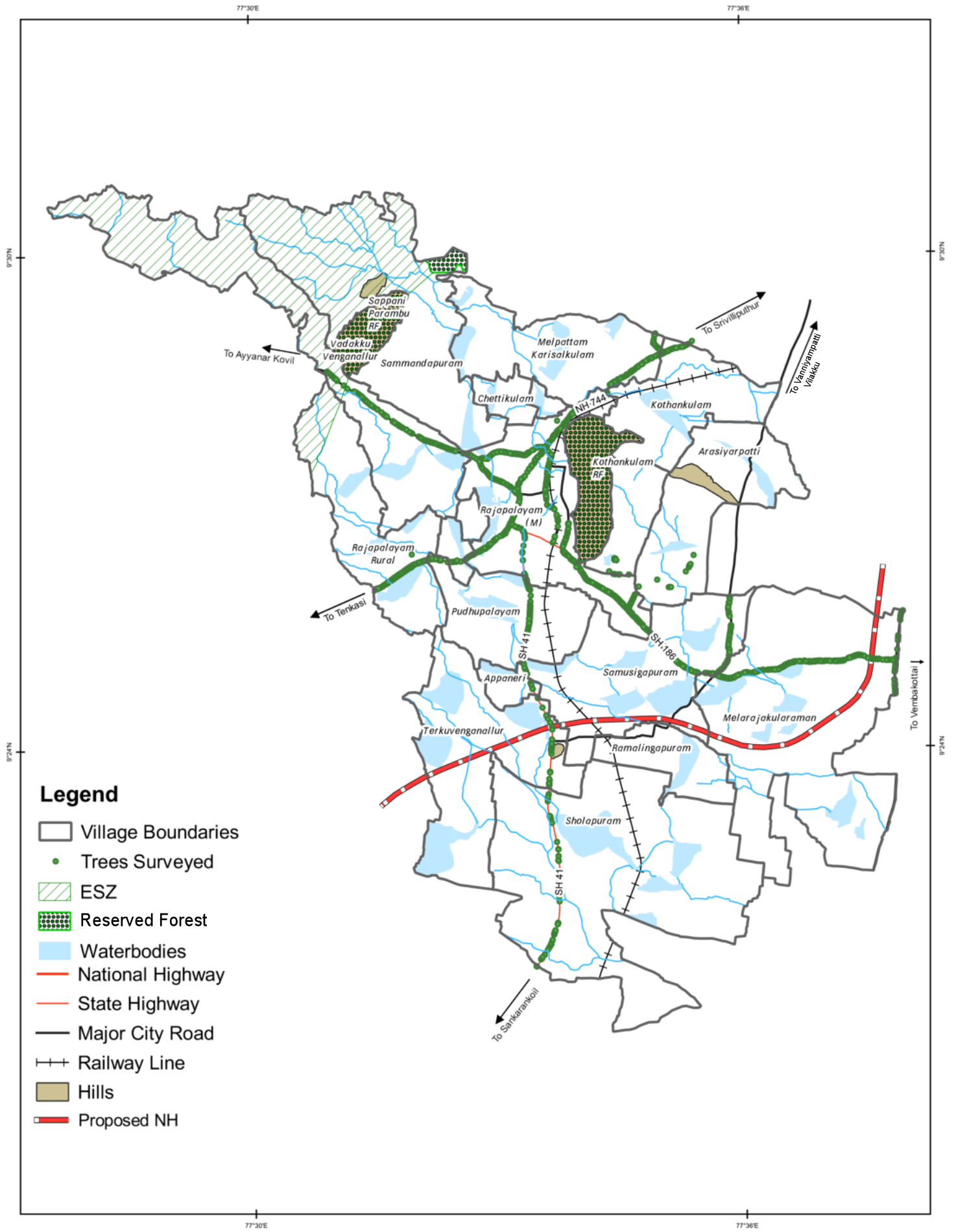
Fig 3.17: **Baobab Tree in Rajapalayam**



Table 3.6: **Commonly Occurring Tree Species**

Abbreviation	Species Occurrence	Scientific Name
Ac.ch	3	<i>Acacia chundra</i>
Ac.lu	2	<i>Acacia leucophloea</i>
Ae.ma	7	<i>Aegle marmelos</i>
Ai.ex	6	<i>Ailanthus excelsa</i>
Al.am	2	<i>Albizia amara</i>
Al.le	28	<i>Albizia lebbbeck</i>
Az. In	1,065	<i>Azadirachta indica</i>
Az.te	2	<i>Azima tetracantha</i>
Ba.pu	2	<i>Bauhinia purpurea</i>
Ba.ro	4	<i>Bauhinia racemosa</i>
Bamboo	1	<i>Bamboo</i>
Bo.fl	154	<i>Borassus flabellifer</i>
Bu.mo	7	<i>Butea monosperma</i>
Ca.do	4	<i>Cordia domestica</i>
Ca.in	10	<i>Cordia domestica</i>
Ca.fr	2	<i>Cadaba fruticosa</i>
Ca.si	20	<i>Cassia fistula</i>
Ce.pe	26	<i>Ceiba pentandra</i>
Ch.sw	2	<i>Chloroxylon swietenia</i>
Cr.ad	18	<i>Crateva adansonii</i>
Da.si	3	<i>Dalbergia sissoo</i>
De.el	6	<i>Delonix elata</i>
De.re	129	<i>Delonix regia</i>
Fi.am(5m)	1	<i>Ficus amplissima</i>
Fi.be	10	<i>Ficus benghalensis</i>
Fi.ra	98	<i>Ficus racemosa</i>
Gm.ar	1	<i>Gmelina arborea</i>
Ho.in	34	<i>Holoptelia integrifolia</i>
Ka.se	1	<i>Khaya senegalensis</i>
La.co	110	<i>Lannea coromandelica</i>
Ma.ap	1	<i>Maerua apetala</i>
Ma.lo	1	<i>Madhuca longifolia</i>
Mi.el	59	<i>Mimusops elengi</i>
Mi.he	2	<i>Millintonia hortensis</i>
Mo.co	51	<i>Morinda coreia</i>
Pe.pt	51	<i>Peltophorum pterocarpum</i>
Pi.du	35	<i>Pithecllobium dulce</i>
Popi	765	<i>Pongamia pinnata</i>
Pr.ci	3	<i>Prosopis cineraria</i>
Pt.sa	1	<i>Pterocarpus sandalinus</i>
Sa.al	3	<i>Santalum album</i>
Sa.sa	24	<i>Samanea saman</i>
Sa.sa(3.5m)	1	<i>Spathodea campanulata</i>
Singapuran jerry	3	<i>Streblus asper</i>

Abbreviation	Species Occurrence	Scientific Name
Sp.ca	1	<i>Santalum album</i>
Sp.co	1	<i>Spathodea campanulata</i>
St.as	16	<i>Streblus asper</i>
St.fo	6	<i>Sterculia foetida</i>
Sy.cu	13	<i>Syzygium cumini</i>
Ta.in	242	<i>Tamarindus indica</i>
Te.ar	3	<i>Terminalia arjuna</i>
Te.ca	45	<i>Terminalia catappa</i>
Te.gr	5	<i>Tectona grandis</i>
Te.un	5	<i>Tecomella undulata</i>
Th.po	1	<i>Thespesia populnea</i>
Vi.ne	4	<i>Vitex negundo</i>
Wr.ti	2	<i>Writia tintoria</i>
Zi.ma	4	<i>Ziziphus mauritiana</i>
Zi.xy	1	<i>Ziziphus xylopyrus</i>



Legend

- Village Boundaries
- Trees Surveyed
- ESZ
- Reserved Forest
- Waterbodies
- National Highway
- State Highway
- Major City Road
- Railway Line
- Hills
- Proposed NH

Tree Occurance in Rajapalayam LPA	Notes and Inferences :	Data Credits Auroville Botanical Gardens Field Survey	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 3.14: Trees Occurrence in Rajapalayam LPA

3.10.2.3. INVASIVE SPECIES WITHIN THE LPA

Within the LPA there are over several non-native or exotic species (Table 3.7), some of these have the potential to be an invasive threat, either in agricultural lands, on waste lands, within the forest areas or in water bodies.

Table 3.7: Exotic Plant List of Rajapalayam

S.No.	Binomial Name	Habit	Family	Invasive	Habitat
1	<i>Acacia caesia</i>	Shrub	Fabaceae	Yes	
2	<i>Acacia planifrons</i>	Tree	Fabaceae	Yes	Forest
3	<i>Acanthospermum hispidum</i>	Herb	Asteraceae	Yes	
4	<i>Adansonia digitata</i>	Tree	Malvaceae		
5	<i>Adenanthera pavonina</i>	Tree	Fabaceae	Yes	
6	<i>Adina cordifolia</i>	Tree	Rubiaceae		
7	<i>Aegle marmelos</i>	Tree	Rutaceae		
8	<i>Ageratum conyzoides</i>	Herb	Asteraceae	Yes	Agricultural
9	<i>Ailanthus excelsa</i>	Tree	Meliaceae		
10	<i>Albizia amara</i>	Tree	Fabaceae		
11	<i>Albizia lebbek</i>	Tree	Fabaceae		
12	<i>Albizia saman</i>	Tree	Fabaceae		
13	<i>Alstonia scholaris</i>	Tree	Apocynaceae		
14	<i>Alternanthera ficoidea</i>	Herb	Amaranthaceae	Yes	
15	<i>Annona squamosa</i>	Shrub	Annonaceae	Yes	
16	<i>Araucaria heterophylla</i>	Tree	Araucariaceae		
17	<i>Bambusa bambos</i>	Woody grass	Poaceae	Yes	
18	<i>Bauhinia purpurea</i>	Small tree	Fabaceae		
19	<i>Bauhinia variegata</i>	Small tree	Fabaceae		
20	<i>Blainvillea acmella</i>	Herb	Asteraceae	Yes	
21	<i>Borassus flabellifer</i>	Tree	Arecaceae		
22	<i>Bridelia montana</i>	Tree	Phyllanthaceae		
23	<i>Caesalpinia pulcherrima</i>	Shrub	Fabaceae		
24	<i>Calliandra haematocephala</i>	Shrub	Fabaceae		
25	<i>Carica papaya</i>	Small tree	Caricaceae		
26	<i>Caryota urens</i>	Tree	Arecaceae		
27	<i>Cassia fistula</i>	Tree	Fabaceae		
28	<i>Cassia siamea</i>	Tree	Fabaceae	Yes	
29	<i>Ceiba pentandra</i>	Tree	Malvaceae		
30	<i>Chromolaena odorata</i>	Shrub	Asteraceae	Yes	Agricultural
31	<i>Cocos nucifera</i>	Tree	Arecaceae		
32	<i>Conocarpus lancifolius</i>	Tree	Combretaceae		
33	<i>Cordia sebestena</i>	Tree	Boraginaceae		
34	<i>Couroupita guianensis</i>	Tree	Lecythidaceae		
35	<i>Cycas revoluta</i>	Shrub	Cycadaceae		
36	<i>Cymbopogon citratus</i>	Grass	Poaceae	Yes	Forest
37	<i>Delonix regia</i>	Tree	Fabaceae	Yes	
38	<i>Derris scandens</i>	Climber	Fabaceae		
39	<i>Dolichandrone atrovirens</i>	Tree	Bignoniaceae		

S.No.	Binomial Name	Habit	Family	Invasive	Habitat
40	<i>Eichhornia crassipes</i>	Floating herb	Pontederiaceae	Yes	Waterbodies
41	<i>Ficus benghalensis</i>	Tree	Moraceae		
42	<i>Ficus benjamina</i>	Tree	Moraceae		
43	<i>Ficus hispida</i>	Tree	Moraceae		
44	<i>Gliricidia sepium</i>	Shrub	Fabaceae		
45	<i>Guaiacum officinale</i>	Small tree	Zygophyllaceae		
46	<i>Guazuma ulmifolia</i>	Small tree	Malvaceae	Yes	
47	<i>Handroanthus impetiginosus</i>	Tree	Bignoniaceae		
48	<i>Hibiscus tiliaceus</i>	Tree	Malvaceae		
49	<i>Holoptelea integrifolia</i>	Tree	Ulmaceae		
50	<i>Ipomoea carnea</i>	Shrub	Convolvulaceae	Yes	Waterbodies
51	<i>Kigelia africana</i>	Tree	Bignoniaceae		
52	<i>Lagerstroemia speciosa</i>	Small tree	Lythraceae		
53	<i>Lannea coromandelica</i>	Tree	Anacardiaceae		
54	<i>Lantana camara</i>	Shrub	Verbenaceae	Yes	Forest
55	<i>Lawsonia inermis</i>	Shrub	Lythraceae		
56	<i>Leonotis nepetifolia</i>	Shrub	Lamiaceae		
57	<i>Leucaena leucocephala</i>	Tree	Fabaceae	Yes	
58	<i>Luffa cylindrica</i>	Climber	Cucurbitaceae	Yes	
59	<i>Madhuca longifolia</i>	Tree	Sapotaceae		
60	<i>Mangifera indica</i>	Tree	Anacardiaceae		
61	<i>Markhamia lutea</i>	Small tree	Bignoniaceae		
62	<i>Martynia annua</i>	Shrub	Martyniaceae	Yes	
63	<i>Melia azedarach</i>	Tree	Meliaceae		
64	<i>Melia dubia</i>	Tree	Meliaceae		
65	<i>Millingtonia hortensis</i>	Tree	Bignoniaceae	Yes	
66	<i>Mimusops elengi</i>	Tree	Sapotaceae		
67	<i>Muntingia calabura</i>	Small tree	Muntingiaceae	Yes	
68	<i>Nerium oleander</i>	Shrub	Apocynaceae		
69	<i>Parkia biglobosa</i>	Tree	Fabaceae		
70	<i>Parthenium hysterophorus</i>	Shrub	Asteraceae	Yes	Agricultural and Fallow
71	<i>Passiflora foetida</i>	Climber	Passifloraceae	Yes	
72	<i>Pavonia odorata</i>	Herb	Malvaceae	Yes	
73	<i>Peltophorum pterocarpum</i>	Tree	Fabaceae		
74	<i>Phoenix sylvestris</i>	Tree	Arecaceae		
75	<i>Phyllanthus emblica</i>	Small tree	Phyllanthaceae		
76	<i>Pisonia alba</i>	Shrub	Nyctaginaceae		
77	<i>Pithecellobium dulce</i>	Tree	Fabaceae		
78	<i>Plumeria alba</i>	Small tree	Apocynaceae		
79	<i>Polyalthia longifolia</i>	Tree	Annonaceae		
80	<i>Prosopis cineraria</i>	Tree	Fabaceae		
81	<i>Prosopis juliflora</i>	Small tree	Fabaceae	Yes	Forest and Fallow

S.No.	Binomial Name	Habit	Family	Invasive	Habitat
82	<i>Pterygota alata</i>	Tree	Malvaceae		
83	<i>Ricinus communis</i>	Shrub	Euphorbiaceae		
84	<i>Roystonea regia</i>	Tree	Arecaceae		
85	<i>Santalum album</i>	Small tree	Santalaceae		
86	<i>Schoenoplectus articulatus</i>	Grass	Poaceae	Yes	
87	<i>Senna obtusifolia</i>	Herb	Fabaceae	Yes	
88	<i>Senna occidentalis</i>	Shrub	Fabaceae	Yes	
89	<i>Sesbania grandiflora</i>	Small tree	Fabaceae		
90	<i>Spathodea campanulata</i>	Tree	Bignoniaceae		
91	<i>Sterculia foetida</i>	Tree	Malvaceae		
92	<i>Swietenia mahagoni</i>	Tree	Meliaceae		
93	<i>Tabebuia argentea</i>	Tree	Bignoniaceae		
94	<i>Tabebuia rosea</i>	Tree	Bignoniaceae		
95	<i>Tecoma stans</i>	Shrub	Bignoniaceae	Yes	
96	<i>Tecomella undulata</i>	Tree	Bignoniaceae		
97	<i>Tectona grandis</i>	Tree	Lamiaceae		
98	<i>Terminalia catappa</i>	Tree	Combretaceae	Yes	
99	<i>Terminalia mantaly</i>	Tree	Combretaceae		
100	<i>Thespesia populnea</i>	Tree	Malvaceae		
101	<i>Thevetia peruviana</i>	Shrub	Apocynaceae	Yes	
102	<i>Tithonia diversifolia</i>	Shrub	Asteraceae	Yes	Agricultural
103	<i>Typha latifolia</i>	Grass	Typhaceae	Yes	Waterbodies
104	<i>Waltheria indica</i>	Herb	Malvaceae	Yes	
105	<i>Wodyetia bifurcata</i>	Tree	Arecaceae		
106	<i>Ziziphus jujuba</i>	Shrub	Rhamnaceae		

Of these species, 11 are currently a nuisance within the LPA (**Table 3.8**), and as such would require an action plan to assess whether or not they are currently on the increase or decrease.

Table 3.8: **Key Invasive Flora in the LPA**

Species Name	Type of Species	Area of Invasiveness
Acacia planifrons	Tree	Forest
Ageratum conyzoides	Herb	Agricultural
Chromolaena odorata	Shrub	Agricultural
Cymbopogon citratus	Grass	Forest
Eichhornia crassipes	Floating Herb	Water Bodies
Ipomoea carnea	Shrub	Water Bodies
Lantana camara	Shrub	Forest
Parthenium hysterophorus	Shrub	Agricultural and Fallow
Prosopis juliflora	Small Tree	Forest and Fallow
Tithonia diversifolia	Shrub	Agricultural
Typha latifolia	Grass	Waterbodies

3.10.2.4. LIST OF SPECIES WITH RARE, ENDANGERED OR THREATENED STATUS

There are 5 species that are found in the LPA that are species of special concern due to their rarity (**Table 3.9**), 4 of them are endemic to South India, with only *Chloroxylon swietenia* being more widely distributed around India than the other species. Their presence on the hills of the LPA gives a great chance to contribute to their conservation with careful planning.

Table 3.9: **Rare/ Endangered Flora in the LPA**

Plants	Presence in SM	Presence in SP	Presence in SPM	As per IUCN	Remarks
<i>Albizia lathamii</i>		*		En	Very few populations of this tree have been recorded in the wild
<i>Chloroxylon swietenia</i>	*	*		Vu	Threat due to its timber value
<i>Dalbergia coromandeliana</i>	*	*	*	En	Recently thought to be extinct, now a few populations have been rediscovered
<i>Maerua apetala</i>	*	*	*	Vu	Very restricted range in South India, few mature individuals have been reported
<i>Moringa concanensis</i>	*		*	Vu	Restricted range

IUCN – International Union for Conservation of Nature

En – Endangered

Vu – Vulnerable

SM – Sanjeevi Malai

SP – Sappani Parambu

SPM – Sundakka Perumal Malai / Vada Malai

3.10.3. Fauna

In order to understand the distribution of animals within the LPA better, for the faunal analysis the LPA was divided into 3 zones – Municipal, Extended Urban Area, and the rest of LPA. This was to recognize the different habitat opportunities that are available within the 3 different zones (**Table 3.10**).

Table 3.10: **Summary of Faunal Analysis**

	Presence in Municipal Area		Presence in Extended Urban Area (EUA)		Presence in LPA		As per IUCN	
	Nos.	%	Nos.	%	Nos.	NT	VU	EN
Birds	46	37%	78	62%	126	1	3	1
Butterflies	34	18%	86	45%	193			
Mammals	15	52%	22	76%	29	3	4	2
Amphibians	4	44%	7	78%	9			
Snakes	14	48%	24	83%	29	2		
Lizards	7	70%	10	100%	10	1		
Turtles	1	33%	3	100%	3		2	

IUCN – International Union for Conservation of Nature

En – Endangered

Vu – Vulnerable

NT – Near Threateneds

3.10.3.1. BIRDS

There are 126 species that are recorded for the LPA (Table 3.11), 37% of the species are found in the Municipal area, which rises to 62% for the Extended Urban Area (EUA).

Table 3.11: List of Birds in the LPA

S. No.	Scientific name	Common name	Family	Presence in Municipal Area	Presence in EUA	Presence in LPA	As Per IUCN
1	<i>Francolinus pondicerianus</i>	Grey Francolin	Phasianidae	*	*	*	LC
2	<i>Gallus sonneratii</i>	Grey Junglefowl	Phasianidae		*	*	LC
3	<i>Pavo cristatus</i>	Indian Peafowl	Phasianidae	*	*	*	LC
4	<i>Anas poecilorhyncha</i>	Spot-billed Duck	Anatidae		*	*	LC
5	<i>Ardeola grayii</i>	Indian Pond Heron	Ardeidae	*	*	*	LC
6	<i>Bubulcus ibis</i>	Cattle Egret	Ardeidae	*	*	*	LC
7	<i>Phalacrocorax niger</i>	Little Cormorant	Phalacrocoracidae	*	*	*	LC
8	<i>Elanus caeruleus</i>	Black-winged Kite	Accipitridae	*	*	*	LC
9	<i>Milvus migrans</i>	Black Kite	Accipitridae	*	*	*	LC
10	<i>Ictinaetus malayensis</i>	Indian Black Eagle	Accipitridae		*	*	LC
11	<i>Pernis ptilorhynchus</i>	Oriental Honey Buzzard	Accipitridae	*	*	*	LC
12	<i>Spilornis cheela</i>	Crested Serpent Eagle	Accipitridae		*	*	LC
13	<i>Accipiter trivirgatus</i>	Crested Goshawk	Accipitridae			*	LC
14	<i>Accipiter badius</i>	Shikra	Accipitridae	*	*	*	LC
15	<i>Hieraaetus fasciatus</i>	Bonelli's Eagle	Accipitridae		*	*	LC
16	<i>Lophotriorchis kienerii</i>	Rufous-bellied Eagle	Accipitridae			*	NT
17	<i>Nisaetus cirrhatus</i>	Crested Hawk Eagle	Accipitridae			*	LC
18	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	Rallidae	*	*	*	LC
19	<i>Vanellus malabaricus</i>	Yellow-wattled Lapwing	Charadriidae		*	*	LC
20	<i>Vanellus indicus</i>	Red-wattled Lapwing	Charadriidae	*	*	*	LC
21	<i>Coloumba livia</i>	Common pigeon	Columbidae	*	*	*	LC
22	<i>Ducula badia</i>	Mountain Imperial Pigeon	Columbidae			*	LC
23	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Columbidae		*	*	LC
24	<i>Spilopelia chinensis</i>	Spotted-necked Dove	Columbidae		*	*	LC

S. No.	Scientific name	Common name	Family	Presence in Municipal Area	Presence in EUA	Presence in LPA	As Per IUCN
25	<i>Streptopelia senegalensis</i>	Laughing Dove	Columbidae	*	*	*	LC
26	<i>Chalcophaps indica</i>	Emerald Dove	Columbidae			*	LC
27	<i>Loriculus vernalis</i>	Vernal Hanging Parrot	Psittacidae			*	LC
28	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Psittacidae	*	*	*	LC
29	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	Psittacidae			*	LC
30	<i>Psittacula columboides</i>	Malabar parakeet	Psittacidae			*	LC
31	<i>Clamator jacobinus</i>	Jacobin Cuckoo	Cuculidae	*	*	*	LC
32	<i>Cuculus varius</i>	Common Hawk-Cuckoo	Cuculidae	*	*	*	LC
33	<i>Cacomantis sonneratii</i>	Banded Bay Cuckoo	Cuculidae			*	LC
34	<i>Cacomantis passerinus</i>	Grey-bellied Cuckoo	Cuculidae			*	LC
35	<i>Eudynamis scolopaceus</i>	Common Koel	Cuculidae	*	*	*	LC
36	<i>Rhopodytes viridirostris</i>	Blue-faced Malkoha	Cuculidae		*	*	LC
37	<i>Taccocua leschenaultii</i>	Sirkeer Malkoha	Cuculidae			*	LC
38	<i>Centropus sinensis</i>	Greater Coucal	Cuculidae		*	*	LC
39	<i>Glaucidium radiatum</i>	Jungle Owlet	Strigidae			*	LC
40	<i>Bubo bubo</i>	Indian Eagle Owl	Strigidae		*	*	LC
41	<i>Cypsiurus balasiensis</i>	Asian Palm Swift	Apodidae	*	*	*	LC
42	<i>Tachymarpis melba</i>	Alpine Swift	Apodidae			*	LC
43	<i>Hemiprocne coronata</i>	Crested Treeswift	Hemiprocnidae			*	LC
44	<i>Harpactes fasciatus</i>	Malabar Trogon	Trogonidae			*	LC
45	<i>Coracias benghalensis</i>	Indian Roller	Coraciidae	*	*	*	LC
46	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Alcedinidae	*	*	*	LC
47	<i>Alcedo atthis</i>	Common Kingfisher	Alcedinidae		*	*	LC
48	<i>Nyctornis athertoni</i>	Blue-bearded Bee-eater	Meropidae		*	*	LC
49	<i>Merops orientalis</i>	Green Bee-eater	Meropidae	*	*	*	LC

S. No.	Scientific name	Common name	Family	Presence in Municipal Area	Presence in EUA	Presence in LPA	As Per IUCN
50	<i>Merops leschenaulti</i>	Chestnut-headed Bee-eater	Meropidae			*	LC
51	<i>Ocyrceros griseus</i>	Malabar Grey Hornbill	Bucerotidae			*	VU
52	<i>Buceros bicornis</i>	Great Hornbill	Bucerotidae			*	VU
53	<i>Megalaima zeylanica</i>	Brown-headed Barbet	Ramphastidae		*	*	LC
54	<i>Megalaima viridis</i>	White-cheeked Barbet	Ramphastidae		*	*	LC
55	<i>Megalaima haemacephala</i>	Coppersmith Barbet	Ramphastidae	*	*	*	LC
56	<i>Celeus brachyurus</i>	Rufous Woodpecker	Picidae		*	*	LC
57	<i>Dinopium javanense</i>	Common Flame-backed Woodpecker	Picidae		*	*	LC
58	<i>Chrysocolaptes lucidus</i>	Greater Goldenback	Picidae			*	LC
59	<i>Tephrodornis virgatus</i>	Large Woodshrike	Incertae sedis			*	LC
60	<i>Tephrodornis pondicerianus</i>	Common Woodshrike	Incertae sedis		*	*	LC
61	<i>Coracina macei</i>	Large Cuckoo-shrike	Campephagidae			*	LC
62	<i>Pericrocotus flammeus</i>	Scarlet Minivet	Campephagidae			*	LC
63	<i>Aegithina tiphia</i>	Common Iora	Aegithinidae		*	*	LC
64	<i>Lanius cristatus</i>	Brown Shrike	Laniidae		*	*	LC
65	<i>Lanius vittatus</i>	Bay-backed Shrike	Laniidae		*	*	LC
66	<i>Lanius schach</i>	Long-tailed Shrike	Laniidae			*	LC
67	<i>Lanius meridionalis</i>	Southern Grey Shrike	Laniidae			*	VU
68	<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo	Dicruridae	*	*	*	LC
69	<i>Dicrurus macrocercus</i>	Black Drongo - Common	Dicruridae	*	*	*	LC
70	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Dicruridae			*	LC
71	<i>Dicrurus caerulescens</i>	White-bellied Drongo	Dicruridae		*	*	LC
72	<i>Oriolus oriolus</i>	Eurasian Golden Oriole	Oriolidae	*	*	*	LC
73	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Oriolidae			*	LC
74	<i>Terpsiphone paradisi</i>	Asian Paradise-flycatcher	Monarchidae	*	*	*	LC
75	<i>Hypothymis azurea</i>	Black-naped Monarch	Monarchidae			*	LC

S. No.	Scientific name	Common name	Family	Presence in Municipal Area	Presence in EUA	Presence in LPA	As Per IUCN
76	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Corvidae	*	*	*	LC
77	<i>Dendrocitta leucogastra</i>	White-bellied Treepie	Corvidae			*	LC
78	<i>Corvus macrorhynchos</i>	Large-billed Crow/ Jungle Crow	Corvidae	*	*	*	LC
79	<i>Corvus splendens</i>	House Crow	Corvidae	*	*	*	LC
80	<i>Parus major</i>	Great Tit	Paridae		*	*	LC
81	<i>Parus aplonotus</i>	Indian Yellow Tit	Paridae		*	*	LC
82	<i>Hirundo rustica</i>	Barn Swallow	Hirundinidae	*	*	*	LC
83	<i>Alauda gulgula</i>	Oriental Skylark	Alaudidae		*	*	LC
84	<i>Pycnonotus melanicterus</i>	Black-crested Bulbul	Pycnonotidae			*	LC
85	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Pycnonotidae		*	*	LC
86	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Pycnonotidae	*	*	*	LC
87	<i>Pycnonotus xantholaemus</i>	Yellow-throated Bulbul	Pycnonotidae			*	LC
88	<i>Pycnonotus luteolus</i>	White-browed Bulbul	Pycnonotidae		*	*	LC
89	<i>Acritillas indica</i>	Yellow-browed Bulbul	Pycnonotidae			*	LC
90	<i>Hypsipetes leucocephalus</i>	Black Bulbul	Pycnonotidae			*	LC
91	<i>Prinia socialis</i>	Ashy Prinia	Cisticolidae	*	*	*	LC
92	<i>Orthotomus sutorius</i>	Common Tailorbird	Cisticolidae	*	*	*	LC
93	<i>Phylloscopus trochiloides</i>	Greenish Warbler	Sylviidae	*	*	*	LC
94	<i>Pellorneum ruficeps</i>	Puff-throated Babbler	Timaliidae			*	LC
95	<i>Pomatorhinus horsfieldii</i>	Indian Scimitar Babbler	Timaliidae			*	LC
96	<i>Turdoides striata</i>	Jungle Babbler	Timaliidae			*	LC
97	<i>Turdoides affinis</i>	Yellow-billed Babbler	Timaliidae	*	*	*	LC
98	<i>Garrulax delesserti</i>	Rufous-vented Laughing-thrush	Timaliidae			*	LC
99	<i>Chrysomma sinense</i>	Yellow-eyed Babbler	Timaliidae			*	LC
100	<i>Zosterops palpebrosus</i>	Oriental White-eye	Zosteropidae			*	LC
101	<i>Sitta frontalis</i>	Velvet-fronted Nuthatch	Sittidae			*	LC
102	<i>Gracula religiosa</i>	Hill Myna	Sturnidae			*	LC
103	<i>Acridotheres tristis</i>	Common Myna	Sturnidae	*	*	*	LC

S. No.	Scientific name	Common name	Family	Presence in Municipal Area	Presence in EUA	Presence in LPA	As Per IUCN
104	<i>Myophonus horsfieldii</i>	Malabar Whistling Thrush	Turdidae			*	LC
105	<i>Copsychus saularis</i>	Oriental Magpie-Robin	Muscicapidae	*	*	*	LC
106	<i>Copsychus malabaricus</i>	White-rumped Shama	Muscicapidae			*	LC
107	<i>Saxicoloides fulicatus</i>	Indian Robin	Muscicapidae	*	*	*	LC
108	<i>Saxicola caprata</i>	Pied Bushchat	Muscicapidae		*	*	LC
109	<i>Cyornis tickelliae</i>	Tickell's Blue Flycatcher	Muscicapidae			*	LC
110	<i>Irena puella</i>	Asian Fairy Bluebird	Leptogastrinae			*	LC
111	<i>Chloropsis cochinchinensis</i>	Blue-winged Leafbird	Chloropseidae			*	EN
112	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	Chloropseidae		*	*	LC
113	<i>Dicaeum agile</i>	Thick-billed Flowerpecker	Dicaeidae			*	LC
114	<i>Dicaeum erythrorhynchos</i>	Pale-billed Flowerpecker	Dicaeidae	*	*	*	LC
115	<i>Dicaeum concolor</i>	Plain Flowerpecker	Dicaeidae			*	LC
116	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird	Nectariniidae	*	*	*	LC
117	<i>Nectarinia minima</i>	Crimson-backed sunbird	Nectariniidae			*	LC
118	<i>Cinnyris asiaticus</i>	Purple Sunbird	Nectariniidae	*	*	*	LC
119	<i>Cinnyris lotenius</i>	Loten's Sunbird	Nectariniidae	*	*	*	LC
120	<i>Arachnothera longirostra</i>	Little spiderhunter	Nectariniidae			*	LC
121	<i>Ploceus philippinus</i>	Baya Weaver	Ploceidae	*	*	*	LC
122	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Estrildidae	*	*	*	LC
123	<i>Lonchura kelaarti</i>	Black throated Munia	Estrildidae			*	LC
124	<i>Lonchura malacca</i>	Black-headed Munia	Estrildidae		*	*	LC
125	<i>Motacilla maderaspatensis</i>	White-browed Wagtail	Motacillidae		*	*	LC
126	<i>Anthus rufulus</i>	Paddyfield pipit	Motacillidae		*	*	LC

From the 126 species 8% are particularly associated with water bodies, and consequently rarely found within the municipal area (**Table 3.12**). There are 14 raptors, various types of eagles, buzzards, owls and kites. Most of the species, 45% feed solely on insects, with a further 16% being omnivorous with insects and fruit. Only 7% feed solely on fruits, 4% feed on flowers and 2% depend solely on grains.

Table 3.12: **Details of Birds**

Habitat	Number of Species	%	Food	Number of Species	%
Ground	13	10%	Duck	2	2%
Shrub	30	24%	Fish	1	1%
Sky	73	58%	Wader	4	3%
Water	10	8%	Flower	5	4%
			Fruit	9	7%
			Insect	57	45%
			Omni	20	16%
			Prey	14	11%
			Scavenger	12	10%
			Seeds	2	2%

There are 5 species of birds that are considered by the IUCN to be of concern (**Table 3.13**). These are generally to be found in the Eco-Sensitive Zone of the LPA, hence the need to protect this area from unwanted future development.

Table 3.13: **Rare/ Endangered Birds in the LPA**

Birds	Common Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
<i>Lophotriorchis Kienerii</i>	Rufous-Bellied Eagle			*	NT
<i>Ocyrceros griseus</i>	Malabar Grey Hornbill			*	VU
<i>Buceros bicornis</i>	Great Hornbill			*	VU
<i>Lanius meridionalis</i>	Southern Grey Shrike			*	VU
<i>Chloropsis cochinchinensis</i>	Blue-winged Leafbird			*	EN

IUCN – International Union for Conservation of Nature

En – Endangered

Vu – Vulnerable

NT- Near Threatened

3.10.3.2. BUTTERFLIES

There are 193 butterflies to be found within the LPA (**Table.3.14**), although only 18% of these are seen in the municipal area, and 45% of these in the EUA.

Table 3.14: List of Butterflies in the LPA

S. No	Binomial Name	Species	Scientific name	Presence in Municipal Area	Presence in EUA	Presence in LPA
1	<i>Bibasis jaina</i>	Orange Awlet	Hesperiidae			*
2	<i>Bibasis sena</i>	Orange-tail Awl	Hesperiidae			*
3	<i>Hasora chromus</i>	Common Banded Awl	Hesperiidae	*	*	*
4	<i>Hasora taminatus</i>	White Banded Awl	Hesperiidae			*
5	<i>Badomia exclamationis</i>	Brown Awl	Hesperiidae			*
6	<i>Celaenorhinus ambareesa</i>	Malabar Spotted Flat	Hesperiidae			*
7	<i>Spialia galba</i>	Indian Skipper	Hesperiidae	*	*	*
8	<i>Gomalia elma</i>	African Marbled Skipper	Hesperiidae	*	*	*
9	<i>Pseudocoladenia dan</i>	Fulvous Pied Flat	Hesperiidae			*
10	<i>Coladenia indrani</i>	Tricoloured Pied Flat	Hesperiidae			*
11	<i>Tagiades japedus</i>	Common Snow Flat	Hesperiidae			*
12	<i>Tagiades litigiosa</i>	Water Snow Flat	Hesperiidae			*
13	<i>Odontoptilum angulata</i>	Chestnut Angle	Hesperiidae			*
14	<i>Caprona agama</i>	Spotted Angle	Hesperiidae			*
15	<i>Caprona ransonnetti</i>	Golden Angle	Hesperiidae			*
16	<i>Caprona alida</i>	Alida Angle	Hesperiidae			*
17	<i>Taractrocera ceramas</i>	Tamil Grass Dart	Hesperiidae			*
18	<i>Taractrocera maevius</i>	Common Grass Dart	Hesperiidae	*	*	*
19	<i>Oriens goloides</i>	Common Dartlet	Hesperiidae			*
20	<i>Oriens concinna</i>	Tamil Dartlet	Hesperiidae			*
21	<i>Telicota ancilla</i>	Dark Palm Dart	Hesperiidae			*
22	<i>Telicota colon</i>	Pale Palm Dart	Hesperiidae			*
23	<i>Cephrenes chrysozona</i>	Plain Palm-dart	Hesperiidae			*
24	<i>potanthus pseudomaesa</i>	Dart sp. (Potanthus sp.)	Hesperiidae			*
25	<i>Parnara guttata</i>	Straight Swift	Hesperiidae		*	*
26	<i>Borbo cinnara</i>	Rice Swift	Hesperiidae		*	*
27	<i>Pseudoborbo bevan</i>	Bevan's Swift	Hesperiidae			*
28	<i>Pelopidas conjuncta</i>	Conjoined Swift	Hesperiidae			*
29	<i>Polytremis lubricans</i>	Contiguous Swift	Hesperiidae			*
30	<i>Caltoris kumara</i>	Blank Swift	Hesperiidae			*
31	<i>Suastus gremius</i>	Indian Palm Bob	Hesperiidae		*	*
32	<i>Cupitha purreea</i>	Wax Dart	Hesperiidae			*
33	<i>Gangara thyrasis</i>	Giant Redeye	Hesperiidae		*	*
34	<i>Erionota torus</i>	Rounded Palm Redeye	Hesperiidae		*	*
35	<i>Lambrix salsala</i>	Chestnut Bob	Hesperiidae		*	*
36	<i>Halpe homolea</i>	Indian Ace	Hesperiidae		*	*
37	<i>Thoressa evershedi</i>	Evershed's Ace	Hesperiidae			*
38	<i>Graphium sarpedon</i>	Common Bluebottle	Papilionidae	*	*	*

S. No	Binomial Name	Species	Scientific name	Presence in Municipal Area	Presence in EUA	Presence in LPA
39	<i>Graphium doson</i>	Common Jay	Papilionidae	*	*	*
40	<i>Graphium agamemmon</i>	Tailed Jay	Papilionidae			*
41	<i>Graphium nomius</i>	Spot Swordtail	Papilionidae			*
42	<i>Chilasa clytia</i>	Common Mime	Papilionidae			*
43	<i>Papilio polytes</i>	Common Mormon	Papilionidae	*	*	*
44	<i>Papilio dravidarum</i>	Malabar Raven	Papilionidae			*
45	<i>Papilio helenus</i>	Red Helen	Papilionidae			*
46	<i>Papilio polymnestor</i>	Blue Mormon	Papilionidae		*	*
47	<i>Papilio demoleus</i>	Lime Butterfly	Papilionidae	*	*	*
48	<i>Papilio crino</i>	Common Banded Peacock	Papilionidae		*	*
49	<i>Atrophaneura aristolochiae</i>	Common Rose	Papilionidae	*	*	*
50	<i>Atrophaneura hector</i>	Crimson Rose	Papilionidae	*	*	*
51	<i>Troides minos</i>	Southern Birdwing	Papilionidae		*	*
52	<i>Eurema andersoni</i>	One-spot Grass Yellow	Pieridae	*	*	*
53	<i>Eurema blanda</i>	Three-spot Grass Yellow	Pieridae			*
54	<i>Eurema brigitta</i>	Small Grass Yellow	Pieridae		*	*
55	<i>Eurema hecabe</i>	Common Grass Yellow	Pieridae		*	*
56	<i>Catopsilia pomona</i>	Common Emigrant	Pieridae	*	*	*
57	<i>Catopsilia pyranthe</i>	Mottled Emigrant	Pieridae	*	*	*
58	<i>Colotis amata</i>	Small Salmon Arab	Pieridae		*	*
59	<i>Colotis danae</i>	Crimson-tip	Pieridae		*	*
60	<i>Colotis etrida</i>	Small Orange-tip	Pieridae		*	*
61	<i>Colotis eucharis</i>	Plain Orange-tip	Pieridae		*	*
62	<i>Colotis fausta</i>	Large Salmon Arab	Pieridae		*	*
63	<i>Ixias marianne</i>	White Orange-tip	Pieridae		*	*
64	<i>Ixias pyrene</i>	Yellow Orange-tip	Pieridae		*	*
65	<i>Hebomoia glaucippe</i>	Great Orange-tip	Pieridae			*
66	<i>Pareronia ceylanica</i>	Dark Wanderer	Pieridae			*
67	<i>Pareronia valeria</i>	Common Wanderer	Pieridae			*
68	<i>Appias libythea</i>	Striped Albatross	Pieridae		*	*
69	<i>Appias lycnida</i>	Chocolate Albatross	Pieridae			*
70	<i>Appias indra</i>	Plain Puffin	Pieridae			*
71	<i>Appias albina</i>	Common Albatross	Pieridae			*
72	<i>Cepora nerissa</i>	Common Gull	Pieridae		*	*
73	<i>Cepora nadina</i>	Lesser Gull	Pieridae			*
74	<i>Prioneris sita</i>	Painted Sawtooth	Pieridae			*
75	<i>Delias eucharis</i>	Common Jezebel	Pieridae	*	*	*
76	<i>Leptosia nina</i>	Psyche	Pieridae	*	*	*
77	<i>Belenois aurota</i>	Pioneer	Pieridae		*	*
78	<i>Spalgis epius</i>	Apefly	Lycaenidae		*	*

S. No	Binomial Name	Species	Scientific name	Presence in Municipal Area	Presence in EUA	Presence in LPA
79	<i>Curetis thetis</i>	Indian Sunbeam	Lycaenidae	*	*	*
80	<i>Arhopala amantes</i>	Large Oakblue	Lycaenidae			*
81	<i>Surendra quercetorum</i>	Common Acacia Blue	Lycaenidae		*	*
82	<i>Zesius chrysomallus</i>	Redspot	Lycaenidae		*	*
83	<i>Amblypodia anita</i>	Leaf Blue	Lycaenidae			*
84	<i>Rathinda amor</i>	Monkey Puzzle	Lycaenidae	*	*	*
85	<i>Tajuria jehana</i>	Plains Blue Royal	Lycaenidae	*	*	*
86	<i>Tajuria cippus</i>	Peacock Royal	Lycaenidae			*
87	<i>Ancema blanka</i>	Silver Royal	Lycaenidae			*
88	<i>Hypolycaena nilgirica</i>	Nilgiri Tit	Lycaenidae			*
89	<i>Deudorix isocrates</i>	Guava Blue	Lycaenidae			*
90	<i>Deudorix epijarbas</i>	Cornelian	Lycaenidae			*
91	<i>Bindahara phocides</i>	Plane	Lycaenidae			*
92	<i>Rapala iarbus</i>	Indian Red Flash	Lycaenidae		*	*
93	<i>Rapala manea</i>	Slate Flash	Lycaenidae			*
94	<i>Rapala varuna</i>	Indigo Flash	Lycaenidae			*
95	<i>Spindasis lohita</i>	Long-banded Silverline	Lycaenidae	*	*	*
96	<i>Spindasis vulcanus</i>	Common Silverline	Lycaenidae		*	*
97	<i>Spindasis schistacea</i>	Plumbeous Silverline	Lycaenidae		*	*
98	<i>Spindasis ictis</i>	Common Shot Silverline	Lycaenidae		*	*
99	<i>Anthene lycaenina</i>	Pointed Ciliate Blue	Lycaenidae			*
100	<i>Caleta caleta</i>	Angled Pierrot	Lycaenidae		*	*
101	<i>Discolampa ethion</i>	Banded Blue Pierrot	Lycaenidae			*
102	<i>Castalius rosimon</i>	Common Pierrot	Lycaenidae	*	*	*
103	<i>Tarucus callinara</i>	Spotted pierrot	Lycaenidae			*
104	<i>Leptotes plinius</i>	Zebra Blue	Lycaenidae	*	*	*
105	<i>Petrelaea dana</i>	Dingy Lineblue	Lycaenidae			*
106	<i>Nacaduba kurava</i>	Transparent 6-lineblue	Lycaenidae			*
107	<i>Nacaduba beroe</i>	Opaque 6-lineblue	Lycaenidae			*
108	<i>Prosotas nora</i>	Common Lineblue	Lycaenidae		*	*
109	<i>Prosotas dubiosa indica</i>	Tailless Lineblue	Lycaenidae			*
110	<i>Prosotas noreia</i>	White-tipped Lineblue	Lycaenidae			*
111	<i>Ionolyce helicon</i>	Pointed Lineblue	Lycaenidae			*
112	<i>Jamides bochus</i>	Dark Cerulean	Lycaenidae			*
113	<i>Jamides celeno</i>	Common Cerulean	Lycaenidae		*	*
114	<i>Jamides alecto</i>	Metallic Cerulean	Lycaenidae			*
115	<i>Catochrysops strabo</i>	Forget-me-not	Lycaenidae	*	*	*
116	<i>Lampides boeticus</i>	Pea Blue	Lycaenidae		*	*
117	<i>Tarucus balkanicus</i>	Balkan pierrot	Lycaenidae			*
118	<i>Tarucus extricatus</i>	Rounded Pierrot	Lycaenidae			*
119	<i>Zizeeria karsandra</i>	Dark Grass Blue	Lycaenidae		*	*
120	<i>Pseudozizeeria maha</i>	Pale Grass Blue	Lycaenidae			*

S. No	Binomial Name	Species	Scientific name	Presence in Municipal Area	Presence in EUA	Presence in LPA
121	<i>Freyeria putli</i>	Oriental Grass Jewel	Lycaenidae		*	*
122	<i>Zizina otis</i>	Lesser Grass Blue	Lycaenidae		*	*
123	<i>Zizula hylax</i>	Tiny Grass Blue	Lycaenidae		*	*
124	<i>Azanus ubaldus</i>	Bright Babul Blue	Lycaenidae			*
125	<i>Azanus jesous</i>	African Babul Blue	Lycaenidae	*	*	*
126	<i>Everus lacturnus</i>	Indian Cupid	Lycaenidae			*
127	<i>Neopithecops zalmora</i>	Quaker	Lycaenidae			*
128	<i>Megisba thwaitesi</i>	Tailless Malayan	Lycaenidae			*
129	<i>Euchrysops cnejus</i>	Gram Blue	Lycaenidae	*	*	*
130	<i>Acytolepis puspa</i>	Common Hedge Blue	Lycaenidae			*
131	<i>Udara akasa</i>	White Hedge Blue	Lycaenidae			*
132	<i>Celastrina lavendularis</i>	Plain Hedge Blue	Lycaenidae			*
133	<i>Acytolepis lilacea</i>	Hampson's Hedge Blue	Lycaenidae			*
134	<i>Chilades pandava</i>	Plains Cupid	Lycaenidae			*
135	<i>Chilades lajus</i>	Lime Blue	Lycaenidae	*	*	*
136	<i>Abisara echerius</i>	Plum Judy	Lycaenidae			*
137	<i>Abisara bifasciata</i>	Double-banded Judy	Lycaenidae			*
138	<i>Catochrysops panormus</i>	Silver Forget-me-not	Lycaenidae			*
139	<i>Libythea lepita</i>	Common Beak	Nymphalidae			*
140	<i>Libythea myrrha</i>	Club Beak	Nymphalidae			*
141	<i>Tirumala limniace</i>	Blue Tiger	Nymphalidae	*	*	*
142	<i>Tirumala septentrionis</i>	Dark Blue Tiger	Nymphalidae		*	*
143	<i>Danaus genutia</i>	Striped Tiger	Nymphalidae			*
144	<i>Danaus chrysippus</i>	Plain Tiger	Nymphalidae	*	*	*
145	<i>Parantica aglea</i>	Glassy Tiger	Nymphalidae			*
146	<i>Euploea sylvester</i>	Double-branded Crow	Nymphalidae			*
147	<i>Euploea core</i>	Common Crow	Nymphalidae	*	*	*
148	<i>Idea malabarica</i>	Malabar Tree Nymph	Nymphalidae			*
149	<i>Polyura athamas</i>	Common Nawab	Nymphalidae		*	*
150	<i>Polyura agraria</i>	Anomalous Nawab	Nymphalidae		*	*
151	<i>Charaxes bernardus</i>	Tawny Rajah	Nymphalidae			*
152	<i>Charaxes solon</i>	Black Rajah	Nymphalidae		*	*
153	<i>Melantia leda</i>	Common Evening Brown	Nymphalidae	*	*	*
154	<i>Melantia phedima</i>	Dark Evening Brown	Nymphalidae			*
155	<i>Lethe rohria</i>	Common Treebrown	Nymphalidae			*
156	<i>Mycalesis perseus</i>	Common Bushbrown	Nymphalidae		*	*
157	<i>Mycalesis mineus</i>	Dark-brand Bushbrown	Nymphalidae			*
158	<i>Mycalesis subdita</i>	Tamil Bushbrown	Nymphalidae			*
159	<i>Mycalesis patnia</i>	Glad-eye Bushbrown	Nymphalidae			*
160	<i>Ypthima asterope</i>	Common Three-ring	Nymphalidae			*
161	<i>Ypthima baldus</i>	Common Five-ring	Nymphalidae			*

S. No	Binomial Name	Species	Scientific name	Presence in Municipal Area	Presence in EUA	Presence in LPA
162	<i>Ypthima ceylonica</i>	White Four-ring	Nymphalidae	*	*	*
163	<i>Ypthima heubneri</i>	Common Four-ring	Nymphalidae			*
164	<i>Ypthima striata</i>	Striated Five-ring	Nymphalidae			*
165	<i>Acraea violae</i>	Tawny Coster	Nymphalidae		*	*
166	<i>Vindula erata</i>	Cruiser	Nymphalidae		*	*
167	<i>Cirrachroa thais</i>	Tamil Yeoman	Nymphalidae			*
168	<i>Cupha erymanthis</i>	Rustic	Nymphalidae			*
169	<i>Phalanta phalantha</i>	Common Leopard	Nymphalidae			*
170	<i>Maduza procris</i>	Commander	Nymphalidae		*	*
171	<i>Athyma perius</i>	Common Sergeant	Nymphalidae			*
172	<i>Athyma ranga</i>	Black-vein Sergeant	Nymphalidae			*
173	<i>Athyma selenophora</i>	Staff Sergeant	Nymphalidae			*
174	<i>Pantoporia hordonia</i>	Common Lascar	Nymphalidae			*
175	<i>Neptis jumbah</i>	Chestnut-streaked Sailer	Nymphalidae			*
176	<i>Neptis hylas</i>	Common Sailer	Nymphalidae		*	*
177	<i>Euthalia aconthea</i>	Common Baron	Nymphalidae		*	*
178	<i>Euthalia nais</i>	Baronet	Nymphalidae			*
179	<i>Dophia evelina</i>	Redspot Duke	Nymphalidae			*
180	<i>Cyrestis thyodamas</i>	Common Map	Nymphalidae			*
181	<i>Ariadne ariadne</i>	Angled Castor	Nymphalidae			*
182	<i>Ariadne merione</i>	Common Castor	Nymphalidae		*	*
183	<i>Byblia ilithyia</i>	Joker	Nymphalidae		*	*
184	<i>Rohana parisatis</i>	Black Prince	Nymphalidae			*
185	<i>Kaniska canace</i>	Blue Admiral	Nymphalidae			*
186	<i>Junonia orithiya</i>	Blue Pansy	Nymphalidae	*	*	*
187	<i>Junonia hierta</i>	Yellow Pansy	Nymphalidae	*	*	*
188	<i>Junonia iphita</i>	Chocolate Pansy	Nymphalidae	*	*	*
189	<i>Junonia almana</i>	Peacock Pansy	Nymphalidae		*	*
190	<i>Junonia lemonias</i>	Lemon Pansy	Nymphalidae	*	*	*
191	<i>Hypolimnias bolina</i>	Great Eggfly	Nymphalidae		*	*
192	<i>Hypolimnias misippus</i>	Danaid Eggfly	Nymphalidae		*	*
193	<i>Kallima horsfieldi</i>	Blue Oakleaf	Nymphalidae			*

The species fall neatly into 5 families (**Table 3.15**), of which the largest number are found in Lycaenidae: Blues – with a total of 61 species – only 41% of these are found in the EUA, and 16% in the Municipal area. The Nymphalidae: Brush-footed Butterflies – are the next biggest group – 55 species, with a similar pattern of distribution through the zones. Both the Papilionidae: Swallowtails – 14 species and the Pieridae: Whites & Yellows – 26 species, are more represented in the EUA, with around 65% of species showing up there, which indicates that they are less dependent on forest conditions. This is exactly opposite to the Hesperidae: Skippers – 37 species, which have the lowest percentage – 30% - of species to be found in the urban and municipal areas.

Table 3.15: **Details of Butterflies in LPA**

Butterfly Family	Presence in Municipal Area		Presence in EUA		Presence in LPA
	Nos.	%	Nos.	%	Nos.
Hesperiidae: Skippers	4	11%	11	30%	37
Papilionidae: Swallowtails	6	43%	9	64%	14
Pieridae: Whites & Yellows	5	19%	17	65%	26
Lycaenidae: Blues	10	16%	25	41%	61
Nymphalidae: Brush-footed Butterflies	9	16%	24	44%	55
Totals	34	18%	86	45%	193

3.10.3.3. MAMMALS

There are 29 species of mammals to be found in the LPA (Table 3.16). 3 of these species are non-residential, but can be seen passing through on occasion; these are the elephant, sloth bear, and leopard. The only large mammal to be more regular in the LPA is the chital deer which is found in Sappani Parambu. The wild boar is found in all zones and is recognized as a considerable nuisance for agriculture. Of the other mammals there are 3 types of bats, which are seen in all 3 zones, 5 types of mice or rats which are common to most zones. There are 2 types of jungle cats and 2 types of civet cats. The rarest species is the pangolin, which is protected under the cities treaty and also considered by the IUCN to be threatened in the wild. Other notable species are the slender loris and the smooth coated otter.

Table 3.16: List of Mammals in LPA

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
1	<i>Parachinus nudiventris</i>	Madras or Bare-bellied Hedgehog	Mullu Eli	*	*	*	LC
2	<i>Pteropus giganteus</i>	Indian Flying Fox or Indian Fruit Bat	Vaval	*	*	*	LC
3	<i>Rousettus leschenaultii</i>	Fulvous Fruit Bat		*	*	*	NT
4	<i>Cynopterus sphinx</i>	Greater Short-nosed Fruit Bat		*	*	*	LC
5	<i>Rhinopoma microphyllum</i>	Greater Mouse-tailed Bat		*	*	*	LC
6	<i>Loris lydekkerianus</i>	Grey Slender Loris	Thevangu			*	NT
7	<i>Macaca radiata</i>	Bonnet Macaque	Korangu	*		*	LC
8	<i>Manis crassicaudata</i>	Indian Pangolin	Erumbu theeni		*	*	EN
9	<i>Lepus nigricollis</i>	Indian Hare	Katu Musal	*	*	*	LC
10	<i>Funambulus palmarum</i>	Three-striped Palm Squirrel	Anil	*	*	*	LC
11	<i>Mus musculus</i>	House Mouse		*	*	*	LC
12	<i>Mus booduga</i>	Little Indian Field Mouse			*	*	LC
13	<i>Millardia meltada</i>	Soft-furred Field Rat	Varappu Eli		*	*	LC
14	<i>Bandicota indica</i>	Large Bandicoot Rat	Perichali	*	*	*	LC
15	<i>Rattus rattus</i>	House Rat or Black Rat or Roof Rat or Ship Rat	Veetu Eli	*	*	*	LC
16	<i>Hystrix indica</i>	Indian Crested Porcupine	Mullam Pandri		*	*	LC
17	<i>Felis chaus</i>	Jungle Cat	Katu Poonai	*	*	*	LC
18	<i>Prionailurus rubiginosus</i>	Rusty-spotted Cat				*	NT
19	<i>Viverricula indica</i>	Small Indian Civet			*	*	LC
20	<i>Paradoxurus hemaphroditus</i>	Palm Civet or Toddy Cat	Marra Nai		*	*	LC
21	<i>Herpestes edwardsi</i>	Grey Mongoose	Keeri Pullai	*	*	*	LC
22	<i>Canis aureus</i>	Golden Jackal	Nari		*	*	LC
23	<i>Lutrogale perspicillata</i>	Smooth Coated Otter				*	VU
24	<i>Sus scrofa</i>	Wild Boar	Kattu Pandri	*	*	*	LC
25	<i>Axis axis</i>	Spotted Deer or Chital	Pulli Maan		*	*	LC
26	<i>Panthera pardus</i>	Leopard	Siruthai			*	VU
27	<i>Bos gaurus</i>	Indian gaur	Kattu erumai			*	VU
28	<i>Melursus ursinus</i>	Sloth Bear	Karadi			*	VU
29	<i>Elephas maximus indicus</i>	Elephant	Yanai			*	EN

There are 9 species of mammals that are considered to be of concern by the IUCN (**Table 3.17**), all of them are only found in the Eco-Sensitive Zone. The larger animals will only be passing through the zone, however some of the small ones will be resident in the Reserved Forest of Sappani Parambu. The presence of these animals highlights the need to protect the Eco-Sensitive Zone.

Table 3.17: **Rare/ Endangered Mammals in the LPA**

Mammals	Common Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
<i>Rousettus leschenaultii</i>	Fulvous Fruit Bat	*	*	*	NT
<i>Loris lydekkerianus</i>	Grey Slender Loris			*	NT
<i>Manis crassicaudata</i>	Indian Pangolin		*	*	EN
<i>Prionailurus rubiginosus</i>	Rusty-spotted Cat			*	NT
<i>Lutrogale perspicillata</i>	Smooth Coated Otter			*	VU
<i>Panthera pardus</i>	Leopard			*	VU
<i>Bos gaurus</i>	Indian gaur			*	VU
<i>Melursus ursinus</i>	Sloth Bear			*	VU
<i>Elephas maximus indicus</i>	Elephant			*	EN

*Note: IUCN – International Union for Conservation of Nature

En – Endangered

Vu – Vulnerable

NT – Near Threatened

3.10.3.4. SNAKES

There are 29 species of snakes that are found in the LPA (**Table 3.18**), of which only 5 are confined to the wider area, with the rest being found commonly in the EUA. However only 48% of the species are to be found in the Municipal area. Of this, 3 of the species are water snakes, and consequently associated with the tanks and ponds. There are 5 poisonous species, of these only the slender coral snake is confined to the wider LPA, the others – saw scaled viper, russel's viper, common krait, and cobra are found in all the zones. The rock python, the largest of the snakes, has been reported from Sappani Parambu and adjacent areas in the Eco-Sensitive Zone.

Table 3.18: List of Snakes in the LPA

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
1	<i>Indotyphlops braminus</i>	Brahminy worm snake	Seyan pambu, Sevi pambu	*	*	*	LC
2	<i>Grypotyphlops acutus</i>	Beaked worm snake	Peria seyan pambu		*	*	LC
3	<i>Eryx johnii</i>	Red or john's sand boa	Iruthalai pambu	*	*	*	NT
4	<i>Eryx conicus</i>	Common or russell's sand boa	Manooly pambu		*	*	LC
5	<i>Coelognathus helena helena</i>	Common trinket snake	Sangili ponnian	*	*	*	LC
6	<i>Ptyas mucosus</i>	Common rat snake	Sarai pambu	*	*	*	LC
7	<i>Argyrogena fasciolata</i>	Banded racer	Odugali pambu	*	*	*	LC
8	<i>Oligodon arnensis</i>	Common or banded kukri snake	Paal viriyan		*	*	LC
9	<i>Oligodon taeniolatus</i>	Russell's or variegated kukri snake	Pul viriyan, Poi nagam		*	*	LC
10	<i>Sibynophis subpunctatus</i>	Dumeril's black-headed snake	Karunthalai pambu		*	*	LC
11	<i>Dendrelaphis tristis</i>	Common indian bronzeback	Komberi moorken	*	*	*	LC
12	<i>Lycodon aulicus</i>	Common wolf snake	Sangu viriyan, Vellikol viriyan	*	*	*	LC
13	<i>Lycodon anamallensis</i>	Slender wolf snake	Suvarotti pambu		*	*	LC
14	<i>Lycodon striatus</i>	Barred wolf snake	Karun Sangu viriyan		*	*	LC
15	<i>Dryocalamus nympha</i>	Indian bridal snake	Mukkadu pambu		*	*	LC
16	<i>Fowlea piscator</i>	Checkered keelback	Thaneer pambu, Neer sarai	*	*	*	LC
17	<i>Amphiesma stolata erythrostickus</i>	Buffstriped keelback	Mariatha pambu		*	*	LC
18	<i>Atretium schistosum</i>	Olivaceous keelback	Kailankutty, Pachai nagam			*	LC
19	<i>Ahaetulla oxyrhyncha</i>	Common green whip snake or vine snake	Pachai pambu, Kan kuthi pambu	*	*	*	LC
20	<i>Boiga trigonata</i>	Common cat snake	Poi surutai, Olai pambu		*	*	LC
21	<i>Echis carinata</i>	Saw-scaled viper	Surutai pambu, Surutai virian	*	*	*	LC
22	<i>Daboia russelii</i>	Russell's viper	Kannadi viriyan	*	*	*	LC
23	<i>Bungarus caeruleus</i>	Common krait	Kattu viriyan, Karuvelan pambu, Aanai viriyan	*	*	*	LC

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
24	<i>Naja naja</i>	Spectacled cobra	Naga pambu, Nalla pambu	*	*	*	LC
25	<i>Calliophis melanurus</i>	Slender coral snake	Pavala pambu, Poo nagam, Ratha viriyan			*	LC
26	<i>Coelognathus helena</i>	Trinket snake		*	*	*	LC
27	<i>Hypnale hypnale</i>	Humped pit viper				*	LC
28	<i>Python sebae</i>	Rock python	Malaippampu			*	NT
29	<i>Chrysopelea ornata</i>	Flying snake	Parakkum pambu			*	LC

Two species of snakes are near threatened, again to be found mainly in the Eco sensitive zone of the LPA (Table 3.19).

Table 3.19: **Rare/ Endangered Snakes in the LPA**

Snakes	Common Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
<i>Eryx johnii</i>	Red Sand Boa	*	*	*	NT
<i>Python sebae</i>	Rock python			*	NT

IUCN – International Union for Conservation of Nature

NT – Near Threatened

3.10.3.5. OTHER REPTILES

Of the other reptiles, which there are only 13 species (Table 3.20). The majority of them are found everywhere; it is only the more specialised lizards that are not to be found in the Municipal area – blanford's rock agama (found on rocks), southern green calotes (a specialised forest lizard) and the south asian chameleon (a slow and vulnerable lizard that does not do well in close contact to humans). In addition to these species there are two types of turtles – water based and one type of tortoise – forest based, which are to be found in the zones.

Table 3.20: **List of Other Reptiles present in LPA**

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
1	<i>Hemidactylus frenatus</i>	Southern House Gecko	Veetu Palli	*	*	*	LC
2	<i>Hemidactylus parvimaculatus</i>	Spotted House Gecko	Pulli Veetu Palli	*	*	*	LC
3	<i>Hemidactylus leschenaultii</i>	Bark Gecko	Mara Palli	*	*	*	LC
4	<i>Eutropis carinata</i>	Keeled Grass Skink	Aranai	*	*	*	LC
5	<i>Eutropis macularia</i>	Bronze Grass Skink	Aranai	*	*	*	LC

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
6	<i>Calotes versicolor</i>	Indian Garden Lizard	Onan	*	*	*	LC
7	<i>Calotes calotes</i>	Southern Green Calotes	Pachai Onan		*	*	LC
8	<i>Psammophilus blanfordanus</i>	Blanford's Rock Agama	Malai Onan		*	*	LC
9	<i>Chamaeleo zeylanicus</i>	South Asian Chameleon	Pachaonthi		*	*	LC
10	<i>Varanus bengalensis</i>	Indian Monitor Lizard	Udumbu	*	*	*	NT
11	<i>Geochelone elegans</i>	Indian Star Tortoise	Nakshatra Aamai		*	*	VU
12	<i>Melanochelys trijuga</i>	Black Pond Turtle	Sethu aamai		*	*	LC
13	<i>Lissemys punctata</i>	Indian Flap-Shell Turtle	Neer aamai	*	*	*	VU

The presence of species of concern throughout the LPA (Table 3.21), highlights the importance of developing planning measures to ensure that they will continue to be present in the area in the future.

Table 3.21: Rare/ Endangered Reptiles in the LPA

Reptiles	Common Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
<i>Varanus bengalensis</i>	Indian Monitor Lizard	*	*	*	NT
<i>Geochelone elegans</i>	Indian Star Tortoise		*	*	VU
<i>Lissemys punctata</i>	Indian Flap-shell Turtle		*	*	VU

IUCN – International Union for Conservation of Nature

Vu – Vulnerable

NT – Near Threatened

3.10.3.6. AMPHIBIANS

There are two types of toads which are found in all three zones and 7 species of frog – which are more specialized. Only two of the frogs are found in the municipal area, the others are found in the agricultural lands or around the water bodies (Table 3.22).

Table 3.22: **List of Amphibians in the LPA**

S. No.	Scientific name	Common name	Tamil Name	Presence in Municipal Area	Presence in EUA	Presence in LPA	As per IUCN
1	<i>Duttaphrynus melanostictus</i>	Common Indian toad	Sori Thavalai or Soriyan	*	*	*	LC
2	<i>Duttaphrynus scaber</i>	Dwarf toad	Sriya Thavalai	*	*	*	LC
3	<i>Uperodon systoma</i>	Marbled balloon	Ballon Thavalai		*	*	LC
4	<i>Polypedates maculatus</i>	Common tree frog	Therai	*	*	*	LC
5	<i>Euphlyctis cyanophlyctis</i>	Skittering frog	Jumbo Thavalai	*	*	*	LC
6	<i>Euphlyctis hexadactylus</i>	Indian pond frog	Pachai Thavalai			*	LC
7	<i>Hoplobatrachus crassus</i>	South Indian bullfrog	Kalai Thavalai			*	LC
8	<i>Minervarya agricola</i>	Paddyfield frog	Varappu Thavalai		*	*	LC
9	<i>Kaloula taprobanica</i>	Indian painted frog			*	*	LC

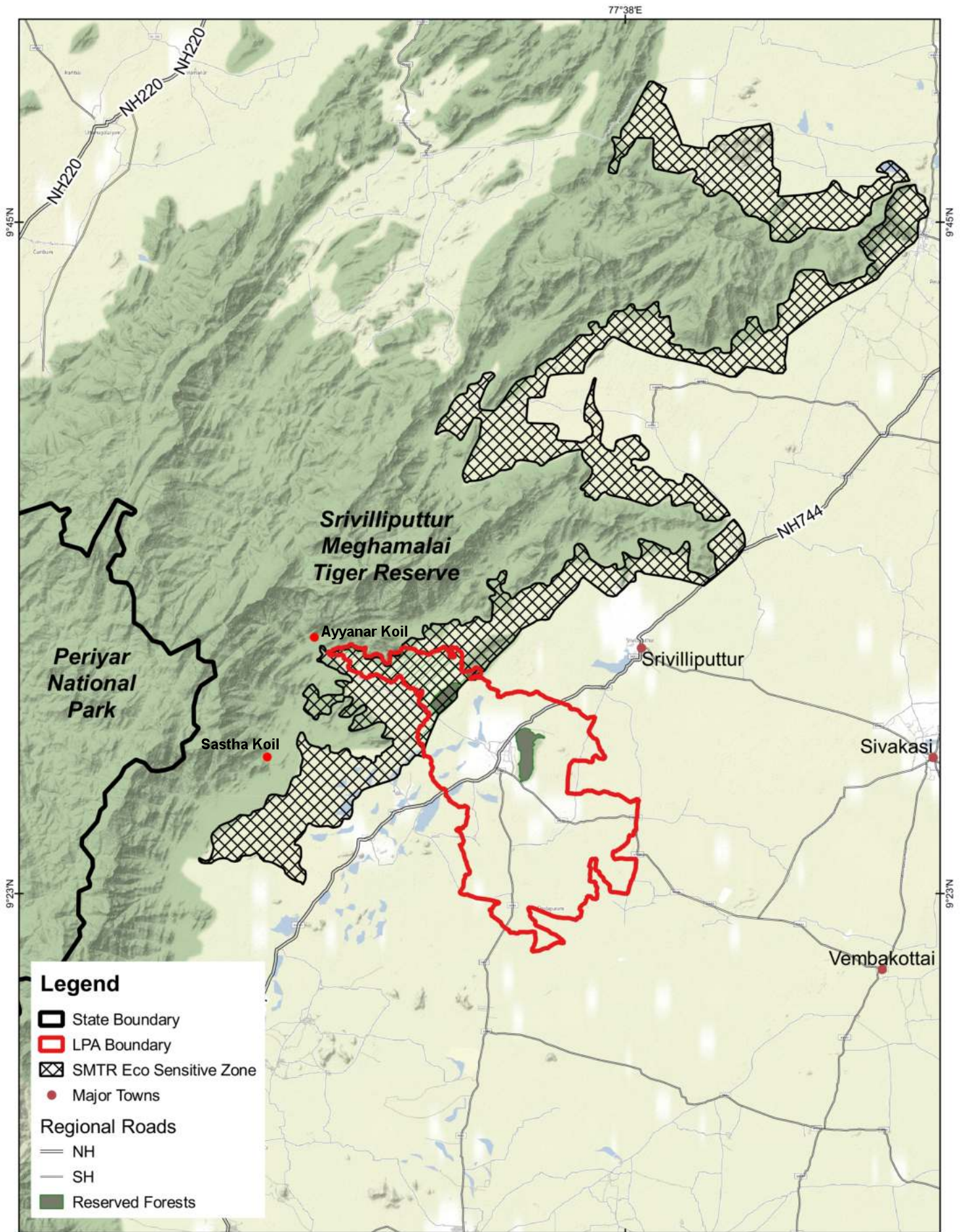
IUCN – International Union for Conservation of Nature

LC – Least Concern

3.10.4. Eco-Sensitive Zone (ESZ)

The Western Ghats is rich in biodiversity and home to many rare and endemic varieties of flora and fauna. The Ministry of Environment, Forest and Climate Change issued a notification on 09-07-2018, declaring an area between 0 – 6.2 km from the boundary of the Srivilliputhur Grizzled Squirrel Wildlife Sanctuary as an Eco-Sensitive Zone. **Map 3.15** shows the ESZ and surroundings in Rajapalayam LPA. Three of the LPA villages – Vadakku Venganallur, Sammandapuram and Rajapalayam (rural) – partly, and Sappani Parambu RF fall within this zone. Tribal hamlets are located in Shenbagathoppu, Ayyanar Kovil, among others. Srivilliputhur-Megamalai Tiger Reserve (SMTR) which was formed comprises of the existing Megamalai wildlife division and Srivilliputhur Grizzled Wildlife Sanctuary. SMTR is spread over 1,016.5713 sq.km / 1,01,657.13 ha of which the buffer zone / Eco-Sensitive Zone is 374.7092 sq.km/ 37,470.92 ha. The buffer zone in the LPA covers 16.21 sq. km.

The Sasthakovil site or Sasthakovil falls located within the sanctuary, is 24 km from Rajapalayam municipal area and a local tourist attraction. The Nagariyar, a seasonal river flows in the site. An ancient Ayyappa deity is present in an open space here, installed by the local people. The Nanjadai Thavirthuliya Swamy temple is located at 3 km distance from Sasathakovil site, outside of the sanctuary. The Ayyanar temple is located 34 km away from the site. These sites are promoted as community-based ecotourism sites by the Forest department, providing employment alternatives and also encouraging participation of the local population in conservation efforts. There are also facilities for 4 km trekking from Sasthakovil to Mamarathukeni.



Extent of Eco Sensitive Zone in Rajapalayam LPA	Notes :	Data Credits Forest Department, GoTN; Stamen Base Map	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 3.15: Extent of Eco-Sensitive Zone in Rajapalayam LPA





Demographic Profile



04

4.1 Population Characteristics in Rajapalayam Municipal Area

Rajapalayam town, is one of the largest towns in Virudhunagar District with a population of 1,30,442 as per the 2011 Census. It had a population of 25,360 in 1901 and has since grown into a sizable municipality in Tamil Nadu. As per the 2011 Census handbook, Rajapalayam Municipality ranks 24th in total population among the listed 158 Municipalities/ Municipal Corporations in the State of Tamil Nadu. Rajapalayam was declared as the first industrial town of the undivided Ramanathapuram district in 1951. The industrial establishments and the associated transportation network - the Railway line, the National Highway - 744 (then NH 208) passing through the town, have contributed greatly to the growth of the town.

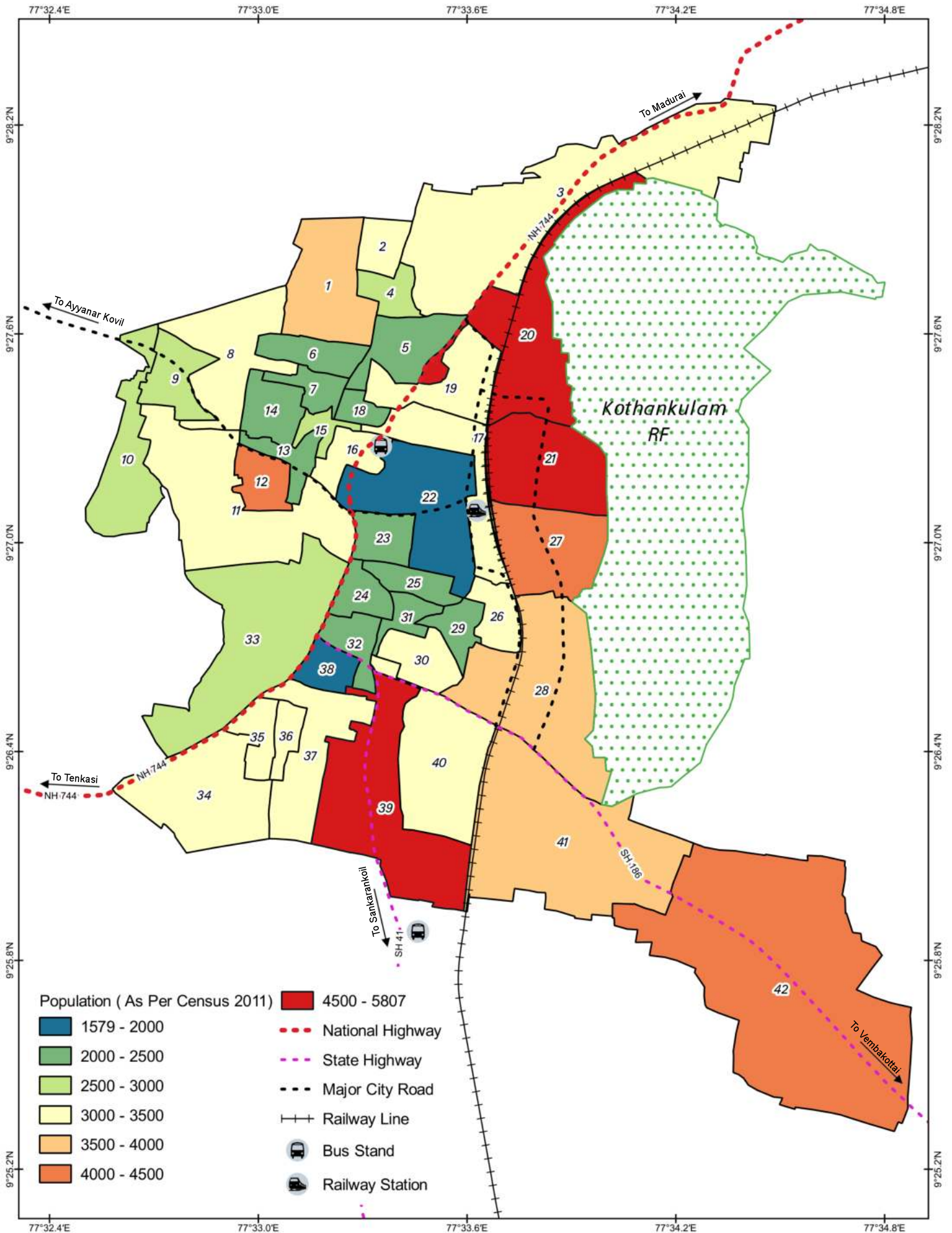
Rajapalayam town, the most populated town in the district, stands second after Srivilliputhur in the district in terms of population density. However, among the 158 Municipalities and Municipal corporations listed under Tamil Nadu in the 2011 census, Rajapalayam ranks in the top 20 most densely populated towns/ cities in the State. The ward-wise population density in Rajapalayam is listed in **Table 4.1** and **Map 4.1**. It is to be noted that the ward-wise population has been arrived using the ward boundaries which were in use prior to 2022. The current ward boundaries are as per revisions made in 2022.

Table 4.1: **Ward-Wise Population and Density in Rajapalayam Town, 2011**

Census Ward Number	Area (in sq.km)	Population (Census 2011)	Population Density (Persons per Sq.km)
1	0.25	3,719	14,739
2	0.07	3,069	45,073
3	0.80	3,481	4,374
4	0.06	2,728	43,042
5	0.13	2,371	17,551
6	0.09	2,042	23,739
7	0.06	2,283	40,536
8	0.26	3,376	13,120
9	0.11	2,912	26,689
10	0.21	2,978	14,391
11	0.48	3,473	7,251
12	0.08	4,271	52,579
13	0.06	2,147	35,042
14	0.10	2,200	22,730
15	0.03	2,535	73,436
16	0.08	3,152	40,286

Census Ward Number	Area (in sq km)	Population (Census 2011)	Population Density (Persons per Sq km)
17	0.18	3,139	17,039
18	0.04	2,426	65,285
19	0.18	3,482	19,792
20	0.35	5,672	16,018
21	0.28	5,807	20,739
22	0.33	1,579	4,817
23	0.08	2,369	29,403
24	0.07	2,377	35,173
25	0.07	2,128	32,469
26	0.08	3,090	39,702
27	0.24	4,159	17,258
28	0.49	3,550	7,291
29	0.06	2,342	37,866
30	0.10	3,471	34,993
31	0.05	2,451	50,526
32	0.07	2,193	30,045
33	0.52	2,756	5,320
34	0.33	3,259	9,779
35	0.07	3,099	44,309
36	0.05	3,098	66,538
37	0.22	3,130	13,967
38	0.06	1,928	29,680
39	0.47	5,186	10,944
40	0.32	3,004	9,376
41	0.70	3,963	5,657
42	1.31	4,047	3,076
Total	9.59	1,30,442	13,602

Source: Census 2011; GIS mapping for area; data analysis



<p>Population in Rajapalayam Municipal Area</p>	<p>Notes The Ward Boundaries used are the Old Census Ward Boundaries that were in circulation pre 2022.</p>	<p>Data Credits Census of India 2011</p>	<p>CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 4.1: Population Map of Rajapalayam Municipal Area
(Based on ward boundaries prior to 2022)

4.1.1. Population Density in Municipal Area

Population density in these wards were grouped under 7 density ranges as per the following three categories (**Table 4.2; Map 4.2**):

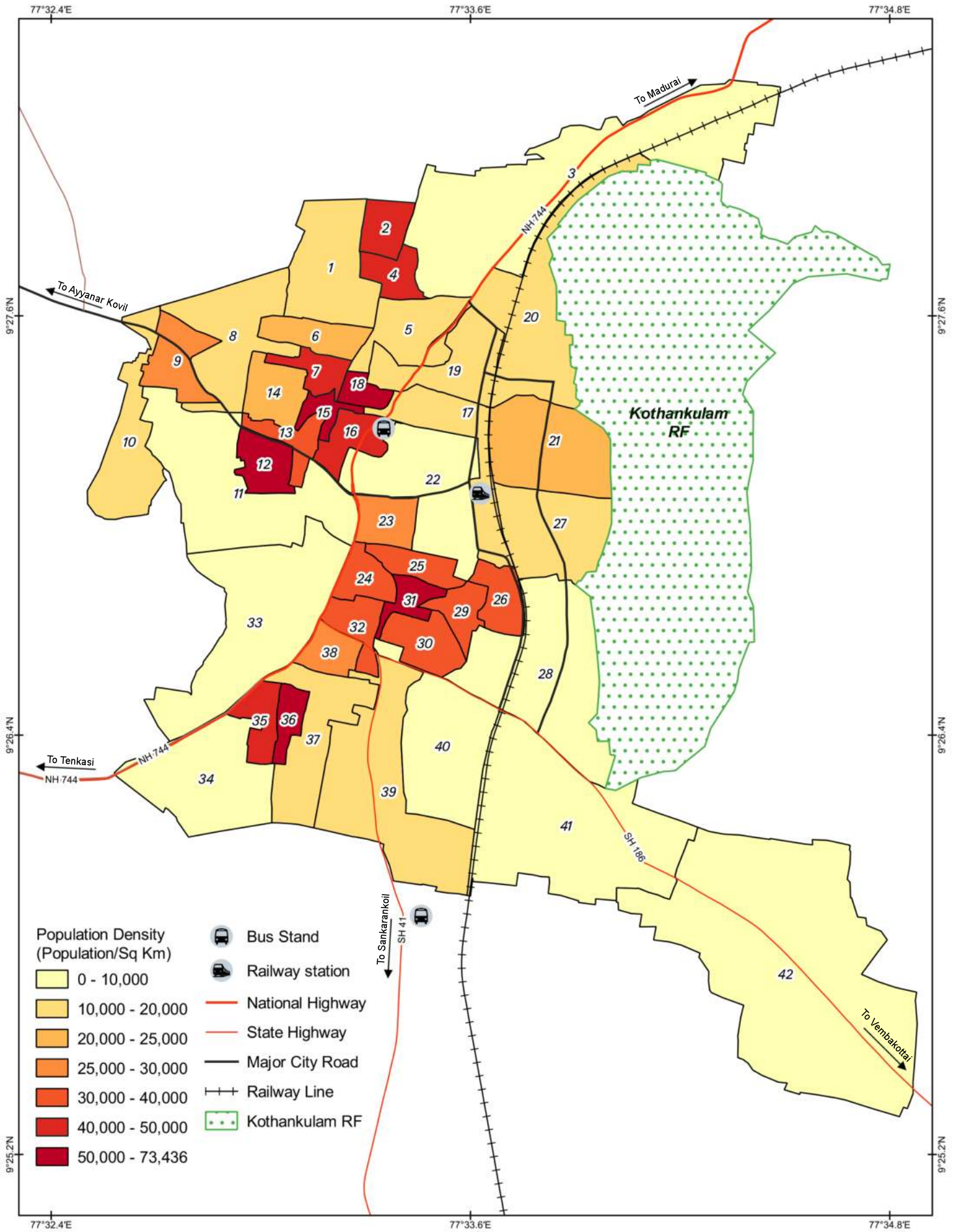
- Low density - density lesser than 20,001
- Medium density - 20,001-25,000
- High density - density greater than 25,000

High density wards are seen as three clusters - wards 24, 25, 26, 29, 30, 31 and 32 that largely fall between the NH - 744 and the Railway line, wards 7, 15, 16 and 18 that are part of the old town, and wards 2 and 4 that fall in an area with cottage industries. Low density (5,000 - 20,000) wards are mainly located in the periphery region of the town.

Table 4.2: **Range of Population Density in Rajapalayam Municipal Area**

S.No.	Range of Population Density (Persons/ sq.km)	Old Ward Number	Total No. of Wards
Low Density – 19			
1	Less than 10,000	3, 11, 22, 28, 33, 34, 40, 41, 42	9
2	10,001 - 20,000	1, 5, 8, 10, 17, 19, 20, 27, 37, 39	10
Medium Density – 3			
3	20,001 - 25,000	6, 14, 21	3
High Density – 20			
4	25,001 - 30,000	9, 23, 38	3
5	30,001 - 40,000	13, 24, 25, 26, 29, 30, 32	7
6	40,001 - 50,000	2, 4, 7, 16, 35	5
7	Above 50,000	12, 15, 18, 31, 36	5
Total			42

Source: Census 2011 & Analysis



<p>Population Density in Rajapalayam Municipal Area</p>	<p>Notes The Ward Boundaries used are the Old Census Ward Boundaries that were in circulation pre 2022.</p>	<p>Data Credits Census of India 2011</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>	

Map 4.2: **Population Density of Rajapalayam Municipal Area**
(Based on ward boundaries prior to 2022)

4.1.2. Decadal Growth Rate – Municipal Area

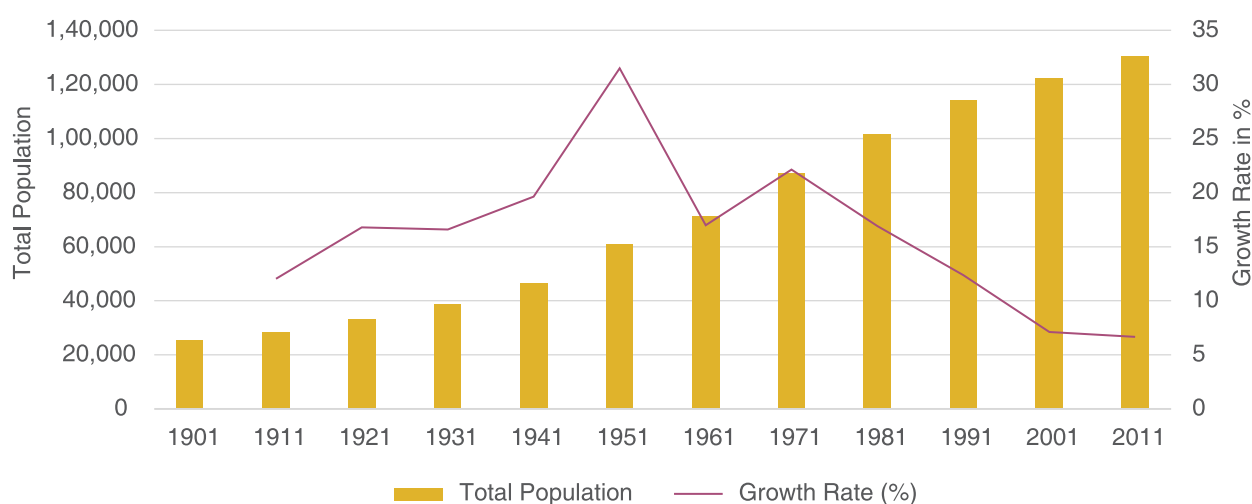
The decadal population and growth rate data of Rajapalayam town between 1901 till 2011 (**Table 4.3 & Fig. 4.1**), indicates that while the overall population is increasing, the growth rate was at its peak in 1951 and continued to show double digit growth till the 1990s. In the next two decades the growth rate has slowed down considerably and is currently less than 7.5%.

Table 4.3: Population Trend and Variation in Rajapalayam Town, 1901-2011

S.No.	Year	Total Population	Variation	Growth Rate (%)
1	1901	25,360	-	-
2	1911	28,412	3,052	12.03
3	1921	33,184	4,772	16.80
4	1931	38,693	5,509	16.60
5	1941	46,289	7,596	19.63
6	1951	60,861	14,572	31.48
7	1961	71,203	10,342	16.99
8	1971	86,952	15,749	22.12
9	1981	1,01,640	14,688	16.89
10	1991	1,14,202	12,562	12.36
11	2001	1,22,307	8,105	7.10
12	2011	1,30,442	8,135	6.65

Source: Census 2011

Fig 4.1: Population Trend in Rajapalayam Town



A comparison of the growth rate of the town with that of the urban growth rates of both Virudhunagar district and the State of Tamil Nadu between 1941 – 2011 (**Table 4.4 & Fig. 4.2**), shows that Rajapalayam has the lowest growth rate among the three. However, the decreasing decadal growth rate trend is visible regionally at the district level as well.

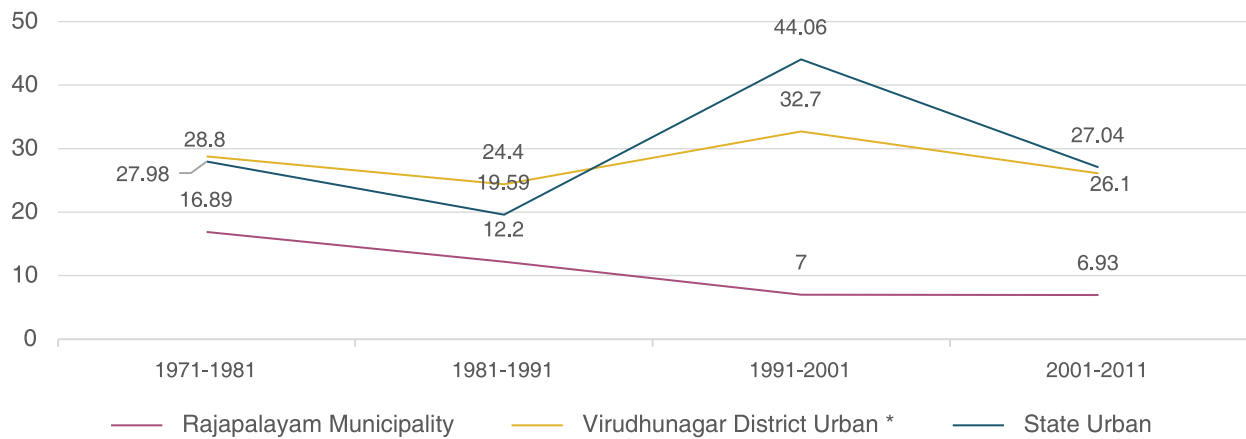
Table 4.4: Decadal Growth Rate Comparison, 1941-2011

S.No.	Decade	Decadal Growth Rate – Rajapalayam Town	Decadal Growth Rate – Virudhunagar District Urban	Decadal Growth Rate – State Urban
1	1941 – 1951	31.49	-	-
2	1951 – 1961	16.99	-	14.88
3	1961 – 1971	22.12	-	38.70
4	1971 – 1981	16.89	28.8	27.98
5	1981 – 1991	12.20	24.4	19.59
6	1991 – 2001	7.00	32.7	44.06
7	2001 – 2011	6.93	26.1	27.04

Source: Census 2011

*Virudhunagar was part of undivided Ramanathapuram District until 1985

Table 4.2: Decadal Growth Rate Comparison



Growth rate of a population is a useful indicator for understanding the future growth trajectory of the population of a town. Given the wide variation between the growth rate of the State's urban population and Rajapalayam town, a look at the growth rate data of selected towns in Tamil Nadu with population between 1,00,000 to 2,00,000 (Table 4.5) provides a useful context.

Table 4.5: Growth Rate of Population in Comparable Towns during 2001 - 2011

S.No.	Town Name	Total Population	Area as per 2011 Census (sq.km)	Decadal Growth Rate 2001 - 2011 (%)	Population Density as per 2011 Census
1	Hosur (M. Corp)	1,16,821	11.71	38.42	9,976
2	Pudukkottai (M)	1,17,630	12.95	7.70	9,083
3	Rajapalayam (M)	1,30,442	9.59*	6.65	13,602*
4	Kumbakonam (M)	1,40,156	12.58	0.14	11,141
5	Erode (M. Corp)	1,57,101	8.44	4.36	18,614
6	Kancheepuram (M)	1,64,384	11.72	7.34	14,026
7	Cuddalore (M)	1,73,636	27.69	9.46	6,271
8	Vellore (M. Corp)	1,85,803	11.65	4.84	15,949
9	Dindigul (M)	2,07,327	14.01	5.27	14,799

Source: Census 2011

* Area for Rajapalayam updated to reflect the current estimate

4.1.3. Gender Distribution

The sex ratio in the town is 1,014 females to 1,000 males in the population; the overall sex ratio over the past 6 decades has been within the range of 997-1,014. A decline in the ratio is noted between 1961-1991. The subsequent increase could be attributed to possible improvement in employment opportunities for women from 1991 onwards. However, the town still records a better ratio in comparison to the State ratio of 1995 in 2011 (**Table 4.6**).

Table 4.6: **Sex Ratio in Rajapalayam Town**

Decade	Population	Male	Percentage of Male to Total Population	Female	Percentage of Female to Total Population	Sex Ratio
1951	60,861	30,478	50.1	30,383	49.9	997
1961	71,203	35,865	50.4	35,338	49.6	985
1971	86,952	43,845	50.4	43,107	49.6	983
1981	1,01,640	51,769	50.9	49,871	49.1	963
1991	1,14,202	57,943	50.7	56,259	49.3	971
2001	1,22,307	61,221	50.1	61,086	49.9	998
2011	1,30,442	64,765	49.6	65,677	50.4	1,014

Source: Census 2011

4.1.4. Literacy

The literacy rate in the town in the year 1991 was 64%, higher than the then percentage of 55 for Tamil Nadu. The most recent listed literacy rate for the Census year 2011, has increased to 78%, but falls short of the State's rate of 80% (**Table 4.7**).

Table 4.7: **Literacy Rate in Rajapalayam Town**

Year	Total Population	Total Literates	Literacy Rate %	% of Male Literates to Total Literates	% of Male Literates to Total Males	% of Female Literates to Total Literates	% of Female Literates to Total Female
1991	1,14,202	73,473	64	58	73	42	55
2001	1,22,307	88,790	73	55	80	45	66
2011	1,30,442	1,01,581	78	53	83	47	73

Source: Census 2011

4.1.5. Births and Deaths – Municipal Area

Tamil Nadu's birth rate in 2017 was recorded as 15 births per 1,000 people and death rate was around 6.7 deaths per 1,000 people. Rajapalayam municipal area has registered in 2019-20 a birth and death rate of 13.21 and 7.17, respectively. The birth rate of the entire district is 11.24, while that of urban Virudhunagar for the same time frame is much lower at 8.3%. Similarly, the death rate for urban Virudhunagar at 3.2%, is much lower than that of the town.

4.2 Population Characteristics in Non-Municipal Area

As per 2011 Census

Rajapalayam LPA revenue villages and reserved forests together occupy a total area of 139.47 sq.km. The total population of the non-municipal area as of 2011 census data is 86,000. Of the 15 revenue villages, two villages - (viz) Ramalingapuram and Samusigapuram are listed as census towns. An overview of the village-wise population of the LPA is shown in **Map 4.3**.

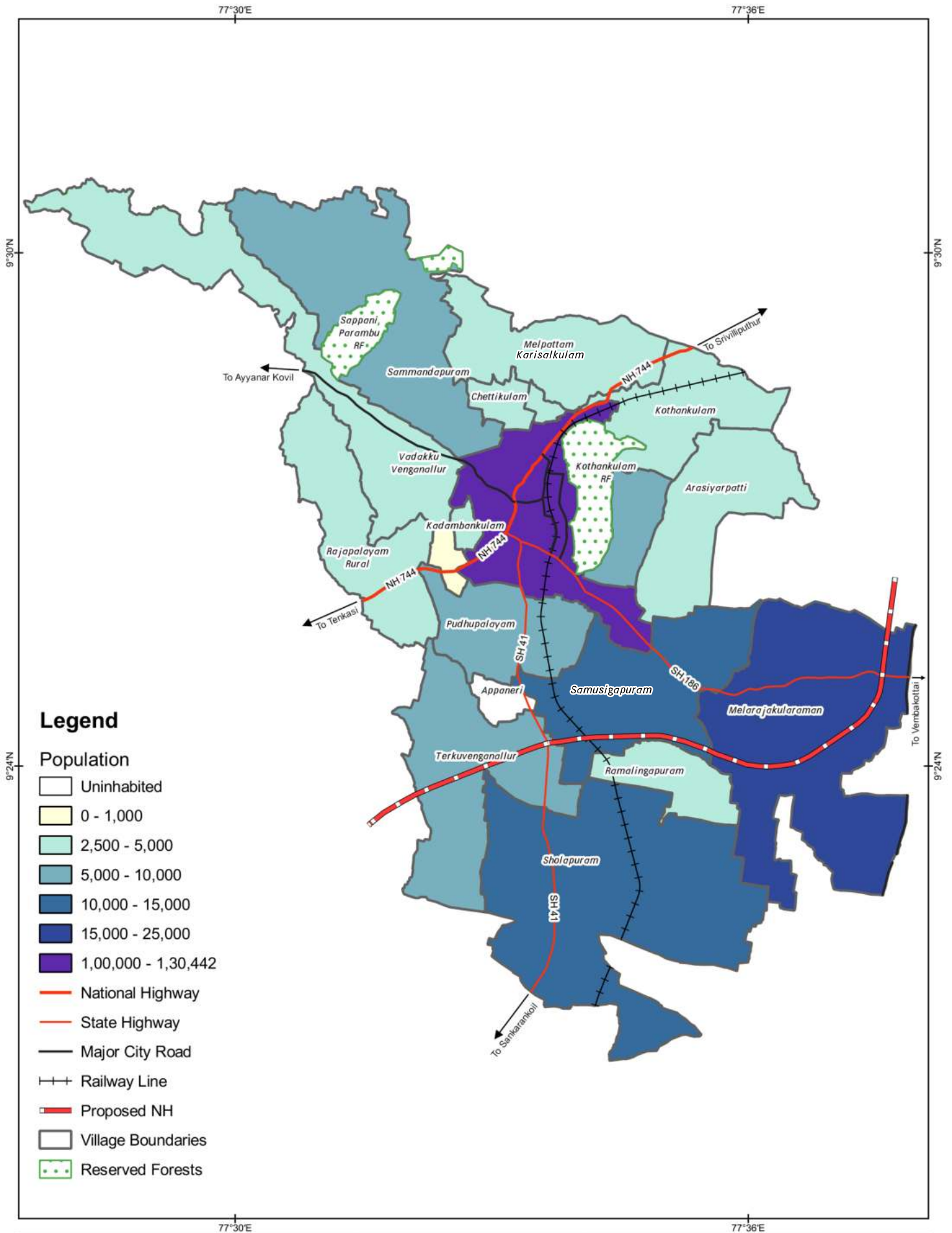
An approximate 40% of the total LPA population resides outside the municipal area. Villages such as Samusigapuram which lies primarily on SH-186 (Rajapalayam-Vembakottai) and Ramalingapuram, have highest densities in non-municipal villages, ranging between 1,250 - 1,450 persons per sq.km. Those villages with the lowest densities, ranging between 250 - 400 persons per sq.km. are evidently located north and west of the town, towards the Western Ghats (**Table 4.8; Map 4.4**). It is to be noted that Inam Chettikulam was listed as a Gram Panchayat under Rajapalayam Rural (village) in the 2011 census data records. However now Chettikulam has been made into a revenue village.

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Table 4.8: **Population and Population Density in Non-Municipal Area**

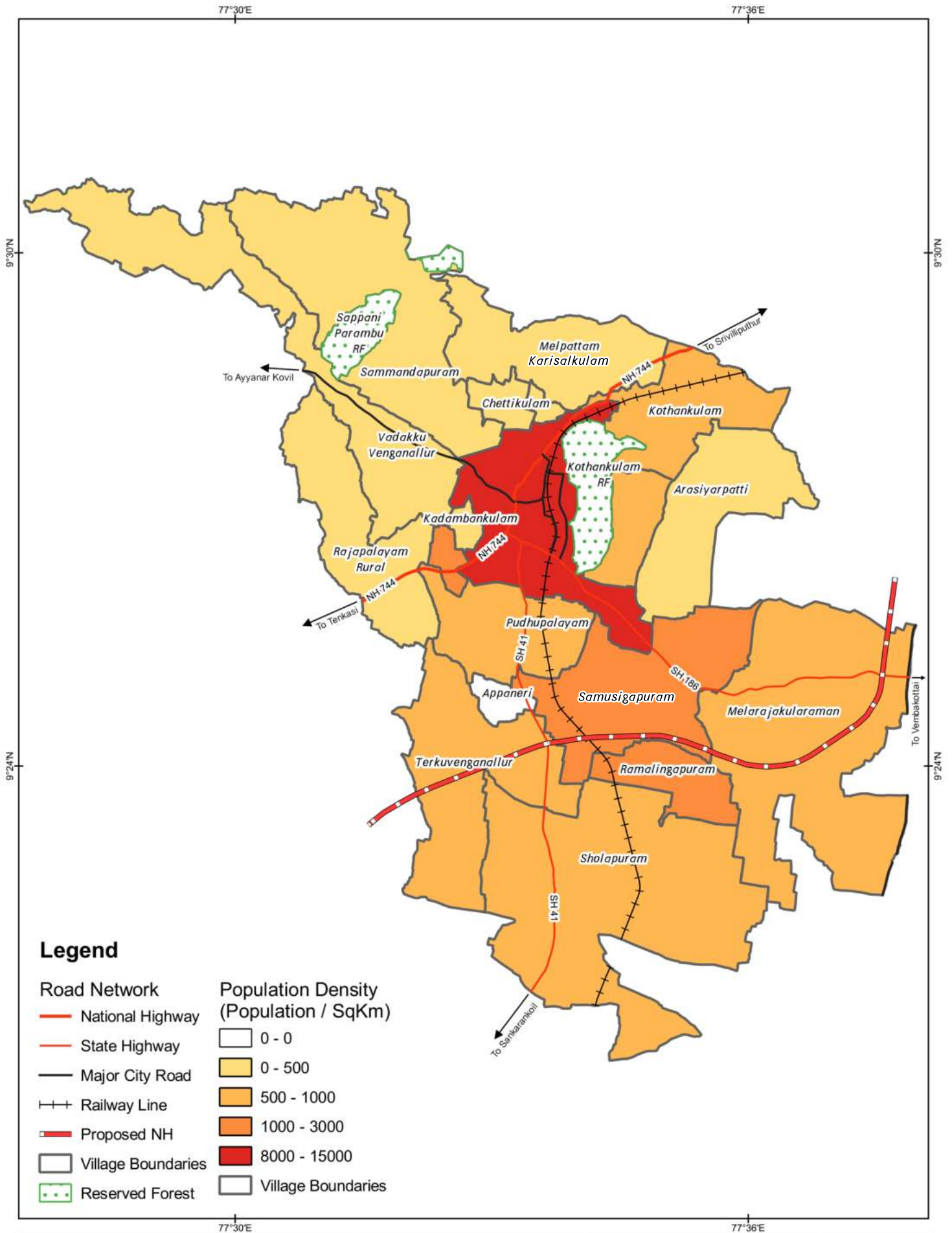
S.No.	Location Code (2011 Census)	Revenue Village	Geographic Area in Sq.km	Population (Census 2011)	Density (persons per Sq.km)
1	641170	Vadaku Venganallur (part)	12.35	4,557	369
2	641171	Sammandapuram (part)	14.41	5,462	379
3	641172	Melpattam Karisalkulam	7.42	2,667	360
4	641173	Kothankulam (Part)	6.10	4,898	803
5	641174	Arasiyarpatti	7.75	3,784	488
6	641175	Rajapalayam (incl. Rajapalayam rural & Inam Chettikulam)	10.18	2,617	257
7	641178	Kadambankulam (Part)	0.76	983	1,287
8	641181	Melarajakularaman	20.18	16,652	825
9	641182	Pudhupalayam (Part)	8.43	7,922	940
10	641186	Terkuvenganallur	10.67	5,745	538
11	641187	Appaneri	0.91	-	-
12	641191	Sholapuram	22.31	11,607	520
13	641204	Sappani Parambu RF	1.57	-	-
14	641205	Kothankulam RF	2.79	-	-
15	641208	Samusigapuram (CT)	10.40	14,601	1,404
16	641209	Ramalingapuram (CT)	3.24	4,505	1,392
Total (Rest of LPA)			139.47	86,000	617

Source: Census 2011 for population; GIS Map for area & density



<p>Population in Rajapalayam LPA</p>	<p>Notes The Village wise Population was considered from Census 2011.</p>	<p>Data Credits Census of India, 2011</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 4.3: Population Map of Rajapalayam LPA



Population Density in Rajapalayam LPA	Notes The Village wise Population was considered from Census 2011.	Data Credits Census of India, 2011	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 4.4: Population Density of Rajapalayam LPA

As of 2021 (Based on data collected)

Data collected from BDO and Village Panchayats indicates the most recent available total number of households in the non-municipal area is 39,923. Considering the household size as 3.43 (as per Census 2011), the total population is calculated to be 1.36 lakhs. The village panchayats and demography details in the LPA area are listed in **Table 4.9**.

Table 4.9: **List of Village Panchayats with Household & Population Details**

S.No.	Village Name	Total Households	Estimated Population
1	Kothankulam	2,008	6,887
2	Sholapuram	3,992	13,693
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	3,268	11,209
4	Samusigapuram	6,558	22,494
5	Melarajakularaman	7,209	24,727
6	Kalangaperi (Arasiyarpatti)	1,932	6,627
7	Melpattam Karisalkulam, Sammandapuram pt.	4,113	14,108
8	Ramalingapuram	2,014	6,908
9	Therkuvenganallur, Kadambankulam pt., Pudhupalayam pt.	7,537	25,852
10	Rajapalayam Rural + Chettikulam	1,292	4,432
11	Appaneri	-	-
12	Kothankulam (Reserved Forest)	-	-
13	Sappani Parambu (Reserved Forest)	-	-
	Total	39,923	1,36,936

Source: Office of Block Development Officer & Village Panchayat

4.2.1. Gender Distribution

Male and female population in the non-municipal area is recorded as 992 (**Table 4.10**), lesser than that of Rajapalayam town (1,014) and the district ratio (1,007). Among the LPA villages, the highest ratio is registered in Terkuvenganallur (1,051) and the least in Sammandapuram (950).

Table 4.10: Gender Distribution in LPA Villages

Revenue Villages	Total Male Population	Total Female Population	Sex Ratio
Vadakku Venganallur (part)	2,322	2,235	963
Sammandapuram (part)	2,801	2,661	950
Melpattam Karisalkulam	1,336	1,331	996
Kothankulam (Part)	2,438	2,460	1,009
Arasiyarpatti	1,872	1,912	1,021
Rajapalayam (incl. Rajapalayam rural & Inam Chettikulam)	1,281	1,336	1,043
Kadambankulam (Part)	486	497	1,023
Melarajakularaman	8,394	8,258	984
Pudhupalayam (Part)	4,015	3,907	973
Terkuvenganallur	2,801	2,944	1,051
Appaneri	0	0	0
Sholapuram	5,830	5,777	991
Sappani Parambu RF	0	0	0
Kothankulam RF	0	0	0
Samusigapuram (CT)	7,341	7,260	989
Ramalingapuram (CT)	2,252	2,253	1,000
Total	43,169	42,831	992

Source: Census 2011

4.2.2. Literacy

Literacy rate in the non-municipal area is 72%, (Table 4.11) and is lower than the town's literacy rate of 78%. The highest literacy rate is recorded in Sammandapuram (79%) and the lowest rate in Rajapalayam (rural). Male and female literacy rates 83% and 75%, respectively are higher in Sammandapuram among the LPA villages.

Table 4.11: Literacy Rate in LPA Villages

Revenue Villages	Total Population	Total Literates	Literacy Rate %	Male Literates	% of Male Literates to Total Literates	% of Male Literates to Total Males	Female Literates	% of Female Literates to Total Literates	% of Female Literates to Total Female
Vadakku Venganallur (part)	4,557	3,325	73%	1,775	53%	76%	1,550	47%	69%
Sammandapuram (part)	5,462	4,320	79%	2,314	54%	83%	2,006	46%	75%
Melpattam Karisalkulam	2,667	1,796	67%	991	55%	74%	805	45%	60%
Kothankulam (Part)	4,898	3,191	65%	1,783	56%	73%	1,408	44%	57%
Arasiyarpatti	3,784	2,600	69%	1,393	54%	74%	1,207	46%	63%

Revenue Villages	Total Population	Total Literates	Literacy Rate %	Male Literates	% of Male Literates to Total Literates	% of Male Literates to Total Males	Female Literates	% of Female Literates to Total Literates	% of Female Literates to Total Female
Rajapalayam (incl. Rajapalayam rural & Inam Chettikulam)	2,617	1,588	61%	872	55%	68%	716	45%	54%
Kadambankulam (Part)	983	646	66%	369	57%	76%	277	43%	56%
Melarajakularaman	16,652	12,060	72%	6,744	56%	80%	5,316	44%	64%
Pudhupalayam (Part)	7,922	6,016	76%	3,267	54%	81%	2,749	46%	70%
Terkuvenganalur	5,745	3,868	67%	2,110	55%	75%	1,758	45%	60%
Appaneri	-	-	-	-	-	-	-	-	-
Sholapuram	11,607	8,147	70%	4,493	55%	77%	3,654	45%	63%
Sappani Parambu RF	-	-	-	-	-	-	-	-	-
Kothankulam RF	-	-	-	-	-	-	-	-	-
Samusigapuram (CT)	14,601	10,952	75%	6,002	55%	82%	4,950	45%	68%
Ramalingapuram (CT)	4,505	3,233	72%	1,810	56%	80%	1,423	44%	63%
Total	86,000	61,742	72%	33,923	55%	79%	27,819	45%	65%

Source: Census 2011

4.3 Summary

A brief summary of the demographic profile of the entire LPA is listed (**Table 4.12**):

Table 4.12: **Basic Demographic Profile of Rajapalayam LPA**

S.No.	Demographic Characteristics	Rajapalayam Town	Rest of LPA	Total LPA
1	Area in sq.km	9.59	139.47	149.06
2	Population	1,30,442	86,000	2,16,442
3	Male	64,765	43,169	1,07,934
4	Female	65,677	42,831	1,08,508
5	Population Density (Persons per sq.km)	13,602	617	1,452
6	No. of Households	37,797	25,111	62,908
7	Percentage of Households to Total Households	60%	40%	100%
8	Sex Ratio	1,014	992	1,005
9	Literates	1,01,581	61,742	1,63,323
10	Literacy Rate	78%	72%	75%
11	Male Literates	53,711	33,923	87,634
12	Male Literacy	83%	79%	81%
13	Female Literates	47,870	27,819	75,689
14	Female Literacy	73%	65%	70%

Source: GIS Map for Area; Census 2011 & Calculated values for rest of data





Economic Profile



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5.1 Economy in Primary Sector

Rajapalayam is an important textile region, where a large number of spinning mills, ginning mills, power looms and surgical cotton units are located. Most of the economic activity happens on the major transport corridor predominantly located along NH-744 and along SH-186 due to historical as well as logistical reasons. These textile related manufacturing activities induce a lot of supporting activities within and outside the municipal area and Samusigapuram, resulting in the spread of ancillary units. Apart from the textile industry, agriculture has been the major source of job and economy for more than a century. This is due to the availability of fertile land fed by water sources originating from the Western Ghats, and rain-fed land especially consisting of black cotton soil, suitable for cotton and maize cultivation.

5.1.1. Agriculture

Agriculture provides sustenance to around 16.07% of total workers in LPA as per the 2011 Census. About 52.9% of total land in LPA is currently used for agriculture. Productivity of agriculture is influenced by numerous factors such as soil, climate, irrigation, marketing and credit facilities, and agricultural practices and techniques. Of the 96,188 total workers, 16.07% are listed as cultivators & agricultural labourers. 2,077 are main cultivators and 11,127 are main agricultural workers. Marginal cultivators are 200 and marginal agricultural workers are 2,058.

5.1.1.1. AGRICULTURE PRODUCE UNDER RAJAPALAYAM LPA

Rajapalayam LPA produces the following agricultural commodities listed in **Table 5.1**.

Table 5.1: **Agricultural Produce in LPA Villages**

Village Name	Agricultural Commodities (First)	Agricultural Commodities (Second)	Agricultural Commodities (Third)
Vadaku Venganallur	Mango	Coconut	Paddy
Melpattam Karisalkulam	Cotton	Paddy	Sugarcane
Kothankulam	Paddy	Maize	Cotton
Arasiyarpatti	Cotton	Paddy	Maize
Rajapalayam (Rural)	Paddy	Sugarcane	Coconut
Kadambankulam	Paddy	Sugarcane	
Melarajakularaman (Part)	Maize	Chili	Cotton
Pudhupalayam	Paddy	Coconut	Sugarcane
Terkuveganallur	Paddy	Sugarcane	Cotton
Sholapuram	Paddy	Cotton	

Source: Census 2011

The soil type parallel to and on either side of Mudangiyaru river is clayey, especially in Rajapalayam Rural, Terkuvenganallur, Sholapuram, and is well suited for paddy. Apart from this Melpattam Karisalkulam, Kothankulam, and Sammandapuram, on the banks of Kalar, also have clayey soil. Arasiyarpatti, Ramalingapuram, Sholapuram have predominantly sandy clay loam. Paddy and sugarcane are grown here. The rest of the area is primarily sandy clay. Apart from this dairy is another major commodity (non-agricultural) in Terkuvenganallur.

5.1.1.2. NINE-FOLD CLASSIFICATION

Table 5.2: **Nine-Fold Land Classification in LPA Villages**

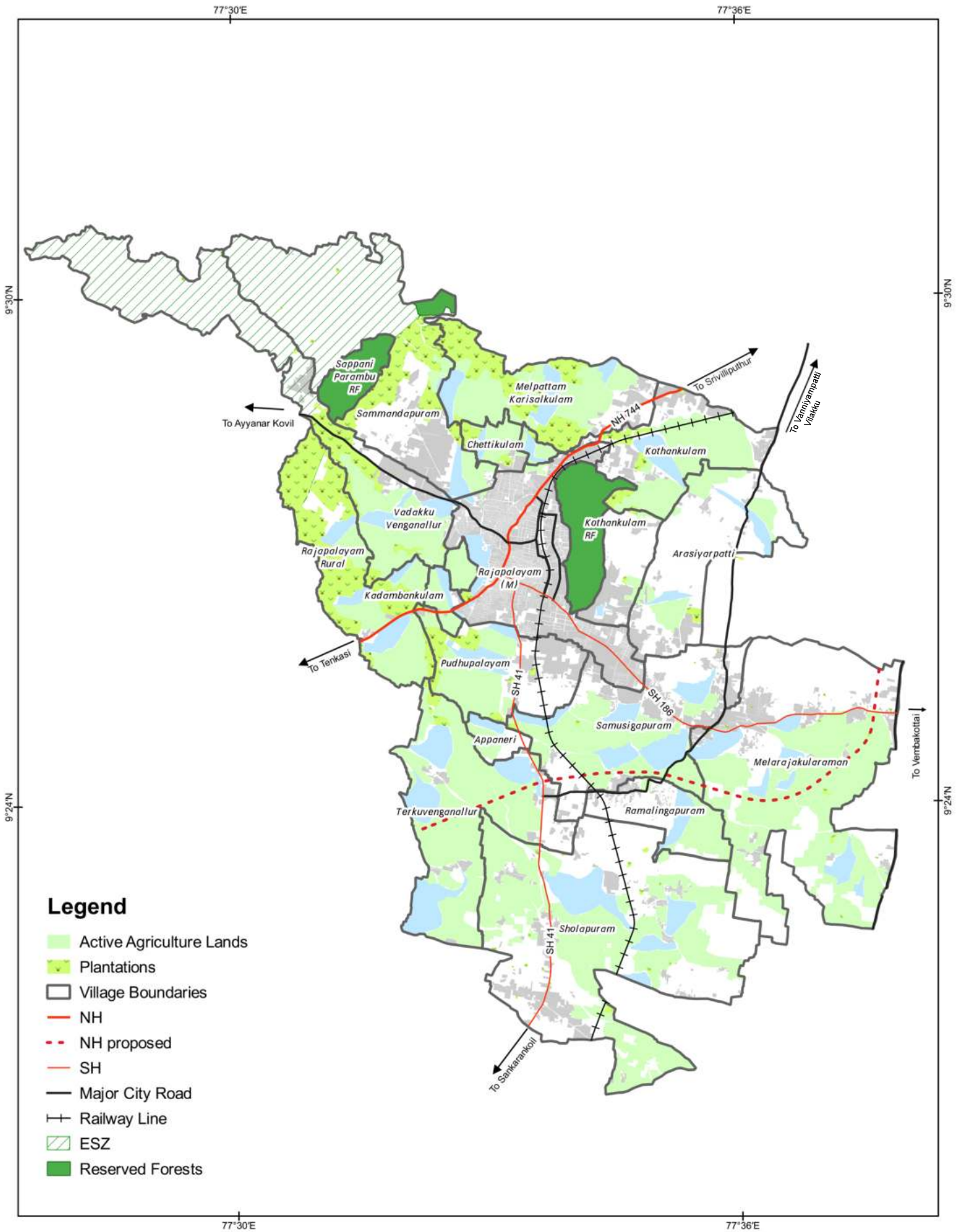
Village Name	Total Geographical Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Net Area Sown (in Hectares)
Vadaku Venganallur	1,239.15	185.76	6.06	-	150.35	1.22	129.34	17.21	749.21
Sammandapuram	1,599.92	71.56	29.28	7.57	-	16.64	18.96	537.69	710.09
Melpattam Karisalkulam	738.17	120.23	-	-	-	0.05	192.69	-	425.2
Kothankulam	638.83	150.13	20	-	-	100.5	-	176.19	192.01
Arasiyarpatti	775.58	133.33	93.66	-	0.69	0.27	277.24	47.28	223.11
Rajapalayam Rural	1,009.26	75.42	-	-	-	18.1	124.11	144.04	647.59
Kadambankulam	86.22	33.09	-	-	-	8.57	1.75	-	42.81
Melarajakularaman (Part)	2,016.59	332.29	2.27	-	165.24	-	994.33	-	522.46
Pudhupalayam	1,067.53	53.35	25	-	-	311.43	305.67	-	372.08
Terkuvenganallur	1,067.53	387.52	13.62	-	108.35	-	67.03	44.56	446.45
Appaneri	90.15	-	8.61	-	2	-	-	22.66	56.88
Sholapuram	2,227.19	396.68	0.6	-	241.35	-	674.25	226.34	687.97
Sappani Parambu RF	154.5	-	-	-	-	-	-	-	-
Kothankulam RF	222.9	-	-	-	-	-	-	-	-
Total	12,933.52	1,939.36	199.1	7.57	667.98	456.78	2,785.37	1,215.97	5,075.86

Source: Census 2011 (Census Towns not incl.)

Data from the **Table 5.2** indicates that Net Area Sown is the largest land classification in the LPA villages (40%), with anywhere between 30-60% of village area falling under this category for individual villages. Vadakku Venganallur, Appaneri, Melpattam Karisalkulam, Rajapalayam (R) and Kadambankulam have at least 50% of the land area as sown area (**Map 5.1**).

The second largest land classification is Fallow Lands other than Current Fallow (22%), followed by land under Non-Agricultural Uses (15%). Fallow Lands other than Current Fallows in Melarajakularaman constitutes 35% of the total Fallow Lands other than Current Fallow lands, followed by Sholapuram (24%) and Pudhupalayam (11%). These lands had taken up cultivation but were temporarily out of cultivation for a period of not less than one year and not more than five years at the time of the Census survey.

Barren Lands are primarily listed in Arasiyarpatti, which is 12% of the Arasiyarpatti geographical area. On the whole, Barren Land constitutes only 1.5% of the geographical area. Sholapuram, Vadakku Venganallur, Terkuvenganallur and Melarajakularaman each have between 100-250 hectare lands under tree crops.



Legend

- Active Agriculture Lands
- Plantations
- Village Boundaries
- NH
- NH proposed
- SH
- Major City Road
- Railway Line
- ESZ
- Reserved Forests

<p>Existing Land Use - Agriculture and Plantation Lands in Rajapalayam LPA</p>	<p>Notes : Active Agriculture lands only include the lands that have an active cropping going on atleast once a year. This Data has been captured through Primary survey and Verifying timeline from Google Earth Imagery</p>	<p>Data Credits Primary Survey and Satellite Image Verification</p> <p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<div style="display: flex; align-items: center; justify-content: flex-end;"> </div> <p style="font-size: 8px; margin-top: 5px;">CRS : WGS 1984</p>	

Map 5.1: Existing Land Use - Agricultural Lands in Rajapalayam LPA

5.1.1.3. IRRIGATION

Taluk level data from the Virudhunagar District Statistical Report, 2019-20 shows that the sources of irrigation of Rajapalayam taluk uses the maximum number of wells for irrigation in the district. Rajapalayam taluk does not have any reservoirs to support the agricultural practices. In terms of domestic use, Rajapalayam taluk stands second after Srivilliputhur in the use of wells. The district also lacks a canal system to support the water supply within.

Data from 2011 Census on the LPA villages shows that of the 40% of the total village under cultivation 6.8% are unirrigated land and 32.5% irrigated land. Surface water sources are used to irrigate 17% and ground water sources 15% of the total lands (**Table 5.3**). TNEB provides 2,962 service connections under Agriculture in the LPA area, having a total installed capacity of 15,377 HP. From 2011-21, a total of 28 solar pumps have been setup for irrigation.

Table 5.3: Sources of Irrigation in LPA Villages

Village Name	Total Geographical Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)	Wells/Tube Wells Area (in Hectares)	Tanks/Lakes Area (in Hectares)	Net Area Sown (in Hectares)
Vadaku Venganallur	1,239.15	40.85	708.36	474.66	233.7	749.21
Sammandapuram	1,599.92	123.36	586.73	125.5	461.23	710.09
Melpattam Karisalkulam	738.17	5.41	419.79	140.05	279.74	425.2
Kothankulam	638.83	41.81	150.2	59.92	90.28	192.01
Arasiyarpatti	775.58	38.32	184.79	138.46	46.33	223.11
Rajapalayam	1,009.26	77.39	570.2	446.2	124	647.59
Kadambankulam	86.22	0	42.81	3.83	38.98	42.81
Melarajakularaman (Part)	2,016.59	24.59	497.87	239.8	258.07	522.46
Pudhupalayam	1,067.53	187.36	184.72	85.5	99.22	372.08
Terkuvenganallur	1,067.53	78.73	367.72	134.18	233.54	446.45
Appaneri	90.15	0	56.88	15.46	41.42	56.88
Sholapuram	2,227.19	260.26	427.71	97.1	330.61	687.97
Sappani Parambu RF	154.5	0	0	0	0	0
Kothankulam RF	222.9	0	0	0	0	0
Total	12,933.52	878.08	4,197.78	1,960.66	2,237.12	5,075.86

Source: Census 2011 (Census Towns not incl.)

For each of the revenue villages, the nine-fold classification is graphed against the irrigation data (Fig. 5.1) and net area sown against the irrigation types of the lands (Fig. 5.2).

Fig 5.1: Nine-Fold Classification & Irrigation in LPA Villages

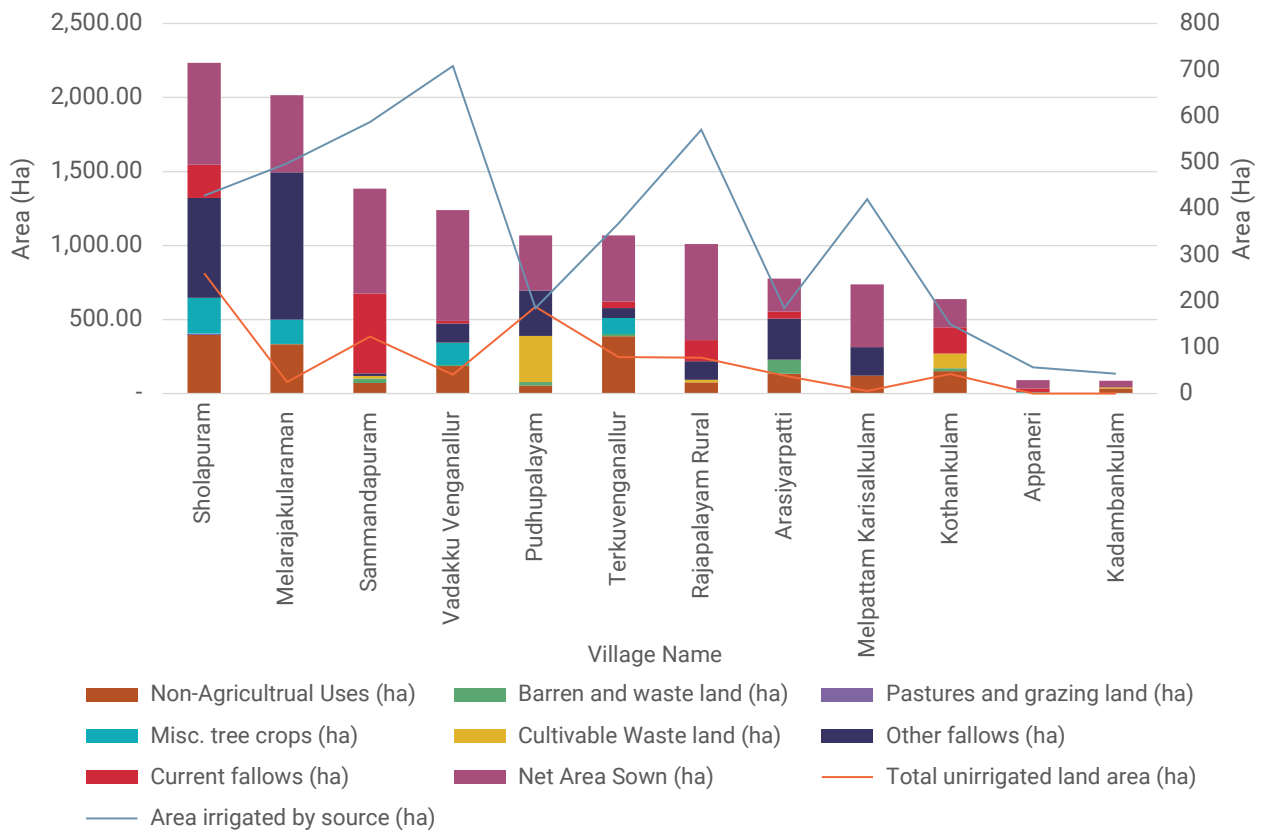
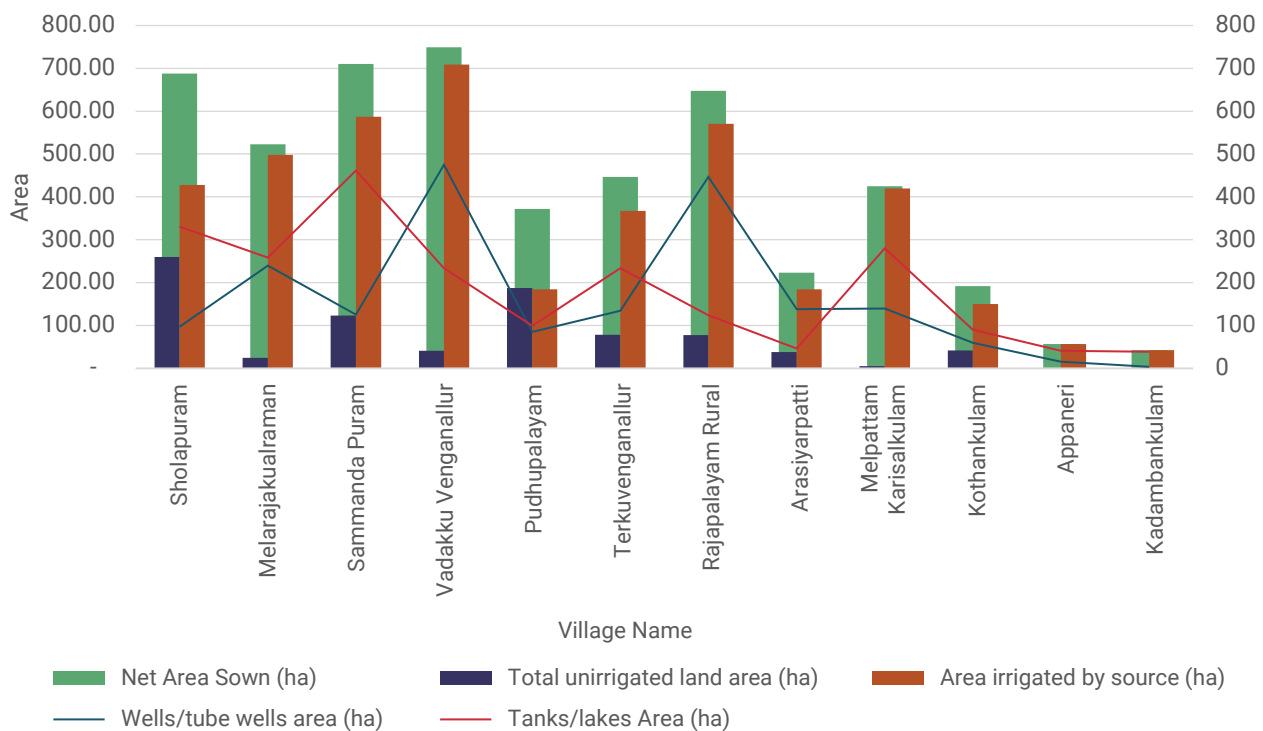


Fig 5.2: Nine-Fold Classification in LPA Villages - Net Sown Area & Irrigation



5.1.1.4. AGRICULTURAL TREND: BASED ON SURVEY IN LPA

A survey was conducted in 40+ agricultural settlements in the LPA to understand the livelihood and the current trends in agriculture. The outcome of the survey is listed in **Table 5.4**.

Table 5.4: Overall Agricultural Trends within LPA

S.No.	Summary of Information Gathered during the Primary Survey for Agricultural Sector
1	Agriculture as Livelihood
	Even though agriculture does not meet their financial needs, most of them do farming out of passion.
	Farmers having agriculture as their primary livelihood choose paddy, sugarcane, cotton for farming. People who have agriculture as their secondary means choose chillies, vegetables etc.
2	Other Employments
	Mills, Construction, Weaving, Cattle-grazing
3	Irrigation
	Around 75% irrigation depends on tanks. 25% on wells and borewells.
	If water is adequate, farmers prefer paddy and sugarcane.
	If water is medium, they prefer maize. Maize is less water consuming and also excels paddy in income.
	If the water level is very low, farmers prefer black gram, gingelly seeds etc.
	For the last 3 years, rainfall is up to the mark in Virudhunagar district and farmers are not facing severe irrigation issues.
	Some tanks are under the control of the fisheries department, where they grow fishes. And sometimes, they empty the tanks to catch fishes, which concerns the farmers in some places.
4	Loans and Subsidies
	Most of the farmers are not aware of the schemes provided by the government. Big farmers and influential farmers enjoy most of the schemes and subsidies provided by the government.
	Private fertilizer shops lend credits for fertilizers till harvest is done and this pushes small farmers to move towards private outlets.
	Government benefits cannot be availed by farmers cultivating on leased land.
5	Marketing
	Around 85% of people prefer to sell their produce to middlemen, who come directly to the fields to procure, and the payment is immediate.
	In government procurement centers, one has to take the products to the center and certain formalities are to be followed and delay in payment is imminent. Hence most of the farmers sell their produce to the middleman.
6	Labour
	Labour shortage is one the major issues farmers face due to labourers opting for the MGNREGA scheme, and the presence of mills located around Rajapalayam.
7	Price Rise and Low Price
	Prices of fertilizers and seeds are high and the price for the produce are very low which makes agriculture a profitless profession.
	A bag of paddy seed is priced at 1,300 INR and the purchase rate of 1 bag of paddy is 800-1,100 INR.
8	Wild Animals
	Wild boar, deer, elephants, rabbit are the main predators that invade farmlands. Unless the farmer is vigilant, the extent of damage may rise to 50%.
	Government compensation for damages caused by elephants is considered to be meagre.
	Guarding farm lands against wild animals adds an extra work pressure on the farmers.

S.No.	Summary of Information Gathered during the Primary Survey for Agricultural Sector
9	Land Leasing
	Farmers who lease lands for agriculture face more financial crises than people who do farming on their own lands as they are not entitled to government schemes.
	There are three types of lease rates: <ul style="list-style-type: none"> • Giving 1/5th of the produce to the owner • Paying 6,000 – 8,000 INR per acre annually • Giving a lump sum to the owner and entering into an agreement for 3 or more years and getting back the money after the agreement period is over
10	Land Selling
	In areas where agriculture is still strong, there is little buying and selling of land - this is particularly true in the clay soils where paddy and sugarcane are predominant.
	Lands in areas of urban sprawl, generally to the east and south-east of Rajapalayam, are being sold for real estate. This is predominantly on the sandy soils, and the first land to go are the non-irrigated lands in the catchment area above the tanks. The ayacut lands below are generally the last to be sold.
11	Next Generation
	The majority of the youth are not encouraged to carry on the farming tradition, as the earning from the work is seen to be insufficient. Mostly the youth are seeking other employment. Lands are either leased to other family members or other parties.

Revenue Village/ Town-wise Survey Results

Out of the 15 revenue villages and 1 municipal town within the LPA, two are predominantly Urban – Rajapalayam (Municipality) and Pudhupalayam, and consequently little or no agricultural activities are present there. Another two have relatively little agricultural activity – Arasiyarpatti and Melpattam Karisalkulam (Table 5.5). Of the other 12 units, more than 50% of the population are depending on agriculture for their livelihoods, either partially or fully.

Table 5.5: Revenue Village/ Settlement-wise Agricultural Analysis within LPA

S.No.	Town/ Revenue Village	Villages/ Hamlets/ Habitations Surveyed	Comment
1	Appaneri	No settlements in this area	Appaneri revenue village has no human settlements. There is one farm, which grows mainly sugarcane and paddy on the clay soil; there is a large area of fallow land on the red earth. Irrigation is mainly through one open well and tank irrigation.
2	Arasiyarpatti	Kalangaperi	In this revenue village not more than 25% of the workforce depend on agriculture as their first source of livelihood. Paddy, cotton and vegetables are the main crops grown. Irrigation mostly depends on wells.
		Muthulingapuram	
		Pudur	

S.No.	Town/ Revenue Village	Villages/ Hamlets/ Habitations Surveyed	Comment
3	Chettikulam	Avarampatti	In this revenue village nearly half of the workforce depends on agriculture as their main source of livelihood. Paddy, sugarcane and coconut are the main crops cultivated in the block. Irrigation mainly depends on tanks.
		Chettikulam	
4	Sholapuram	Asilapuram	In this revenue village more than half of the workforce depends on agriculture as their primary source of livelihood. Paddy, cotton, maize are the major crops grown in the block. Irrigation mainly depends on wells and tanks.
		Avaranthai	
		Sholapuram	
		Desigapuram	
		Kamakshipuram	
		N.Pudur	
		Nallamanaickenpatti	
		Panangulam	
		Rengappanayakkanpatti	
		Sangaralingapuram	
5	Kadambankulam	Kadambankulam	In this revenue village more than half of the workforce are dependent on agriculture as their main source of livelihood. Paddy is the dominant crop cultivated. Irrigation mainly depends on tanks.
		Kammappatti	
6	Kothankulam	Kotthankulam	In this revenue village more than half of the workforce are dependent on agriculture as their primary source of livelihood. Paddy, cotton and maize are the major crops cultivated. Irrigation mainly depends on tanks and wells.
		K.Thottiyapatti	
		Vanniampatti	
7	Melpattam Karisalkulam	Melpattam Karisalkulam	In this revenue village around 15% of the workforce might depend on agriculture as their main source of livelihood. Paddy, sugarcane, cotton, maize are the main crops cultivated. Irrigation mainly depends on tanks and wells.
		MPK. Pudupatti	

S.No.	Town/ Revenue Village	Villages/ Hamlets/ Habitations Surveyed	Comment
8	Melarajakularaman	Alagapuri	In this revenue village around 65% of the population depends on agriculture for their livelihood. Cotton, maize, paddy are the major crops cultivated. Irrigation mainly depends on wells.
		Appanoor	
		Ayyanpuram	
		Chatrapatti	
		Kammampatti	
		Kannithavanpatti	
		Krishnapuram	
		Minakshipuram	
		Nattampatti	
		Sangampatti	
		Satti kinaru	
		Tharmapuram	
		V.Pudur	
		Vagaikulathuppati	
Venkatachalapuram			
9	Pudhupalayam	Kamapatti	This revenue village adjoins Rajapalayam Municipality. Due to urbanisation here, agriculture is not practised here. Mills and construction work are the main source of livelihood.
10	Ramalingapuram	Ramalingapuram	Majority of the population of Ramalingapuram village of Ramalingapuram revenue village have agriculture as their primary source. Paddy, cotton, maize, onion are the major crops cultivated. Irrigation mainly depends on tanks.
11	Sammandapuram	Malaiyapuram	This revenue village has a predominant workforce dependent on agriculture for their livelihood. Paddy, cotton and vegetables are grown here. Irrigation mainly depends on wells.
12	Samusigapuram	Chokkalingapuram	This revenue village has both urbanised clusters and agriculture dependent villages. More than half of the population depend on agriculture for their livelihood. Paddy, cotton, chilly are the major crops cultivated here. Tanks and wells are the main source of irrigation.
		Gandhinagar	
		Kothainatchiapuram	
		Krishnapuram	
		Minakshipuram	
		P.R.R. Nagar	
		Samusigapuram	
		Sakkarapandiyapuram	
Velayuthapuram			

S.No.	Town/ Revenue Village	Villages/ Hamlets/ Habitations Surveyed	Comment
13	Terkuvenganallur	Chidamparapuram	The revenue village is mainly agriculture dependent, where more than half of the workforce are dependent on agriculture for their livelihood.
		Koonangulam	
		Muthugudi	Paddy, sugarcane, cotton are the major crops cultivated in the block.
		Sengulam	Tanks and wells are the major source of the irrigation.
		Terkuvenganallur	
14	Vadaku Venganallur	No settlements in this area	Area is mainly covered with coconut and mango plantations. Some areas are still under cultivation for maize and cotton.
15	Rajapalayam (M)	Bharathinagar	Most of the settlements in the municipal area are heavily urbanised. Pudhupalayam, Sammandapuram villages under the Municipality has agricultural lands. Very few people of Pudhupalayam and Sammandapuram depend on agriculture for their livelihood. Textiles, mills, construction are the main sources of livelihood here.
		Chettikulam	
		Kongalapuram	
		Naduvakurichi	
		Pudupalayam	Paddy, sugarcane, plantain, cotton, maize are the major crops cultivated in the block.
		Rajapalayam	Irrigation mainly depends on wells and tanks.
		Sammandapuram	
		Sarvasamudram	
Thoppupatti			
16	Rajapalayam (R)	No settlements in this area	Most of the area is covered with coconut and mango plantations. Rest of the area with good irrigation is used for sugarcane and rice. The tanks in this area are the first to be filled up from the Western Ghats. So, agriculture in this area is relatively secure.
		Urban areas	
		Minimal agriculture	
		Predominant Agriculture	

5.1.1.5. DISTRIBUTION AND MARKETING

Marketing of agricultural products is supported through various infrastructure and services provided by the Department of Agricultural Marketing & Agri Business, through Regulated Markets, Co-Operative marketing societies, Uzhavar Sandhai (Fruits and Vegetables), Wholesale Markets and Local Shandies, in addition to the existing daily and weekly markets. Rajapalayam has both an Uzhavar Sandhai and a dedicated Cotton Market. There is also a cold storage facility in the municipal area.

Rajapalayam is one of 278 Regulated Markets in the State, functioning under the Virudhunagar/ Ramanathapuram Market Committee (Agrimark). Regulated Markets act as a common forum for farmers and traders to interact on an equal footing for marketing of agricultural produce. Each Market Committee has its own notified area for the purchase and sale of notified agricultural produce. The list of notified commodities under this Market Committee include paddy, ragi, cholam, cumbu, black gram, groundnut, gingelly, cotton, chillies, coriander, coconut, cashew and sunflower seeds. The commodity transaction, along with the volume in quantity and trade, in the Rajapalayam regulated market is listed in **Table 5.6**.

Table 5.6: **List of Agricultural Commodities in Rajapalayam Regulated Market**

S.No.	Main Commodities Transacted	Quantity Arrivals (in MT)	Receipts (INR in Lakhs)
	NOTIFIED CROPS		
1	Paddy	2,978.94	5.24
2	Chillies	9.89	0.11
3	Cotton	5,469.34	43.48
	Cotton with Kapas	10,837.11	58.84
4	Sugarcane Jaggery	59.46	0.19
5	Coconut	5,036.80	8.17
6	Gingelly	0.50	-
7	Waste Cotton	19,869.36	64.56
8	Cashewnuts	-	-
9	Cholam	-	-
10	Groundnut	9.97	0.05
11	Ragi	-	-
12	Coriander	-	-
13	Cumbu	-	-
14	Blackgram	14.53	0.13
15	Sunflower Seeds	-	-
	NON-NOTIFIED CROPS		
1	Maize	1,102.55	-
2	Greengram	-	-
3	Horsegram	-	-
	TOTAL	45,388.45	180.77

Source: Virudhunagar District Statistical Report, 2019-20 - Secretary, Ramanathapuram Regulated Market Committee, Virudhunagar

5.1.1.6. INSTITUTIONS & INFRASTRUCTURE

Agricultural support network (**Map 5.2**) in the region includes the following:

- Cotton Research Station, Srivilliputhur, under the Tamil Nadu Agricultural University (TNAU), that develops and disseminates technologies to improve crop yield and provides farm advisory services.
- Virudhunagar District Mango Growers Association, with 23 Executive Members from Rajapalayam.
- Rajapalayam Precision Farmers Producers Company has 1,300 farmers as members, actively practicing and propagating modern agriculture practices.
- A network of godowns and co-operative societies in Rajapalayam block (**Table 5.7 & 5.8**).

Table 5.7: **Godown Details in Rajapalayam Block**

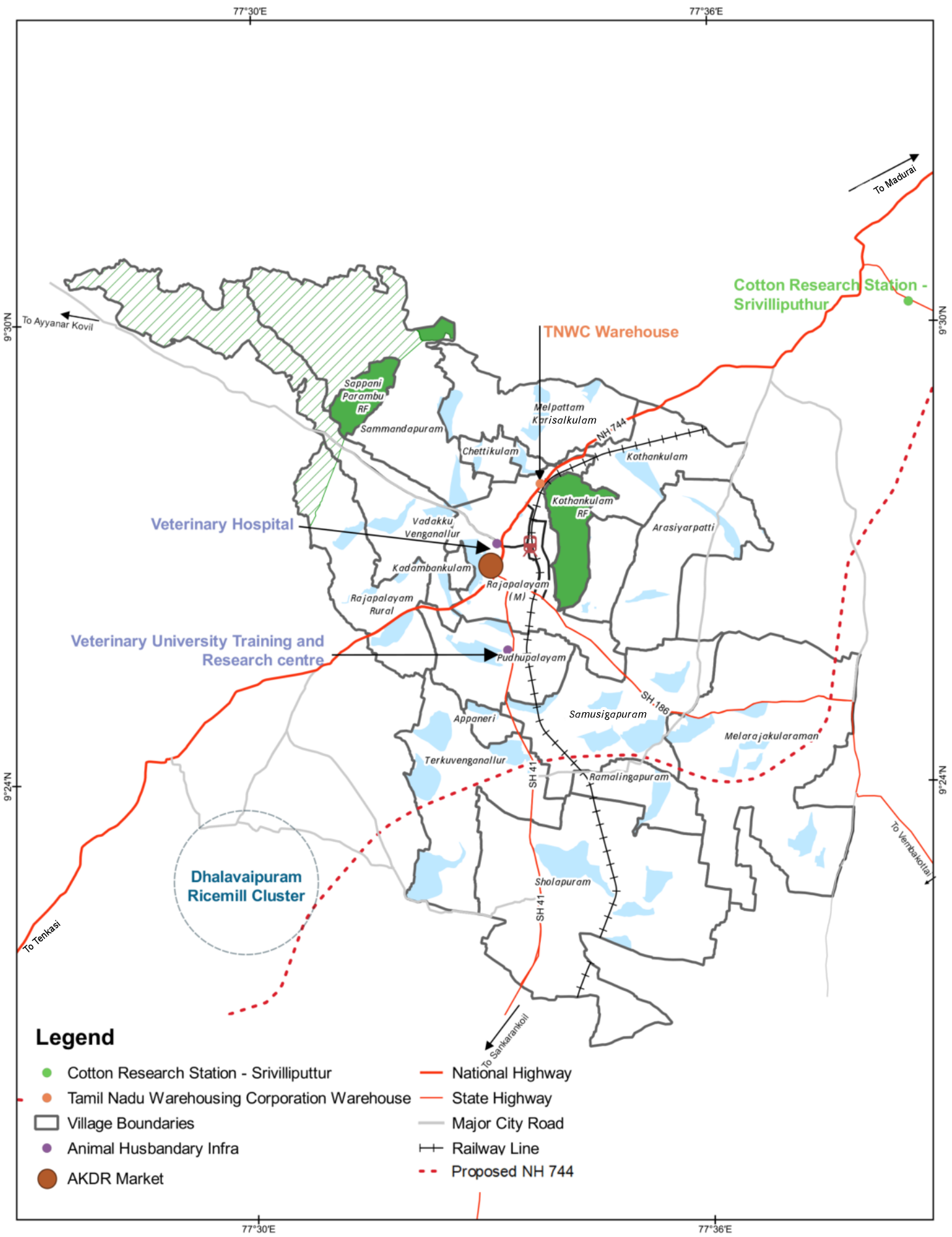
Godown Type	Number	Capacity (Tonne)
Agriculture	2	200
Food Corporation	-	-
Co-operation	29	5,050
Civil Supplies	3	860
Panchayat Union	2	200
Regulated Market	5	5,400
Total	41	11,710

Source: Rajapalayam Block Handbook, 2019-20

Table 5.8: **Co-operative Society Details in Rajapalayam Block**

S.No.	Type of Society	No. of Societies	Membership
1	Primary Agricultural Co-Operative Societies	12	19,818
2	Non-Agricultural Credit Society	9	5,665
3	Primary Agricultural Marketing Society	1	4,320
4	Tenant Farming Cooperative Society	2	634
5	Employees Co-operative Stores	1	1,187
6	Primary Co-operative Stores	2	1,701
7	Student Co-operative Stores	1	188
8	Urban Bank	2	6,551
9	District Co-operative Wholesale Stores	1	1,061
10	Special Type of Co-operative Society	1	541
11	Health Society (Special type)	1	541

Source: Rajapalayam Block Handbook, 2019-20



<p>Agriculture and Veterinary Infrastructure in Rajapalayam LPA</p>	<p>Notes :</p>	<p>Data Credits Primary Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 5.2: Agriculture & Veterinary Infrastructure in Rajapalayam LPA

5.1.2. Horticulture and Sericulture

The department of horticulture with its headquarters at Srivilliputhur, is running an Orchard cum Nursery for the production of quality seedlings of mango, guava, citrus, sapota, etc. Rajapalayam is famous for Sappattai Mango (**Fig. 5.3**). Panchavaram, Kilimukku, Palamani, Panaras Mangoes for Pickles and some other hybrid varieties are also being cultivated in Rajapalayam block. According to a news report in 2019, KS Jegannatha Raja, a fourth-generation mango farmer in Tamil Nadu, has revived three endangered mango varieties through approach grafting with mangoes harvested inside his 15-acre farm abutting the Western Ghats near Rajapalayam.

Rajapalayam block has 66 acres under Mulberry cultivation and produced 31,453 kg of cocoon worth 1.4 Cr INR as of 2017-18, as per the 2019-20 Rajapalayam Block Handbook.

Fig 5.3: **Sappattai Mango**



5.1.3. Medicinal Plants

Some of the medicinal plants cultivated in Rajapalayam LPA are gloriosa, amla & wild tulasi. Large number of farmers are actively involved in collecting medicinal plants in the wild. These plants are generally considered as weeds by the local people; but these plants have huge medicinal values. As can be inferred from chapter 3.9.1, medicinal plant cultivation has shown more than 50% growth compared to previous fasli.

5.1.4. Animal Husbandry

The Rajapalayam is a South-Indian breed of dog (**Fig. 5.4**), also called the Polygar hound or the Indian Ghost hound that is native to Rajapalayam. Significant population of the local farming community raises livestock (**Table 5.9**). The bovine population per sq.km for Rajapalayam Block is 719 as of 2019-20. Goat rearing is another prominent activity, especially in the foothills of the Western Ghats and near the Reserved Forests and hillocks.

Fig 5.4: **Rajapalayam Dog**



Table 5.9: **Livestock Population in Rajapalayam Block**

S.No.	Classification	Number
A	Total Poultry	41,262
B	Total Livestock	50,371
1	Cows - Males	1,990
2	Cows - Females - In Milk	4,264
3	Cows - Females - Under 2.5 years/ Dry/ Not Calved	6,232
4	Buffaloes	2,520
5	Sheep	22,550
6	Goats	9,900
7	Horses and Ponies	-
8	Pigs	1,386
9	Donkeys	45
10	Other Livestock - Dogs	1,484

Source: Rajapalayam Block Statistical Handbook, 2019-20 - 18th Quinquennial Livestock Census

Veterinary and animal sciences infrastructure in Rajapalayam block mainly include 1 Government Veterinary Hospital, 10 dispensaries and 3 sub-centres (**Table 5.10**). Training and education in animal sciences is provided by the Veterinary University Training and Research Centre (VUTRC), formerly called the Poultry Research and Development Centre (PRDC), in Rajapalayam, as a part of the Tamil Nadu Veterinary and Animal Sciences University (TANUVAS). Rajapalayam also houses the Rajapalayam Milk Producers Co-Operative Society Limited and the closest milk chilling plant is available in Srivilliputhur.

Table 5.10: **Veterinary Facilities in Rajapalayam Block, 2019-20**

Facilities (in Rajapalayam Block)	Numbers
Clinician centre	-
Veterinary Hospitals	1
Veterinary Hospitals cum Key villages centres	-
Veterinary Dispensaries	10
Rural Veterinary Dispensaries	-
Mobile Veterinary Units	-
Artificial insemination centre - Sub-centre	3
No. of Doctors	9
No. of Livestock Inspectors	4
No. of Cases Treated	1,19,160
No. of Castrations Performed	6,516

Source: Rajapalayam Block Statistical Handbook, 2019-20 - Assistant Director of Animal Husbandry, Srivilliputhur

Goat Farming

In Rajapalayam LPA, a significant portion of goat rearing is carried out around the foothills of the Western Ghats. Goat farming is a critical economic activity (source of milk and meat), especially among small landless farmers due to financial constraints and shortage of grazing lands. A study on the socio-economic status of goat farmers in three blocks of Virudhunagar district including Rajapalayam, in fringe villages at the foothills of Western Ghats was carried out in 2019 by TANUVAS. Approximately 75% of the participating farmers had less than 30 goats. 90% of the farmers had no land holding and only 5.5% had additional income sources. 84.4% of the participating goat farmers in Rajapalayam block were illiterate, with 5.6% having completed primary education, 5.6% middle school education and 4.4% high school. Most of the farmers (95%) had no prior training exposure in goat farming, and it was suggested that targeted training activities for goat farmers might aid in improving their socio-economic status.

5.2 Economy in Secondary Sector

5.1.5. Mining

The Virudhunagar District Statistical Report, 2019-20 lists 1 major and 19 minor quarrying and mining units in Rajapalayam taluk; a review of this list indicated the absence of any mines or quarries within the LPA region.

5.2.1. Industrial Development

Earlier, agriculture was the principal source of living for the people of Rajapalayam. Around the 1930's to 1950's, Rajapalayam gradually evolved into a thriving town based on the textile industry. Numerous spinning mills and textile related industries are located in Rajapalayam taluk. These mills, while utilising the latest practices and technologies, have been in the forefront of developing necessary social infrastructure. The taluk is also famous for bandage cloth, woven cloth and nightwear production, which has greatly contributed to the export sector. Chathrapatti (in the LPA area), Mugavoor and Dhalavaipuram which are small towns in the vicinity of the Rajapalayam LPA region, are focal points of production of surgical gauze and bandage. There is a SIDCO Industrial Estate in Muthukudi, having 96 plots mostly catering to industries dealing with corrugated boxes, PVC and readymade garments. A few pertinent facts about production in Rajapalayam taluk are listed in **Table 5.11**.

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Table 5.11: **Important Commodities in LPA**

Most important Commodities Imported	Most important Commodities Manufactured	Most important Commodities Exported	Highest employment generating Manufacturing Sector
Raw Cotton, Cotton Bale, Plastic Granules	Cotton Yarn, Garments, Cloth, Surgical Bandage, PVC Pipes	Cotton Yarn, Garments, Cloth, Surgical Bandage, PVC Pipes	Textiles (specifically spinning mills)

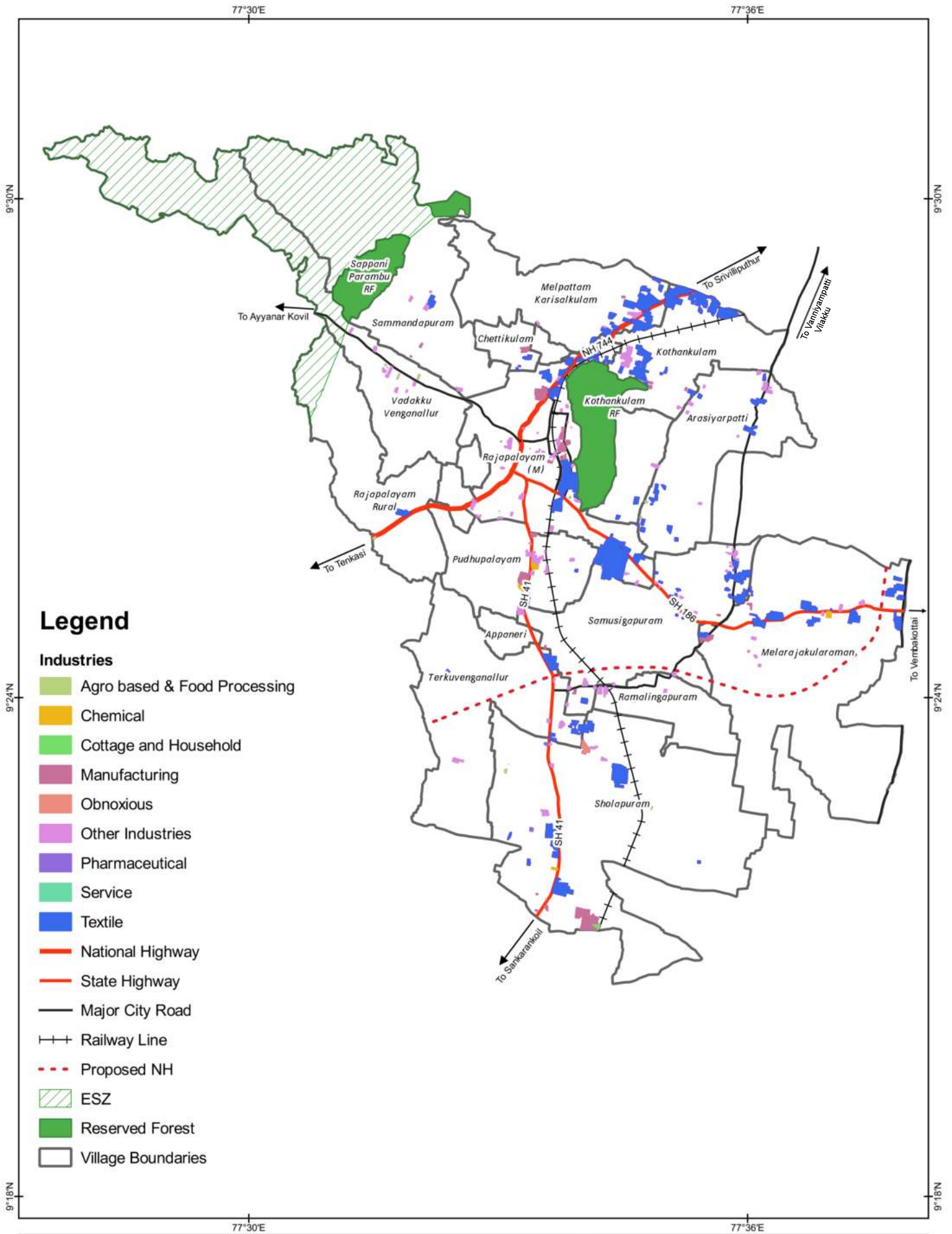
5.2.1.1. INDUSTRIES BY TYPE AND LOCATION

Data from the District Industries Centre (DIC), Virudhunagar district, with the year wise total of all enterprises in Rajapalayam LPA is listed in **Table 5.12 & Map 5.3**.

Table 5.12: **Year-wise Enterprise List in and around Rajapalayam**

S.No.	Type of enterprises	2015	2016	2017	2018	2019	2020	Total
1	Large	N/A	N/A	N/A	N/A	N/A	12	12
2	Medium	1	3	5	6	4	3	22
3	Small	19	87	59	87	107	50	409
4	Household/ Micro	449	359	759	658	907	941	4,073
5	Hazardous	1	2	3	4	5	3	18
6	Crushers	-	-	-	-	-	-	-

Source: DIC, Virudhunagar



Legend

Industries

- Agro based & Food Processing
- Chemical
- Cottage and Household
- Manufacturing
- Obnoxious
- Other Industries
- Pharmaceutical
- Service
- Textile
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- ESZ
- Reserved Forest
- Village Boundaries

<p>Industries by Type and Location in Rajapalayam LPA</p>	<p>Notes : The Industrial Classification is Made in accordance to Industrial Sub classes in AMRUT Guidelines</p>	<p>Data Credits Landuse Survey</p> <p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<div style="display: flex; align-items: center;"> </div> <p style="font-size: small; margin-top: 5px;">CRS : WGS 1984</p>	

Map 5.3: Industries in Rajapalayam LPA

Data collected on the list of industries in Rajapalayam Taluk lists a total of 428 industries, of which 315 industries are currently serving inside Rajapalayam LPA. There are 113 more industries in the vicinity of LPA region like Dhalavaipuram, for example, which also have an impact on the LPA region. **Table 5.13** lists the sector wise details of these 315 industries within Rajapalayam LPA. Of the 315 industries mentioned, manufacturing related to the textile sector constitutes around 199 industries, which is around 63% of the total industries (**Fig. 5.5**).

Fig 5.5: Sector-wise Distribution of Industries in LPA

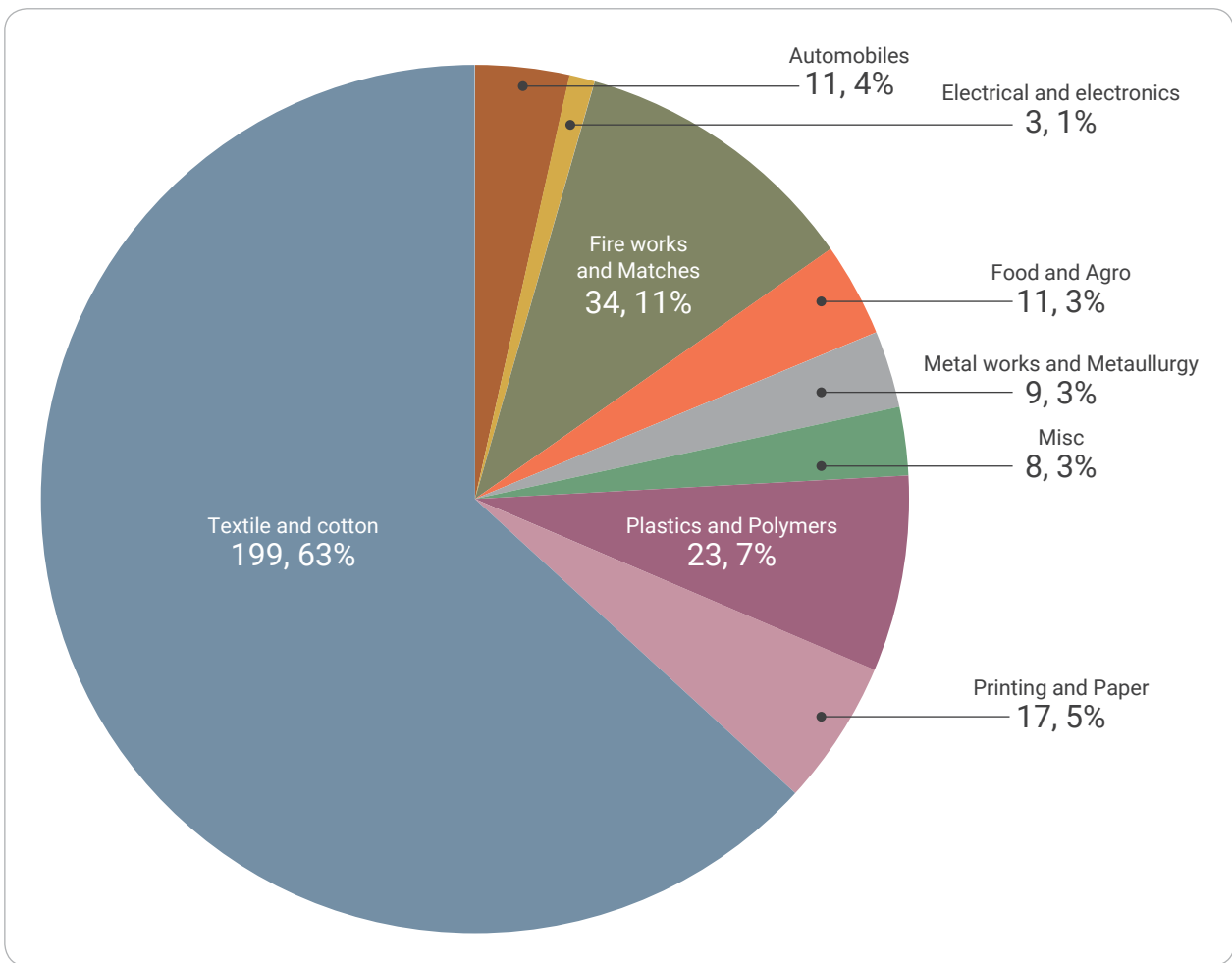


Table 5.13: Sector-wise Industry Details in Rajapalayam LPA

S.No.	Type of Industry	Numbers	Sub-Total
1	Textile and Cotton		199
	Ginning	26	
	Spinning	104	
	Garments	13	
	Weaving	11	
	Bandage and surgical cotton	11	
	Cotton grey cloth	1	
	Fabrics	2	
	Textile	9	
	Power looms	19	
	Sizing	3	
2	Fireworks and Matches		34
	Fireworks and Matches	34	
3	Plastics and Polymers		23
	HDPE Bags, Polythene Bags	14	
	Plastic Products and Polymers	8	
	Pipes	1	
4	Printing and Paper		17
	Printing	2	
	Paper Boards, Packaging Paper	15	
5	Automobiles		11
	Vehicle Repair and Workshop, Automobile	11	
6	Food and Agro		11
	Food Products	3	
	Oil Mills	2	
	Rice Mills	4	
	Herbal Products	2	
7	Metal Works and Metallurgy		9
	Accessories, Aluminium Plates and Rivets, Screws	4	
	Steel works, Metal Fabrications, Engg.	4	
	Lead Ingots	1	
8	Electrical and Electronics		3
	Electrical and Electronics	3	
9	Misc.		8
	Rubber Products	1	
	Plywood	1	
	Paints	1	
	Gem powder	5	
	TOTAL		315

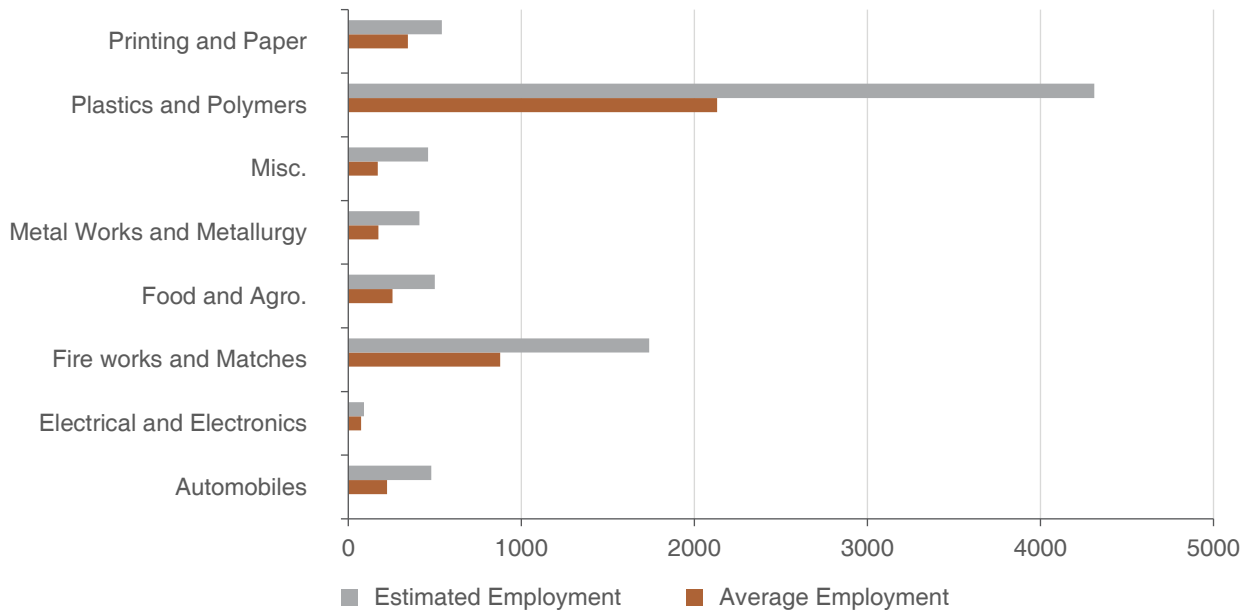
5.2.1.2. Industrial Employment

From individual industries data, the sector-wise average and estimated employment details are presented in **Table 5.14 & Fig. 5.6**. The manufacturing sector in the LPA region has a total average employment of 20,263; those employed in the industrial sector are largely from within the local region.

Table 5.14: **Industrial Employment Details in and around Rajapalayam LPA**

Type of Industries	Number of Industries	Average Employment Numbers	Estimated Employment Numbers
Automobiles	11	223	480
Electrical and Electronics	3	74	90
Fireworks and Matches	34	878	1,739
Food and Agro	11	255	499
Metal Works and Metallurgy	9	174	410
Plastics and Polymers	23	2,131	4,310
Printing and Paper	17	344	540
Textile and Cotton	199	16,014	27,905
Misc.	8	170	460
Total	315	20,263	36,433

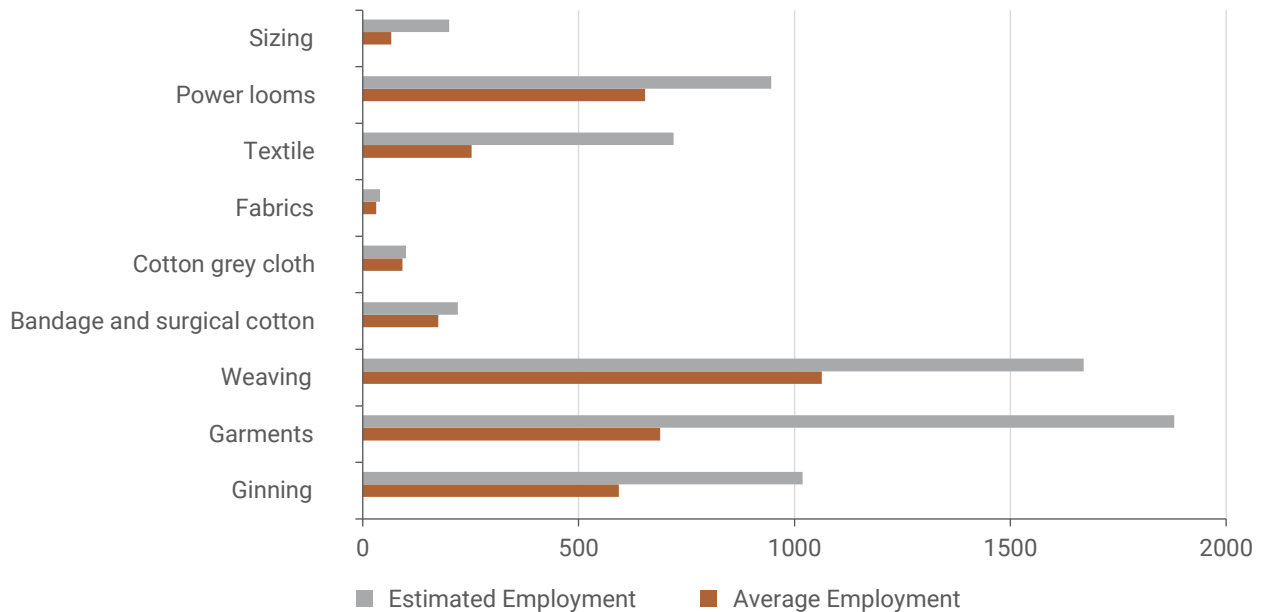
Fig 5.6: **Estimated vs. Average Employment** *Textile Industry data excl.



It is to be noted that the textile segment employment of 16,014 is 79% of the total average industrial employment. A break-up of the employment details in the textiles sector is presented in **Table 5.15 & Fig. 5.7**. It is evident that the spinning industries which constitute 52% of the textile sector, provides 77% of total average employment in this category.

Table 5.15: **Employment Details in Textile Industry**

Textile and Cotton Industries	Numbers	Average Employment Numbers	Estimated Employment Numbers
Ginning	26	593	1,019
Garments	13	689	1,880
Weaving	11	1,063	1,670
Bandage and surgical cotton	11	175	220
Cotton grey cloth	1	92	100
Fabrics	2	31	40
Textile	9	252	720
Power looms	19	654	946
Sizing	3	66	200
Spinning	104	12,399	21,110
Total	199	16,014	27,905

Fig 5.7: **Estimated vs. Average Employment - Textile Industry** *Spinning Industry data excl.

5.2.1.3. Horsepower Statistics

The total maximum horsepower required by the textile industries is 1,90,733 HP. 88% of this requirement, 1,68,266 HP, is from the spinning mills. The break-up of the remaining requirement is shown in Fig. 5.8. The maximum horsepower required by the non-textile industries is from the plastics and polymers industries (Fig. 5.9).

Fig 5.8: **Maximum Horsepower Details - Textile Industries** *Spinning Industry data excl.

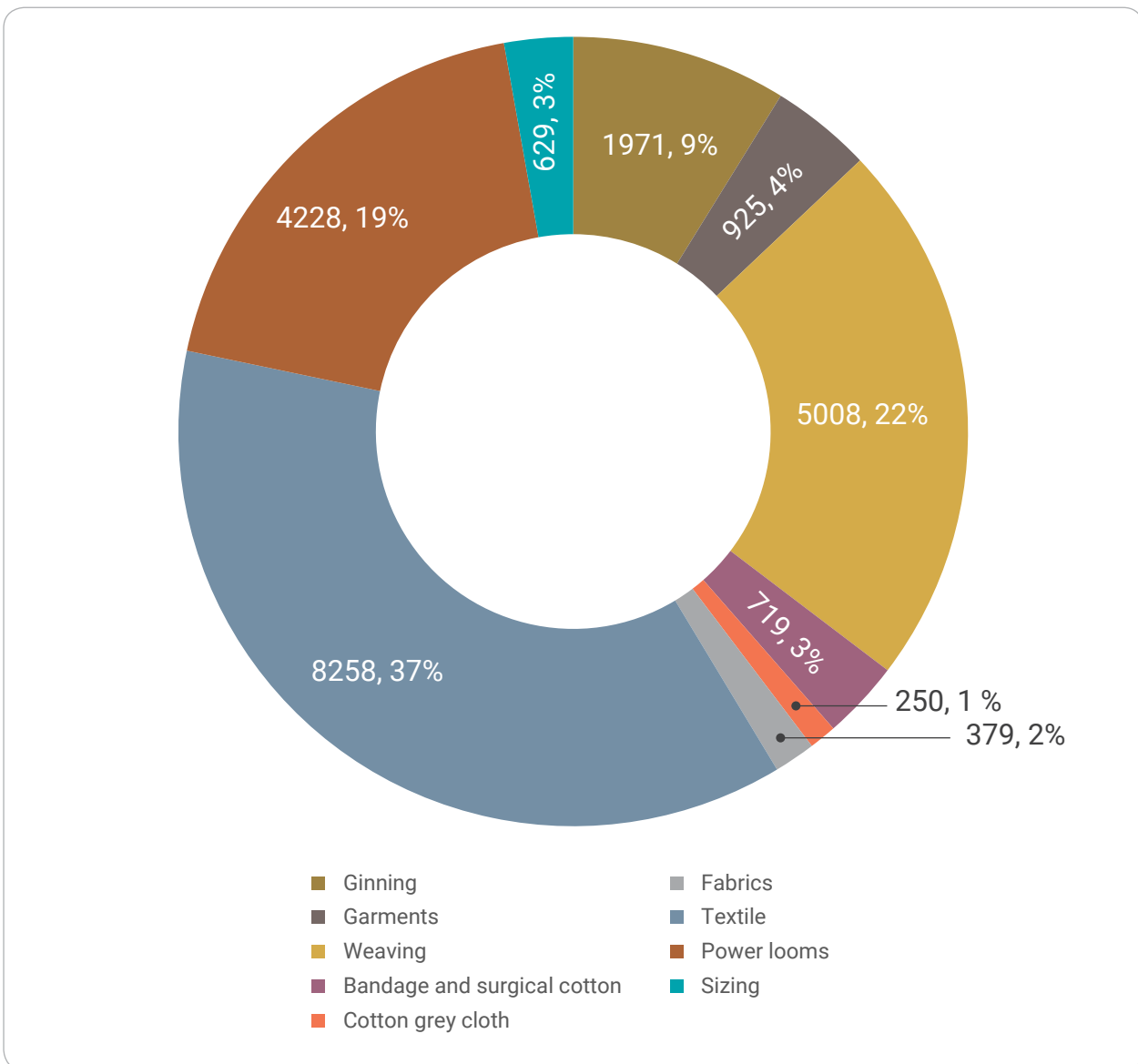
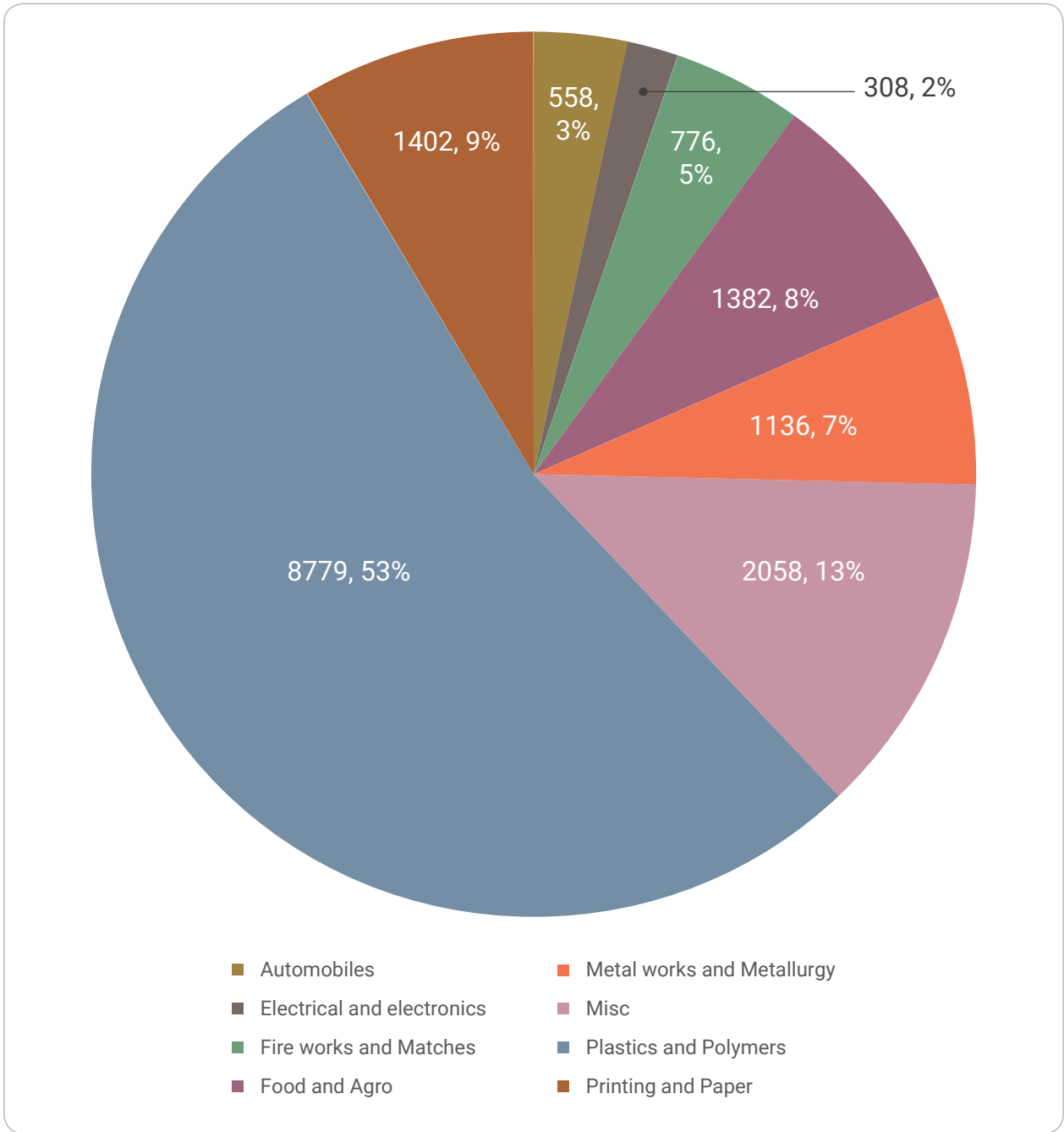


Fig 5.9: Maximum Horsepower Details - Non-Textile Industries



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5.2.1.4. OTHER SMALL AND MICRO MANUFACTURING UNITS

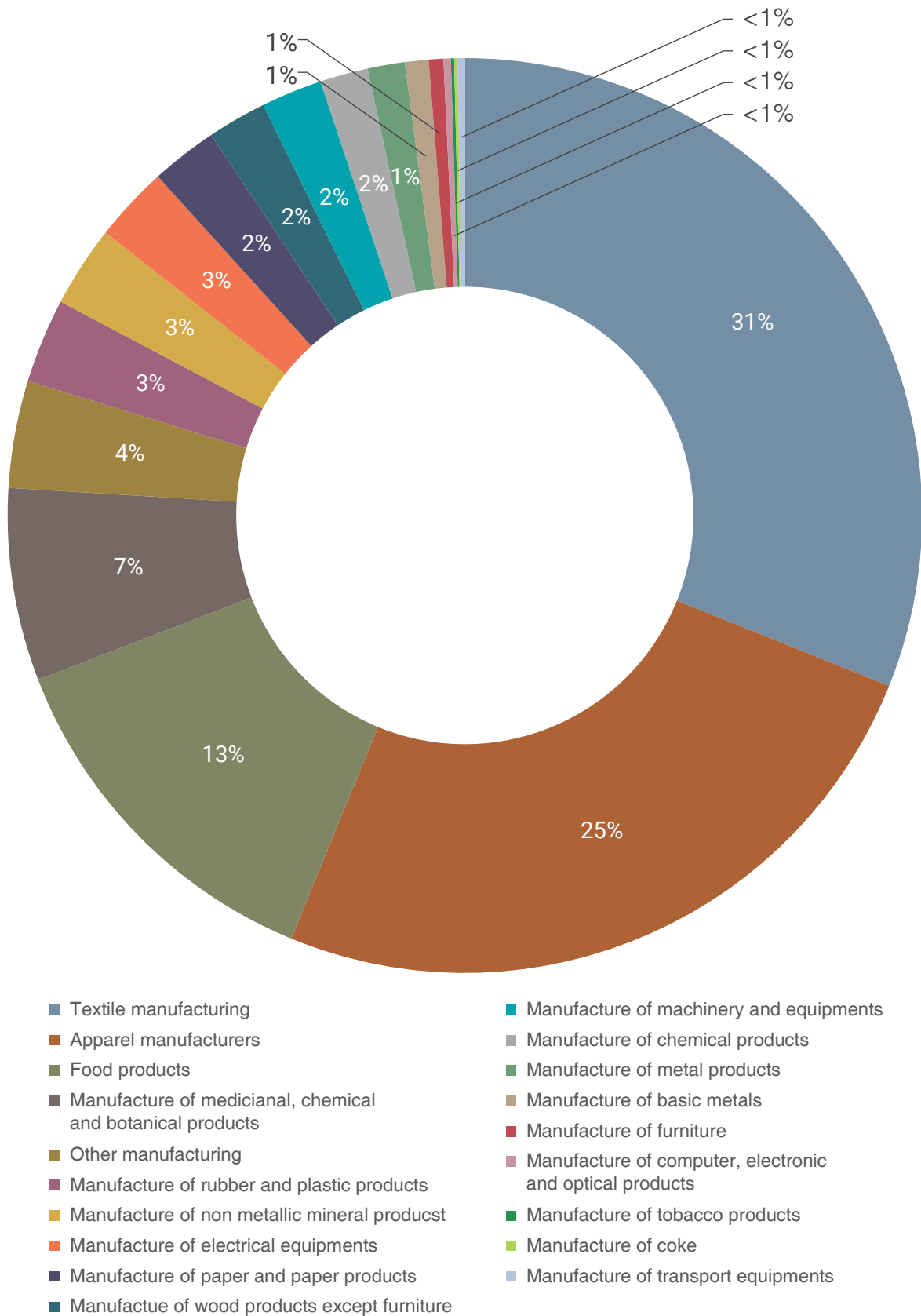
The DIC data lists a total of 3,482 small and micro industries in and around the LPA area (**Table 5.16**). The sector-wise split up of these industries shows that textiles and apparels constitute the major portion of this segment at 56%, followed by food products at 13% (**Fig. 5.10**).

Table 5.16: **Small & Micro Industries Details in and around Rajapalayam LPA**

Small and Micro Industries	Numbers
Textile manufacturing	1,082
Apparel manufacturers	875
Food products	451
Manufacture of medicinal, chemical and botanical products	237
Other manufacturing	132
Manufacture of rubber and plastic products	104
Manufacture of non-metallic mineral products	100
Manufacture of electrical equipment	93
Manufacture of paper and paper products	82
Manufacture of wood products except furniture	73
Manufacture of machinery and equipment	75
Manufacture of chemical products	59
Manufacture of metal products	46
Manufacture of basic metals	29
Manufacture of furniture	18
Manufacture of computer, electronic and optical products	9
Manufacture of tobacco products	4
Manufacture of coke	4
Manufacture of transport equipment	9
Total	3,482

Source: District Industries Centre

Fig 5.10: Small & Micro Industries in and around Rajapalayam LPA



5.3 Economy in Tertiary and Quaternary Sector

5.3.1. Service Sector

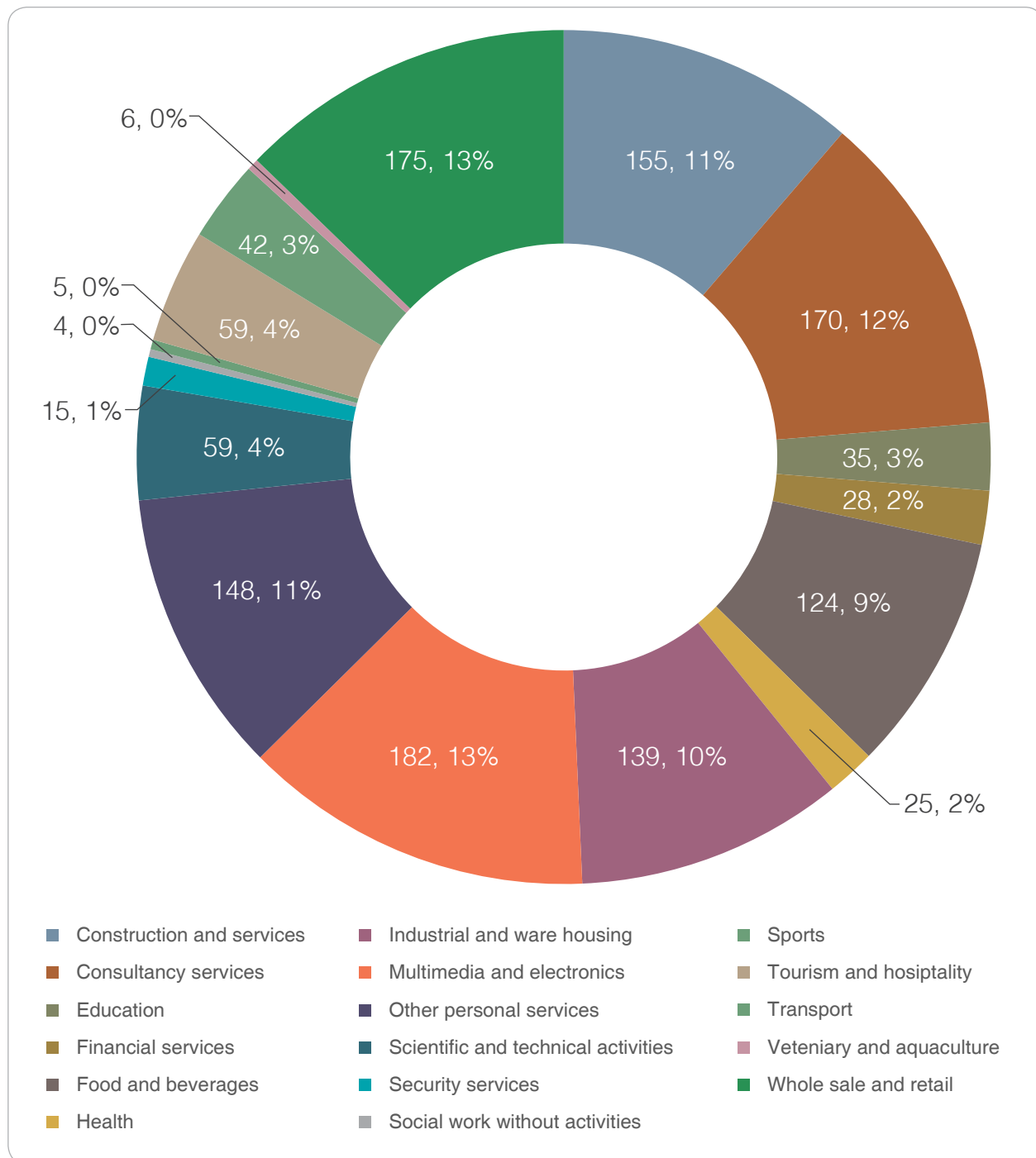
In terms of scale, there are no sizable enterprises in the tertiary or quaternary sectors, which contribute in large to the economy. The list of enterprises in the LPA region, as per DIC records, is listed in **Table 5.17** and represented visually in **Fig. 5.11**.

Table 5.17: **List of Tertiary & Quaternary Enterprises in Rajapalayam LPA**

Enterprises	Numbers
Construction and services	155
Consultancy services	170
Education	35
Financial services	28
Food and beverages	124
Health	25
Industrial and warehousing	139
Multimedia and electronics	182
Other personal services	148
Scientific and technical activities	59
Security services	15
Social work without activities	4
Sports	5
Tourism and hospitality	59
Transport	42
Veterinary and aquaculture	6
Whole sale and retail	175
Total	1,371

Source: District Industries Centre

Fig 5.11: Tertiary & Quaternary Industries in Rajapalayam LPA



5.3.2. Tourism

The District of Virudhunagar is home to famous tourist attractions that boast ecological as well as religious significance. Notable attractions include the Sri Andal Temple located at Srivilliputhur, Sastha Falls, Ayyanar Falls, Thiruthangal temple, Sivakasi etc. Tourism, however, is not a prominent characteristic in the town of Rajapalayam or the LPA, despite the presence of existing tourist attractions like Ayyanar Kovil and Falls and the other religious temples. The Western Ghats present in the area with its interesting

ecological profile, places of interest like Ayyanar Falls, and the Sanjeevi Malai situated at the center of the LPA all offers tourism potential that can be explored. The temple town of Srivilliputhur lies less than 15 km from Rajapalayam.

5.3.3. Tourism Carrying Capacity

Despite the lack of prominent tourist attractions, accommodation facilities are available in Rajapalayam for budget stay. There exists a total of eight hotels, with a total capacity to accommodate 883 persons (**Table 5.18**). Most of these hotels are located in the heart of the town either on the Tenkasi Road or the Railway Feeder Road, except for Hotel Amil.

Table 5.18: **Tertiary & Quaternary Industries in Rajapalayam LPA**

Name of Hotel	Address	Status	No. of Rooms Available		Bed Strength (Accommodation)		Rent (Approximate Range in INR)	
			AC	Non-AC	AC	Non-AC	AC	Non-AC
Hotel Bombay Boarding and Lodging	Tenkasi Road, Rajapalayam	Unclassified	10	33	20	66	1,300	600
Hotel Jaisantham	112-E Hospital Road, Rajapalayam	Unclassified	28	14	56	14	1,300	500
Hotel MAP Lodge	60-61, Kamaraj Nagar, Rajapalayam	Unclassified	-	22	-	44	-	500
Hotel Ruba Lodge	Near Old Bus stand, Rajapalayam	Unclassified	-	23	-	46	-	500
Hotel Jayam Lodge	Railway Feeder Road, Rajapalayam	Unclassified	-	8	-	16	1,200	550
Hotel Asoka	97, Kamaraj Nagar, Rajapalayam	Unclassified	40	-	80	-	1,300	-
Hotel Anantha	Tenkasi Road, Rajapalayam	Unclassified	32	37	64	74	1,300	-
Hotel Amil	295, Tenkasi Road, Rajapalayam	Unclassified	52	-	104	-	1,500	-
Total			162	137	324	260		
Total Accommodation Capacity (299 +584) =883				299		584		

Source: Tourism Department, Virudhunagar District

5.4 Workforce & Occupational Pattern

Census 2011 indicates that in the non-municipal area the total workers were 42,275 and the participation rate was 49%, which was higher than the municipal area's participation rate of 41% (Table 5.19). Of the total workers, the male workers and female workers in this area were 62% and 38% respectively.

Table 5.19: Workforce Details of Rajapalayam LPA

S. No.	Demographic Characters	Municipal Area	Non-Municipal Area	Total LPA
1	Population	1,30,442	86,000	2,16,442
2	Male	64,765	43,169	1,07,934
3	Female	65,677	42,831	1,08,508
4	Sex ratio	1,014	992	1,005
5	Total Workers	53,913	42,275	96,188
6	Participation Rate	41%	49%	44%
7	Total Male Workers	39,468	26,035	65,503
8	Total Female Workers	14,445	16,240	30,685
9	% of Male Workers to Total Workers	73%	62%	68%
10	% of Female Workers to Total Workers	27%	38%	32%
11	Main Workers	50,654	38,443	89,097
12	% of Main Workers to Total Workers	94%	91%	93%
13	Main Workers – Male	37,692	24,390	62,082
14	% of Male Main Workers to Total Workers	70%	58%	65%
15	Main Workers – Female	12,962	14,053	27,015
16	% of Female Main Workers to Total Workers	24%	33.24%	28.08%
17	Marginal Workers	3,259	3,832	7,091
18	% of Marginal Workers to Total Workers	6%	9%	7%
19	Cultivators & Agri. Labourers	4,416	11,046	15,462
20	% of Cultivators & Agri. Labourers to Total Workers (Primary Sector)	8.19%	26.13%	16.07%
21	Household Industry Workers	1,661	1,245	2,906
22	% of HH Industry Workers to Total Workers	3.08%	2.95%	3.02%
23	Other Trade Workers	47,836	29,984	77,820
24	% of Other Trade Workers to Total Workers	88.73%	70.93%	80.90%
25	No. of Households	37,797	25,111	62,908
26	% of Households to Total Households	60%	40%	100%

Source: Census, 2011

5.5 Development Indices

Main workers constituted 91% of the total workers and the marginal workers constituted 9% of the total workers in the non-municipal area. Percentage of workers in the primary sector (cultivators and agricultural labourers) is 26.13% and workers in other trades 70.93% of the total workers in the non-municipal area. Workers in Household industries were a meagre (3%) in the non-municipal area and the same trend is also noticed in the municipal area.

Workforce participation ratio in the municipal area is 41%, comprising 94% main workers and 6% as marginal workers. The workers in the municipal area are primarily engaged in manufacturing and processing industries and trade and commerce. Over the years, there has been a marginal shift of workers from primary sector to tertiary sector, though agriculture still plays a major role in the economy of the municipal area.

Economic growth and development are critical for poverty reduction and improving the quality of life in a population. Development indices are common measures of socioeconomic development among a population and can also be used to compare and rank performances of different regions. Each composite index is calculated based on specific dimensions - health/ well-being, knowledge/ education, living standard are a few examples of dimensions. Individual dimensions are calculated based on relevant indicators to arrive at a composite score. For example, mortality rate is one of the indicators commonly used for health/ well-being. The District Human Development report 2017 for Virudhunagar ranks the blocks on the basis of the following composite development indices (**Table 5.20**).

Table 5.20: **Composite Development Indices for Rajapalayam Block**

S. No.	Composite Development Index	Evaluation Dimension and Indicators (Scores for Rajapalayam Block as available)	Score & Rank - Rajapalayam Block	Score - Virudhunagar District	Score - Highest ranked district in Tamil Nadu
1	Human Development Index (HDI)	<p>Standard of living - 0.59 Access to cooking fuel – 0.88 Access to toilet facilities – 0.16 Access to drinking water – 0.88 Access to electricity – 0.94 Access to Pucca houses – 0.65</p> <p>Health - 0.69 Infant Mortality Rate – 0.55 Maternal Mortality Ratio – 0.92 Under 5 Mortality Rate – 0.66</p> <p>Education - 0.96 Literacy rate – 0.93 Gross enrolment in Primary – 1.0 Gross enrolment in secondary – 0.97</p>	0.735 Rank 3	0.625	0.944 Kanyakumari District

S. No.	Composite Development Index	Evaluation Dimension and Indicators (Scores for Rajapalayam Block as available)	Score & Rank – Rajapalayam Block	Score – Virudhunagar District	Score – Highest ranked district in Tamil Nadu
2	Gender Inequality Index (GII)	<p>Health Maternal Mortality Ratio (MMR) – 0.13 Share of institutional delivery – 1.00 Share of Antenatal coverage – 0.91</p> <p>Empowerment Female literacy rate 0.79 Male literacy rate – 0.96 Share of female children 0 – 6 years – 0.49 Share of male children 0 – 6 years – 0.51 Share of male elected representatives in RLBs and ULBs – 0.60 Share of female elected representatives in RLBs and ULBs – 0.40</p> <p>Labour market Female work participation rate – 0.34 Male work participation rate – 0.61 Female work participation rate in non Agri. Sector – 0.68 Male work participation rate in non Agri. Sector – 0.82 Female Agri. wage rate – 0.33 Male Agri. wage rate – 0.41</p>	0.056 Rank 7	0.048	0.036 The Nilgiris District
3	Child Development Index (CDI)	<p>Health Under 5-year mortality rate (U5MR) – 0.62 Juvenile (0.6) – 0.48</p> <p>Nutrition Malnourished children (0-5) – 1.0</p> <p>Education Gross enrolment ratio in primary – 1.00 Gross enrolment ratio in secondary – 0.77 Children never enrolled in schools – 0.00 Transition rate from primary to upper primary school – 0.68 Transition rate from upper primary to secondary school – 0.76</p>	0.664 Rank 2	0.672	0.872 Kanyakumari District
4	Multidimensional Poverty Index (MPI)	<p>Health Infant Mortality rate IMR – 0.49 Higher order birth rate – 0.86 Malnourished children – 1.00</p> <p>Education Drop out of the primary – 0.40 Drop out in secondary – 0.29</p> <p>Standard of living Access to cooking fuel – 0.88 Access to toilet facilities – 0.00 Access to drinking water – 0.98 Access to Pucca houses – 0.62 Access to electricity – 0.89</p>	0.358 Rank 4	0.63	0.34 Kancheepuram District

Source: Human Development Report 2017 – Virudhunagar District for Block data; Tamil Nadu Human Development Report 2017 for District data

Development indices facilitate cross-country and global comparison and can play a critical role in urban planning. The Human Development Index (HDI) was launched by the UNDP with the explicit purpose “to shift the focus of development economics from national income accounting to people centred policies”. It is interesting to note that Kanyakumari district has a HDI of 0.944 and stands 1st in the State (as per the TN State Human Development report of 2017); interestingly, Switzerland, ranked 2nd globally, has a HDI score similar to Kanyakumari. India is ranked 131 out of 162 countries. The HDI for Virudhunagar district as reported in 2017 is 0.855 and is classified as very high; it is comparable on a global scale to Slovakia (global rank 39 out of 161 countries).

These indices can be used to look at inter-block disparities or within a particular block to look at the individual indicators shows where the shortfalls are and can be used for drive fund allocation, active, program planning, etc. As per the District Human Development report of Virudhunagar, 2017 Sivakasi block, is ranked number 1 in the district and has a score of 0.871, which is considered to be very high. Rajapalayam block has a score of 0.735 which is classified as high; however, on indicators such as access to toilet, the block ranks abysmally low and highlights the need for attention.

Similarly, Gender Inequality Index (GII) is estimated by taking health, empowerment of women and labour force as dimensions. Rajapalayam block has a score of 0.056 and is ranked 7th in the district. The index for Rajapalayam is comparable to Iceland which is ranked 9th globally. Sivakasi block is ranked number 1, with a score of .041; this is comparable to Netherlands, which is ranked 4th globally. The district of Virudhunagar has a score of 0.056. The district of Nilgiris has a GII score of 0.036 and stands 1st in the State.

5.6

Situation Assessment and Key Findings

On analysing the various key economic factors of the region, the overall economic growth of the region is rather slow paced. Not much of diversification in the industrial setting has happened, especially in the last two decades. From the household survey, it can be inferred that the average income of majority of the residents seems to be less than taxable income. The demographic growth shows that the growth has stagnated possibly due to out migration especially of the educated population. Nearly 20% of the population of Rajapalayam town reside in slums.

Traditionally, agriculture and textile industries especially spinning have been the two pillars on which the economy was dependent. However, there has been a rapid decline in the population dependent on agriculture even though a majority of the land area is under paddy and plantations like coconut and mango.

Primary Sector – Agriculture

Agricultural land is the most predominant land use in the LPA and it constitutes around 52.92% of the total land. Rajapalayam LPA despite not being an agrarian dominant economy, has significant amount of agricultural land holdings. Interviews were conducted in the villages/ hamlets/ habitations in the LPA, with village leaders to understand the daily reality for the people, the current agricultural trends. Issues in the area of agriculture are listed below:

- It is interesting to note even though there are large agricultural land holdings within the LPA, only about 7% of the population are classified as cultivators or agricultural labourers as per the 2011 Census. This could be a concern as it could accelerate change of land use in the area. Agricultural lands are essential both as an economic driver to maintain the production cycle, and environmentally to maintain the carbon and nutrient cycle in the macro scheme of things.
- Most of the farmers are not aware of the schemes provided by the government. Big farmers and influential famers enjoy most of the schemes and subsidiaries provided by the government. Around 85% of people prefer to sell their produce to middlemen, who come directly to the fields to procure, and the payment is immediate. In government procurement centers, one has to take the produce to the procurement center and certain formalities are to be followed and therefore a delay in payment is imminent. Hence, most of the farmers sell their produce to middlemen.
- Labour shortage is one the major issues that local farmers face.

- The majority of youth are not encouraged to carry on the farming tradition, as the revenue for this line of work is not enough. Mostly the youth seek other employment. Lands are either leased to other family members or external parties.
- Farmers who lease lands for agriculture face more financial crisis than people who farm on own lands, since they are not entitled to government schemes that land owners normally can claim.
- The prices of fertilizers and seeds are high, and the price for the produce is relatively very low, which makes agriculture not so profitable.
- Wild boar, deer, elephants, rabbit are the main predators that invade farm lands. Protecting the lands from wild animals adds to the workload and economic pressure of the farmers. Unless the farmer is vigilant, the extent of damage can rise up to 50%. Moreover, the Government compensation for damages caused by animals, such as elephants are very meagre.
- Lands in areas of urban sprawl, generally to the east and south-east of Rajapalayam, are being sold for real estate. This is predominantly on the sandy soils, and the first land to go is the non-irrigated lands in the catchment area above the tanks.
- Lack of required agriculture related infrastructure like storage godowns, cold storage, precision farming equipment, food processing units are leading to low economic turnover and being unproductive in spite of being blessed with fertile lands and climate.

Secondary Sector – Manufacturing

The secondary sector is primarily made up of textile-related industries in Rajapalayam LPA. Out of the 315 units located within the LPA, as per data received, cotton-based textile industries comprise of 199 units (63%). However, it is to be understood that on an average only 2% of the workforce in the textile industry comprises of managerial and management-level staff. Around 10% of the workforce are mid-level technicians and support staff. The remaining 88 to 90% are mainly the shop floor workers.

With the advent of automation, there is a possibility that textile manufacturing might not be able to add much value in terms of providing employment in the future. Moreover, with the high levels of literacy and education opportunities available to the people in the LPA, the possibility to find laborers for shop floor might become difficult and unviable for the industry, and the remuneration insufficient for the individuals.

In spite of Rajapalayam being among the highest contributors to the exchequer in the district, the inadequate road infrastructure, absence of appropriate mechanism to identify and allocate

suitable land, inadequate infrastructure, especially with regards to treating water, such as collective ETP for surgical cotton units, and STP for the urban clusters, and the abysmally low access to toilet facilities could be some of the reasons for the absence of sufficient investment in-flow.

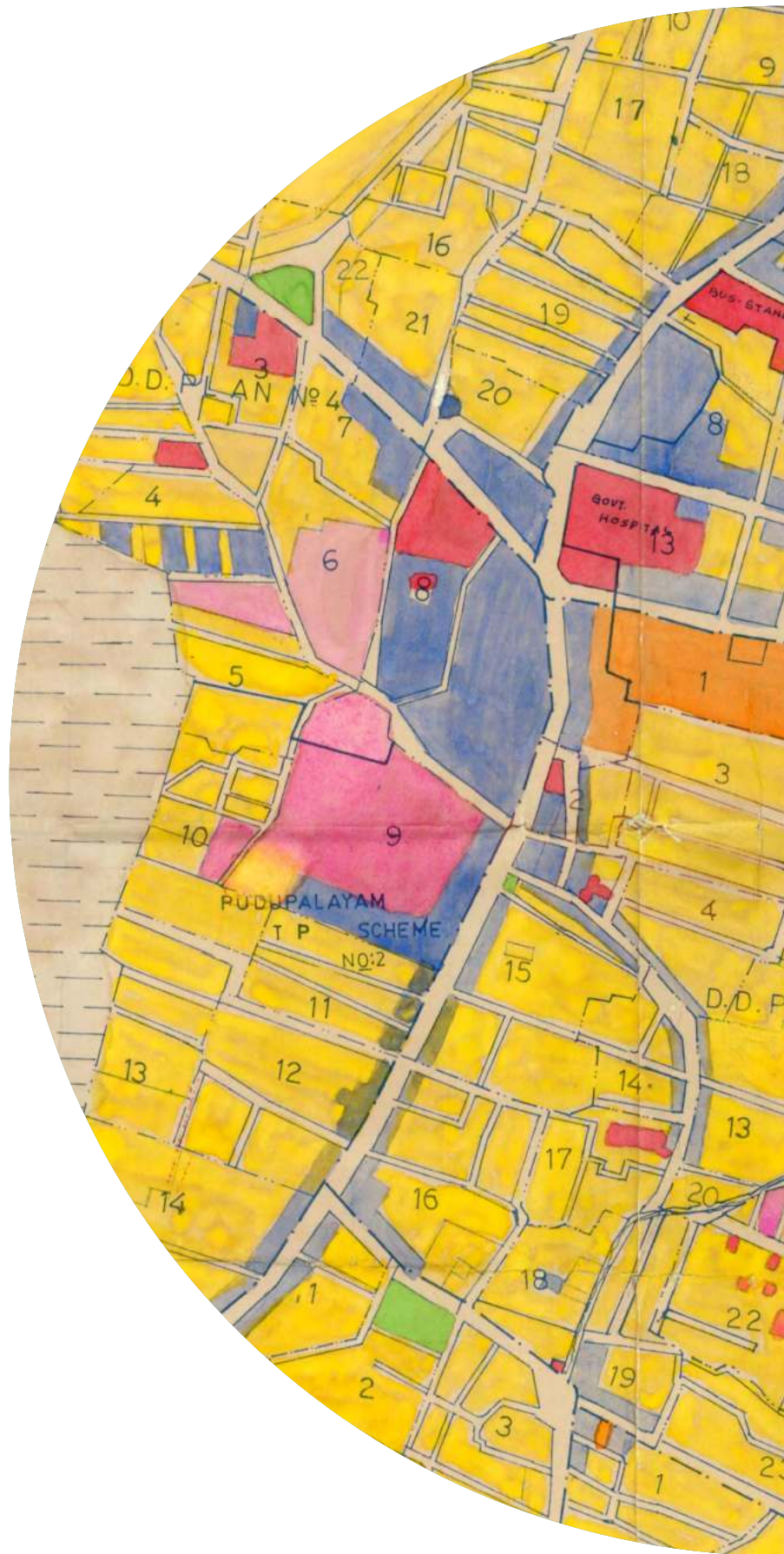
The LPA has access to international seaports within 125 km in Tuticorin, 190 km from the proposed Vizhinjam and international airport within 100 km (Madurai). Other advantages of the LPA include the location at the foothills of western Ghats, good climate, long tradition of investing on education and more than 75 years of industrial growth. In the last decade however, the economic growth seems to have stagnated. Hence Rajapalayam is at a critical junction where it needs to re-invent itself as a hub providing job opportunities in order to economically sustain its citizenry in the foreseeable future.

Tertiary Sector – Tourism

There is abundant potential for eco-tourism and cultural tourism in the LPA. However, despite the proximity of the town to the Western Ghats (a biodiversity hotspot and a part of a designated tiger reserve) on one side, presence of the culturally and spiritually important Srivilliputhur at a 12 km distance, strong association of the town to the Indian Independence efforts, and the presence of rich architecture and cultural heritage of a unique community like the Rajus, the tourism potential of the town has not been fully explored. Infrastructure pertaining to heritage and eco-tourism remains to be developed.

Workforce Participation

The literacy rate of women in Rajapalayam is 73% as per the 2011 Census, but the percentage of female workers to total workers is 32% and female main workers is 28%. The Gender Inequality Index (GII) is a composite measure, reflecting inequality in achievements between women and men in three dimensions: reproductive health, empowerment and the labour market. The labour dimension is measured by women's participation in the workforce. The female workforce participation for Rajapalayam block as listed in the Gender Inequality Index released by the District Human Development Report 2017 is 0.34, which is considered to be low.





Land Profile



06



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6.1

Background

Rajapalayam is a Class I census town situated in the district of Virudhunagar, Tamil Nadu. Under the Town and Country Planning act of Tamil Nadu, 1971, it was eligible to be constituted as a Local Planning Area. Under section 10(4) of the Town and Country Planning Act 1971, in G.O Ms. No. 1374 RDLA, dated 30.05.1974, it was confirmed to be a local planning area. Eventually, Rajapalayam Local Planning area was constituted under section 11(1) of the Town and Country Planning Act 1971, in G.O Ms. No. 650 RDLA, dated 08.04.1975.

6.1.1. Evolution of the Town

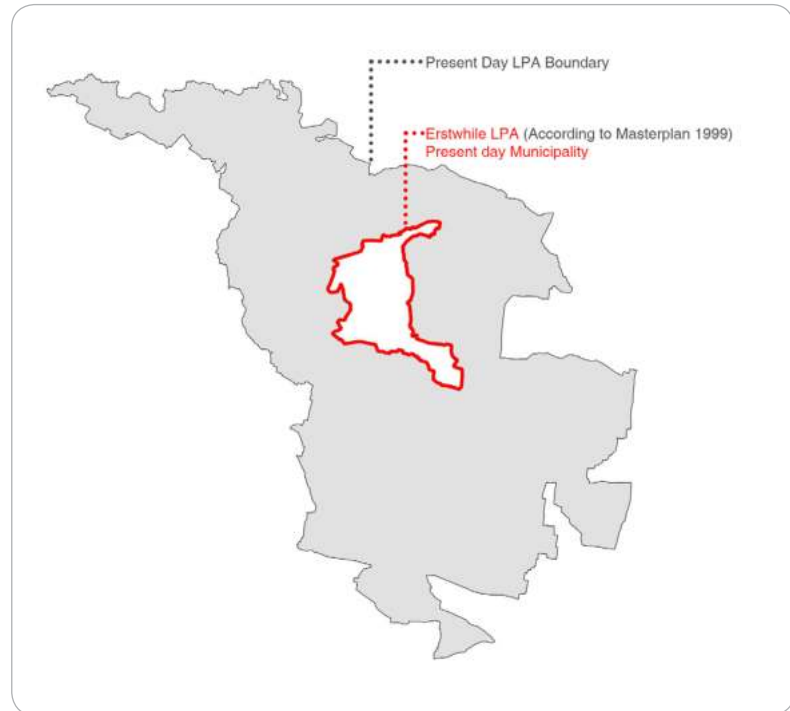
The town of Rajapalayam has a rich heritage and cultural significance behind its origins. The town is said to have originated from the Palayapalayam area, which is the old town area located in the north-eastern part of the town, between Madaswamy Kovil Street and Periya Kadai Bazaar. The commercial central node, which is now generally referred to as the Panchu Market by the locals is the first commercial node that was formed. This dispersion of settlements is still adamantly visible in the spatial spread as seen in the **Map 6.1**.

The current Rajapalayam Local Planning Area or the LPA in short, is a composite of various villages in addition to the erstwhile LPA, which was just the present municipal area. The intention to add additional areas to the Rajapalayam Local Planning Area, with a view to control and channelize the development and growth in Rajapalayam and the surrounding villages was declared by issuing the G.O. (Ms). No. 2014 on 30th December 2011, under section 10(1) of the Tamil Nadu Town and Country Planning Act, 1971 by the Housing and Urban Development Department.

The intention notified additional areas were confirmed as part of the Rajapalayam LPA, under section 10(4) of the Tamil Nadu Town and Country Planning Act, 1971 by issuing a G.O. (Ms). No. 168, on 20th November 2014 by the Housing and Urban Development Department, Govt. of Tamil Nadu.

Hence, it has to be noted that the Master Plan of 1999 prepared for the horizon year of 2011, only talks about the erstwhile LPA which is the present Municipal boundary (**Fig. 6.1**). The total land area of the Municipality as per GIS mapping is 9.591 sq.km.

Fig 6.1: **Limits of the Previous and Current Master Plan**

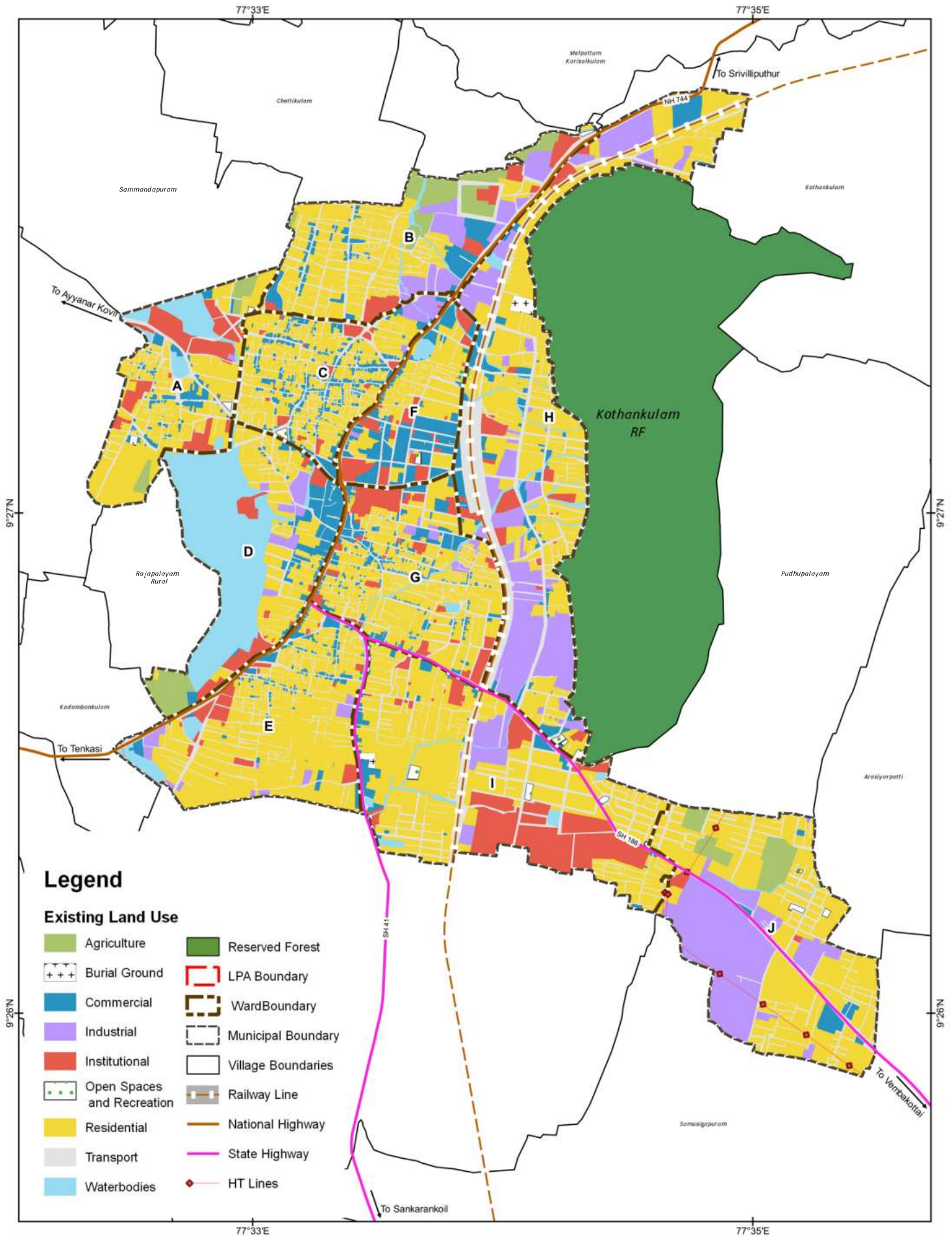


6.2 General Note on Municipal Ward Boundary

It is to be noted that while the data collection for the Master Plan was ongoing, the ward boundaries of the municipal area which were in use was the same as that used by Census 2011 (**Map 2.6** - old ward boundary). However, in 2022 the ward boundaries were re-delineated, with some of the boundaries getting realigned in the municipal area. Therefore, for better understanding both the old and the current boundaries of the municipal area are mentioned, as per the data requirement to ensure the understanding is also in alignment to the 2011 census related data.

6.3 Existing Land Use in Rajapalayam Municipal Area

A break-up of the existing land use (**Table 6.1 & Fig. 6.2**) based on the Existing Land Use 2021 map (**Map 6.1**) is presented below:



Legend

Existing Land Use

- Agriculture
- Reserved Forest
- Commercial
- Industrial
- Institutional
- Open Spaces and Recreation
- Residential
- Transport
- Waterbodies
- Burial Ground
- LPA Boundary
- Ward Boundary
- Municipal Boundary
- Village Boundaries
- Railway Line
- National Highway
- State Highway
- HT Lines

<p style="text-align: center;">Existing Land Use for Rajapalayam Municipal Area - 2021</p>	<p>Notes</p>	<p>Data Credits Tapasya Design Studio, Auroville</p>	 <p style="text-align: center; font-size: small;">CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

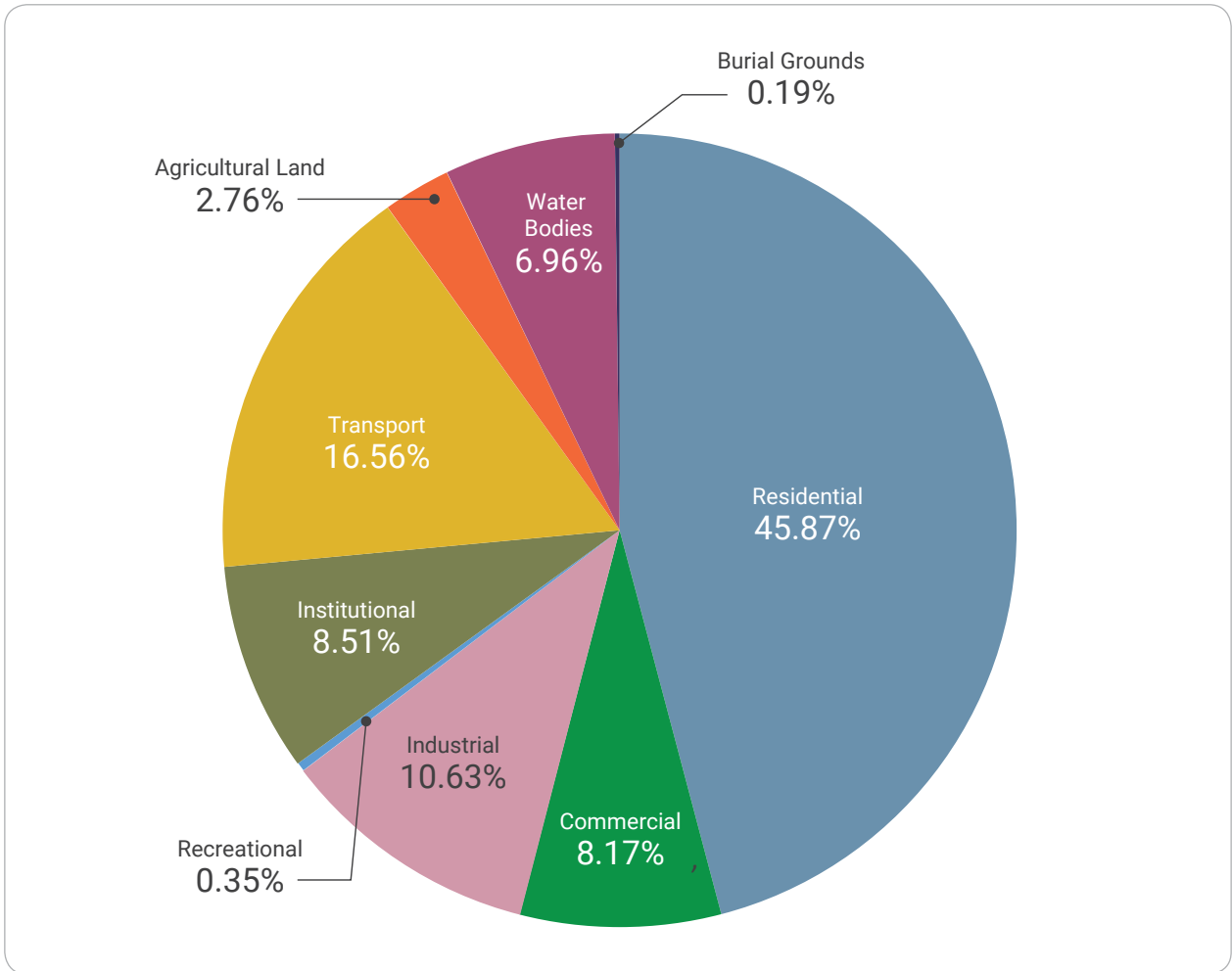
Map 6.1: Existing Land Use for Rajapalayam Municipal Area, 2021

Table 6.1: **Existing Land Use Classification in Rajapalayam Municipal Area, 2021**

S. No.	Land Use Classification with Subclass RAJAPALAYAM MUNICIPAL AREA		Extent (sq.km)		Percentage of Total Area (%)
			Main Class	Sub Class	
A	DEVELOPED AREA				
1	Residential		4.400		45.87
1.1		Slum		0.268	
2	Commercial		0.783		8.16
3	Industrial		1.019		10.63
4	Open Spaces & Recreational		0.034		0.35
5	Institutional		0.817		8.51
5.1		Educational		0.404	
5.2		Health Services		0.084	
5.3		Religious		0.095	
5.4		Misc Institutional		0.110	
5.5		State Govt Property		0.124	
6	Transport		1.589		16.56
6.1		Railway Property		0.017	
6.2		Road		1.572	
B	UNDEVELOPED AREA (AREA UNDER AGRICULTURE USE)				
7	Agriculture		0.265		2.76
C	PROTECTED AREA				
8	Waterbodies		0.668		6.96
9	Burial Grounds		0.018		0.19
		TOTAL	9.593		100

Source: Existing Land Use Map

Fig 6.2: Existing Land Use Classification in Rajapalayam Municipal Area, 2021



6.3.1. Residential Use

Residential land use spans across 4.400 sq.km. This alone contributes to 45.87% of the total land use in the municipal area. This includes slums, which spans across 0.268 sq.km. Therefore, the residential area excluding slums, spans 4.132 sq.km or 413.2 ha. The residential area historically originated from Palayapalayam area that is part of the old town (Fig. 6.3). The residential zone then sprawls into the southern parts of the area, where the population density is also higher. It is observed that the new residential development was mostly towards the south, in revenue wards E, I & J, i.e. new ward numbers 32–33 (old ward nos. 35, 36, 37), and 40, 41 & 42 (old wards 41 & 42). It is worth noting that this type of development is mostly a linear ribbon sprawl along the State Highways 186 and 41, towards New Bus stand (Sankarankoil Road) and Chathrapatti (Vembakottai Road), respectively. The Town Planning Areas that were developed specifically for residential development during the 1980s have given rise to the

distinct residential pockets that are purely residential (**Fig. 6.4 & Table 6.2**). Revenue ward F, i.e. new ward numbers 16, 17 & 20 (old wards 16, 17, 18, 19, 22), which were a part of the Railway Station town planning scheme, are good examples of this phenomena.

Fig 6.3: **Palayapalayam Residential Area**



Fig 6.4: **Town Planning Schemes for Rajapalayam Municipal Area (Consented Master Plan)**

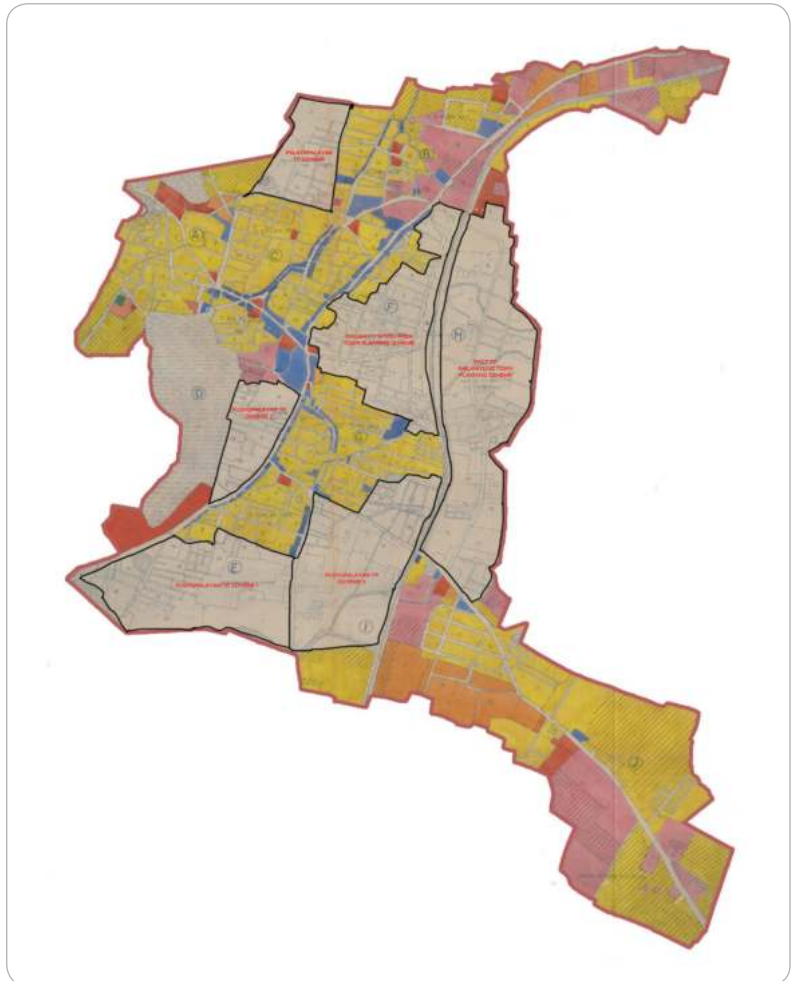


Table 6.2: **List of Town Planning Schemes for Rajapalayam Municipal Area**

S.No.	Name	Area (in sq.km)
1	Railway Station Area Town Planning Scheme	0.5308
2	East of Railway Station Town Planning Scheme	0.5451
3	Pudhupalayam Town Planning Scheme - I	1.0830
4	Pudhupalayam Town Planning Scheme - II	0.1994
5	Pudhupalayam Town Planning Scheme - III	0.1485
6	Palayapalayam Detailed Development Plan	0.2305
Total TPS Area		2.7373 sq.km
Rest of Municipal Area		6.8559 sq.km
Total Municipal Area		9.5932 sq.km

Source: DTCP Records

6.3.1.1. Slums and Squatters

Slums are defined in the Slum Clearance Act, 1956 as mainly those residential areas where dwellings are in any respect unfit for human habitation by reasons of dilapidation, overcrowding, faulty designs of buildings, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities or any combination of these factors, which are detrimental to safety, health and morals. According to the Municipality records (**Table 6.3**), the total population living in the slums was around 25,424. These slums are geographically located in the revenue ward H, i.e. new wards 18, 19 & 25 (old ward nos. 20, 21 & 27) to the east of the town, between the railway track and the foothills of Sanjeevi Malai. This area is called Malaiyadipatti and is one of the largest slums in the town, with around 8,639 population living in it. Slums are also located in revenue wards A, B, C and G, i.e. new wards 11, 12, 26 & 28 (old ward nos. 2, 3, 10, 15, 26, 30 & 35). More details are provided in Chapter 10.4.

Table 6.3: **Slum Details in Rajapalayam Town**

Ward Number (Old)	Name of the Slum	Notified/Non-Notified	Slum Households	Slum Population
2	Mela Avarampatti	Notified	507	1,407
3	Keela Avarampatti	Notified	682	1,575
10	Somaiyapuram	Notified	694	1,898
15	Kumaran Street	Notified	583	2,642
16	Ooranipatti Street	Notified	127	746
17	Church Street	Non-Notified	347	2,560
20	Malaiyadipatti	Notified	840	3,317
21	Malaiyadipatti	Notified	800	2,680
26	Duraisampuram	Notified	420	1,367
27	Malaiyadipatti	Notified	640	2,642
30	Thoppupatti	Notified	425	2,382
35	Mangapuram Street	Notified	650	1,753
42	Thiruvalluvar Nagar	Non-Notified	112	455
Total			6,827	25,424

Source: Rajapalayam Municipality

6.3.2. Commercial Use

Commercial land use accounts for 8.16% (0.783 sq.km) of the whole municipal area. The commercial stretch of the town is concentrated and located very close to the town centroid, specially showing linear concentration on both the sides of National Highway 744. The majority of commercial activity is observed to be concentrically growing outward from revenue ward D, i.e. new ward number 12 (old ward no. 11) as the focal point. The major commercial activities in the town include wholesale and retail business of textiles, handlooms, leather goods, furniture shops, automobile spares, repair shops, etc. Shops constructed under the IUDP (Integrated Urban Development Project) Scheme at Kumaran Street and Thiruvananthapuram Street (revenue ward D/ ward no. 12/ old ward no.11) come under this use.

Revenue ward F and G, i.e new ward no. 20 (old ward 22) also comprises of large commercial activities, where the type of activity is mostly mixed use with retail commercial and residential. The majority of the mixed land use consists of a residential and commercial mix, commonly found in revenue ward B, C and G, i.e. new wards 6, 7, 13, 14, 16, 17, 22 & 23 (old wards 13, 14, 15, 16, 17 & 18). Ward number 20 (old ward no. 22) is where residential, commercial as well as health services are observed to be together.

Commercial activities such as wholesale and retail business - textile showroom, leather, furniture shops, automobile sales & service centres, hotels and lodges are seen along the NH-744. The Palayapalayam area also houses Ulavar Santhai, Vyazhan Santhai (revenue D/ ward 12/ old ward no.11) (**Fig 6.5**) and Panchu Market (wards 3, 5 & 6); all of these form the core commercial areas. Commercial activity can also be observed in and around ward 21 (old wards 17 & 22/ revenue ward F and G), where a dense commercial retail area is situated around the Rajapalayam railway station.

Fig 6.5: **Vyazhan Sandhai in Rajapalayam**



6.3.3. Industrial Use

Rajapalayam being a prominent industrial town in Virudhunagar District with numerous large, medium and household industries, has at present 10.63% (1.019 sq.km) of the land under industrial use (**Fig. 6.6**). The industrial land use predominantly comprises cotton mills, power looms, ginning mills, processing factories and match industries. Industrial activities are largely concentrated to the eastern side of the town along the railway line and the state highway (SH-186) leading to Vembakottai. The majority of the industrial use is present in revenue wards B, H & J, i.e. new wards 3, 25, 39, 41 & 42 (old wards 3, 28 & 42).

Fig 6.6: **Rajapalayam Mills Limited**



6.3.4. Institutional Use

Institutional use, usually constitutes educational, health, institutional and other government and private service sector related uses (**Table 6.4**). Institutional use, totally constitutes 8.51% (0.817 sq.km) of the total land use. Revenue wards F, G and I, i.e. new wards 15, 21, 38 & 40 (old wards 22, 23, 28 & 41) have the most amount of Institutional.

Table 6.4: **Classification of Institutional Uses**

Institutional Sub Classes	Area (sq.km)	Percentage (in the Municipal Area)
Educational	0.404	4.21%
Health Services	0.084	0.87%
Religious	0.095	0.99%
State Govt. Property	0.110	1.15%
Misc. Institutional	0.124	1.29%

6.3.4.1. EDUCATIONAL USE

Educational use covers almost 4.21% (0.404 sq.km) of total land use in the municipal area which is a major part of overall institutional use. There is one polytechnic institution, namely P.A.C. Ramasamy Raja Polytechnic within the municipal area (Fig. 6.7). Most of the educational institutions are schools. There are a total of 69 schools, of which only 16 are private schools. The majority are fully-aided schools (45 nos.).

Fig 6.7: **P.A.C. Ramasamy Raja Polytechnic**



6.3.4.2. HEALTH SERVICES

Health facilities include the Government Hospital and other health facilities maintained by the Municipality. This covers 0.87% (0.084 sq.km) of the municipal area. The town consists of a Government Hospital with 212 beds on NH-744, at the western boundary of the municipal area. Apart from this, there is a Government Maternity Hospital (Fig. 6.8) located centrally on the NH-744 at the Tower Clock Junction, two health centres of which one is a maternity care unit, and one dispensary are also functioning in the town. In addition, there are about 52 private hospitals and 82 medical clinics managed by private practitioners and other associated health related institutions within the town. All these facilities occupy an area of 0.084 sq.km.

Fig 6.8: **Government Maternity Hospital**



6.3.4.3. RELIGIOUS AND SOCIO-CULTURAL USE

Rajapalayam also has 0.095 sq.km of religious and socio-cultural facilities, including temples, churches, mosques, dargahs and crematoriums. This comprises 0.99% of the total municipal area. Temples especially are very prominent in Rajapalayam, given its rich heritage and cultural background. These religious places act as the primary social spaces for the town, where many festivities of social and religious prominence are celebrated. The renowned Chavadis (**Fig. 6.9**) of the town were historically used as socio-cultural spaces, as an office, official meeting place, place to pay taxes, a place to keep community records, and importantly as a place to settle disputes in the community.

Fig 6.9: Palayapalayam Chavadi (Savadi)



6.3.5. Recreational Use

Rajapalayam is a town that is severely devoid of open spaces and recreation, and the land use figures solidify this statement. Recreational spaces like parks, gardens, etc. only contribute to 0.35% (0.034 sq.km) of the total municipal area, which is very low. Totally there are 15 areas designated as parks, of which 9 are maintained by the Municipality (**Fig. 6.10**). It is interesting to note that out of the 15 parks, 9 are situated within revenue ward J, i.e. new wards 41 & 42 (old ward nos. 41 & 42).

Fig 6.10: Municipal Park Under AMRUT



6.3.6. Detailed Ward-wise Land Use for Municipal Area

Table 6.5 provides a ward-wise detailed breakup of the land use classes in the municipal area. These are extracted according to the revenue ward boundaries.

Table 6.5: **Ward-wise Existing Land Use in Municipal Area, 2021**

LAND USE MAIN CLASSES AND SUB CLASSESSES (in sq.km)								
Revenue Ward	Agriculture	Burial Grounds	Commercial	Industrial	Institutional			
	Agricultural land	Burial Grounds	Commercial	Industrial	Educational	Health Services	Religious	
A	0.027	0.002	0.044	0.001	0.020	0.002	0.022	
B	0.118	-	0.075	0.110	0.018	-	0.010	
C	-	-	0.108	0.024	0.005	0.000	0.005	
D	0.048	-	0.091	0.035	-	0.018	0.023	
E	0.001	-	0.054	0.031	0.014	0.000	0.008	
F	-	-	0.132	0.002	0.028	0.020	0.000	
G	-	-	0.100	0.015	0.042	0.026	0.006	
H	-	0.011	0.108	0.377	0.014	0.004	0.007	
I	-	0.005	0.047	0.057	0.262	0.013	0.014	
J	0.071	-	0.025	0.365	0.002	-	-	
Total	0.265	0.018	0.783	1.019	0.404	0.084	0.095	

	Institutional		Recreational	Residential		Transportation		Waterbodies	Total (sq.km)
	Misc. Institutional	State Govt. Property	Open Spaces and Recreational	Residential	Slum	Railway Property	Road	Waterbodies	
	0.028	0.040	0.004	0.315	0.012		0.088	0.077	0.683
	0.010	0.028	0.002	0.330	0.016		0.150	0.014	0.880
	0.005	0.010	0.003	0.313	0.002		0.133	0.003	0.610
	0.008	0.008	-	0.191	0.017		0.050	0.439	0.928
	0.016	0.007	-	0.611	0.001		0.147	0.033	0.924
	0.006	0.002	0.002	0.146	0.001		0.104	0.012	0.455
	0.016	-	-	0.374	0.047		0.166	0.012	0.805
	0.027	0.016	0.007	0.503	0.171	0.017	0.369	0.036	1.669
	0.001	-	0.011	0.734	-		0.231	0.036	1.412
	0.007	-	0.005	0.613	-		0.134	0.004	1.227
	0.124	0.110	0.034	4.132	0.268	0.017	1.572	0.668	9.593

6.4

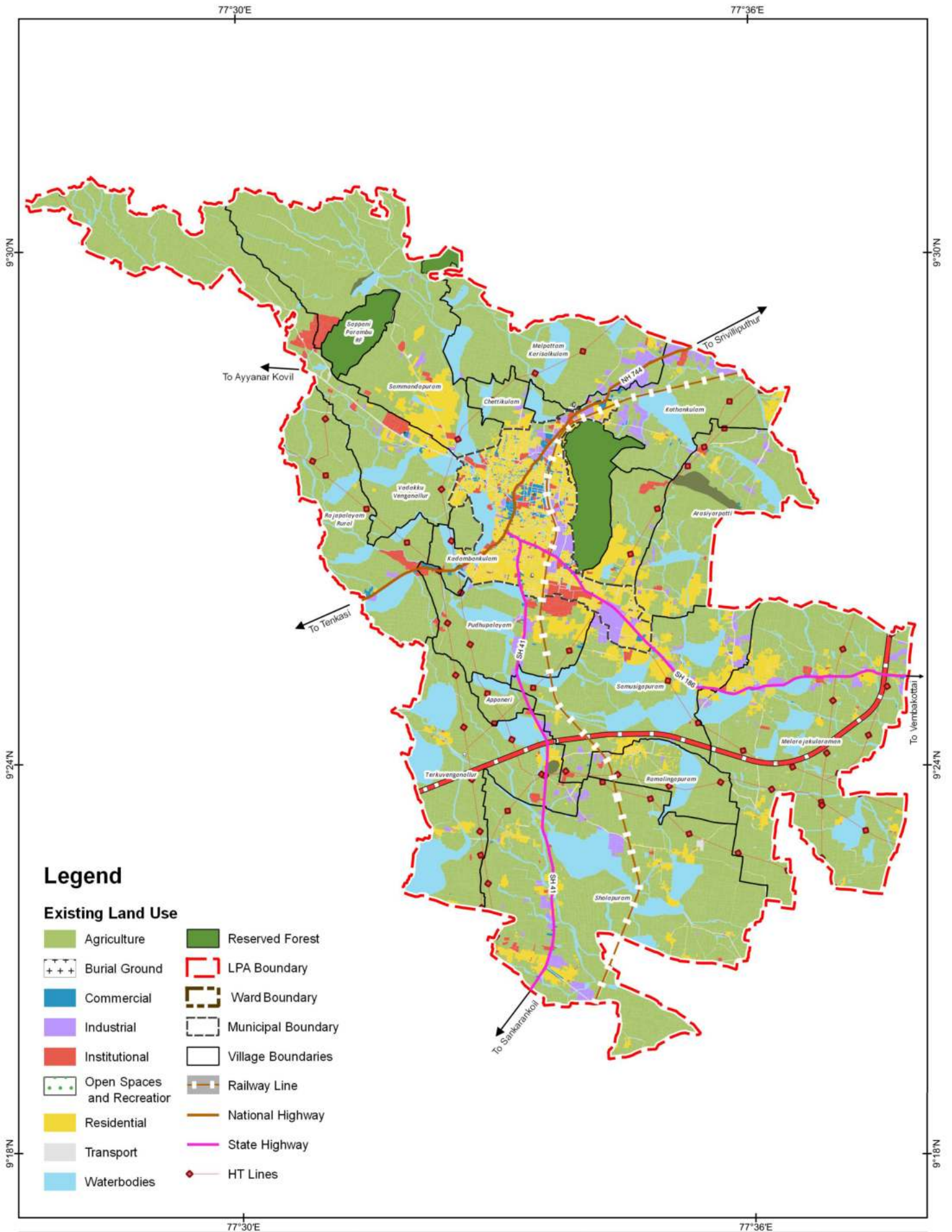
Existing Land Use in Non-Municipal Area

Rajapalayam Local Planning Area (LPA) consists of the Rajapalayam municipal area and adjoining 15 revenue villages and 2 reserved forests. The Rest of LPA (i.e. non-municipal area) extends over 139.467 sq.km, 94% of the total LPA. A broad land use distribution in the Rest of the Planning Area is presented in **Table 6.6** and the Existing Land Use details of the LPA in **Map 6.2**.

Table 6.6: Land Use Distribution in Non-Municipal Area, 2021

S. No.	Land Use Classification with Sub Class Non-Municipal Area		Extent (sq.km)		Percentage of Total Area (%)
			Main Class	Sub Class	
A	DEVELOPED AREA				
1	Residential		8.151		5.84
1.1		Slum		0.104	
1.2		Rural		1.144	
2	Commercial		0.322		0.23
3	Industrial		3.501		2.51
4	Recreational		0.007		0.01
5	Institutional		1.861		1.33
5.1		Educational		1.437	
5.2		Health Services		0.079	
5.3		Communication		0.004	
5.4		State Govt. Property		0.026	
5.5		Central Govt. Property		0.028	
5.6		Misc. Institutional		0.286	
6	Transport		2.167		1.55
6.1		Road		1.803	
6.2		Railway Property		0.000	
6.3		Traffic and Transportation		0.364	
B	UNDEVELOPED AREA (AREA UNDER AGRICULTURE USE)				
7	Agriculture		98.932		70.94
7.1		Agriculture Land		79.290	
7.2		Vacant Land		4.460	
7.3		Wastelands		14.972	
7.4		Misc.		0.211	
C	PROTECTED AREA				
8	Reserved Forests		4.590		3.29
9	Hills		0.634		0.45
10	Waterbodies		19.282		13.83
11	Burial Grounds		0.020		0.01
		TOTAL	139.467		100.00

Source: Existing Land Use Map, 2021



Existing Land Use for Rajapalayam LPA - 2021	Notes	Data Credits Tapasya Design Studio, Auroville	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 6.2: Existing Land Use for Rajapalayam LPA, 2021

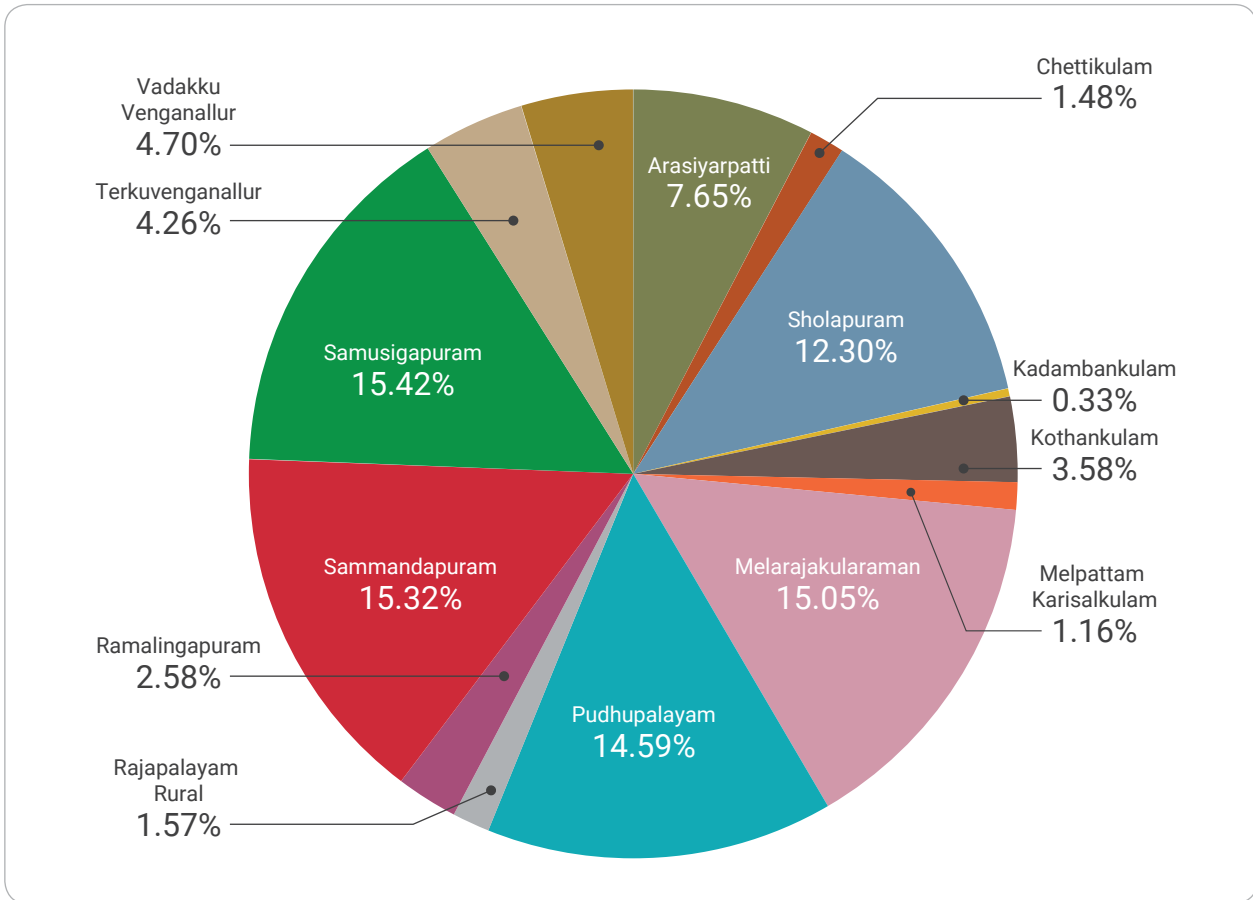
6.4.1. Residential Use

Residential area in the Rest of Local Planning Area covers an extent of 8.151 sq.km which constitutes about 5.84% of the non-municipal area. A review of the village-wise residential density (Table 6.7 & Fig. 6.11), shows that Samusigapuram has the highest residential area among the revenue villages – 1.257 sq.km, which contribute to 15.42% of total residential use in the non-municipal area. This is followed by Sammandapuram, Pudhupalayam, Melarajakularaman and Sholapuram. The villages of Rajapalayam Rural, Terkuvenganallur and Kadambankulam have the least residential area, with the combined total of all three villages accounting for less than 1% of total residential use in the non-municipal area. Sappani Parambu RF remains uninhabited. Kothankulam RF, however has 0.104 sq.km listed as slums. It has to be noted that all natham areas are considered as residential.

Table 6.7: Village-wise Split of Residential Use in the Non-Municipal Area

Village Names	Residential Area (sq.km)	% of Residential Area in Rest of LPA (%)
Appaneri	0.002	0.02
Arasiyarpatti	0.624	7.65
Chettikulam	0.121	1.48
Sholapuram	1.002	12.30
Kadambankulam	0.027	0.33
Kothankulam	0.292	3.58
Melpattam Karisalkulam	0.095	1.16
Melarajakularaman	1.227	15.05
Pudhupalayam	1.189	14.59
Rajapalayam Rural	0.128	1.57
Ramalingapuram	0.210	2.58
Sammandapuram	1.248	15.32
Samusigapuram	1.257	15.42
Terkuvenganallur	0.347	4.26
Vadakku Venganallur	0.383	4.70

Fig 6.11: Residential Use Distribution in Non-Municipal Area



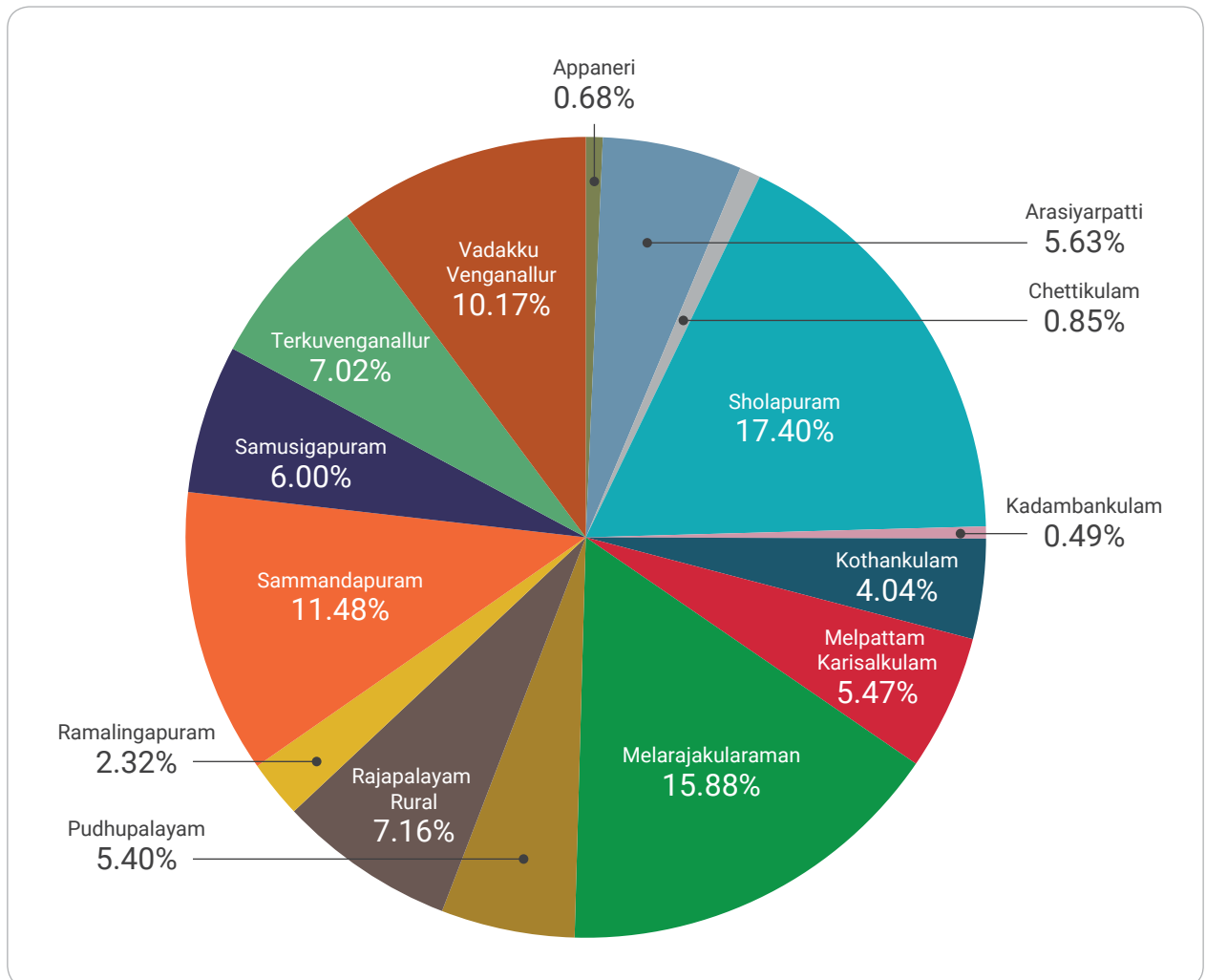
6.4.2. Agricultural Use

Agricultural land use is the most predominant land use in the LPA and it constitutes around 70.94% of the total non-municipal land use (Table 6.8 & Fig. 6.12). The total 98.932 sq.km under agricultural land use, comprises of 79.290 sq.km of agricultural land, 14.972 sq.km of wastelands and 4.46 sq.km of vacant land and 0.211 sq.km categorised under miscellaneous. Rajapalayam, despite not being an agrarian dominant economy, has a significant amount of agricultural land holdings. It is to be noted that 26.13% of the population economically depend on agriculture in the non-municipal area. Agricultural lands are essential as they maintain the production cycle as an economic driver, as well as help environmentally maintain the carbon and nutrient cycle in the macro scheme of things. The agricultural lands on the western side of the LPA, especially in Rajapalayam Rural, Terkuvenganallur, Appaneri and Sholapuram, and Melpattam Karisalkulam on the eastern side, are traditionally fertile lands fed by streams originating in the Western Ghats coupled with irrigation tanks; they are well known for paddy cultivation. Sammandapuram and Vadakku Venganallur predominately have plantation crops, majorly mango and coconut.

Table 6.8: **Village-wise Split of Agricultural Use in Non-Municipal Area**

Village Names	Area Under Agriculture Use (sq.km)	% Respective to Village Area	% Respective to Total Agriculture Area
Appaneri	0.675	74.48	0.68
Arasiyarpatti	5.570	71.84	5.63
Chettikulam	0.836	70.30	0.85
Sholapuram	17.217	77.19	17.40
Kadambankulam	0.482	63.10	0.49
Kothankulam	3.995	65.50	4.04
Melpattam Karisalkulam	5.409	72.93	5.47
Melarajakularaman	15.713	77.86	15.88
Pudhupalayam	5.342	63.40	5.40
Rajapalayam Rural	7.088	78.90	7.16
Ramalingapuram	2.293	70.84	2.32
Sammandapuram	11.362	78.87	11.48
Samusigapuram	5.936	57.24	6.00
Terkuvenganallur	6.949	64.87	7.02
Vadakku Venganallur	10.065	81.51	10.17

Fig 6.12: **Agricultural Use Distribution in Non-Municipal Area**



6.4.2.1. VACANT LANDS

Vacant lands are the lands that are been converted from other uses, usually from agriculture into any developable use, with no active construction or structure on it. Under AMRUT Classification, private vacant lands, Municipal and Government assets, reclaimed lands and layouts/ plotted lands without structures fall under vacant lands.

Land under vacant use in the Rest of LPA is 4.46 sq.km, which constitutes 3.2% of the total land in the non-municipal area (**Table 6.9**). Out of the total vacant land, the majority of the land is available in the revenue villages of Melarajakularaman (24% of all vacant land in non-municipal area), followed by Sholapuram, Pudhupalayam, Samusigapuram and Sammandapuram.

Table 6.9: **Village-wise Split of Vacant Land Use in Non-Municipal Area**

Village Names	Area under Vacant Land (sq.km)	% Respective to Village Area	% Respective to Total Vacant Area
Appaneri	0.000	-	-
Arasiyarpatti	0.184	2.37	4.12
Chettikulam	0.013	1.12	0.30
Sholapuram	0.547	2.45	12.25
Kadambankulam	0.010	1.33	0.23
Kothankulam	0.319	5.24	7.16
Melpattam Karisalkulam	0.027	0.36	0.60
Melarajakularaman	1.083	5.36	24.28
Pudhupalayam	0.543	6.45	12.18
Rajapalayam Rural	0.037	0.41	0.82
Ramalingapuram	0.338	10.44	7.58
Sammandapuram	0.498	3.46	11.17
Samusigapuram	0.536	5.17	12.01
Terkuvenganallur	0.101	0.94	2.26
Vadakku Venganallur	0.225	1.82	5.04

6.4.2.2. WASTELANDS

Wastelands are a sub class of agriculture land use, which includes lands that are not suitable for agriculture anymore due to various factors including the terrain, water availability or the geological and pedological characteristics of the area. Under AMRUT Classification, these wastelands usually include scrublands, barren lands, rocky lands, sandy areas and gullied areas. Majority of the wastelands found in Rajapalayam LPA are scrub lands, mostly occurring in villages of Sholapuram, Melarajakularaman and Arasiyarpatti (**Table 6.10**).

Table 6.10: **Village-wise Split of Wastelands in Non-Municipal Area**

Village Names	Area under Wastelands (sq.km)	% Respective to Village Area	% Respective to Total Wastelands Area
Appaneri	0.052	5.78%	0.35%
Arasiyarpatti	1.648	21.25%	11.01%
Chettikulam	0.047	3.92%	0.31%
Sholapuram	4.536	20.34%	30.30%
Kadambankulam	0.016	2.05%	0.10%
Kothankulam	0.955	15.65%	6.38%
Melpattam Karisalkulam	0.560	7.54%	3.74%
Melarajakularaman	3.787	18.77%	25.30%
Pudhupalayam	0.246	2.92%	1.64%
Rajapalayam Rural	0.473	5.26%	3.16%
Ramalingapuram	0.194	5.99%	1.29%
Sammandapuram	0.643	4.46%	4.30%
Samusigapuram	0.650	6.27%	4.34%
Terkuvenganallur	0.523	4.88%	3.49%
Vadakku Venganallur	0.643	5.21%	4.29%

6.4.3. Industrial Use

Industries in Rajapalayam LPA are one of the defining aspects of the LPA. The textile industry in the municipal area extends out of the town into Kothankulam and Pudhupalayam villages. Areas of Chathrapatti in revenue villages of Samusigapuram and Melarajakularaman, are famous across the country for the household and medium scale industries that produce surgical gauze bandages and other medical items based out of surgical cotton. The village-wise industrial use in the non-municipal area is detailed in **Table 6.11**.

Table 6.11: **Village-wise Split of Industrial Use in Non-Municipal Area**

Village Names	Area Under Industrial Use (sq.km)	% Respective to Village Area	% Respective to Total Industrial Area
Appaneri	-	0.00	-
Arasiyarpatti	0.187	2.41	5.35
Chettikulam	0.041	3.42	1.16
Sholapuram	0.629	2.82	17.96
Kadambankulam	0.003	0.34	0.07
Kothankulam	0.691	11.32	19.72
Melpattam Karisalkulam	0.437	5.89	12.48
Melarajakularaman	0.418	2.07	11.95
Pudhupalayam	0.254	3.01	7.25
Rajapalayam Rural	0.059	0.66	1.69
Ramalingapuram	0.039	1.21	1.12
Sammandapuram	0.066	0.46	1.88
Samusigapuram	0.480	4.63	13.71
Terkuvenganallur	0.129	1.20	3.68
Vadakku Venganallur	0.069	0.56	1.97

6.4.4. Land Under Water

The LPA is well distributed with a network of interconnecting water bodies, which harness the surface run-off originating in the Western Ghats. All the villages in the local planning area have water bodies in their extent, covering a total of 19.282 sq.km, which accounts to 13.8% of the non-municipal area (**Table 6.12**). The revenue villages of Terkuvenganallur, Sholapuram, Samusigapuram, and Melarajakularaman have the highest percentages of land under water. It is worth noting that as these tanks are usually dry given the climatic condition of the area, there is a need to preserve their extent for maintaining the catchment and the watershed. They also form part of an important catchment area for Vaippar river basin.

Table 6.12: **Village-wise Split of Land Under Water Use in Non-Municipal Area**

Village Names	Area Under Waterbodies (sq.km)	% Respective to Total Village Area	% Respective to Total Land Under Water
Appaneri	0.220	24.27	1.14
Arasiyarpatti	0.781	10.07	4.05
Chettikulam	0.170	14.29	0.88
Sholapuram	2.810	12.60	14.57
Kadambankulam	0.225	29.45	1.17
Kothankulam	0.891	14.61	4.62
Melpattam Karisalkulam	1.385	18.67	7.18
Melarajakularaman	2.333	11.56	12.10
Pudhupalayam	0.977	11.59	5.07
Rajapalayam Rural	1.556	17.32	8.07
Ramalingapuram	0.576	17.80	2.99
Sammandapuram	0.751	5.21	3.89
Samusigapuram	2.396	23.10	12.43
Terkuvenganallur	3.046	28.43	15.80
Vadakku Venganallur	1.165	9.43	6.04

6.5 Existing Land Use for Rajapalayam LPA

The detailed land use distribution for the whole LPA is provided in **Table 6.13**.

Table 6.13: Detailed Existing Land Use Distribution in Rajapalayam LPA, 2021 (1 of 3)

Main Class	Land Use Classification	Appaneri		Arasiyarpatti		Chettikulam		Sholapuram		Kadambankulam		Kothankulam		Kothankulam RF	
		Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total
Residential	Residential	-	-	0.616	7.94	0.121	10.17	0.634	2.84	0.027	3.53	0.285	4.67	-	-
	Slum	-	-	-	-	-	-	-	-	-	-	-	-	0.104	3.73
Commercial	Rural	0.002	0.20	0.008	0.10	-	-	0.369	1.65	-	-	0.007	0.11	-	-
		-	-	0.009	0.11	0.000	0.04	0.051	0.23	0.013	1.65	0.034	0.56	-	-
Recreational		-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial		-	-	0.187	2.41	0.041	3.42	0.629	2.82	0.003	0.34	0.691	11.31	-	-
	Central Govt. Property	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Institutional	Communication	-	-	-	-	-	-	0.001	0.01	-	-	-	-	-	-
	Educational	-	-	0.017	0.22	-	-	0.087	0.39	-	-	0.062	1.01	-	-
	Health Services	-	-	-	-	-	-	0.002	0.01	0.006	0.74	-	-	-	-
	Misc Institutional	-	-	0.037	0.48	0.000	0.01	0.034	0.15	0.001	0.10	0.001	0.02	-	-
	State Govt. Property	-	-	-	-	0.002	0.17	0.008	0.04	-	-	-	-	-	-
	Road	0.010	1.05	0.120	1.54	0.019	1.58	0.344	1.54	0.008	1.09	0.069	1.13	-	-
Transport	Railway Property	-	-	-	-	-	-	0.000	0.00	-	-	-	-	-	-
	Traffic and Transportation	-	-	-	-	-	-	0.120	0.54	-	-	0.071	1.17	-	-
Agriculture	Agriculture Land	0.623	68.71	3.729	48.09	0.768	64.53	12.105	54.27	0.446	58.35	2.713	44.43	-	-
	Misc	-	-	0.010	0.13	0.009	0.73	0.029	0.13	0.010	1.37	0.008	0.13	-	-
	Vacant Land	-	-	0.184	2.37	0.013	1.12	0.547	2.45	0.010	1.33	0.319	5.23	-	-
	Wastelands	0.052	5.78	1.648	21.25	0.047	3.92	4.536	20.34	0.016	2.05	0.955	15.63	-	-
Reserved Forest		-	-	-	-	-	-	-	-	-	-	-	-	2.686	96.27
Hills		-	-	0.409	5.27	-	-	-	-	-	-	-	-	-	-
Waterbodies		0.220	24.27	0.781	10.07	0.170	14.29	2.810	12.60	0.225	29.45	0.891	14.59	-	-
	Burial Ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	0.907	100.00	7.754	100.00	1.190	100.00	22.306	100.00	0.764	100.00	6.106	100.00	2.790	100.00

Table 6.13: Detailed Existing Land Use Distribution in Rajapalayam LPA, 2021 (2 of 3)

Land Use Classification		Melpattam Karisalkulam		Melarajakularaman		Pudhupalayam		Rajapalayam Rural		Rajapalayam Municipality		Ramalingapuram	
Main Class	Sub Class	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total
Residential	Residential	0.069	0.94	0.868	4.30	14.11	14.11	0.018	0.20	4.132	43.07	0.210	6.50
	Slum	-	-	-	-	0.00	-	-	-	0.268	2.79	-	-
Commercial	Rural	0.025	0.34	0.359	1.78	0.00	-	0.006	0.07	-	0.00	-	-
		0.013	0.18	0.041	0.20	0.73	0.73	0.028	0.32	0.783	8.16	0.003	0.09
Recreational		0.007	0.09	-	-	0.00	-	-	-	0.034	0.35	-	-
Industrial		0.437	5.89	0.418	2.07	3.01	3.01	0.059	0.66	1.019	10.63	0.039	1.21
	Central Govt. Property	-	-	-	-	0.00	-	-	-	-	0.00	-	-
Institutional	Communication	0.003	0.04	-	-	0.00	-	-	-	-	0.00	-	-
	Educational	0.003	0.04	0.064	0.32	3.39	3.39	0.144	1.60	0.404	4.21	0.011	0.35
	Health Services	-	-	0.003	0.01	0.44	0.44	0.009	0.10	0.084	0.87	0.001	0.03
	Misc Institutional	0.009	0.12	0.011	0.05	1.76	1.39	0.019	0.21	0.219	2.28	0.001	0.04
	State Govt. Property	0.002	0.02	0.008	0.04	0.01	0.01	-	-	0.110	1.15	0.001	0.03
	Road	0.055	0.74	0.363	1.80	1.07	1.07	0.054	0.61	1.572	16.39	0.077	2.37
Transport	Railway Property	-	-	-	-	0.00	-	-	-	0.017	0.18	-	-
	Traffic and Transportation	-	-	0.000	0.00	0.49	0.86	-	-	-	0.00	0.017	0.53
		-	-	-	-	-	-	-	-	-	-	-	-
Agriculture	Agriculture Land	4.821	65.01	10.816	53.59	53.97	53.97	6.578	73.23	0.265	2.76	1.761	54.41
	Misc	0.001	0.02	0.027	0.13	0.05	0.05	-	-	-	-	-	-
	Vacant Land	0.027	0.36	1.083	5.36	6.45	6.45	0.037	0.41	-	0.00	0.338	10.44
	Wastelands	0.560	7.54	3.787	18.77	2.92	2.92	0.473	5.26	-	0.00	0.194	5.99
Reserved Forest		-	-	-	-	0.00	-	-	-	-	-	-	-
Hills		-	-	-	-	0.00	-	-	-	-	0.00	-	-
Waterbodies		1.385	18.67	2.333	11.56	11.59	11.59	1.556	17.32	0.668	6.96	0.576	17.80
Burial Ground		-	-	-	-	0.00	-	0.003	0.03	0.018	0.19	0.007	0.21
	TOTAL	7.417	100.00	20.181	100.00	100.00	100.00	8.984	100.00	9.593	100.00	3.236	100.00

Table 6.13: Detailed Existing Land Use Distribution in Rajapalayam LPA, 2021 (3 of 3)

Land Use Classification		Sammandapuram		Sappani Parambu RF		Samusigapuram		Terkuvenganallur		Vadakkuvenganallur		Grand Total	
Main Class	Sub Class	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total	Area (sq.km)	% to Total
Residential	Residential	1.247	8.66			1.216	11.73	0.026	0.24	0.376	3.05	11.04	7.40
	Slum	-	-			-	-	-	-	-	-	0.37	0.25
Commercial	Rural	0.001	0.01			0.040	0.39	0.321	3.00	0.007	0.05	1.14	0.77
		0.006	0.04			0.030	0.29	0.005	0.05	0.027	0.22	1.10	0.74
Recreational			-				-		-		-	0.04	0.03
		0.066	0.46			0.480	4.63	0.129	1.20	0.069	0.56	4.52	3.03
Industrial	Central Govt. Property	0.028	0.20			-	-	-	-	-	-	0.03	0.02
	Communication	-	-			-	-	-	-	-	-	0.00	0.00
Institutional	Educational	0.290	2.01			0.042	0.41	0.044	0.42	0.389	3.15	1.84	1.23
	Health Services	0.000	0.00			-	-	0.000	0.00	0.022	0.17	0.16	0.11
Transport	Misc Institutional	0.007	0.05			0.011	0.11	0.010	0.09	0.028	0.23	0.54	0.36
	State Govt. Property	-	-			0.001	0.01	0.001	0.01	0.002	0.02	0.14	0.09
Transport	Road	0.155	1.08			0.135	1.30	0.111	1.04	0.192	1.56	3.37	2.26
	Railway Property	-	-			-	-	-	-	-	-	0.02	0.01
Agriculture	Traffic and Transportation	-	-			0.082	0.79	-	-	-	-	0.33	0.22
	Agriculture Land	10.194	70.76			4.750	45.80	6.245	58.30	9.193	74.45	79.55	53.37
Reserved Forest	Misc	0.026	0.18			-	-	0.080	0.75	0.005	0.04	0.21	0.14
	Vacant Land	0.498	3.46			0.536	5.17	0.101	0.94	0.225	1.82	4.46	2.99
Hills	Wastelands	0.643	4.46			0.650	6.27	0.523	4.88	0.643	5.21	14.97	10.04
		0.334	2.32	1.570	100.00	-	-	-	-	-	-	4.59	3.08
Waterbodies		0.159	1.10			-	-	0.066	0.62	-	-	0.63	0.43
		0.751	5.21			2.396	23.10	3.046	28.43	1.165	9.43	19.95	13.38
Burial Ground		-	-			-	-	0.004	0.04	0.006	0.05	0.04	0.03
	TOTAL	14.407	100.00	1.570	100.00	10.371	100.00	10.712	100.00	12.348	100.00	149.06	100.00

6.5.1. Comparisons of Existing Land Use with URDPFI Standards

URDPFI Standards

The proposed land use distribution guidelines for Urban Centers, as per the Urban and Regional Development Plan Formulation and Implementation (URDPFI) guidelines formulated by the Ministry of Urban Development, MOUD (now referred to as Ministry of Housing and Urban Affairs), are shown in **Table 6.14**.

Table 6.14: **URDPFI Land Use Categorization**

S.No.	Category	Small (%)	Medium (%)	Large (%)	Metropolitan (%)
1	Residential	45-50	43-48	36-39	36-39
2	Commercial	2-3	4-6	5-6	5-6
3	Industrial	8-10	7-9	7-8	7-8
4	Institutional	6-8	6-8	10-12	10-12
5	Recreational	12-14	12-14	14-16	14-16
6	Transport and Communication	10-12	10-12	12-14	12-14
7	Agricultural, Waterbodies, Special Areas and Others	Balance	Balance	Balance	Balance
8	Total Developed Area	100	100	100	100

Land Use Comparison Against URDPFI Standards

Rajapalayam municipal area falls under the Medium Town II Category as per the URDPFI guidelines based on population and area. Even with the inclusion of the local planning area villages, the population of the LPA is at 2,16,442 as per 2011 Census which classifies the area under Medium Town II (1 Lakh - 5 Lakhs Population category). The guidelines mandate these towns to have a Municipal Council, which Rajapalayam already has. A comparison of the URDPFI Land Use standards against the Existing Land Use of both the municipal area as well as the Rest of LPA is presented in **Table 6.15**.

Table 6.15: **Land Use Comparison Against URDPFI Standards**

S.No.	Category	Standards (%)	Municipal Area (%)	Rest of LPA (%)	Total LPA (%)
1	Residential	43-48	45.87	5.84	8.42
2	Commercial	4-6	8.16	0.23	0.77
3	Industrial	7-9	10.63	2.51	3.03
4	Institutional	6-8	8.51	1.34	1.82
5	Open Space & Recreational	12-14	0.35	0.01	0.03
6	Transport	10-12	16.56	1.55	2.50
7	Agricultural, Waterbodies and Others	Balance	Balance (9.91)	Balance (88.52)	Balance (83.43)
8	Total Developed Area	100	100	100	100

6.6 Analysis of the Previous Rajapalayam Master Plan

Inference & Conclusion

- It can be noticed that in the municipal area, the residential area is in the prescribed limit and can be deemed saturated. However, in comparing the overall LPA, the residential area is far lesser than is allowed as per the guideline.
- The agricultural significance of the area is prominently visible with 53.43% of the area being an agricultural area in the whole LPA.
- The area is severely lacking in terms of recreational and open spaces. Even the Rajapalayam municipal area is supposed to have 12-14% of the space reserved for the recreation and open spaces, but in reality, has only 0.02%.
- Water bodies occupy 13% of the LPA making it a prominent resource that needs to be conserved.
- The transportation area in the municipal area is higher than the guidelines, this is due to the spread-out road network and the railway station area.

6.6.1. Master Plan Limits

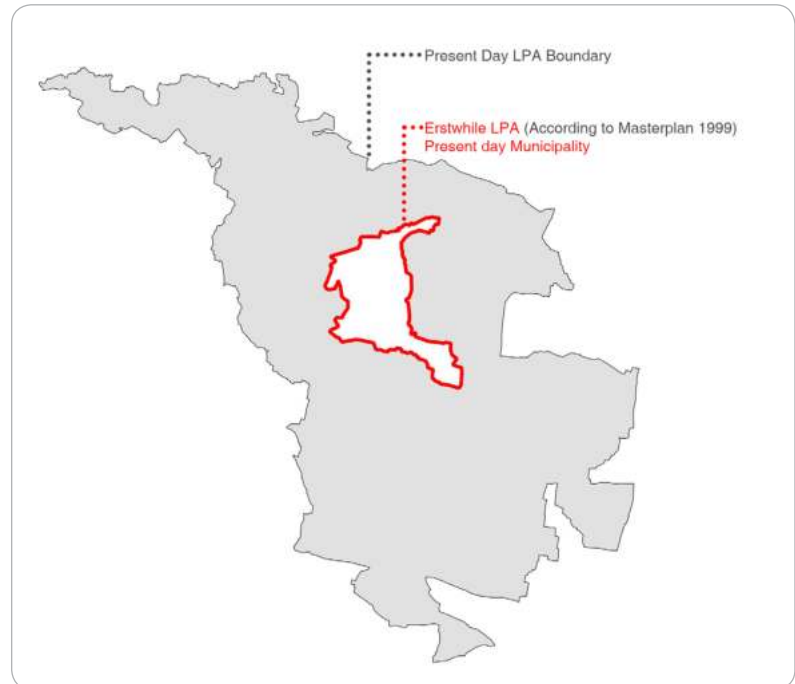
The current Rajapalayam Local Planning Area or the LPA in short, is a composite of various villages in addition to the erstwhile LPA, which was just the municipal boundary. The intention to add additional areas to Rajapalayam Local Planning Area, with a view to control and channelize the development and growth in Rajapalayam and the surrounding villages was declared by issuing the G.O. (Ms). No. 2014 on 30th December 2011.

The intention notified additional areas were confirmed as part of the Rajapalayam LPA under section 10(4) of the Tamil Nadu Town and Country Planning Act, 1971 by issuing a G.O. (Ms). No. 168, on 20th November 2014 by the Housing and Urban Development Department, Govt. of Tamil Nadu.

Hence, it has to be noted that the Master Plan in the year 1999 prepared for the horizon year of 2011, only talks about the erstwhile LPA which is the present municipal boundary (**Fig. 6.13**).

The Master Plan for Rajapalayam erstwhile LPA (current Municipal Area) has been approved in the year 1983. The Master Plan of 1999, prepared later was consented in GO.MS. No.355 Housing and Urban Development dt.15.08.99.

Fig 6.13: Limits of the Previous and Current Master Plan LPA



6.6.2. Detailed Development Plans for Town Planning Schemes

As per 1999 Master Plan, Rajapalayam Municipality had notified 13 DDPs, out of which 7 were under draft preparation and 6 areas were sanctioned. These Detailed Development Plans were created by the DTCP, primarily in residential areas where detailed land use allocation has been done at a cadastral level. These were approved and notified in 1981. The approved Detailed Development Plans/ Town Planning Scheme areas are listed in **Table 6.16**.

Table 6.16: List of Town Planning Schemes for Rajapalayam Municipal Area

S.No.	Name	Area (in sq.km)
1	Railway Station Area Town Planning Scheme	0.5308
2	East of Railway Station Town Planning Scheme	0.5451
3	Pudhupalayam Town Planning Scheme - I	1.0830
4	Pudhupalayam Town Planning Scheme - II	0.1994
5	Pudhupalayam Town Planning Scheme - III	0.1485
6	Palayapalayam Detailed Development Plan	0.2305
Total TPS Area		2.7373 sq.km
Rest of Municipality		6.8559 sq.km
Total Municipal Area		9.5932 sq.km

Source: DTCP Records

These Detailed Development Plans created for Rajapalayam are primarily neighbourhood layouts planned for organised residential development in core areas. **Figure 6.14** for example, is Pudhupalayam DDP. On comparison with the DDP approved and with the current development after 40 years, we see a gross mismatch.

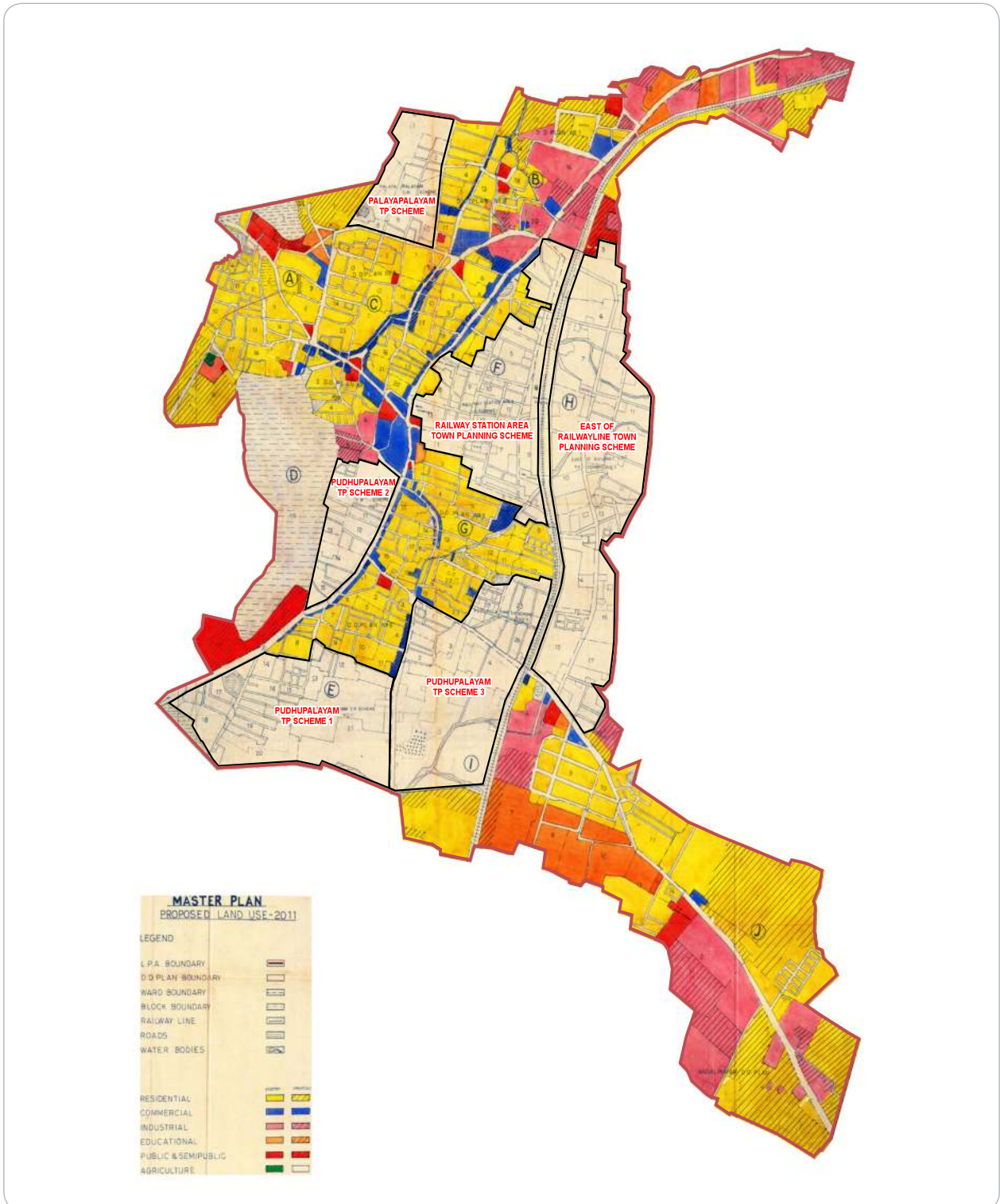
Fig 6.14: **Pudhupalayam Town Planning Scheme I**



Source: DTCP Records

The Master Plan published in the year 1999 (Fig. 6.15) as described previously, only consists of the areas that exclude the 6 town planning scheme areas i.e., out of the 9.59 sq.km area, 2.73 sq.km were covered by the subsequent town planning schemes mentioned before.

Fig 6.15: **Proposed Master Plan (Consented) for the year 2011**



Source: Prepared by DTCP Virudhunagar, Published in 1999

6.6.3. Summary of the 1999 Master Plan Report

The Master Plan (consented) report of Rajapalayam published in the year 1999 consists of 10 chapters in totality, that convey the physical and demographic composition of the area. The chapters and their brief summaries are as follows:

6.6.3.1. INTRODUCTION

This chapter acts as the legal skeleton of the Master Plan, summarizing the hierarchy and chronology of the Acts, orders and other legislations that eventually helped form the erstwhile local planning area (the Municipality only) as well as the Master Plan.

6.6.3.2. SURVEYS AND STUDIES

This Chapter describes the location, geographic characteristics, physical context and the outside connections of the town. It also explores the historical context of the town and Sanjeevi Malai, emphasizing its unique heritage, significance and the origin of the name Rajapalayam. It also gives a glimpse of the predominant land use composition in the area.

6.6.3.3. POPULATION STUDIES

This Chapter analyses the demographic profile of the town. It starts by stating that the population of the town according to the 1991 Census is 1,14,042 which makes it a class II Census town during the time. Furthermore, the decadal population growth and percentile variations from the year 1901 to 1991 over a period of 90 years have been analysed. The report concluded that the rate of growth was slow during the course of 1901-1941, then there was a sudden surge of 31% growth in 1941-51. It also compares the growth to district and state populations. It also talks about the demographic composition of the area.

6.6.3.4. OCCUPATIONAL PATTERN

This chapter deals with the workforce and economic composition in the town. It states that in 1991, only 37.17% of the population are working and is low compared to the 50.20% of the erstwhile Kamarajar district of which Rajapalayam was a part of and 41.29% of Tamil Nadu state. The report states that 20% of total workforce are into agriculture, whereas other categories have the highest composition, predominantly industrial.

6.6.3.5. EXISTING LAND USE PATTERN AND ADMINISTRATIVE LIMITS

This part of the report briefs about the land use pattern and allocation of different land uses in the area. It also speaks about the revenue villages that have been merged to form the Rajapalayam municipality. These details are presented in **Table 6.17**.

Table 6.17: **List of Villages Merged to Form the Previous Municipality**

S.No.	Village	Extent (hectares)
1	Rajapalayam (Rural)	386.04
2	Inam Chettikulam	15.20
3	Sammandapuram	71.05
4	Vadakku Venganallur	3.38
5	Pudhupalayam	314.25
6	Inam Thoppupatti	74.21
7	Samusigapuram	76.08
8	Kothankulam	26.85
9	Kadambankulam	7.96

Source: Rajapalayam Master Plan for 2011

6.6.4. Land Use Breakdown

The 1999 Master Plan indicates that a land use survey was conducted and the existing land use map of Rajapalayam prepared. It states that out of the 975 hectares of the plan limit, 220 hectares are said to be covered by water bodies. But it has to be noted that the land use figures do not entirely match the final tally. This could be assumed to be the way it is because of the surveying accuracy possible during the year the area is speculated to be calculated i.e., in the year 1979. According to the report, the land use is as per **Table 6.18 & Fig. 6.16**.

Table 6.18: **Existing and Proposed Land Use for 2011**

S.No.	Zones	Existing (in Ha)	Proposed (in Ha)	Total (in Ha)
1	Residential	428.34	67.25	495.59
2	Commercial	36.75	8.75	45.5
3	Industrial	81	54.25	135.25
4	Educational	26	4	30
5	Public and semi-Public	17.25	5	22.25
6	Agriculture	139.25		
7	Transport & Communication	142.24		142.24
8	Land under Water	75.82		75.82
	TOTAL	951.15		951.15

Source: Rajapalayam Master Plan for 2011

6.6.4.1. RESIDENTIAL

The 1999 Master Plan Report states that the overall density of the town turns out to be 117 persons/ hectare whereas the gross residential density is approximately 266 persons/ hectare. It states that low density housing settlements are observed on the outskirts of the town especially on the western side of the railway line on both sides of Madurai-Tenkasi main road as well as Chathrapatti Road. The report also specifies the fact that 45% of the Town is covered under residential use, including the DDP Town Planning scheme areas.

6.6.4.2. COMMERCIAL USE

The 1999 Master Plan Report states that the total commercial area of the town is 36.75 hectares, which constitutes around 4.81% of the total area. It states that the major commercial activity happens around the Madurai–Tenkasi Road. Apart from the municipal market, no planned commercial area is reported. However, there is a noteworthy proposal mentioning the construction of commercial areas in and around Kumaran Street and Tiruvanadapuram Street under IUDM Schemes.

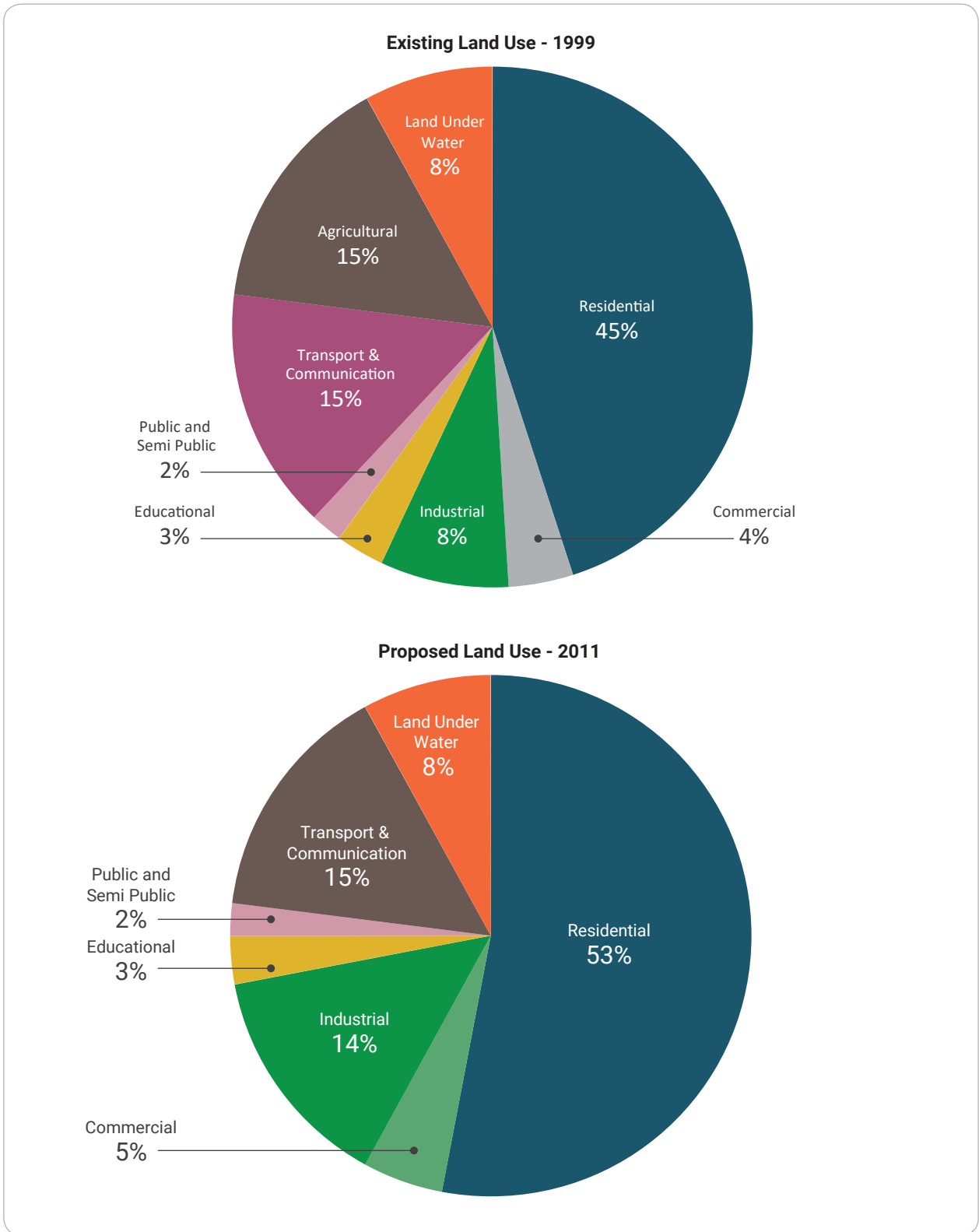
6.6.4.3. INDUSTRIAL USE

Probably the most defining characteristic of the town, the industrial land use is said to be around 81 hectares, which is approximately 8.51% of the total area. The report specifies that Textile mills, Ginning factories, Power looms, Processing Factories and Surgical cotton mills are some of the major industries in town. The report then states the location and details of all the industries in town.

6.6.4.4. INSTITUTIONAL USE

This section details out all the infrastructure, services and the amenities that come under the institutional use. This includes administrative facilities, health services, educational facilities, religious buildings, parks and open spaces, recreational facilities, as well as basic physical infrastructure including water supply, electricity distribution, etc.

Fig 6.16: Existing Land Use Breakup 1999 and Proposed Land Use Breakup 2011



6.6.5. Projections and Analysis in the Previous Master Plan

This section of the Master Plan talks about the analysis stage of the plan, that involves projection of population and the workforce for the horizon year i.e., 2011. The population for the town of Rajapalayam was estimated in the report using three methods i.e., Geometric Ratio method, Exponential Curve method and Second Degree Curve method. The results as mentioned in the report are in **Table 6.19**.

Table 6.19: **Projected Population for the Year 2011**

S.No.	Projection Method	1991 Population	2001 Projected Population	2011 Projected Population
1	Geometric Ratio Method	1,14,042	1,67,000	1,95,000
2	Exponential Curve Method	1,14,042	1,25,000	1,37,500
3	Second Degree Curve Method	1,14,042	1,26,500	1,40,500

Out of the three aforementioned methods, the report states that the exponential curve method is more accurate and is adopted as the final one. Estimated population of around 1,30,000 for the year 2001 and 1,50,000 for 2011 are considered for design purposes.

6.6.5.1. COMPARISON OF PROJECTED POPULATION FOR YEAR 2011 WITH THE ACTUAL CENSUS 2011 POPULATION

To validate the population projections, the projected numbers are compared against the actual population figures extracted from the census of India from the years 2001 and 2011 respectively (**Table 6.20**). This has been done with the 1991 population i.e., 1,14,042 as a baseline. It can be observed that the actual variation in 2001 is -2.15% and for the horizon year it was -5.13%. Negative variation implies that the actual population growth has been lower by 5%.

Table 6.20: **Comparison of Projected Population with Actual Population**

Year	Projected	Designed	Variation From Designed	Actual (Census)	Variation from Projected (%)
2001	1,25,000	1,30,000	4.00%	1,22,307	-2.15%
2011	1,37,500	1,50,000	9.09%	1,30,442	-5.13%

6.6.6. Land Use Comparison of Municipal Area 1999, Proposed Land Use 2011 & Existing Land Use 2021

From the records analysed in **Table 6.18**, it can be observed that there is clearly a distinct classification between existing and proposed land use. If observed clearly, we can also notice the fact that 139 hectares of agricultural land in 1999 has been completely allocated to other land uses. It is also to be noted that the land use surveys numbers are not very accurately presented (**Table 6.21**). It is to be noted that the vacant land isn't considered in the previous Master Plan.

Table 6.21: **Comparison of Existing Land Use 1999 and 2021**

Land Use Category	Current Municipal Area (Erstwhile LPA)		
	Existing Land Use 1999 (Ha)	Proposed Land Use 2011 (As per 2011 Consented Master Plan) (Ha)	Existing Land Use 2021 (Ha)
Residential	428.34	495.59	440.0
Commercial	36.75	45.54	78.3
Industrial	81.00	135.25	101.9
Educational	26.00	30.00	40.4
Institutional (Except Education)	17.25	25.25	41.3
Agriculture	139.25		26.5
Transport and Communication	142.24	142.24	158.09
Land under Water	75.82	75.82	66.8

It can be observed that there has been an increase in the industrial land use which explains the industrial nature of the town, with new industries in the town predominantly being set up on the south end of the town towards Chathrapatti. But it has to be noted that it did not reach the expected value of 135 sq.km.

A healthy increase can be noticed in the public and semi-public land uses along with educational land use. Increase from 17.25 ha to 35.9 ha has been observed in public and semi-public, over and above the proposed. It has to be noted that public and semi-public here includes open spaces, recreation, amenities, administrative buildings, including the physical infrastructure.

As the change in land use has been observed with built-up development over the above-mentioned categories increasing, the agricultural lands, vacant lands and the water bodies are the ones that take a hit. Rapid degradation of such environmentally fragile areas would only lead to environmental stress. Although we did notice a decrease in the size of water bodies and a massive decrease in agriculture, it has to be noted that the previous Master

Plan accounted dried up water bodies as well as vacant land as agricultural spaces and the area statement might not be accurate.

In conclusion, the actual comparison between proposed 2011 land use and existing land use becomes quite obsolete, considering the accuracy of data, omission of land use in town planning schemes as well as the dichotomy of the present land use classes compared to 2011. However, some concrete evidence regarding the land use transition mentioned above can be very much used as an anchor point and act as a guide while arriving at the proposed land use for year 2041.

6.7 Key Issues

6.7.1. Non-Availability of Government Lands

There seems to be a scarcity of government lands in the LPA, especially to develop social infrastructure projects. It is of grave concern to note that recreation spaces cover only 0.21% of the spaces in Rajapalayam town.

Municipal Area

The available government lands within the municipal area are as per **Table 6.22**.

Table 6.22: **Government Lands in Rajapalayam Municipal Area**

Govt. Land Category	Area (sq.m)	Area (sq.km)	Area (ha)
Bungalow	7,931	0.007931	0.7931
Burial	38,217	0.038217	3.8217
Bus Stand	10,757	0.010757	1.0757
Chavadi	278	0.000278	0.0278
Colony	10,435	0.010435	1.0435
Common land	901	0.000901	0.0901
Drainage	645	0.000645	0.0645
Electricity	6,230	0.00623	0.623
Farm	932	0.000932	0.0932
Fire Station	5,722	0.005722	0.5722
Food Shed	1,207	0.001207	0.1207
Garden	487	0.000487	0.0487
Hospital	23,782	0.023782	2.3782
Jalakattu	9,539	0.009539	0.9539
Kalam	2,721	0.002721	0.2721
Library	3,028	0.003028	0.3028
Madam	8,338	0.008338	0.8338
Mandhai	65,781	0.065781	6.5781
Mattukottam	12,869	0.012869	1.2869
Municipal Complex	283	0.000283	0.0283
Natham	4,546	0.004546	0.4546
Offices	12,692	0.012692	1.2692
Park	2,530	0.00253	0.253

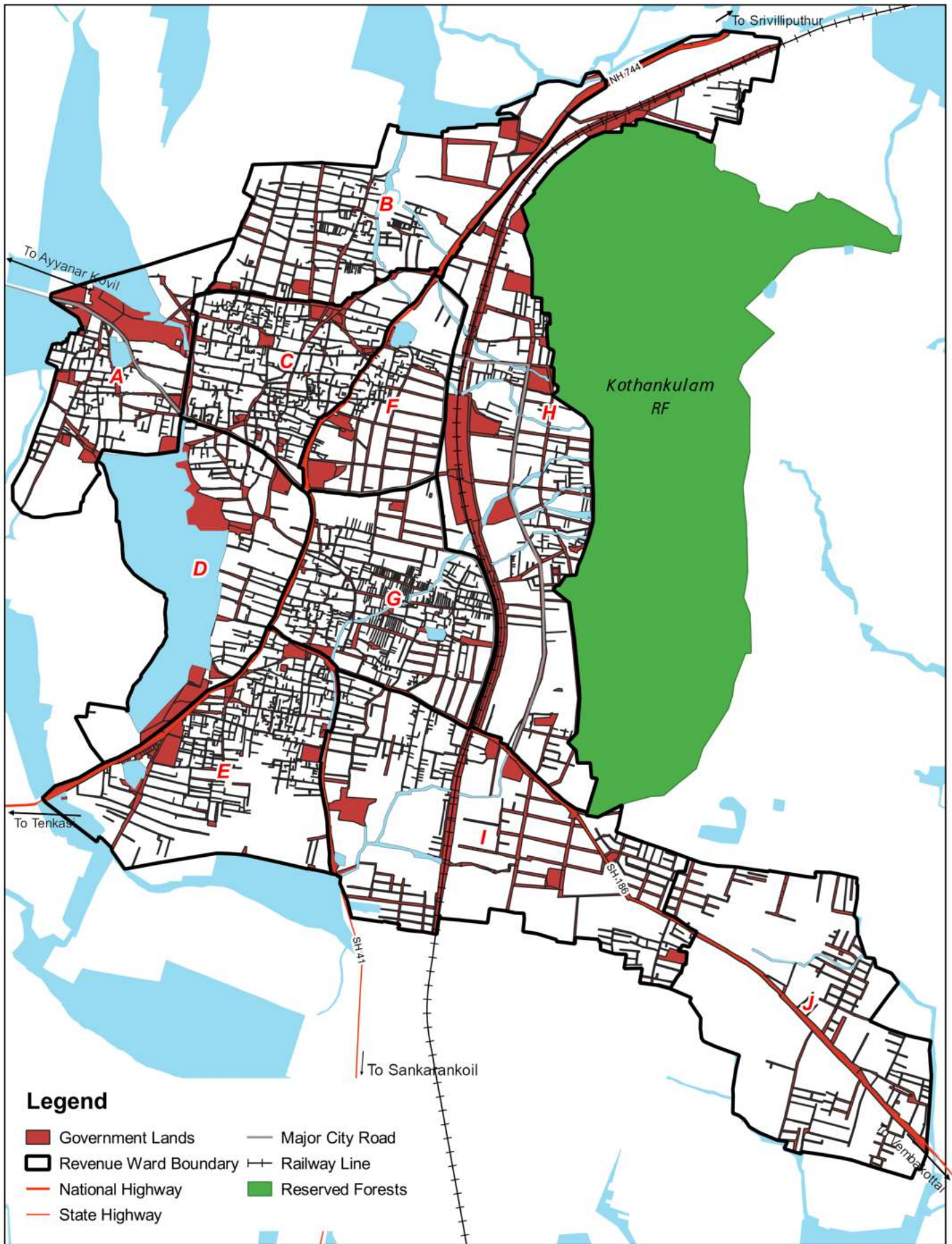
Govt. Land Category	Area (sq.m)	Area (sq.km)	Area (ha)
Playground	20,187	0.020187	2.0187
Police Housing	11,947	0.011947	1.1947
Police Station	1,924	0.001924	0.1924
Poromboke	433	0.000433	0.0433
Railway	2,00,196	0.200196	20.0196
Rent	3,095	0.003095	0.3095
School	96	0.000096	0.0096
Street	5,485	0.005485	0.5485
SWM	205	0.000205	0.0205
Tank	72	0.000072	0.0072
Temple	40,856	0.040856	4.0856
Toilet	483	0.000483	0.0483
Vacant	4,768	0.004768	0.4768
Water Body	16,001	0.016001	1.6001
Water Tank	2,982	0.002982	0.2982
Waterbody	25,462	0.025462	2.5462
Well	3,065	0.003065	0.3065
Others	10,207	0.010207	1.0207
Grand Total	5,77,315	0.577315	57.7315

Developable Municipal Area

In the municipal area, the land owned by the government is 0.57 sq.km which constitutes 5.9% of the total municipal area. However, it has to be noted that these lands are classified under many uses as shown in **Table 6.22**. The land that could be developed, i.e., that without any sort of built-up establishment is 0.104 sq.km (**Table 6.23 & Map 6.3**), which accounts to 18% of the land already owned by the government and 1.08% of the total municipal area. This is inadequate for creation of municipal infrastructure that would be required for the projected population.

Table 6.23: **Net Available Land for New Developments in Municipal Area**

Category	Area (sq.m)	Area (sq.km)	Area (ha)
Farm	932	0.000932	0.0932
Jalakattu	9,539	0.009539	0.9539
Kalam	2,721	0.002721	0.2721
Mandhai	65,781	0.065781	6.5781
Mattukottam	12,869	0.012869	1.2869
Natham	4,546	0.004546	0.4546
Poromboke	433	0.000433	0.0433
Rent	3,095	0.003095	0.3095
Vacant	4,768	0.004768	0.4768
Grant Total	1,03,752	0.103752	10.3752

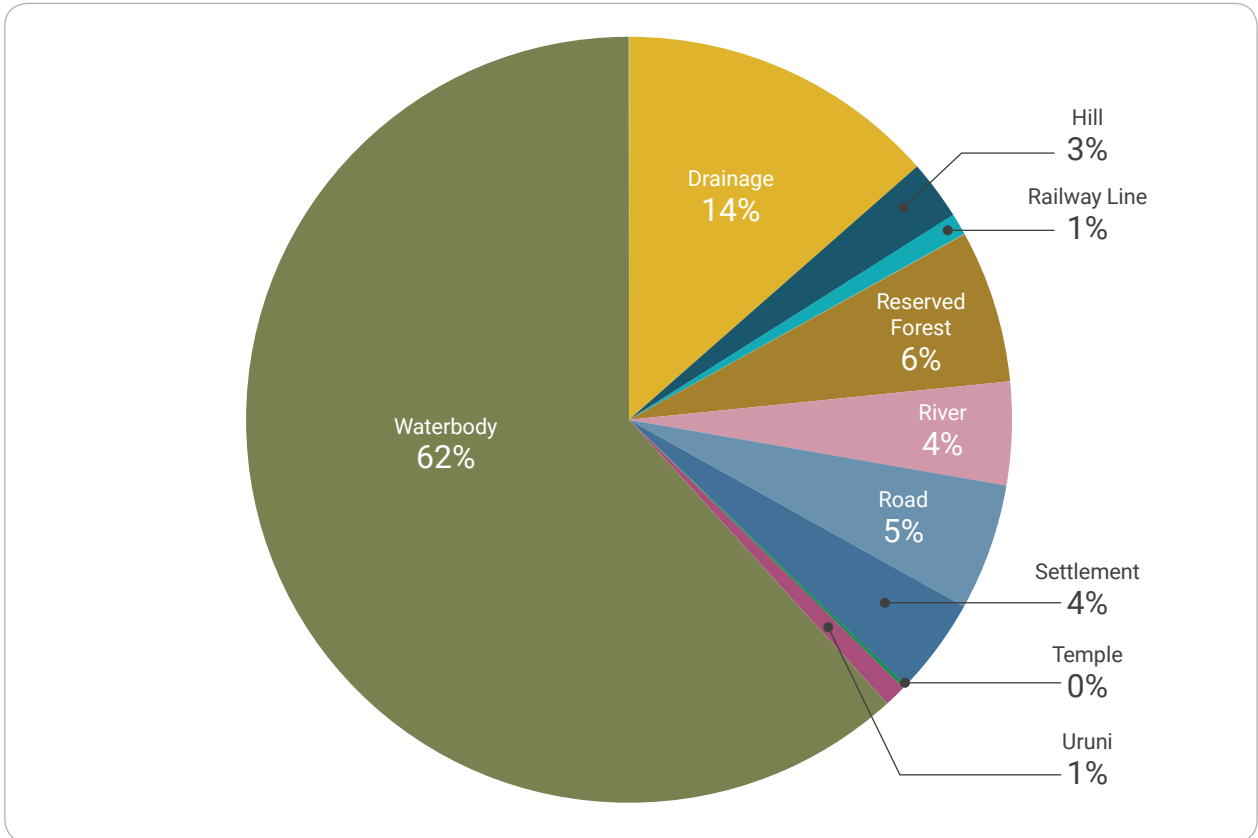


Map 6.3: Government Owned Lands in Municipal Area

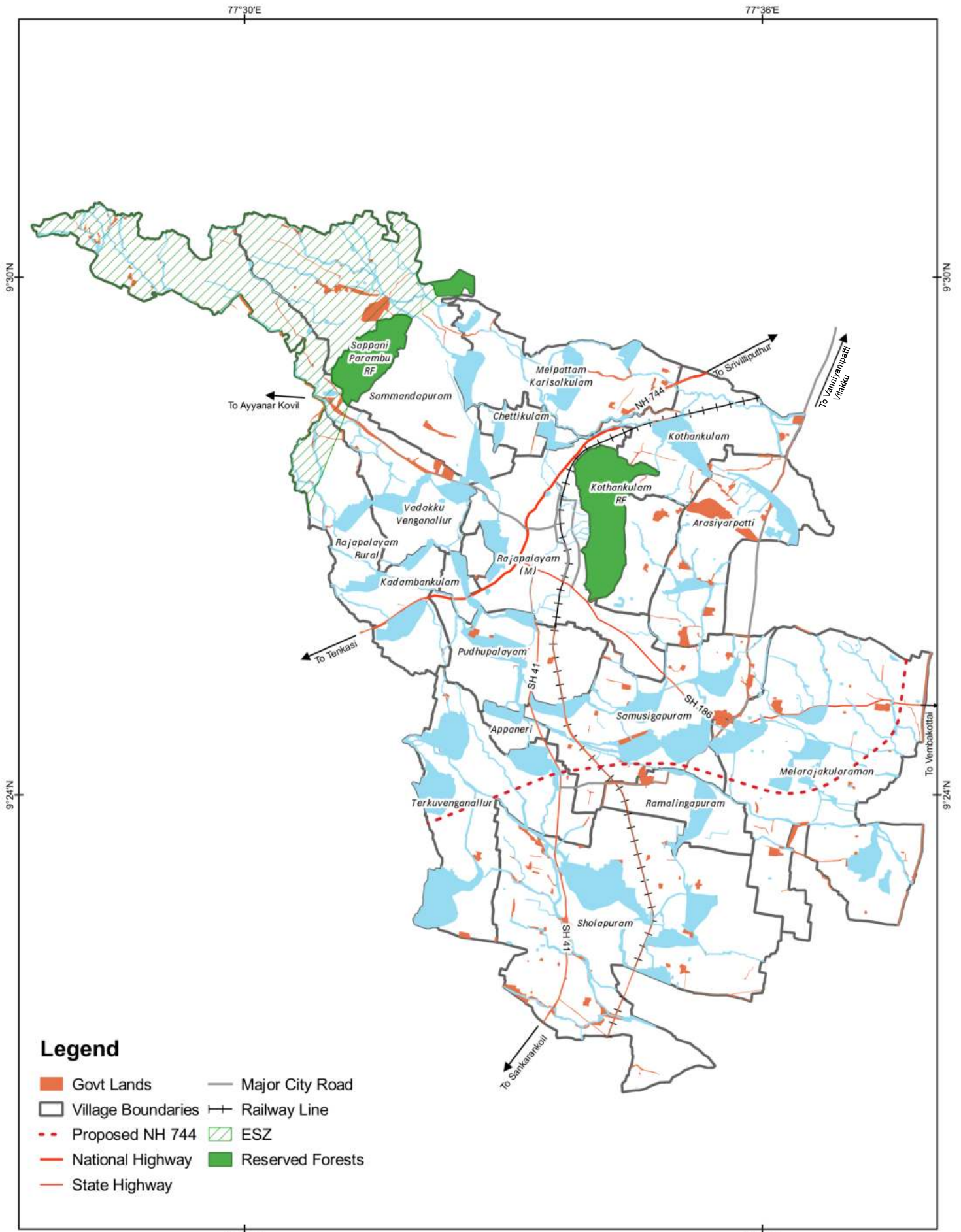
Non-Municipal Area

In the non-municipal areas, it can be observed that the majority of government lands are waterbodies, followed by drainages, which are stream channels and are essentially waterbodies (Fig. 6.17). It is to be noted that there are no lands classified as “Vacant Lands” outside the LPA (Map 6.4), and most of the vacant lands when cross tabulated with the land use fall under Settlements (and classified in land use as Abadi Areas/Vacant).

Fig 6.17: Government Land Classification in Non-Municipal Area



Thus, it is evident that within both the municipal area and non-municipal area, there are not much vacant areas under the ownership of the government for any infrastructural development for the future projected population. For any future developments or additional amenities for the existing population, the government has to purchase or lease land which will increase the project cost.



<p>Government Lands in Rajapalayam Non Municipal Area</p>	<p>Notes :</p>	<p>Data Credits Survey and Land Records Department, GoTN</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 6.4: Government Owned Lands in Non-Municipal Area





Mobility

07

205

Rajapalayam faces traffic and transport issues typical of most small towns in India. These include congestion, safety, parking, lack of organised public transport and poor non-motorised transport infrastructure. While the issues may be typical, it is important to evaluate the reasons behind these issues. This chapter looks at traffic and transport in Rajapalayam, uses primary and secondary data, site perception and stakeholder interaction to diagnose the reasons.

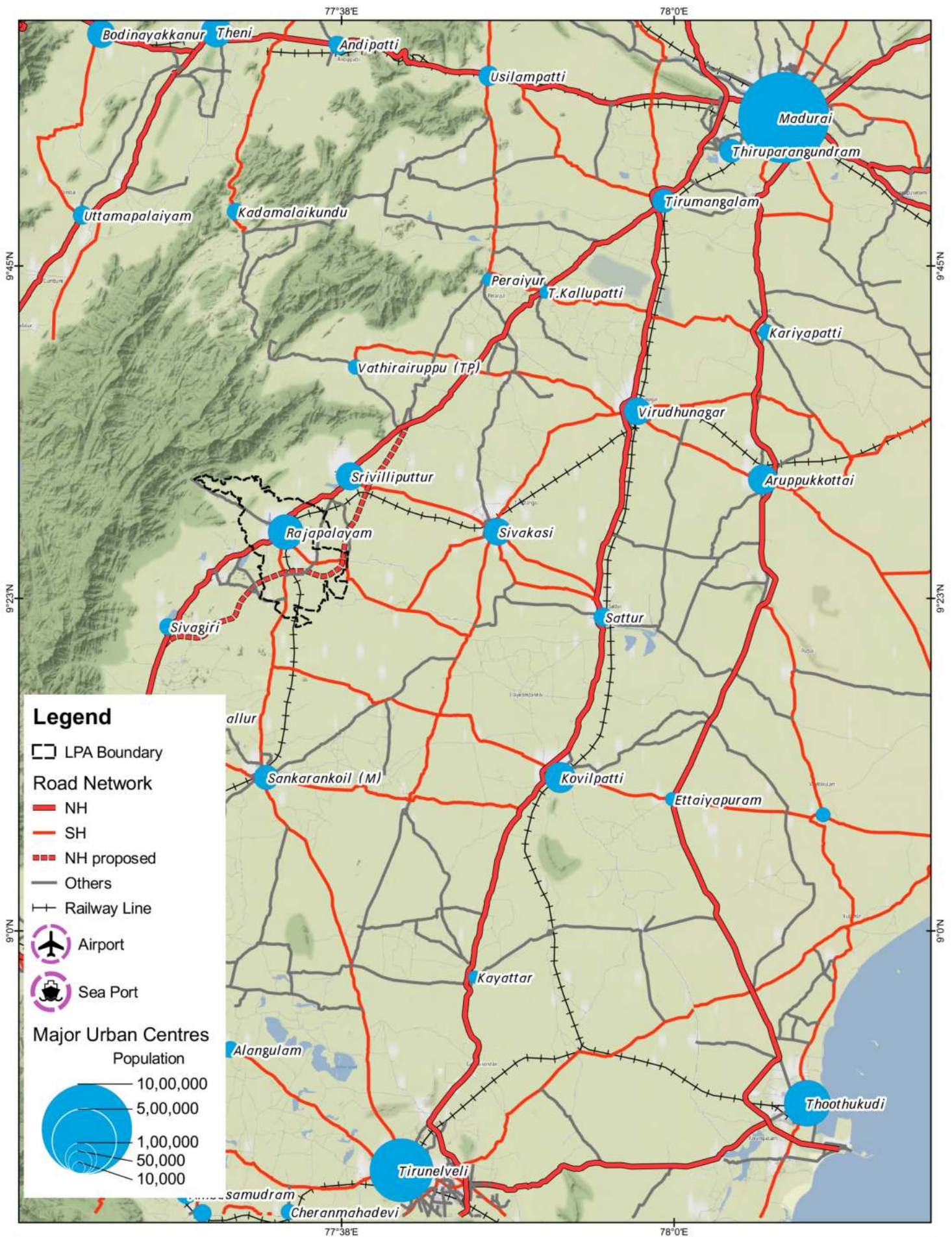
7.1 Access and Connectivity

Rajapalayam lies at the foothills of the Western Ghats and is well connected by road and rail to important towns in Tamil Nadu and Kerala (**Map 7.1**). It lies about 100 km south-west of Madurai and is connected via NH-744. This highway links Madurai to Kollam in Kerala and is a two-lane undivided highway for most of its stretch (**Table 7.1**). Thoothukudi – an important port on the east coast – lies 125 km to the south-east and is connected through NH-38 and SH-44. Other important towns like Srivilliputhur, Virudhunagar and Sivakasi lie in a radius of 20-60 km around Rajapalayam. NH-744, SH-186, SH-41 and other regional roads intersect at Rajapalayam and form the backbone of the road network in the town. A two-lane road (Ayyanar Kovil Road) moves west towards the Western Ghats. Since all are important regional links, a lot of heavy traffic is forced through Rajapalayam's city centre, thereby adding to congestion, pollution and safety issues.

The Sanjeevi Malai (hill) lies to the east of the town and forms a natural barrier to road expansion. Rajapalayam sees major movement towards Madurai, especially for commercial purposes and towards Virudhunagar, which is the district headquarters. The traffic is shared with passenger trains operated by the Indian Railways. There are direct trains to Madurai and to Chennai in Tamil Nadu and Tenkasi and Sengottai near the Kerala border.

Since Rajapalayam is an industrial town, it also sees heavy truck movement to service the various textiles mills. These mills are located on the NH-744 approach into Rajapalayam from the north and on the PAC Ramasamy Raja Salai leading to Chathrapatti towards the south-east.

With the municipal limits, the railway line runs north south and divides the town into two parts. The main market is located towards the western side of the railway line along with the regional bus stations. This forces traffic to move across the railway line frequently during the day and has been explained in detail later in the chapter.



Legend

- LPA Boundary
- Road Network**
- NH
- SH
- NH proposed
- Others
- Railway Line
- Airport
- Sea Port
- Major Urban Centres**
- Population
- 10,00,000
- 5,00,000
- 1,00,000
- 50,000
- 10,000

Regional Connectivity for Rajapalayam LPA	Notes : 1. Map Shows towns only having population of 10,000 or above according to Census 2011.	Data Credits Census of India 2011, Stamen Terrain WMS, Open Street Map Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	<p>CRS : WGS 1984</p>
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area			

Map 7.1: Regional Linkages

Rajapalayam can be reached by air only via Madurai airport, which is well connected to the southern districts, some major Indian metros and a few international routes, especially Colombo, Dubai and Singapore. The nearest seaport, the V.O.Chidambaranar (VOC) port is located at Thoothukudi and is strategically located at the south-eastern tip of India, and it gives quick access to the east and west international sea routes.

Table 7.1: Radials and their Connectivity to Important Landmarks

S.No.	Radial	Connects to
1	NH-744 (old name NH-208)	Srivilliputhur, Tenkasi, Sengottai, Madurai, main market, railway station, bus stand
2	SH-186 (PAC Ramasamy Raja Salai)	Ramco Mills, Chathrapatti
3	SH-41	Muthugudy
4	Ayyanar Kovil Road	Western Ghats

7.2 Mode Share

Based on field surveys, the mode share for Rajapalayam shows a pre-dominance of two-wheelers – they constitute 68.5% of the vehicles seen in Rajapalayam (Table 7.2). Freight is at 6%, while four-wheelers and three-wheelers are at 5% each. At base year, the mode share is fine, with two-wheelers able to move swiftly on roads and consuming much less space for parking. However, if national trends are analysed, many two-wheeler riders are shifting towards four-wheelers. This is a natural progression with the improving economy and aspirations of people.

Table 7.2: Current Mode Share

Mode	Mode share
2W	68.50%
3W	5%
4W	5%
Bus	1.50%
Freight	6%
Others	14%

7.3

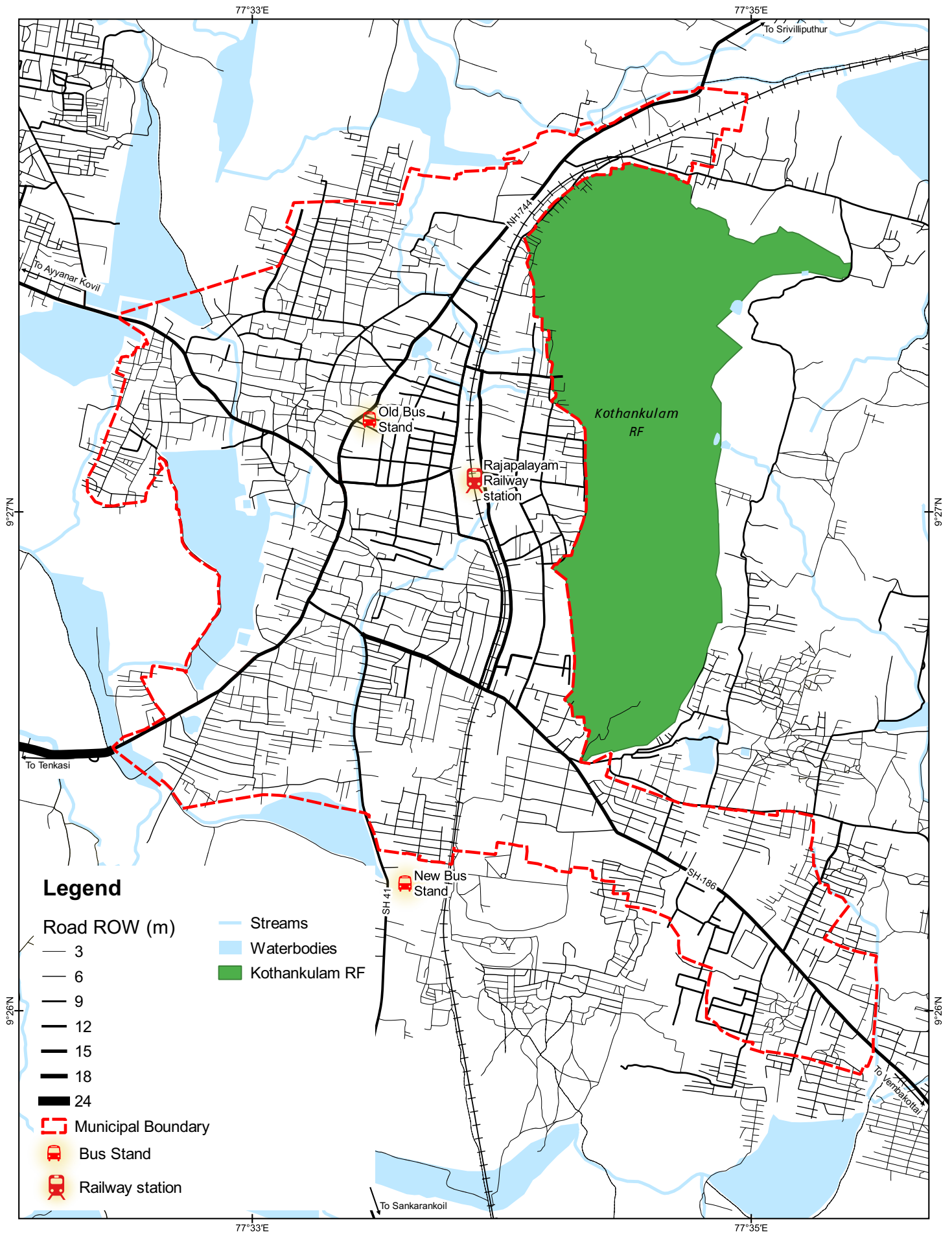
Findings and Analysis

This section looks at various data points (primary and secondary), spatial analysis and stakeholder interaction to evaluate major issues and probable reasons.

7.3.1. Road Network

Rajapalayam has a strong radial network. As explained earlier, all regional roads converge in the city centre. NH-744 is the main artery running in approximately the north-east to south-west direction. SH-41 and SH-186 (PAC Ramasamy Raja Salai) intersect it at the city centre. The old settlement of Rajapalayam is on the west of NH-744. The secondary level of streets has some traces of a grid iron pattern (**Map 7.2**). However, the pattern becomes organic in some areas. The street network on the foothills of Sanjeev Malai is a maze of narrow, disjointed streets. This is partly due to the land being a narrow strip sandwiched between the hill and the railway line.

Some areas around the Polytechnic College are well planned – a legacy from town planning schemes planned and implemented in the 1930s and 1940s. Based on spatial analysis and interaction with stakeholders, it appears that new residential development is happening on the eastern side of Sanjeevi Malai. This appears to be plotting development with streets being laid in a grid iron pattern. However, there is a disconnect between this network and the primary – or arterial – network, since these streets are directly connected to the nearest existing primary street. These streets could also become ‘private’ streets in future meant only for that specific plotting scheme. This has long term implications on mobility as public access to these streets may not be possible. In addition, a by-pass to NH-744 has been planned (**Map 7.3**). This by-pass – when implemented would take off before Srivilliputhur and run east of Sanjiv Malai before intersecting the current NH-744 to the south-west of Rajapalayam beyond the municipal limits. This by-pass is planned as a four-lane divided highway. This is a critical project – not only for improving regional connectivity – but also to divert heavy through traffic from the centre of Rajapalayam. This project is currently under implementation.



Legend

Road ROW (m)

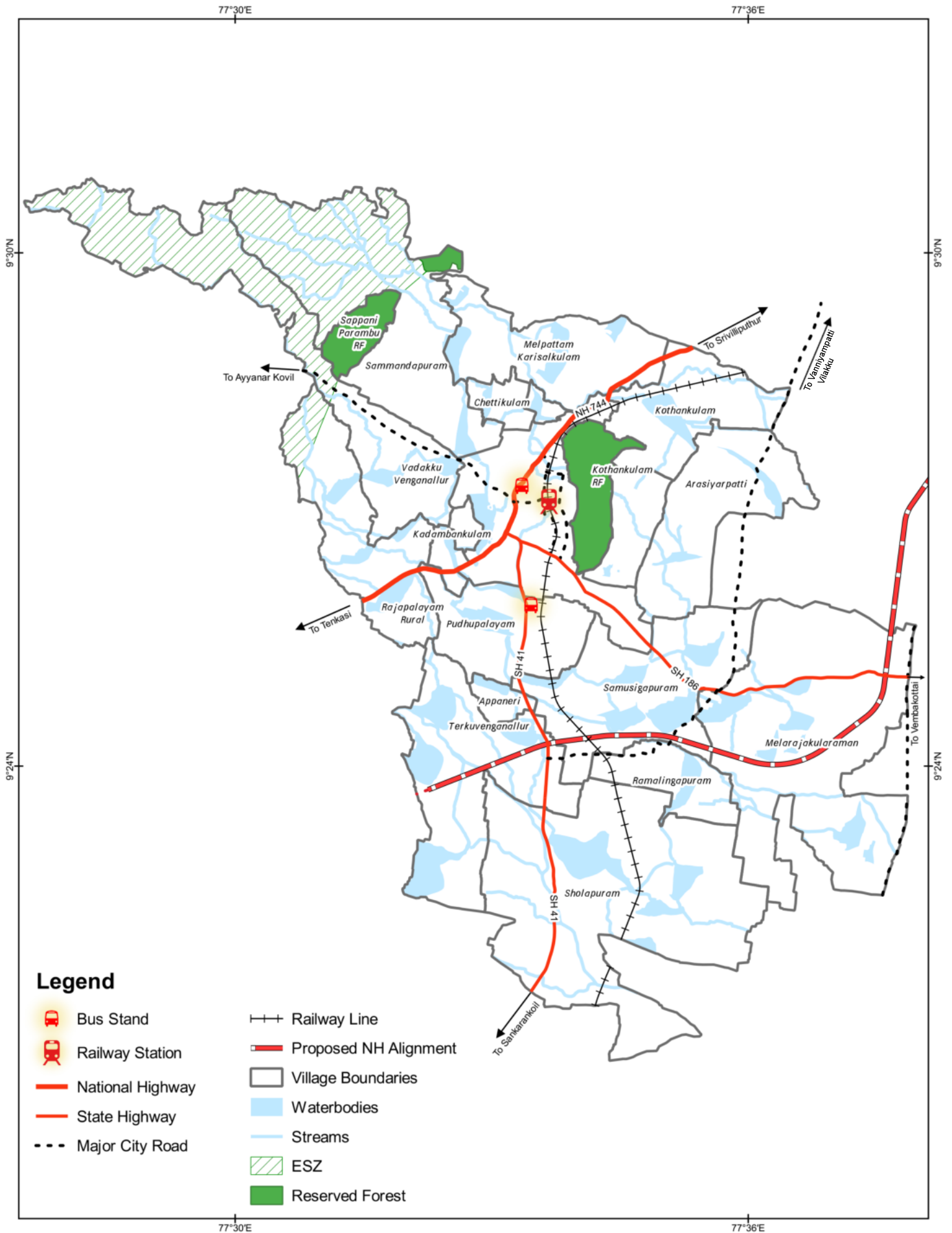
- 3
- 6
- 9
- 12
- 15
- 18
- 24

- Streams
- Waterbodies
- Kothankulam RF

- Municipal Boundary
- Bus Stand
- Railway station

Road Network in Rajapalayam Municipal Area	Notes	Data Credits The Urban Lab, Field Survey	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	 CRS : WGS 1984
		Prepared By Tapasya Design Studio, Auroville	

Map 7.2: Road Network in Municipal Area



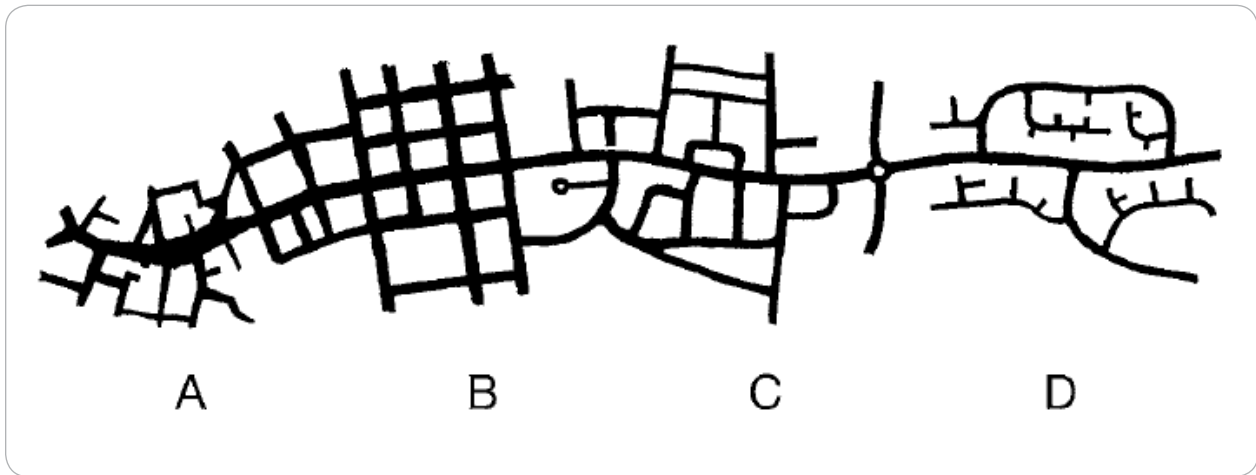
<p>Proposed NH as a Bypass in Rajapalayam</p>	<p>Notes</p>	<p>Data Credits National Highways Authority of India (NHAI)</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 7.3: Proposed NH Bypass

7.3.1.1. STREET PATTERN

Street pattern typologies can be segregated based on city planning and urban design and based on transport network. Stephan Marshall introduces an ABCD typology which portrays typical street networks. **Figure 7.1** is a typical representation of identifying network for a city.

Fig 7.1: Types of Street Patterns



- **Type A:** Typical network pattern found in old city/ core city area.
- **Type B:** Typical of planned extensions or newly founded settlements. Prevalence of four-way perpendicular junctions gives rise to bilateral directionality, with the implication of a grid form at the wider scale.
- **Type C:** This is the most general type which may be found at various positions in a settlement. Most characteristically astride an arterial route, whether constituting the central armature of a village, a whole settlement, or a suburban extension along a radial route.
- **Type D:** Modern hierarchical layouts, and is often associated with curvilinear layouts of distributor roads, forming looping, or branching patterns.

These patterns can be observed in a city at any point of its development. The order A-B-C-D is not mandatory; neither is the monopoly of one street pattern i.e., a city can have one or more patterns in the city.

These patterns were studied in Rajapalayam's network. When the network is closely observed in context to the ABCD typology, it can be inferred that at city level network it resembles broadly C category, whereas at the local, it resembles A and B (**Fig. 7.2**). This would mean that at the city level, it is important to transition from the dependence on one arterial and create a network that is closer to type B with alternate connections available to move across the settlement.

Fig 7.2: Street Patterns – Type B on the Left and Type A on the Right

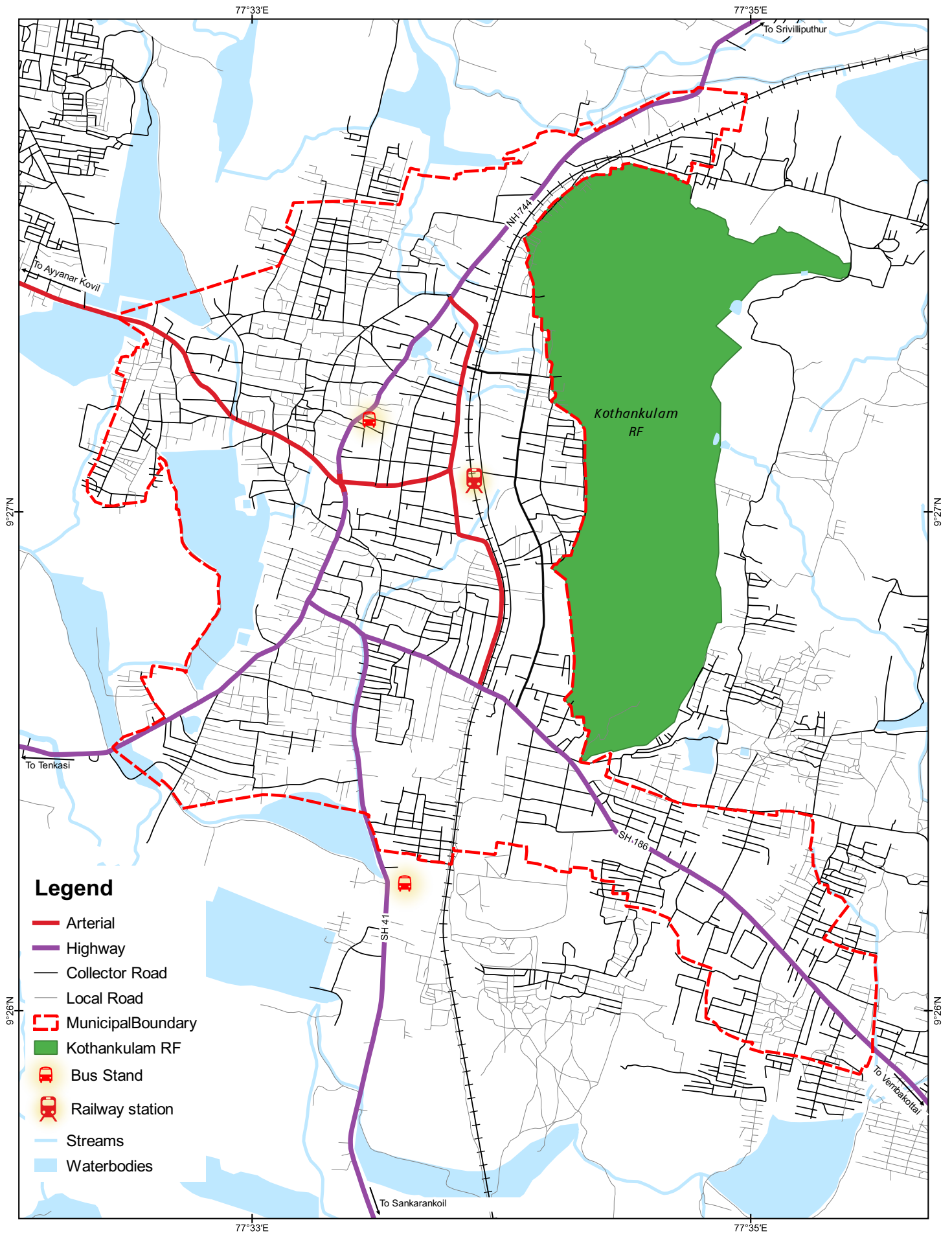


7.3.1.2. ROAD HIERARCHY

Road hierarchy is an important tool used for road network and land use planning. It is a means to define each roadway in terms of its function such that appropriate objectives for that roadway can be set and appropriate design criteria can be implemented. It is related to objectives of connectivity between different land uses and activities. In India, road hierarchy is classified at four levels.

- **Arterial roads:** They are primary roads and convey the highest volumes of traffic. They generally have the highest Right of Way (RoW) and connect important origins and destinations. Due to the nature of their function (mobility/movement), parking is usually not permitted.
- **Sub-arterial roads:** These are also primary roads, but at a lower hierarchy. They connect two arterial roads and are also predominantly used for quick mobility. The RoW may be less compared to arterial roads. Parking is usually not permitted.
- **Distributor/ collector roads:** As the name suggests, these are connectors, which distribute and collect traffic from local/ access streets to arterial and sub-arterial roads. On street parking is permitted and there are several access points to neighbourhood properties.
- **Local/ access streets:** These are utilized for access to bordering properties. Most trips in a city generally begin and end on these streets. They cater to lower speeds and have narrower RoW. Parking is permitted.

Road network in an urban settlement need to follow this hierarchy, both in terms of function and space. Arterial and sub-arterial streets need to be continuous and have a consistent RoW. In Rajapalayam, the road hierarchy is not well defined (**Map 7.4**). At the LPA level, the arterial roads are well defined. These are the radials described earlier. However, the hierarchy below this is inconsistent. There are instances where sub-arterials and collectors have narrow RoW or are not continuous. In other cases, local streets with very narrow RoW connect directly to arterials. This means that local streets open onto higher order streets and cause safety issues. This has happened over a period, with NH-744 acting as the arterial and the town developing organically around it.



<p>Road Network Hierarchy in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits The Urban Lab, Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 7.4: Road Hierarchy in Municipal Area

7.3.1.3. RIGHT OF WAY

Right of Way (RoW) means the width of public land available between properties on opposite sides. The term is sometimes used interchangeably with road width. The RoW has various road elements such as lanes, carriageway, median, footpath, trees, street furniture, parking, street vending and services such as storm water, drinking water, electricity, telephone and sewerage. Development of the entire RoW is important to ensure that all elements get adequate space.

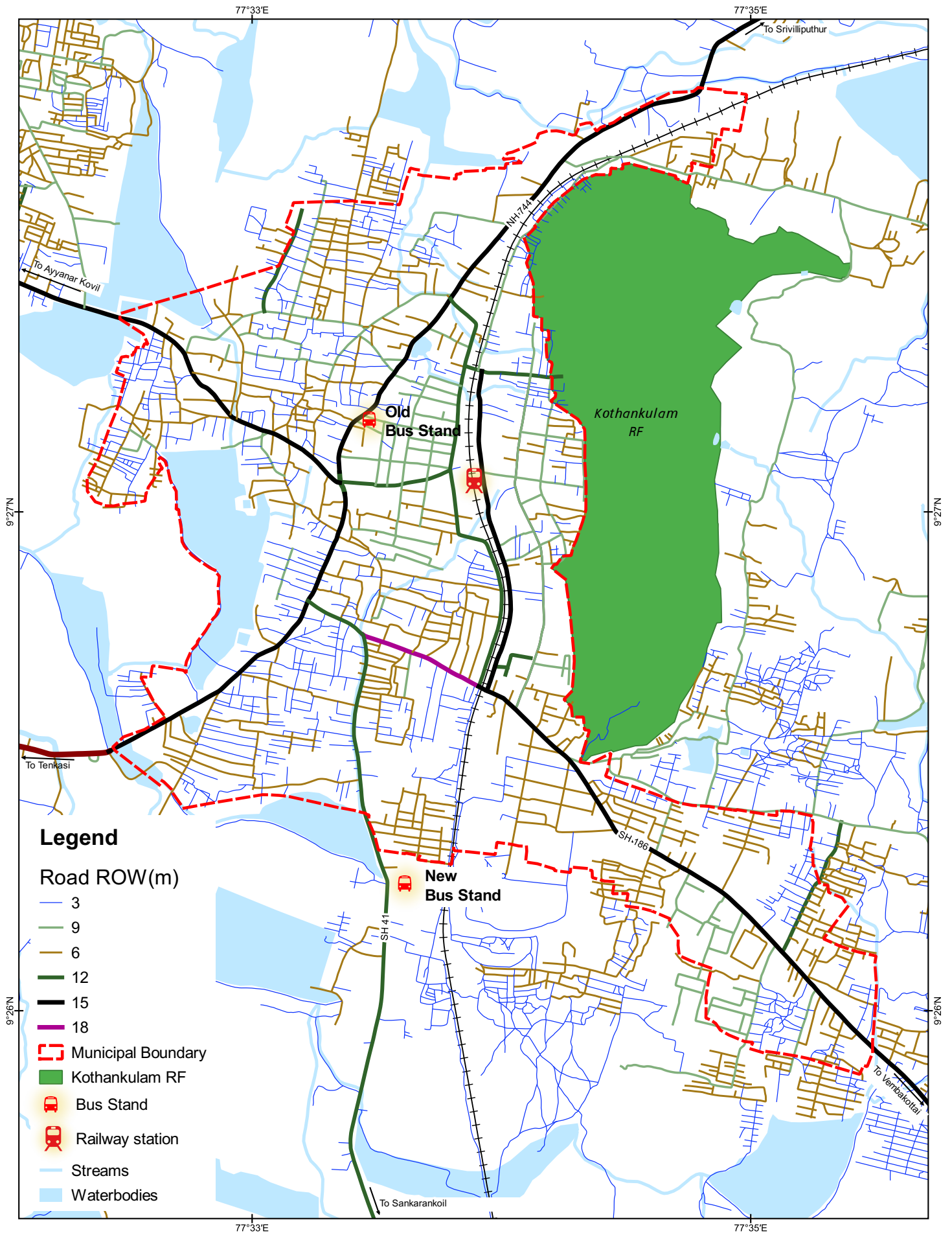
In Rajapalayam, not all streets have utilised the entire RoW (**Map 7.5**). There are dirt shoulders on the side and spaces where it is not clear what uses can happen. This leads to haphazard parking and vending, wrong side driving, jaywalking and an overall sense of chaos and disorder. Wherever streets are developed for entire RoW, the design is improper, with narrow footpaths and poor junction alignment. It is also critical that RoW remains consistent between two junctions. An inconsistent RoW leads to bottlenecks. The capacity of any road is determined by its narrowest point and such inconsistencies affect traffic flow.

The NH-744 running through the centre has a RoW of 15 m. This RoW is inadequate to cater to the kind of traffic it has currently. In most stretches, this functions as a 2-lane undivided carriageway with dirt shoulders. The NH widens to 24 m outside the town limits. The SH-186 (PAC Ramasamy Raja Salai) too has a similar cross section, which is inadequate to cater to the heavy traffic it carries. Both roads see frequent congestion and bottlenecks, even when a single vehicle breaks down. SH-41 is even narrower with a RoW of 12 m. Footpaths are mostly absent. The internal streets range from 3 m to 9 m and accommodate just a carriageway.

Field observation clearly shows that there are electricity poles and transformers obstructing carriageway taking away effective road space (**Fig. 7.3**). This also poses safety concerns since these poles and transformers, in many cases, do not have a proper safety barricade.

Fig 7.3: **Light Poles and Transformer in RoW**





<p>Right of Way in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits The Urban Lab, Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 7.5: Right of Way in Municipal Area

7.3.1.4. MISSING LINKS

There are two major railway level crossings within the municipal area – Malaiyadipatti level crossing and Thottiyapatti level crossing (**Map 7.6**). Apart from this a new railway over-bridge is being built on SH-186, approximately 1.75 kilometre south of the station. The distance between each of the three crossings is more than 1.5 km, which restricts cross railway line connectivity and forces traffic to move longer distances to move across town.

Malaiyadipatti level crossing, situated to the north of Rajapalayam Railway station is one of the major congestion points in municipal area, in the current scenario. As a railway over-bridge is being constructed on SH-186 leading to Chathrapatti, all the traffic is now being offloaded into the narrow Malaiyadipatti Road – TP Mills Road. Many of the workers/ employees of the textile industries who reside on the eastern side of the station use bikes to cross the railway line through the Malaiyadipatti level crossing. This causes a lot of congestion, delay, and inconvenience to the road users. It can also be observed that the traffic peaks at this level crossing from 7 AM – 10 AM and 3 PM – 9 PM, which is also when trains arrive in the station passing through the level crossing. **Table 7.3** shows the PCU on critical sections of the network.

Table 7.3: **Peak Hour Traffic**

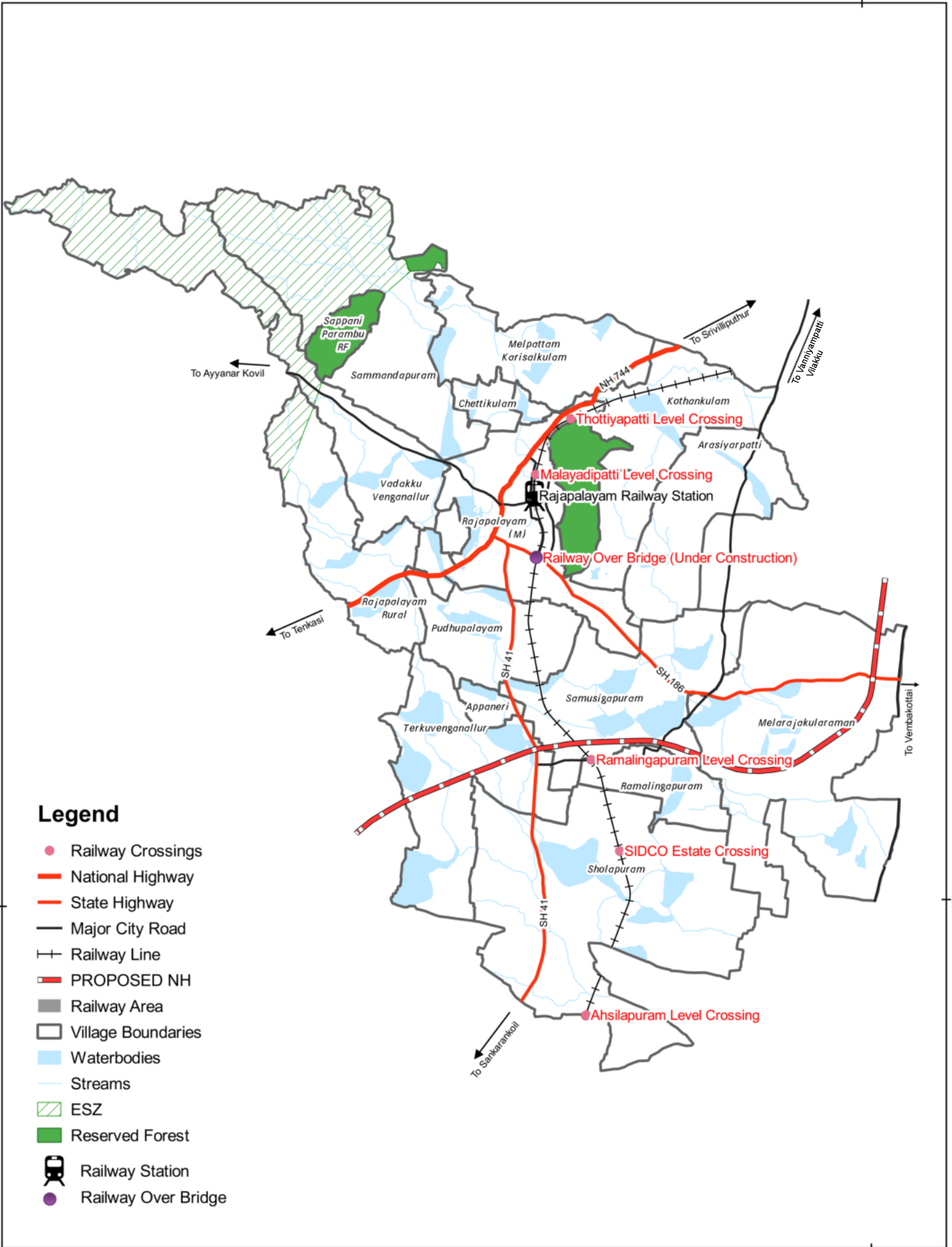
Location	Peak Hour	Peak Hour PCU
Ramalingapuram Road	18:00 – 19:00	303
Vanniyampatti Road	17:30 – 18:30	602
Malaiyadipatti Road	08:15 – 09:15	2,533
Thottiyapatti Road	08:15 – 09:15	603

(Source: Primary survey 2021)

On completion of the over-bridge, even if most of the traffic would be diverted to it, there will still be users on the Malaiyadipatti Road taking the level crossing due to the presence of a high density of residential land use, industrial use and slums in this area.

In areas outside the municipal boundary, there are three major railway crossings – Ramalingapuram, Muthugudi (Near SIDCO Estate) and Aasilapuram (**Map 7.6**). These crossings are crucial for proper movement of traffic. However, due to the construction work of the bridge, the water channel that passes from PSK Nagar to INTUC Nagar is now used as level crossing by commuters, which causes a serious threat during the monsoons. The survey near the S. Ramalingapuram level crossing, showed a traffic composition of 2,827 vehicles (2,119 PCUs).

An analysis of school distribution across the municipal area (**Map 7.7**) highlights issues faced by students to access schools. Many children are forced to walk towards the railway station and use the existing over bridge to cross to their schools on the other side.



Legend

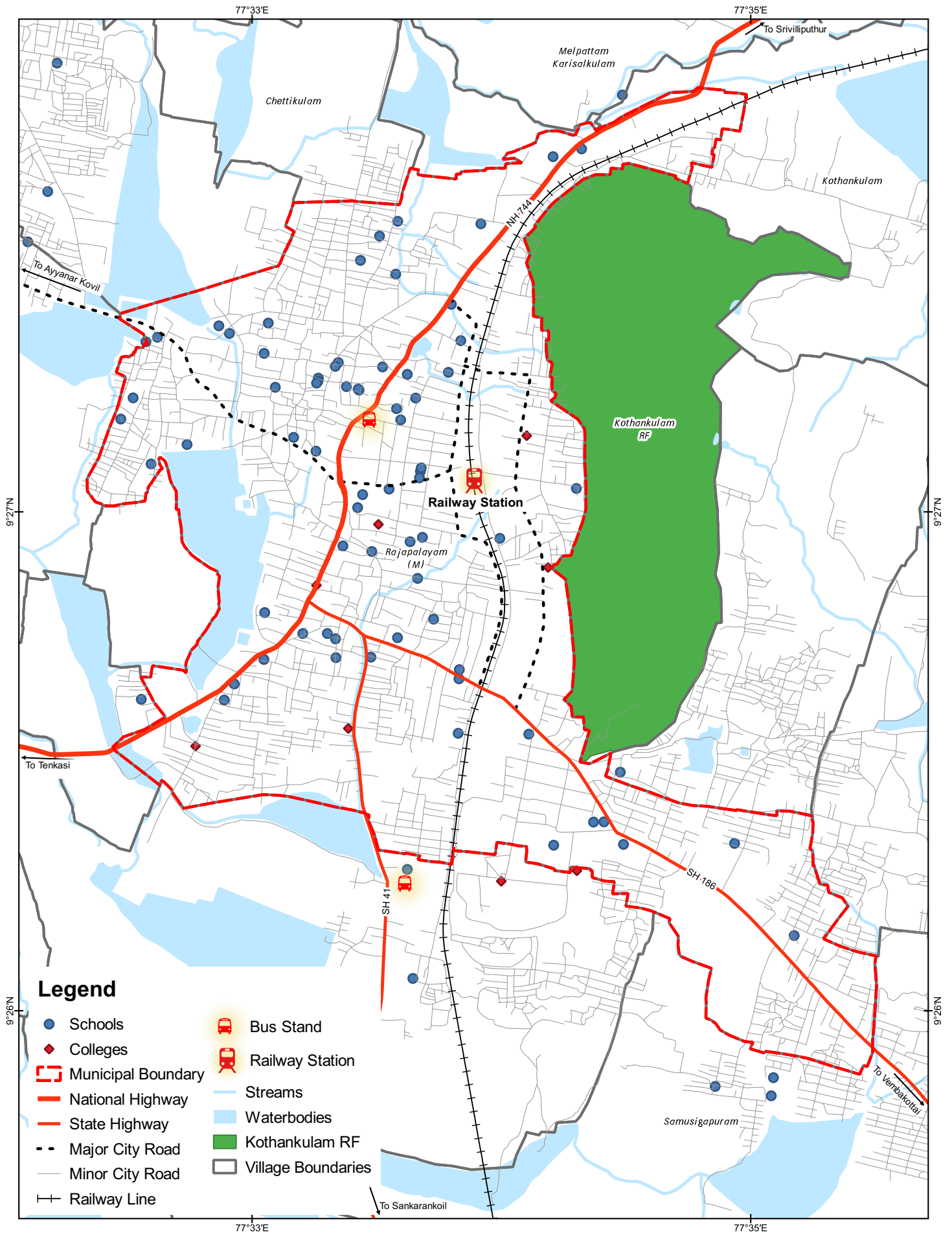
- Railway Crossings
- National Highway
- State Highway
- Major City Road
- +— Railway Line
- ▬ PROPOSED NH
- Railway Area
- ▭ Village Boundaries
- Waterbodies
- Streams
- ▨ ESZ
- Reserved Forest
- 🚂 Railway Station
- Railway Over Bridge


9°23'N

9°23'N

<p>Level Crossings and Railway Over Bridges in LPA</p>	<p>Notes :</p>	<p>Data Credits Primary Survey</p>	<p>0 1 2 km</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 7.6: Level Crossings & Railway Over-bridge in LPA



<p>Schools and Colleges In and Around Railway Line Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 7.7: Location of Schools and Colleges around Railway Line

7.3.1.5. CONGESTION

Arterial roads in Rajapalayam face congestion. A study through google maps shows the extent of congestion (Fig. 7.4). The maps shows clearly that NH-744 is congested throughout the day. The entire network gets congested during the evening peak hours after 7 pm.

This can be attributed to the road network of Rajapalayam, which forces traffic to move along the arterials and city centre, even if the destination is not the city centre. For example, moving from NH-744 to SH-186 compels a driver to come via the railway crossing and TP Mills Road – even if the destination is Chathrapatti. This is a classic tree network where the main trunk must absorb traffic before distributing it to its branches. This is also why ring and radial network works better, as it provides alternate connections and distributes traffic, thereby reducing pressure on a single road.

Fig 7.4: Traffic Congestion During a Typical Weekday



(Source: Google Maps)

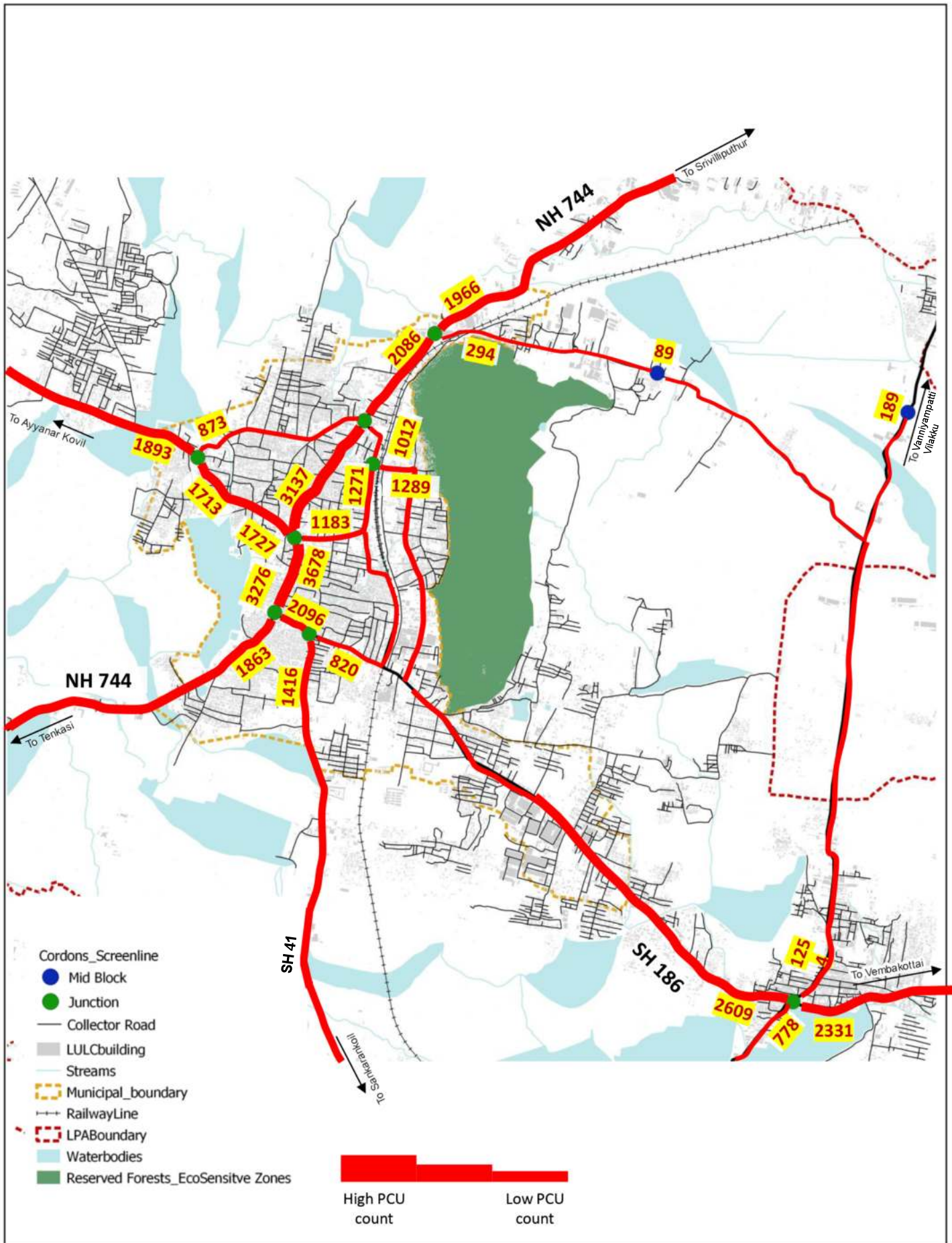
A detailed look at PCUs on various stretches was done to understand the traffic volume. The results are shown in the **Table 7.4**. NH-744 is already carrying more PCUs than its capacity (**Map 7.8**), which is reflected in a Volume/ Capacity (V/C) of 1.09 and LoS of F. SH-41 and SH-186 are also near saturation with LoS of E and D respectively.

Table 7.4: **Level of Service on Arterial Roads**

No	Road	Capacity (as per IRC)	Volume	V/C	LOS
1	NH-744	3,000	3,678	1.226	F
2	SH-41	1,500	1,416	0.94	E
3	SH-186	3,000	2,609	0.86	D

(Source: IRC and primary surveys)

Therefore, the by-pass road being planned is critical to decongesting arterial roads in Rajapalayam.



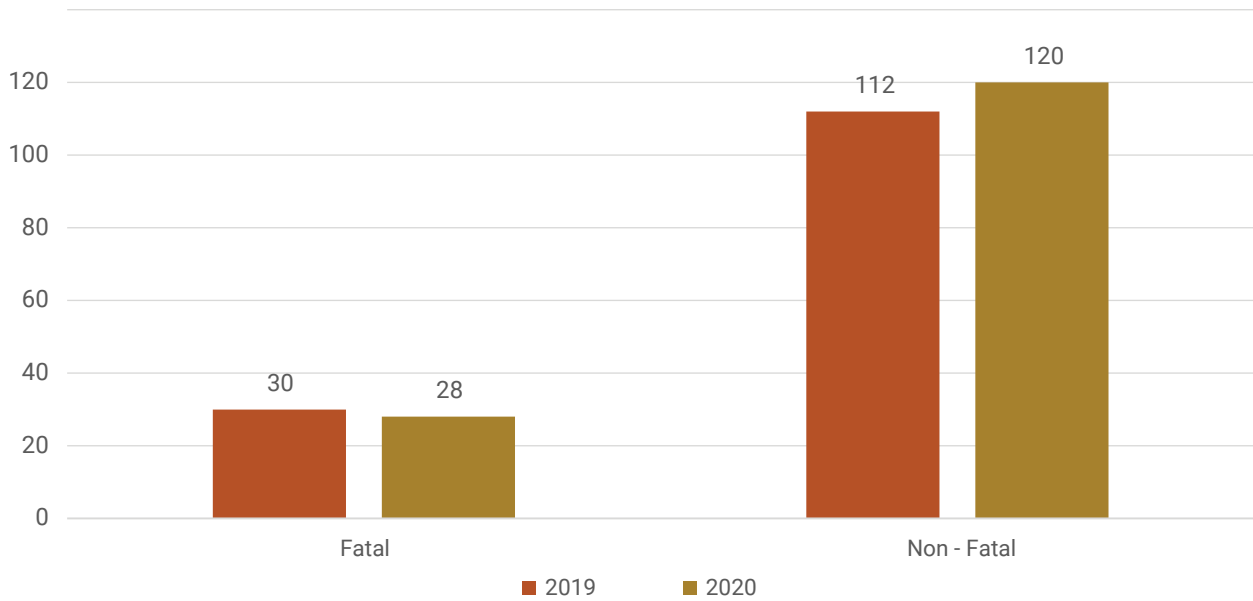
PCUs on Arterial Roads in Rajapalayam LPA	Notes :	Data Credits Primary Survey, The Urban Lab	 CRS: WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 7.8: PCUs on Arterial Roads

7.3.2. Road Safety

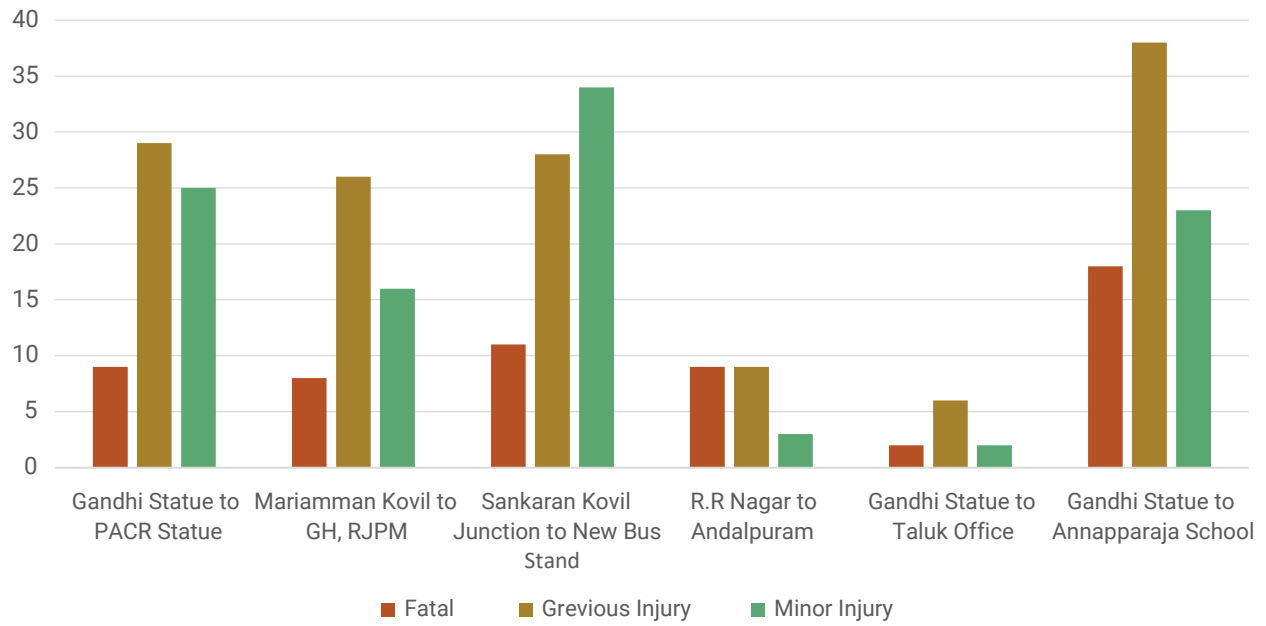
With the presence of regional roads through the city centre, road safety is an issue of concern. The National Highway NH-744, which passes through the town, is the major connecting route for the Sabarimalai Temple in Kerala. During the Sabarimalai season, road accidents are reported in high numbers. The majority of the accidents are within the Municipality limits and specifically along NH-744. The fatal and non-fatal road accidents in 2019 and 2020 are shown in **Figure 7.5**.

Fig 7.5: Road Accidents in Rajapalayam

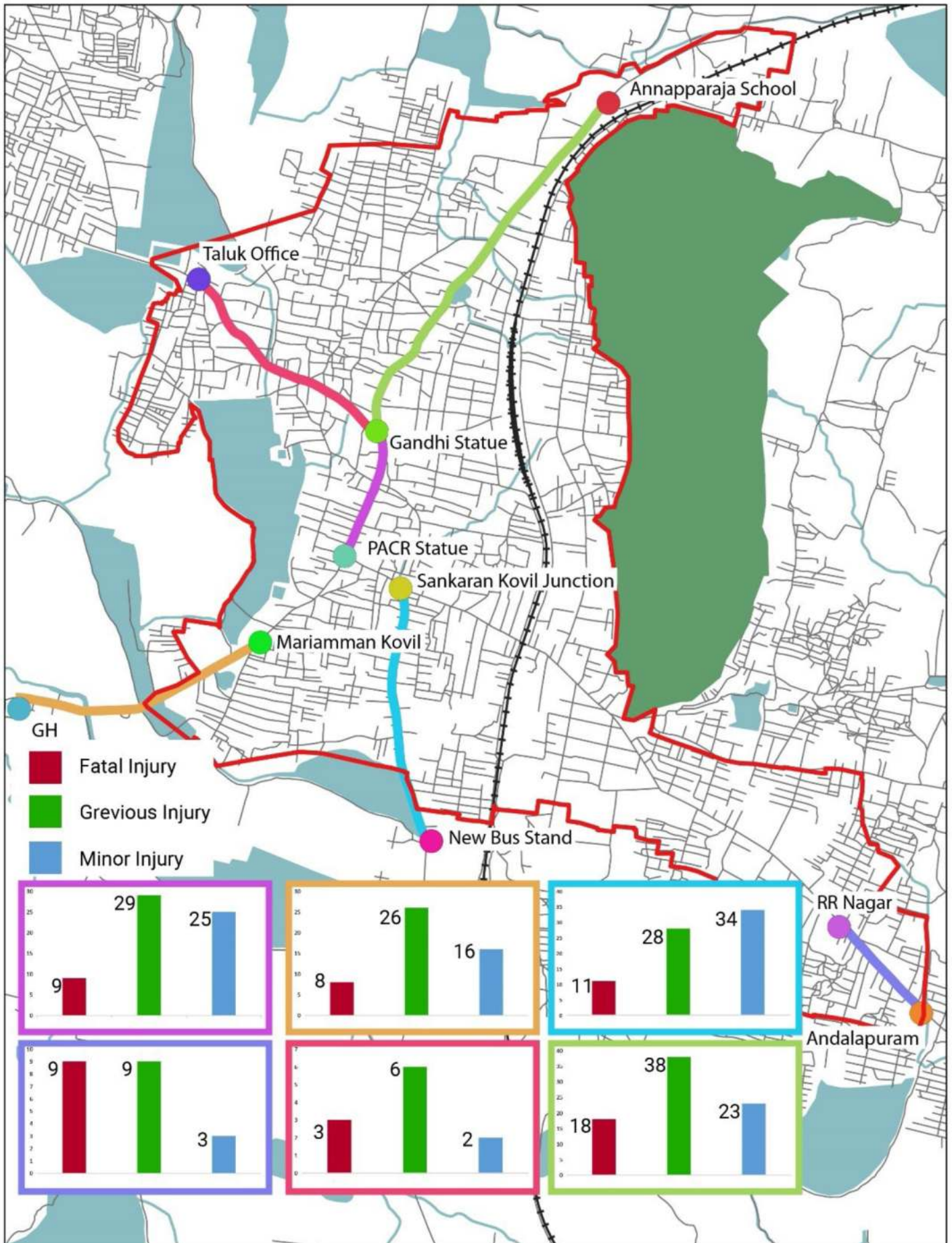


Based on data collected from the highway department and FIRs lodged at police stations in Rajapalayam LPA, the NH-744 stretch from Gandhi statue to Annapparaja School sees high number of road accidents (**Fig. 7.6 & Map 7.9**). The number of fatalities recorded here are also high. The stretch from Gandhi Statue to PACR statue (also along NH-744) records the second highest number of fatalities. While there is no data on vehicle responsible and vehicle affected in the crashes, it is obvious that the mixture of heavy vehicles, two wheelers and cyclists make this stretch unsafe. The stretch from Sankaran Kovil Junction to New Bus Stand also sees multiple road crashes. This can also be attributed to the presence of regional buses on this stretch.

Fig 7.6: Road Accidents Along Major Stretches in Rajapalayam Municipal Area



The data and interaction with stakeholders make it clear that the arterial streets need traffic calming measures, good footpaths and proper intersection design to make them safe for all users.



<p>Roads with High Accidents from 2016-2020 in Rajapalayam Municipal Area</p>	<p>Data Credits Primary Survey, The Urban Lab</p>	 <p>CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam LPA</p>	<p>Client DTCP Virudhunagar</p>	<p>Prepared By Tapasya Design Studio, Auroville</p>

Map 7.9: Roads with High Accidents from 2016-20

7.3.3. Parking

Rajapalayam has inherent parking issues. Parking is free on-street. There are no off-street parking lots for cars and two-wheelers. There are two truck parking lots. Since on-street parking is free, and streets are not well designed, parking is done wherever space is available on the sides. This leads to reduction in carriageway, unsafe condition for pedestrians who must walk around parked vehicles – sometimes in the way of moving traffic. The absence of organised public transport also means over reliance on private vehicles for mobility, which in turns adds to the parking burden.

A parking survey was conducted on NH-744 to understand parking demand and turnover. The study was conducted for a 12-hour duration, for both the right side and left side of the road stretch (**Table 7.5**). The stretch between Hotel Sahana to Annapparaja School shows truck parking.

Table 7.5: **Types of Vehicles Parked on Various Stretches of NH-744**

	Locations	Type of Vehicle
P1	Gandhi Statue to Old Bus Stand	Two-Wheeler
P2	Old Bus Stand to Draupadi Amman Kovil	Two-Wheeler
P3	Gandhi Statue to Golden Jubilee Arch	Two-Wheeler/Share Auto
P4	Gandhi Statue to Railway Station	Two-Wheeler
P5	Draupadi Amman Kovil to Nehru Statue	Two-Wheeler
P6	Hotel Sahana to Annapparaja School	Two-Wheeler/ Truck/ MAVs
P7	Cotton Market to Hotel Sahana	Two-Wheeler/ Truck/ MAVs
P8	Gandhi Statue to Gandhi Kalai Mandram	Two-Wheeler

(Source: Primary survey)

Details of parking characteristics in the study locations (**Table 7.6**) indicates that “quick parkers” (30-minute duration) most commonly occupy space along the shoulders and carriageway for parking. The P6 stretch from Hotel Sahana to Annapparaja School, experience 12% very long stay parking compared to other locations. This is mainly due to parking by trucks and MAVs.

Table 7.6: **Parking Turnover**

Designation of Parking	Duration of Parking	P1	P2	P3	P4	P5	P6	P7	P8
Quick Parkers	Up to 30 min	65%	58%	69%	80%	66%	49%	43%	67%
Short Stay Parking	B/w 0.5 Hour and 1 Hour	19%	20%	12%	12%	14%	19%	25%	17%
Medium Stay Parking	B/w 1 Hour and 2 Hours	10%	10%	7%	7%	8%	16%	16%	9%
Long Stay Parking	B/w 2 Hour and 3 Hours	4%	4%	4%	1%	4%	5%	7%	3%
Very Long Stay Parking	>3 Hours	3%	8%	7%	0%	8%	12%	9%	4%
Total		100%	100%	100%	100%	100%	100%	100%	100%

(Source: Primary survey)

7.3.4. Public Transport

Rajapalayam does not have organised public transport at the town level. Buses – public and private – provide regional linkages to nearby towns. These services are frequent and well patronised.

Auto rickshaws provide an informal system, where shared services run on arterial roads, with the railway station, market and both bus stands as key destinations. Auto rickshaws are also available for individual trips at flat rates.

Overall, Rajapalayam lacks formal public transport. In the long run, this is not desirable, since it will increase dependence on private transport. At the municipal level, with an area of 9 sq.km, trip lengths are also short and a bus based public transport may not be viable.

7.4 Key Issues

Traffic and transport in Rajapalayam has multiple issues – ranging from poor hierarchy to incorrect intersection design and safety. These issues are summarized below:

1. Road hierarchy is inconsistent, especially where arterials and sub-arterials interact with collector and local streets. This results in traffic conflicts.
2. The entire network is dependent on the radial roads. These roads must be used for movement in the city. There are few alternatives to these radials.
3. The physical condition of some streets is not good and not all streets are entirely developed leading to haphazard parking, narrow footpaths and poor junction alignment.
4. RoW is not used in full capacity leading to haphazard on-street parking. Commercial activities on NH-744 generate high demand for visitor parking.
5. There is lack of cross-railway line connectivity leading to dependence on one level crossing and resulting in congestion. School children are forced to use the railway overbridge to cross the railway line.
6. The presence of NH-744 in the city centre cause safety issues. The large volume of trucks and multi-axle vehicles makes it unsafe for city traffic. Incorrectly designed RoW and intersections add to the safety issues.
7. Parking is not organised or designed. It leads to haphazard on-street parking further causing safety issues and presenting a chaotic picture.
8. Traffic surveys and projections show that arterial roads have reached saturation point and either need to be expanded or traffic needs to be managed.
9. The absence of public transport has the potential to lead to more congestion, pollution and contribute to green house gas emissions and climate impacts.





Physical Infrastructure



08



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8.1

Water Supply & Distribution

As the physical infrastructure characteristics between the municipal areas and the non-municipal areas differ greatly, they were studied and presented in the upcoming sections accordingly. It is to be noted that the physical infrastructure, to a great extent, was way below the standards and efforts were underway to bring rapid changes, especially in providing drinking water and sewage management particularly within the municipal limits.

8.1.1. Water Supply in Municipal Area

8.1.1.1. EXISTING SOURCE & QUANTITY

The total water supply for Rajapalayam Municipality is 8.50 MLD, consisting of 7.50 MLD from Mudangiyaru River near Neer Katha Ayyanar Kovil at the foothills of the Western Ghats, 1.00 MLD from ground water sources at the 6th mile dam (**Table 8.1 & Map 8.1**). The 6th mile dam lies outside the LPA and is approximately 12 km from Rajapalayam town. The Western Ghats lie around 3 to 5 km from the reservoir. The two reservoirs cover an approximate area of 65 ha and are under the ownership of Rajapalayam Municipality. The reservoir was initiated by TWAD in the year 1966 and handed over to the Municipality on 26th January 1974.

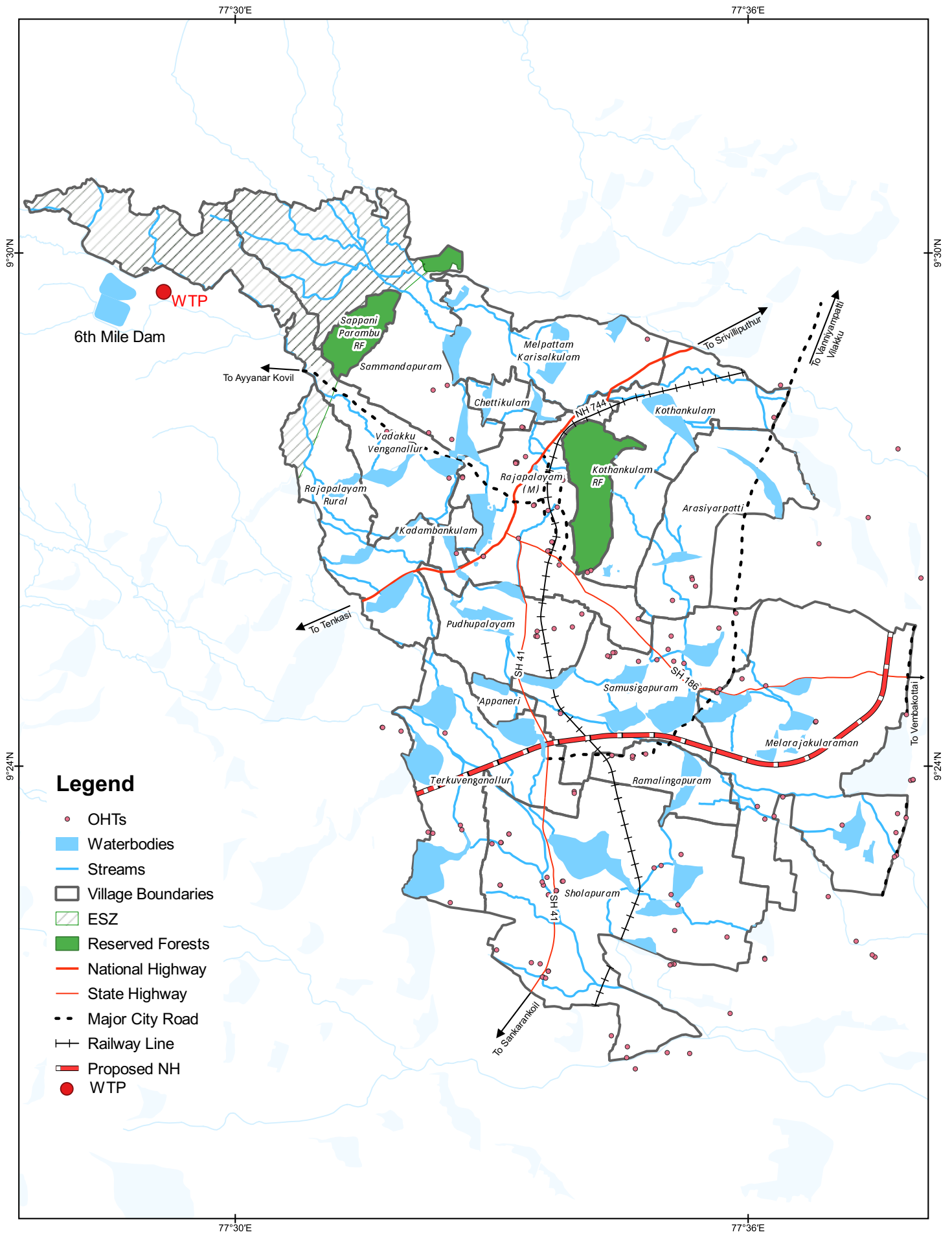
The existing treatment plant was initially designed for 6.18 MLD in 1974. However, in 1996 as part of an improvement scheme with a cost of Rs.22.51 crore, an additional two numbers of slow sand filters, four overhead tanks, 111.73 km of distribution lines were added and the treatment facility was augmented by 9 MLD.

Table 8.1: **Water Supply Sources in Municipal Area**

Water Sources in Use	Name/ Location	Number of Water Tapping Points	Quantity of Water (MLD)
Surface Water Source 1 (River Dam/ Lake/ Pond/ Canal)	Mudangiyaru River	1	7.50
Ground water source 1 (Wells/ Tube Wells/ Borewells/ Handpumps)	6th Mile Dam	Bore Well – 27 Nos. Open Wells – 11 Nos.	1.00
Treated Used Water	-	-	-
Total			8.50

(Source: Rajapalayam Municipality)

The river water is diverted to and stored in two open reservoirs (1,250 ML each). From these reservoirs the water is transmitted to a series of slow sand filters (currently non-functional) and stored in an underground cistern, from where it is then conducted by gravity to eight overhead tanks (OHTs) located throughout the city (9.55 MLD). This water is complemented with subsurface water (1.75 MLD) by continuous pumping from bore-wells and open wells located downstream of the reservoirs, conducted through PVC pipes directly to the cistern and chlorinated in situ.



Legend

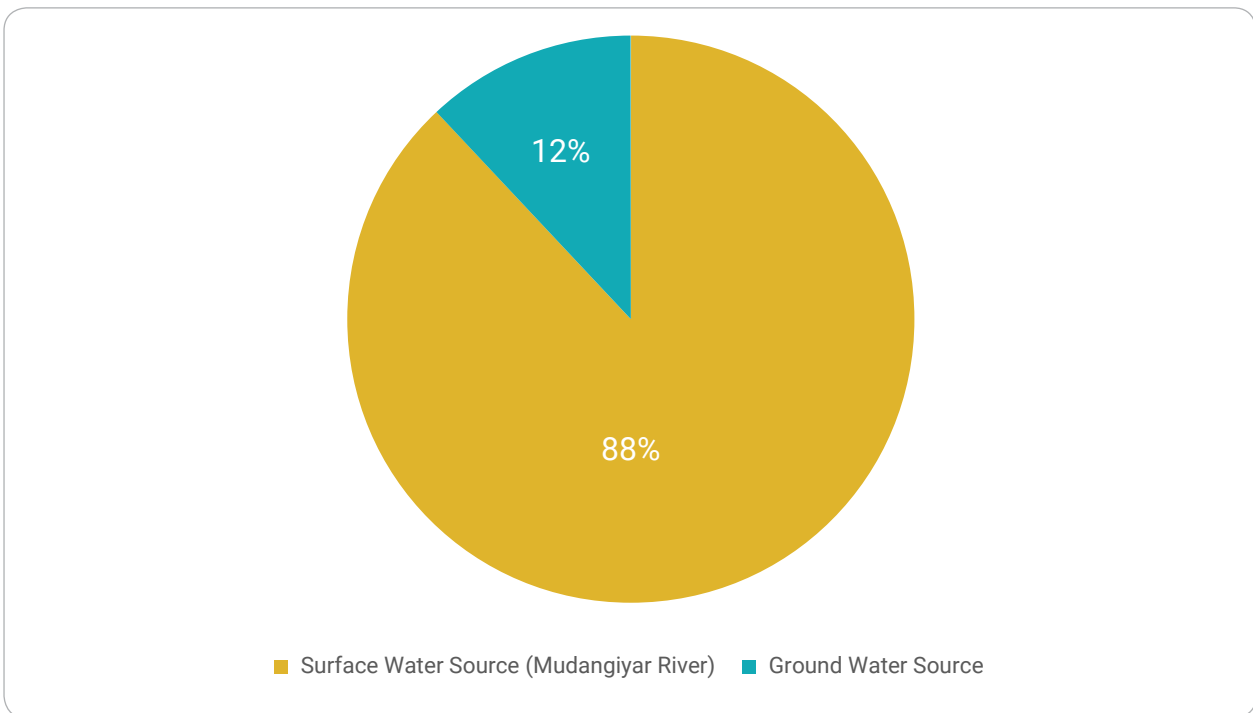
- OHTs
- Waterbodies
- Streams
- Village Boundaries
- ESZ
- Reserved Forests
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- WTP

<p>Water Supply Infrastructure in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits Rajapalayam Municipality, Field Survey - DGS Infra</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.1: Water Supply Sources for Rajapalayam UPA

Due to current deficiency in the required quantity of water supply from the Mudangiyaru River, which is the main source, tapping of groundwater through bore wells, hand pumps and open wells is practised to augment the current supplies. Considering an optimum operation and utilization of these local sources depending upon the availability of ground water and controlled drawl, the present yield from the bore wells and open wells is 1 MLD. About 88% of the current water supplied for Rajapalayam municipal area is from the surface water source i.e., Mudangiyaru River (**Fig. 8.1**). About 27 bore wells and 11 open wells near the 6th mile dam are used to augment the water supply for the municipal area.

Fig 8.1: Sources of Water for Rajapalayam Municipal Area



(Source: Analysis)

The current average supply during normal season is 69 LPCD. The water from the Mudangiyaru River is transmitted to the Summer Storage Tank (SST), which has a capacity of 48 million cubic feet. Water treatment is carried out at Mudangiyaru head works. There is one treatment plant with four slow sand filters with a designed capacity of 9.00 MLD and operational capacity of 8.50 MLD (**Table 8.2**).

Table 8.2: Fresh Water Treatment Plant

S.No.	Location of Water Treatment Plant	Current Designed Capacity of WTP (MLD)	Operational Capacity of WTP (MLD)	Technology Used for Automatic Monitoring
1	6th mile dam	9.00	8.50	Nil

(Source: Rajapalayam Municipality)

Water from the Summer Storage Tank is transmitted to the treatment plant through transmission mains (24" diameter Cast Iron pipes). Treated water is then stored in the Clear Water Reservoir of capacity 0.136 ML. The filtered water from the Clear Water Reservoir is transmitted to the Elevated Service Reservoirs in Rajapalayam town through Trunk (Gravity) Mains (9.41 km length 18" diameter Reinforced Cement Concrete pipes and 16" diameter Cast Iron pipes). The transmitted water is stored in seven Elevated Service Reservoirs (ESRs) located in the town and distributed to municipal households. The total length of the distribution system is 133.490 km.

The present water supply system was commissioned in the year 1974 for a design population of 1,25,000 assuming to meet basic water needs. Since the population of the town is currently more than 1.5 Lakh, it can be inferred that the project has reached its saturation stage and hence, a new Combined Water Supply Scheme (CWSS) is being implemented under the AMRUT scheme in the town to handle the issues in water supply. The detail of the scheme is described in the forthcoming sections.

8.1.1.2. WATER SUPPLY STORAGE

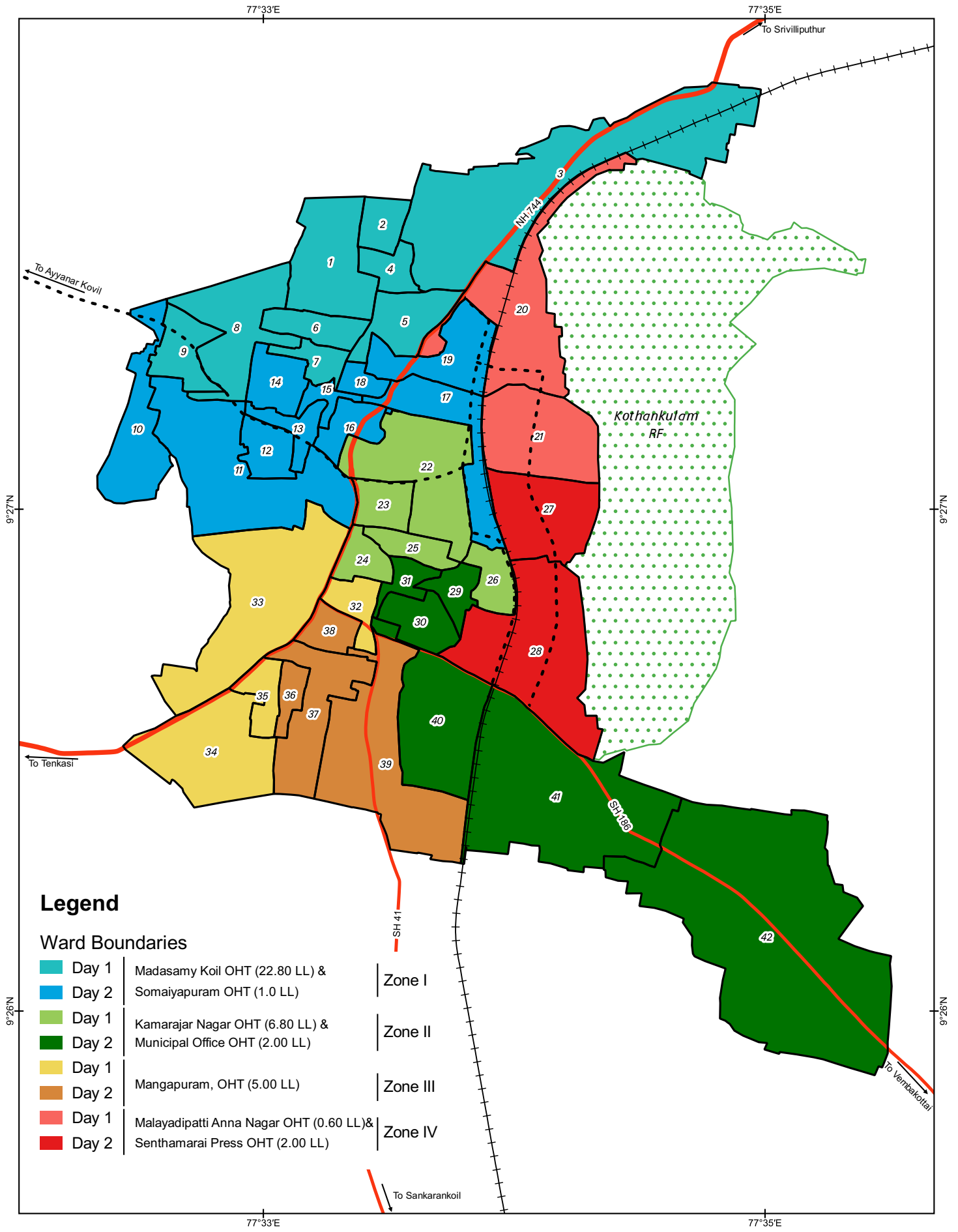
The 42 wards of the municipal area (based on pre-2022/ old ward boundaries) are divided into four zones based on physical barriers, such as the railway track, nallahs, etc. The list of wards covered in each zone and the number of household connections is listed in **Table 8.3**.

Table 8.3: **Zone-wise Division of Municipal Wards**

Zone	Old Wards Covered (Based on pre-2022 Wards)	No. of Household Connections Covered by Distribution Station
I	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	12,023
II	22, 23, 24, 25, 26, 29, 30, 31, 40, 41, 42	6,894
III	32, 33, 34, 35, 36, 37, 38, 39	5,566
IV	20, 21, 27, 28	3,713
	Total	28,196

(Source: Rajapalayam Municipality, 2011 Census)

It may be noted that Zone I and Zone II covers 41% and 26% respectively of the total households in the municipal area. Zone III covers 19% and Zone IV covers 14% of the total number of households. The ward boundaries and hydraulic zone boundaries are shown in **Map 8.2**.



<p>Hydraulic Zone and Ward Wise OHT Distribution in Rajapalayam Municipal Area</p>	<p>Notes : The Ward Boundaries Used here are According to Old Census Wards</p>	<p>Data Credits Rajapalayam Municipality, DGS Infra</p>	 <p>CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 8.2: Hydraulic Zone & Ward-wise OHT Distribution for Municipal Area
(Note: Map based on old ward division)

There are 8 Elevated Service Reservoirs existing in the municipal area and the present storage capacity of the Elevated Storage Reservoirs (ESR) is 4.02 MLD and one Ground Storage Reservoir (GSR) of capacity 0.06 MLD. The zonal distribution of water storages and details of the facilities is provided in **Table 8.4**.

Table 8.4: **Water Storage Capacity & Distribution Details in Municipal Area**

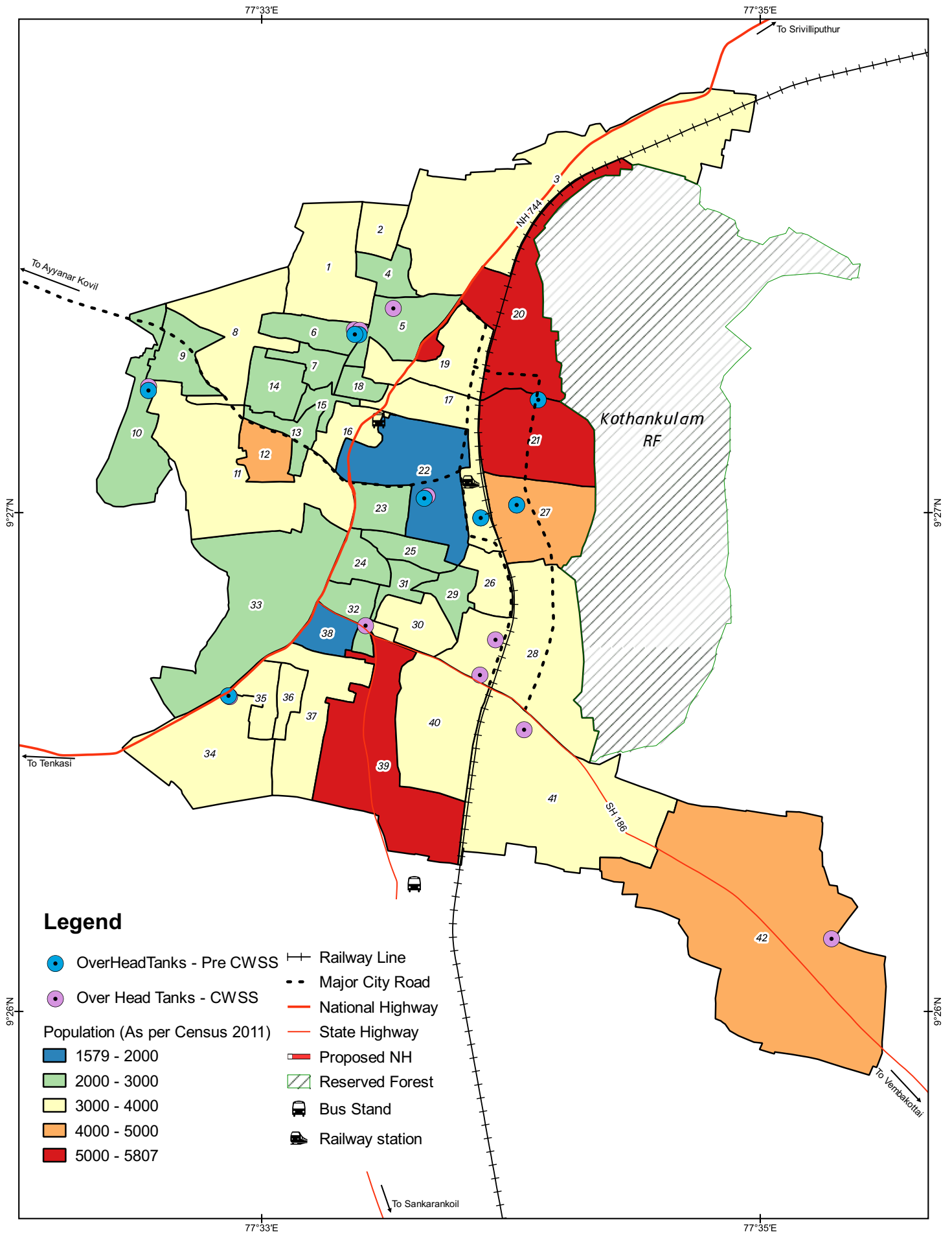
Zone	Name of the Distribution	Water Storage Capacity (GSR in ML)	Water Storage Capacity (ESR in ML)
I	Madasamy Kovil St. (Zone 1)	-	1.14
	Madasamy Kovil St. (Zone 2)	-	1.14
	Sommiyapuram (Zone 3)	-	0.1
II	Kamaraj Nagar	-	0.68
	Office OHT	0.06	0.2
III	Mangapuram ST	-	0.5
IV	Malaiyadipatti Senthamarai Press ST	-	0.2
	Malaiyadipatti Anna Nagar ST	-	0.06
	Total	0.06	4.02

(Source: Rajapalayam Municipality)

It can be noted that Zone I has the maximum storage of about 59% (2.38 ML), followed by Zone II with 22% (0.88 ML) of the total storage capacity. Zone III has about 12% (0.5 ML) and Zone IV has about 6% (0.26 ML) of the total storage capacity.

The average storage capacity is only about 17% of the total water requirement (calculated at 135 LPCD) and near about 43% of the total water available currently for the municipal area. However, newer storage facilities are proposed as part of CWSS system and the details of the same is presented in the following sections.

The locations of existing ESRs (OHTs) in the four zones as well as the locations of new tanks built under the CWSS scheme of municipal area is shown in **Map 8.3**.



Ward-wise Population & ESR (OHT) location in Rajapalayam Municipal Area

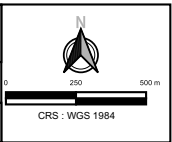
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :
The Municipal Wards used are wards Old Ward Boundaries used Pre 2022.

Data Credits
Rajapalayam Municipality

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville



Map 8.3: Ward-wise Population & ESR (OHT) Location in Municipal Area
(Note: Map based on old ward division)

8.1.1.3. WATER SUPPLY DISTRIBUTION SYSTEM

The total length of distribution main existing in the town is 133.49 km. The water from the service reservoirs and local sources are supplied to the public through public fountains and service connections.

Within the town, the per capita supply of water varies from 40 LPCD to 65 LPCD and the entire town has taken up the CWSS for improvement of water supply. The ward wise supply details of number of connection and length of distribution network is listed in **Table 8.5**.

Note: The no. of households and ward boundaries listed in **Table 8.5** are as per old boundaries which existed pre-2022, as the population are based on 2011 Census.

Table 8.5: **Ward-wise Household Water Supply Connections in Municipal Area**

Zone	Old Ward No.	Length of Streets	Length of water Distribution Pipe	Total No. of Households (2021)	Total No. of Household Connections (2021)	Balance to be Connected (2021)
I	1	7,850	6,500	1,323	967	356
I	2	1,940	1,750	884	599	285
I	3	4,284	2,000	1,178	362	816
I	4	1,063	1,000	976	633	343
I	5	3,505	3,400	749	553	196
I	6	2,238	2,200	741	543	198
I	7	2,079	2,000	794	584	210
I	8	4,392	3,300	1,075	757	318
I	9	1,834	1,700	853	560	293
I	10	2,190	2,100	929	528	401
I	11	5,156	5,100	1,160	757	403
I	12	1,822	1,800	1,054	661	393
I	13	3,179	3,100	750	595	155
I	14	1,680	1,600	687	534	153
I	15	996	1,000	774	614	160
I	16	2,683	2,580	915	687	228
I	17	3,109	3,000	1,061	828	233
I	18	1,556	1,360	705	540	165
I	19	2,561	2,500	1,064	721	343
IV	20	9,705	4,500	1,635	802	833
IV	21	5,878	4,500	1,948	1,331	617
II	22	6,247	6,000	737	587	150
II	23	1,379	1,200	674	445	229
II	24	1,700	1,600	712	475	237
II	25	1,455	1,300	739	502	237
II	26	1,995	1,800	923	645	278
IV	27	4,774	4,500	1,290	884	406
IV	28	6,144	5,200	1,276	696	580

Zone	Old Ward No.	Length of Streets	Length of water Distribution Pipe	Total No. of Households (2021)	Total No. of Household Connections (2021)	Balance to be Connected (2021)
II	29	1,795	1,700	859	493	366
II	30	1,890	1,750	1,192	652	540
II	31	870	1,000	1,047	585	462
III	32	2,069	1,800	769	534	235
III	33	3,596	3,500	1,060	780	280
III	34	5,616	5,550	1,266	807	459
III	35	2,403	2,300	780	491	289
III	36	2,600	2,400	954	640	314
III	37	5,197	5,000	1,055	691	364
III	38	1,702	1,600	661	475	186
III	39	8,112	7,500	1,857	1,148	709
II	40	4,496	4,000	1,342	804	538
II	41	6,108	5,800	1,287	801	486
II	42	12,550	11,000	1,782	905	877
Total				43,517	28,196	15,321

(Source: Rajapalayam Municipality)

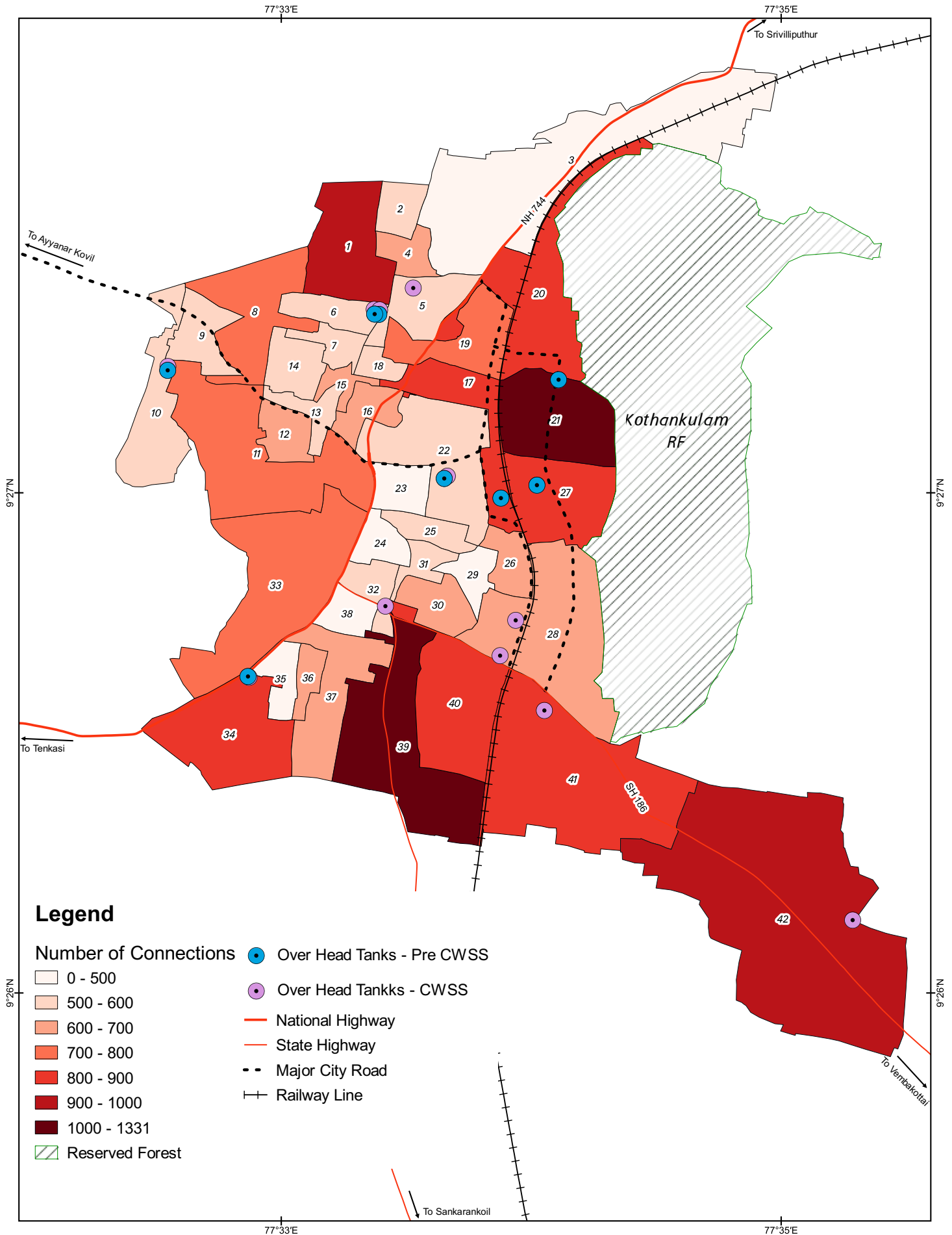
It can be noted that about 88% of the road length across the town has been covered with water distribution pipeline. The total coverage of distribution network in old ward nos. 3 and 20 are less than 50% and old ward nos. 10, 28, 29, 30, 31, 41 and 42 are between 50%-60%; the remaining wards have greater than 60% coverage. Ward-wise household connections given in the municipal area is shown in **Map 8.4**.

The average length of water supply distribution network in Zone I, II and III is more than 89% and is about 71% in Zone IV (**Table 8.6**).

Table 8.6: **Zone-wise Length of Distribution Network**

Zone	Length of Roads (Meters)	Length of Water Supply Distribution Pipeline (Meters)	% of Length of Distribution Network to Length of Streets
I	54,117	47,990	89%
II	40,485	37,150	92%
III	31,295	29,650	95%
IV	26,501	18,700	71%

(Source: Analysis)



Ward-wise Household Water Supply Connections in Municipal Area

AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :
The Municipal Wards used are wards Old Ward Boundaries used Pre 2022.

Data Credits
Rajapalayam Municipality, DGS Infra

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Tapasya Design Studio, Auroville

CRS : WGS 1984

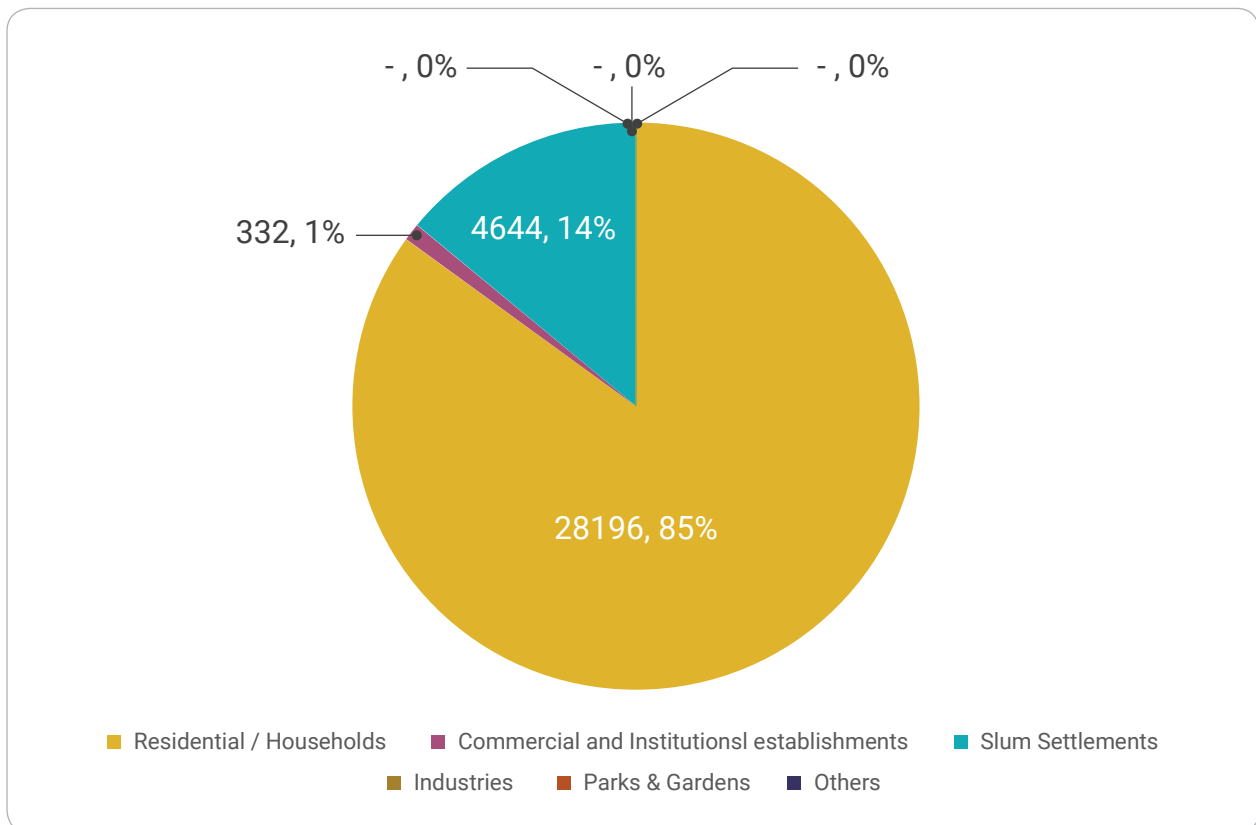
Map 8.4: Ward-wise Household Water Supply Connections in Municipal Area
(Note: Map based on old ward division)

8.1.1.4. SERVICE CONNECTIONS

As per the Urban and Regional Development Plans Formulation and Implementation Guidelines (URDPFI) and Central Public Health and Environmental Engineering Organization (CPHEEO) all households and establishments need to be provided by safe piped water connection at their households.

As per the recent data from the municipality, the total number of service connections are 33,172. Of which about 85% (28,196) are household connections in general residential areas and about 14% (4,644) are household connections in the slum settlements. Only about 1% of the total connections are commercial / institutional. No industrial establishments are served water from the Municipality (Fig. 8.2).

Fig 8.2: Service Connections in Municipal Area



(Source: Rajapalayam Municipality)

Households in the Municipality are about 43,517 and the number of households connected with piped water connection is 28,196, leaving about 35% of the households without piped water connection at their households. However, it is learnt that, as part of the CWSS initiatives, efforts are made to cover 100% households with piped water connection.

Table 8.7: **Zone-wise Details of House Service Connections**

Zone	Number of Households (HH)	House Service Connection (HSC)	% of HH Connected to HSC
I	17,672	12,023	68%
II	11,294	6,894	61%
III	8,402	5,566	66%
IV	6,149	3,713	60%

(Source: Rajapalayam Municipality, Analysis)

It can be noted from **Table 8.7** that Zones II and IV have lesser number of house service connections and relatively lower distribution network system.

On a detailed ward wise analysis, the wards which needs specific focus for improving household service connections were identified (**Table 8.8**). The ward numbers are as per the pre-2022/ old ward boundaries. In these, old ward no. 3 at the entrance to Rajapalayam from Srivilliputhur and old ward 20 at the foothills of Sanjeevi Malai and between railway line have the least house service connections.

Table 8.8: **Wards Requiring Focus for Service Connections**

% of House Service Connections	Old Ward No.	Zone
<50%	3	I
	20	IV
50%-60%	10	I
	28	IV
	29	II
	30	II
	31	II
	42	II
	42	II

8.1.1.5. USER CHARGES

The house service connections are charged at a flat rate of Rs.51 per month for residential connections and Rs.101 per month for commercial and industrial connections (**Table 8.9**).

Table 8.9: **User Charges for Water Supply**

Type of Connections	Number of Connections Provided	Water Tariff Collected per KLD (Rs./ month)
Residential / Households	28,196	Rs.51 per month
Commercial & Institutional establishments	332	Rs.101 per month
Industries	-	Rs.101 per month
Parks & Gardens	-	-
Others (Public fountain)	-	-
Slum Settlements	4,644	Rs.51 per month
Total	33,172	

(Source: Rajapalayam Municipality)

8.1.1.6. SUMMARY OF WATER SUPPLY IN MUNICIPAL AREA

A summary of the water supply and distribution system in the municipal area is listed in **Table 8.10**.

Table 8.10: **Summary of Water Supply and Distribution System for Municipal Area**

Population of the Town (2011 Census)	1,30,442
Population of the Town (as per CWSS assessment for the year 2017)	1,50,000
Number of wards	42
Total Municipal area	9.59 sq.km
Per day supply	8.50 MLD
Frequency of supply	Once in 2-4 days
Supply	69 LPCD (72 LPCD at the time of report preparation)
Transmission	
Length of the Road Network within the wards (in km)	152.40
Length of the Water Distribution pipe within the wards (in km)	133.50
Total No. of Households in the Municipality (2021)	43,517
Total No. of water HSCs (2021)	28,196
Balance No. of HH to be provided with the Water Tap Connections	15,321
Storage	
No. of OHTs	8
Total Storage Capacity	4.02 MLD (1.14 x 2 + 0.1+0.68+0.2+0.5+0.2+0.06)
Water Treatment Plant Capacity	6.18 MLD (Design capacity in 1974) 9 MLD (Current capacity)
Tariff	
Domestic	Rs.51/ month
Commercial / Industrial	Rs.101/ month

(Source: Rajapalayam Municipality.)

8.1.1.7. SERVICE ADEQUACY & SERVICE LEVEL INDICATOR

Key issues/ indicators and comparison to the benchmark levels are based on review, discussions and data analysis (Table 8.11).

Table 8.11: Service Level Indicators for Water Supply in the Municipal Area

S.No.	Indicators	Current Situation	Benchmark Levels
1	Treatment capacity / Total supply	105%	100%
2	Coverage of WS connections (Population)	65%	100%
3	Per capita availability of WS at consumer end	69 LPCD	135 LPCD
4	Extent of metering of WS connections	None	100%
5	Extent of Non-Revenue Water	NA	20%
6	Continuity of Water Supply	Once in 2-3 days	24x7
7	Quality of Water Supplied	Adequate	100%
8	Storage capacity with respect to supply (Municipal supply)	47%	> 33%
9	Pucca Roads covered with distribution network	88%	>100%

(Source: Analysis)

8.1.1.8. HOUSEHOLD SURVEY ANALYSIS

A household survey was conducted covering 554 households. The samples were collected in proportion to wards and covered each ward. Similarly, it is to be noted that the wards mentioned here are based on pre-2022/ old ward boundaries, which were in vogue while the survey was conducted.

Source of Water

Potable Water: The household survey analysis in the Rajapalayam Municipality shows that around 79% of the households were dependent on tap water for drinking water, the other major share of source of 6% is from lake. 9% of the HHs draw water from bore well and 3% rely on Government / Private Water tankers. Hand pump & river has equal share of 1% in the source contribution.

Old ward 16, 23, 26, 32, 35 & 39 depend on other sources like lake/ borewell for at least 25% to 30% of the survey households and old wards 5, 9, 10, 11, 12, 13, 17, 18, 24, 38, 40 were totally dependent on municipal tap water for their drinking need.

Domestic Water: The major source of water for domestic purpose is by tap water for about 52% households surveyed and 24% depend on tube well/ borewell. 7% of the surveyed households in municipal area meet their demand by a combined source which includes tap water, tube well/ borehole. 5 % use water from wells & 6% takes from lakes/ ponds/ tanks. The packaged/ bottled water use is seen in 1% of the surveyed households in municipal area. Ward wise analysis for the source of domestic water shows that all the wards in the municipal area have mixed source in which tap water & bore well are predominant.

Storage of Water

The supplied water is stored via multiple combined ways in the municipal area. It is interesting to note that around 47% of households store water in buckets/ drums/ pots. Majority of the households surveyed, irrespective of the age of the building, use buckets/drums/pots as a means to store water.

Frequency of Water Supply

Potable Water: 89% of the households in various wards in the municipal area responded that the water is supplied weekly once. Only 6% said the supply is daily and 2% alternative days. As per the survey, the households in old wards 3, 9, 10, 11, 13, 14, 15, 16, 18, 21, 22, 24, 25, 30, 35, 39 & 40 receive water once in a week. 25% of the households in the ward 32 & 38 mentioned that they receive daily supply.

Domestic water: In municipal area 56% of the households get domestic water weekly once and 35% daily.

Treatment Method

The water in the municipal area is majorly supplied once in a week and the storage is also majorly in the buckets/ drums/ pots. Therefore, the supplied water needs to be treated for daily usage. From the sample survey it is inferred that 65% of the households boil the water and households which have storage facilities like tanks/sumps etc. use bleach/ chlorine tablet to cleanse the water. Only 3% mention the use of electric purifier (RO or UV).

Rainwater Harvesting

Around 40% of the households in the municipal area have rainwater harvesting facilities in their premises. This is an indication to promote/educate people to establish the rainwater harvesting facilities which can be used to recharge ground water.

User Charges & Willingness to Pay

Around 39% of the households were regular water taxpayers in the municipal area for the existing supply. With respect to willingness of the people to pay for the 24x7 water supply in the future, 52% of the households do not want to pay the tax and interestingly 60% of the respondents said that it is not possible to have 24x7 water supply which indicates lack of awareness. 21% of the respondents were willing to pay around 31-50 Rs./ month and 20% were willing to pay around 51-100 Rs./ month.

User Satisfaction

The supplied water quantity satisfies 73% of the surveyed households in Municipality which indicates that people are used to the current practice for long time. Rajapalayam also has gaps in water source for ensuring adequate supply; this scenario might change after the CWSS comes into practice.

8.1.2. Ongoing Projects – CWSS

8.1.2.1. BACKGROUND

This project has proposed to increase the service level of water from 90 LPCD to 135 LPCD in Municipalities and has committed to supply 14.28 MLD in 2032 for a projected population of 1.8 lakh and 19.01 MLD by 2047 for a projected population of 2.15 lakh. The quantity is including 10% transmission loss and 5% backwash loss in MLD.

CWSS – Rajapalayam Municipality

The ongoing CWSS proposes to provide 19.01 MLD of water to the municipal area for the ultimate year 2041. The components for Rajapalayam Municipality are

- Construction of 10 number of Over Head service reservoirs
- Laying of feeder mains for a distance of 10.51 km
- Laying of distribution mains of 139.80 km within municipal limits
- Provision of 38,586 number of House Service Connections

There are eight existing Elevated Level Service Reservoirs (ELSR) available in Rajapalayam Municipality. In the available ELSRs, 11.40 LL capacity service reservoir (2 nos.) and 6.81 LL capacity service reservoir (1 no.) are not considered under the combined water supply scheme since the staging height is only 7m. 5.00 LL capacity service reservoir (1 no.), 2.00 LL capacity service reservoir (2 nos.) and 1.00 LL capacity service reservoirs (1 no.) are proposed to be utilized in this project. It is proposed to construct 10 more service reservoirs of various capacities in various locations of Rajapalayam Municipality as detailed below.

1. 4.00 LL service reservoir, 16 m staging - 1 no. (Zone 9)
2. 5.00 LL service reservoir, 16 m staging - 2 no. (Zones 7, 11)
3. 6.00 LL service reservoir, 16 m staging - 2 nos. at Kamarajar Nagar (Zone 13 & Zone 14)
4. 6.80 LL service reservoir, 16 m staging - 1 no. (Zone 6)
5. 7.00 LL service reservoir, 16 m staging - 1 no. (Zone 12)
6. 8.40 LL service reservoir, 16 m staging - 1 no. (Zone 4)
7. 11.40 LL service reservoir, 16 m staging - 2 nos. (Zone 1 & Zone 2)

However, currently the municipal area is only covered with the water from Ayyanar Kovil and sub-surface sources, though most the area has already been covered with the distribution network from the Combined Water Supply Scheme.

8.1.2.2. SWOT ANALYSIS OF CWSS SCHEME

The CWSS scheme has been designed and implemented by TWAD as per the norms and practices. SWOT analysis of the scheme is presented in **Table 8.12**.

Table 8.12: **SWOT of CWSS Scheme**

Strength	<ul style="list-style-type: none"> • Improved access to sustainable surface source • Migration from GW centric WSS in water-stressed/ drought prone region • Design storage capacity increased to handle augmented service delivery • Network & HSCs coverage augmented • Improved Service Delivery & O&M Revenue Stream • Improved climate resilience of WSS to handle CC linked risks of lowered precipitation, increased temperatures & recurrent/ prolonged droughts
Weakness	<ul style="list-style-type: none"> • Full migration to non-GW sources not feasible - Water stressed region coupled with long-distance access to strained surface source (Tamirabarani River) • Equitable supply to CWSS beneficiaries - Challenge during lowered precipitation (surface sources) • Bulk water transmission & delivery costs - Need for increase in per-capita charges (or) budgetary support
Opportunities	<ul style="list-style-type: none"> • City-wide GW monitoring system introduction • New/ revamped Infrastructure - better NRW monitoring of piped system • Resilient drought management by ULB • Water Conservation through GW recharge • Captive re-use of treated wastewater from UGSS STP
Threat	<ul style="list-style-type: none"> • Elevated risk of summer demand shortfall unless GW recharge/ conservation is performed • Un-willingness to pay - either full or irregular payments likely to strain ULB finances and affect O&M service delivery • Continued unmonitored tapping of GW - higher per-capita level energy consumption - lowered carbon footprint

8.1.3. Water Supply in Non-Municipal Area

Currently (2021) the total number of households in the non-municipal area is 39,923 and considering the household size 3.43 (as per Census 2011), total population can be calculated to 1.36 lakhs.

8.1.3.1. WATER SOURCE

The primary source for water supply in the non-municipal areas is borewells. Few villages also get bulk water from the CWSS scheme and is currently used as a top-up water with water from bore wells. The number of bore wells in each village panchayat is listed in **Table 8.13**.

Table 8.13: **Number of Water Sources (Borewells) in Non-Municipal Area**

S.No.	Village Name	No. of Water Sources (Borewells)
1	Kothankulam	4
2	Sholapuram	5
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	4
4	Samusigapuram	7
5	Melarajakularaman	5
6	Kalangerperi (Arasiyarpatti)	
7	Melpattam Karisalkulam, Sammandapuram pt.	6
8	Ramalingapuram	3
9	Terkuvenganallur, Kadambankulam (pt.), Pudhupalayam pt.	11
10	Chettikulam	4

(Source: Office of Block Development Officer & Village Panchayats)

The village currently supplies water once in 3-5 days at the rate of 55 LPCD from the ground water resources at an average of 1.4 lakh litres per borewell. The range varies from 2.74 lakh litres in Melarajakularaman to 0.95 lakh litres in Kothankulam.

Water is supplied by village panchayats via water from borewells stored in overhead water tanks (ESRs). Households collect water from community taps near their streets.

8.1.3.2. WATER STORAGE

Primarily water is pumped to the ESRs and then distributed by gravity to the households/ standposts in the villages. There are 147 ESRs of varying capacity from 0.1 lakh litres to 2.0 lakh litres in the non-municipal area of the LPA. The ESRs in the revenue villages are listed in **Table 8.14**.

Table 8.14: **Number of Tanks and Capacity in Non-Municipal Area**

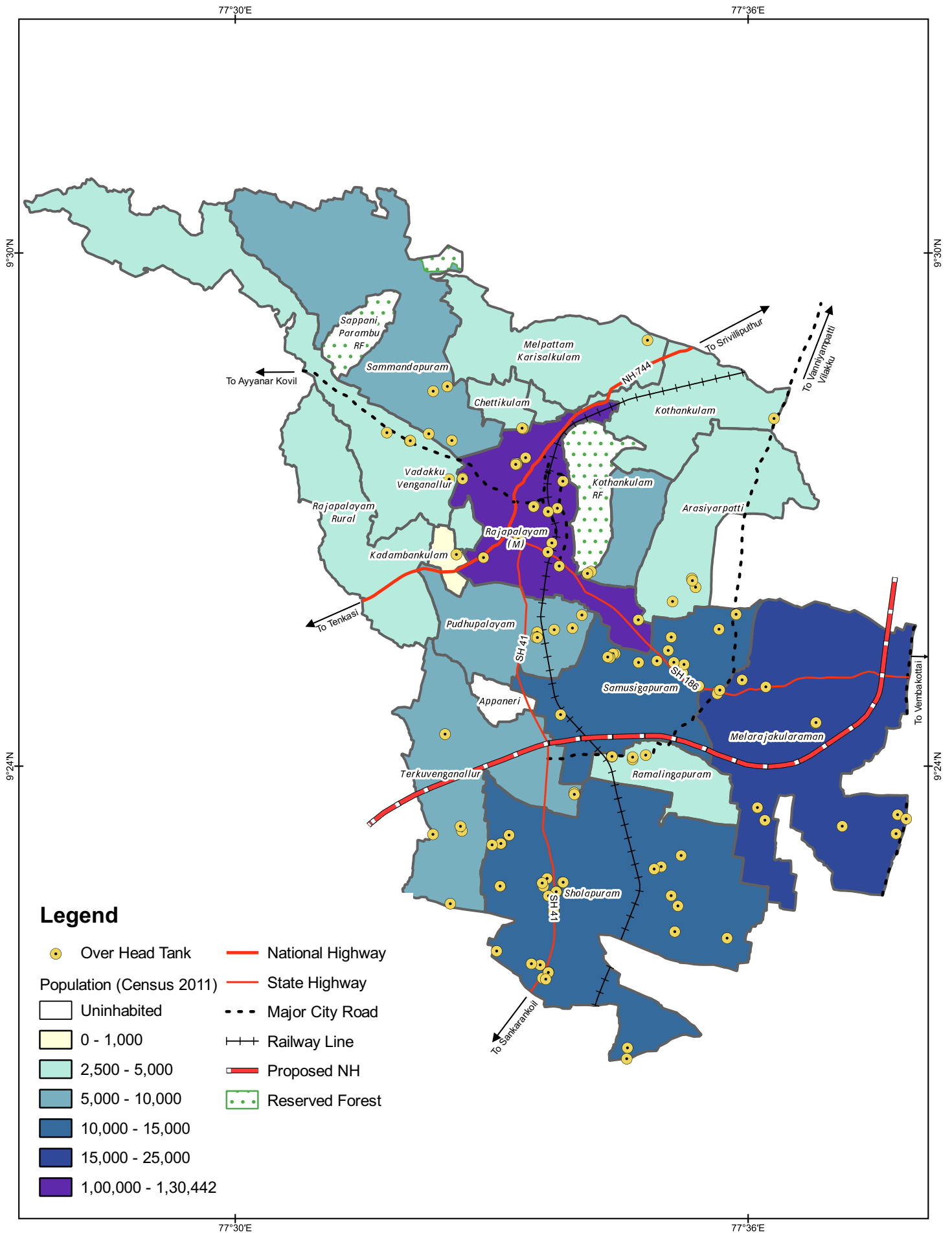
S.No.	Village Name	Number of Tanks & Capacity (Litres)						Total Capacity (LL)
		10K	30K	60K	100K	200K	TOTAL	
1	Kothankulam	2	4	3	-	-	9	3.2
2	Sholapuram	5	8	1	2	-	16	5.5
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	3	3	3	1	-	10	4.0
4	Samusigapuram	11	14	2	3	-	30	9.5
5	Melarajakularaman	9	8	7	5	-	29	12.5
6	Kalangerperi (Arasiyarpatti)	3	6	1	-	-	10	2.7
7	Melpattam Karisalkulam, Sammandapuram pt.	5	8	-	1	2	16	8.9
8	Ramalingapuram	-	-	-	-	-	0	2.5
9	Terkuvenganallur, Kadambankulam (pt.), Pudhupalayam pt.	3	16	3	1	-	23	7.9
10	Chettikulam	1	1	2	-	-	4	1.6
		42	68	22	13	2	147	58.3

(Source: Office of Block Development Officer & Village Panchayats)

The listed ESRs are mapped using GIS (**Map 8.5**) along with the population. It is observed that the villages situated in the southern side of municipal area were denser in terms of population & OHT Nos.

The average storage available per capita is 43 litres. The storage capacity ranges from 63 litres per capita in Melpattam Karisalkulam to 31 litres per capita in Terkuvenganallur.

However, when the per capita supply is increased to 70 LPCD as per National Rural Drinking Water Programme (NRDWP), many panchayats may face shortage of ESRs.



<p>Population and OHT Locations in Rajapalayam LPA</p>	<p>Notes The Village wise Population was considered from Census 2011.</p>	<p>Data Credits Census of India, 2011; DGS Infra, IGC</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.5: Population & OHT Location in Rajapalayam LPA

8.1.3.3. DISTRIBUTION SYSTEM & SERVICE CONNECTIONS

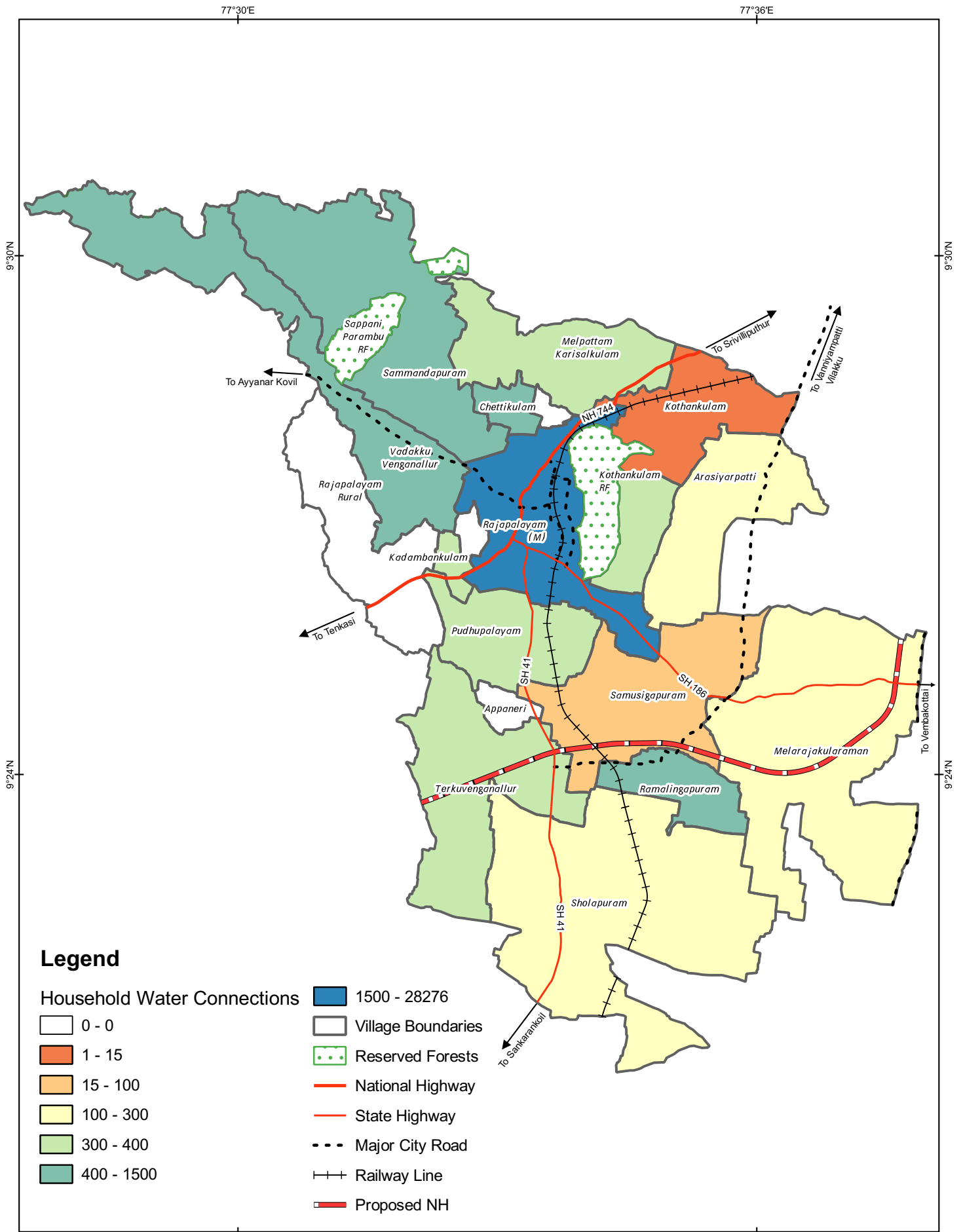
The distribution of water happens primarily through community standposts (**Table 8.15**), which are located at an interval of every 4 to 23 households.

Table 8.15: **Standposts & HSCs in Non-Municipal Area**

S.No.	Village Name	No. of Standposts	Individual Household Connections
1	Kothankulam	324	13
2	Sholapuram	620	252
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	150	1,357
4	Samusigapuram	1,527	75
5	Melarajakularaman	856	120
6	Kalangerperi (Arasiyarpatti)	244	211
7	Melpattam Karisalkulam, Sammandapuram pt.	554	391
8	Ramalingapuram	86	1,350
9	Terkuvenganallur, Kadambankulam (pt.), Pudhupalayam pt.	1,855	398
10	Chettikulam	29	1,250
	TOTAL	6,245	5,417

(Source: Office of Block Development Officer & Village Panchayat)

About 17% of households have individual household connections. However, this number is skewed between Panchayats. Chettikulam claims to have about 97% of individual household service connection. Vadaku Venganallur also has high household service connection (41%). This may be due to the proximity to the Rajapalayam municipal area. The density map shows the number of individual household connections (**Map 8.6**)

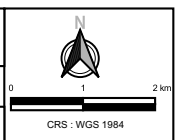


Village-wise Household Water Supply connections in Rajapalayam LPA

AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Note: The Data Recorded by BDO Office is according to the Village Panchayat delineation and not the Revenue Village. Hence, the data could be considered accurate, but not precise

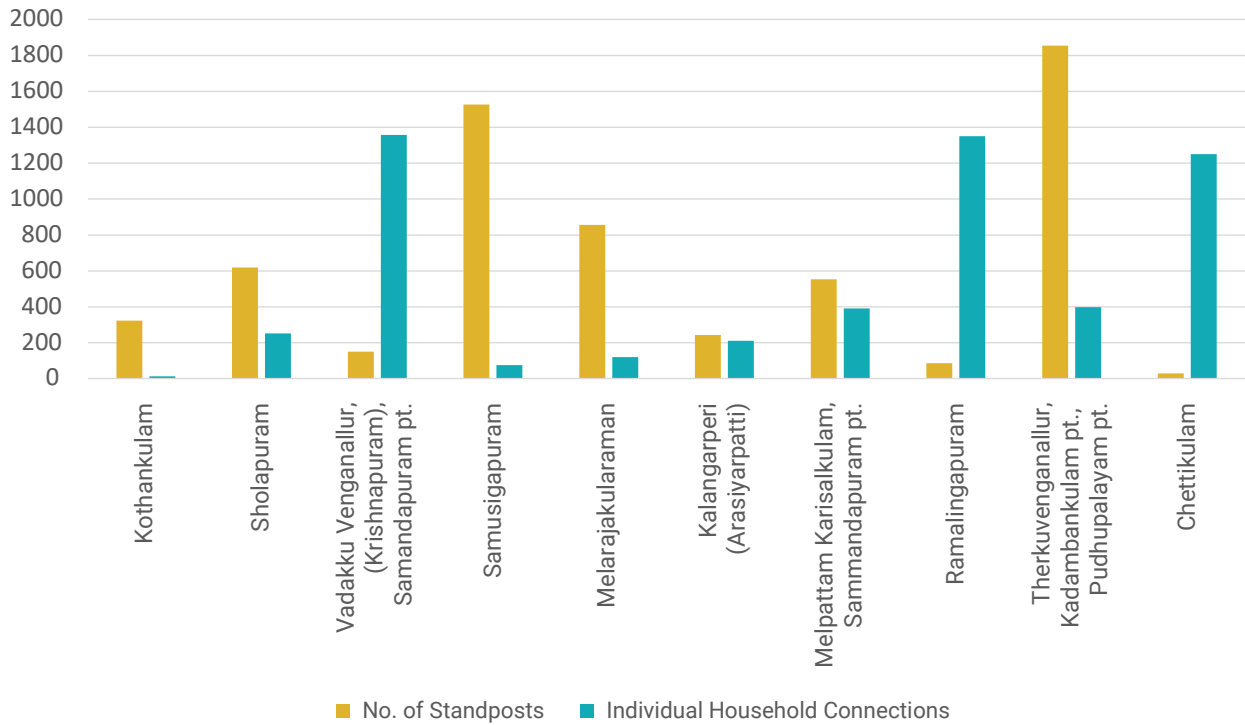
Data Credits
Office of the Block Development Officer and Village Panchayats
Client
DTCP Virudhunagar
Prepared By
Tapasya Design Studio, Auroville



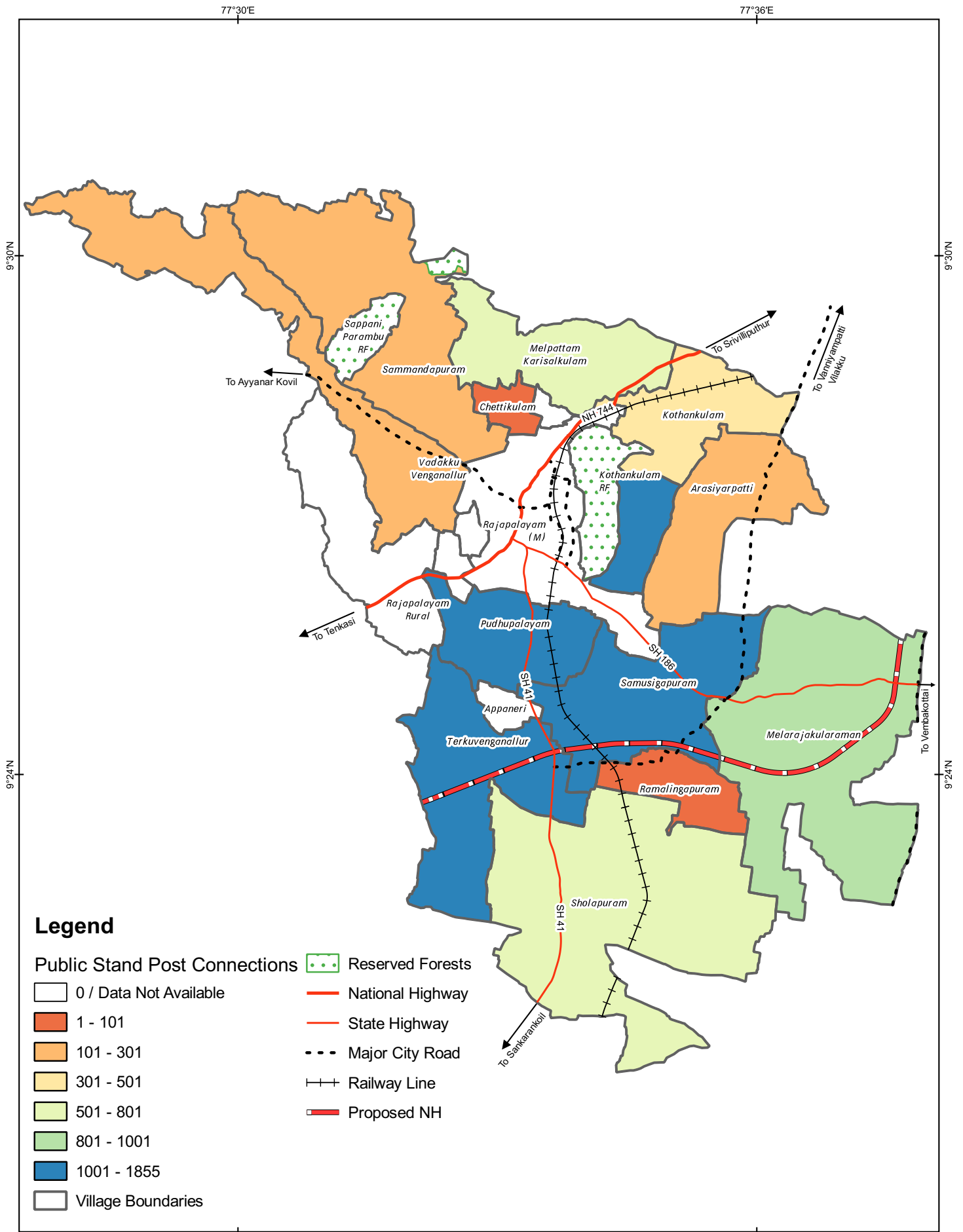
Map 8.6: Village-wise Household Water Supply Connections in LPA

Figure 8.3 captures the distribution of standposts and individual household service connection in panchayats. The skew in distribution of individual household service connection is evident. Panchayats like Ramalingapuram, Kothankulam, Samusigapuram, Melarajakularaman, Terkuvenganallur, Sholapuram, Melpattam Karisalkulam have less than 10% of the total households covered with individual service connections.

Fig 8.3: **Public Stand Posts & Individual Connections in Non-Municipal Area**



The practice for positioning of standposts is one stand post for every 3 to 7 households. However, in the Rajapalayam non-municipal area, the range varies from 4 to 23 households. The current average of public standposts is for every 8 households. Chettikulam & Vadaku Venganallur are being excluded in the analysis of standposts as it claims to have high number of household service connections. Terkuvenganallur has standposts for every 4 households and Ramalingapuram has public standposts for every 23 households. The location of public stand posts for the villages are shown in **Map 8.7**.



<p>Public Stand Post Density in Non-Municipal Area</p>	<p>Notes The Data Recorded by the BDO Office is according to the Village Panchayat delineation and not the Revenue Village; Hence the data here could be considered accurate, but not precise</p>	<p>Data Credits Census of India 2011, Rajapalayam Municipality, Field Survey, DGS Infra Client DTCP Virudhunagar</p>	 <p>CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<p>Prepared By Tapasya Design Studio, Auroville</p>		

Map 8.7: Public Stand Post Density in Non-Municipal Area

8.1.3.4. SUMMARY OF WATER SUPPLY IN NON-MUNICIPAL AREA

A summary of the water supply and distribution system in the non-municipal area is listed in **Table 8.16**.

Table 8.16: **Summary of Water Supply and Distribution in Non-Municipal Area**

Total population in Non-Municipal area (as per 2011 census)	86,000
Population as of 2021 calculated based on no. of households	1,36,936
Number of villages	15
Total Non-Municipal area	139.47 sq.km
Per-day supply	55 LPCD
Frequency of supply	Alternate days
Supply LPCD as of 2021	40
Total No. of Individual HSCs	5,417
Total No. of Community taps	6,245
Storage	
No. of OHTs	147
Total Storage Capacity	58.3 LL
Water Treatment plant capacity	Nil

(Source: Village Panchayats & BDO)

8.1.3.5. SERVICE ADEQUACY & SERVICE LEVEL INDICATOR

Key issues/indicators and comparison to the benchmark levels are based on review and discussions and data analysis (**Table 8.17**).

Table 8.17: **Service Level Indicators for Water Supply in Non-Municipal Area**

S.No.	Indicators	Current Situation	Benchmark Levels
1	Treatment capacity / Total supply	Nil	100%
2	Coverage of WS connections (Population)	17%	100%
3	Per capita availability of WS at consumer end	55 LPCD	70 LPCD
6	Continuity of Water Supply	Once in 3-5 days	24x7
8	Storage capacity with respect to supply	77%	>33%

8.1.3.6. Household Survey Analysis

In the non-municipal areas consisting of 15 revenue villages a total of 462 household were covered to ascertain relevant data as a part of primary data collection. The households were proportionately spread with respect to each settlement in the revenue villages.

Source of Water

Drinking Water: Household survey analysis in the non-municipal area clearly indicates that the people are dependent on tap water as their major source of water supply. About 74% of the households were relying only on tap water for drinking water, and about 15% are dependent on tap water topped additionally with other source like tanker truck, bore well, pond etc. Of this, only

about 12% of the households have tap connections are inside their households. About 79% of the respondents dependent on taps outside their property which are majorly the community taps and stand posts.

Only about 3% of the respondents use tube well/bore well as drinking water source. Only about 5% of the users are dependent on tanker trucks for water and spend on an average of Rs. 101-200 per month (about 42%) and 26% less than Rs.50.

Domestic Water: In the non-municipal area, the respondents are dependent on tap water as their major source for domestic water also. About 81% of the households were dependent only on tap water for domestic water, and about 13% are dependent on tube well/bore well.

Location & Distance

Drinking Water: Only 21% of households responded that they have water source which is either inside their property or house, 65% of the respondents replied that the community taps are less than 50 feet from the household, which is a good sign.

Domestic Water: 65% of respondents say that community taps are available in less than 50 feet from their household.

Storage of Water

Buckets/ drums & pots are majorly the mediums of storage of water (82%) in the non-municipal area. Combination of buckets/ drums & pots with overhead tank constitute about 11% of the total storage facilities. Without buckets/drums, storage of water in the sump and overhead tanks only constitute about 7%.

About 74% of people throw out the excess water stored in the buckets/drums to fill up water. While water is supplied every day or alternate day in the non-municipal area, throwing out the excess water leads to excessive wastage of water.

Frequency of Water Supply

Drinking Water: Drinking water is supplied every alternate day (35%) or every day (28%) in the non-municipal area. In many areas (about 31%) water is also supplied once in a week. On a deeper analysis of the data, it may be inferred that Kadambankulam, Pudhupalayam and Vadakku Venganallur village panchayats have a higher incidence of weekly supply of drinking water and thus the supply needs to be strengthened here. Villages like Melarajakularaman, Kothankulam, Sammandapuram & Chettikulam are supplied with daily or alternate day water supply. The timing of the supply is majorly in the morning (68%).

Domestic Water: Domestic water is supplied daily as per only 42% of the respondents and on alternate day as per 35% in the non-municipal area.

Treatment Method

Nearly half the respondents (55%) treat the water that they receive. The traditional treatment methods like boiling (64%) and bleach/chlorine tablets (32%) are prevalently used for treatment of water. Advanced systems like Electric RO purifier are not very prevalent (3%) in the non-municipal areas.

Rainwater Harvesting

Majority of the households do not practice rainwater harvesting in their localities (85%). Education on the need for rainwater harvesting may need to be introduced at a large scale in the non-municipal area and probably in the municipal area also.

User Charges & Willingness to Pay

As majority are dependent on the community taps for their water requirements, the metered connection is negligible (3%) in the non-municipal area. Water is being charged as flat rate in the non-municipal area, only about 11% pay user charges in the non-municipal areas.

About 80% of the respondents felt that 24/7 water supply in the non-municipal areas is not possible and about 6% were unsure if it was possible. High incidence of negative outlook on feasibility for 24/7 water supply noticed from almost all gram panchayats except Arasiyarpatti, Melarajakularaman, Sholapuram and Terkuvenganallur. The households were also not willing to pay enough for 24/7 water supply. Only about 33% were willing to pay for water supply and preferred to pay less than Rs.100 per month.

User Satisfaction

71% of the households surveyed feel that the current water supply system is sufficient to meet their basic needs. The respondents were in general content with the quantity and quality of water supply in the non-municipal areas. The average rating for taste, color, odour, suspended particules and general quality of water was 4 out of 5.

8.2.1. Sewerage & Sanitation in Municipal Area

8.2.1.1. EXISTING SANITATION SITUATION

The existing system of sanitation of households comprises septic tanks and soak pits. There is no septage management/treatment plant in Rajapalayam currently in use. The black water septages from the septic tanks are collected via private tankers and disposed in the open places or dumped in water bodies and streams. Currently in the municipal area (3 zones and 42

8.2 Sewerage System & Sanitation

municipal wards), a UGSS system is under implementation by Rajapalayam Municipality and is yet to be inaugurated.

From the densely populated old town areas, sewage from toilets/ septic tanks and sullage is discharged mostly into existing open drains, which are constructed along the streets in the town (**Fig. 8.4**). In the houses where soak pits are available, the septic tank effluent and sullage from bath and kitchens is let into soak pits.

The wastewater discharged into open drains accumulates in low lying areas of the town and flows into the irrigation tanks in the periphery of the town. There are no rivers flowing through the town, and drainage is mainly controlled by irrigation tanks/ ooranis/ Nallahs in and around the town.

Fig 8.4: **Sullage in Open Drains in Municipal Area (Near Palayapalayam)**



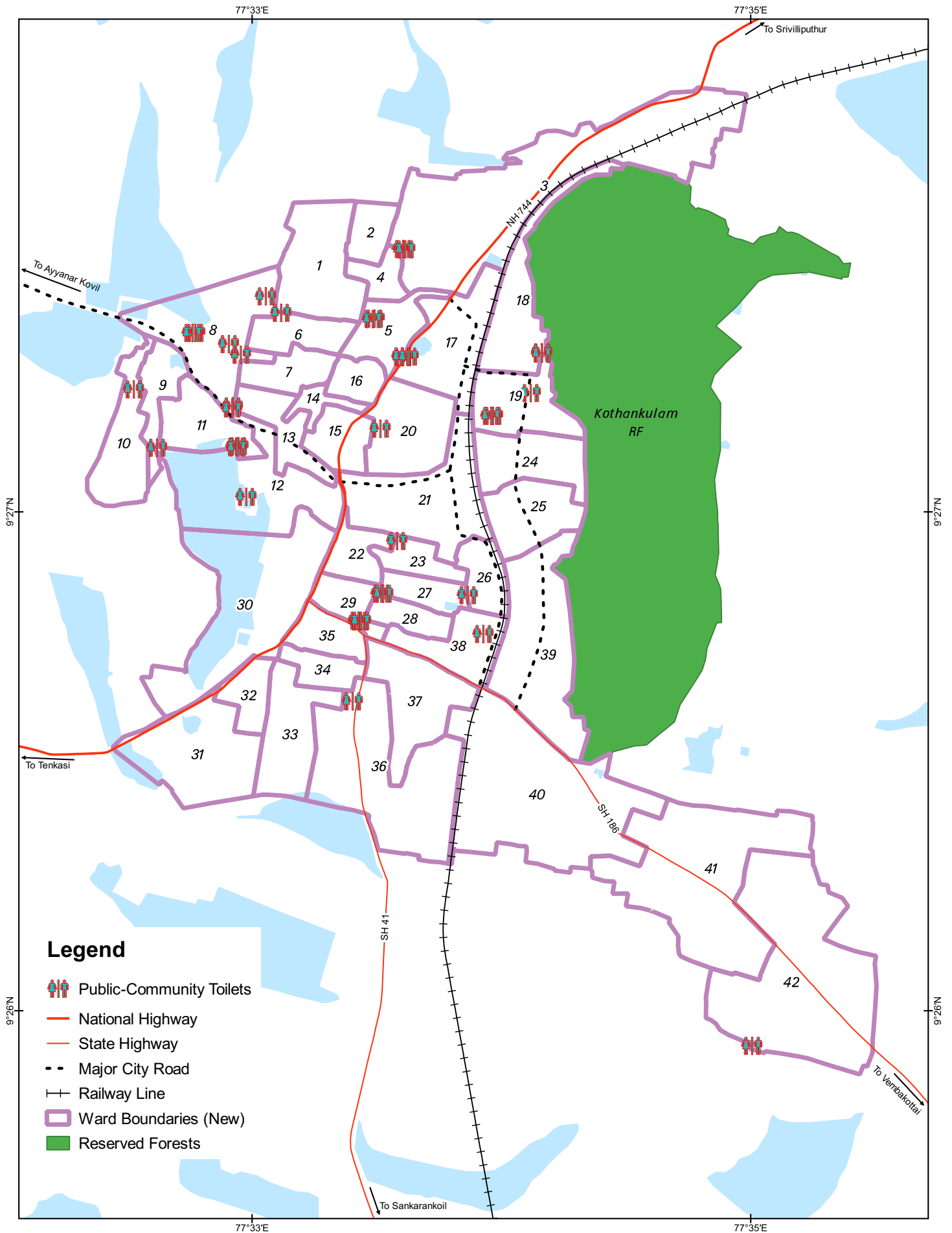
8.2.1.2. DETAILS OF PUBLIC / COMMUNITY TOILETS IN MUNICIPAL AREA

According to the Rajapalayam Municipal Handbook (MHB) report (2019–2020), 103% of the households (i.e.) 44,836 Households in the Municipality have latrine facilities within their premises. From the Municipal Public Health Office report, there are in total 73 toilet blocks in the Municipality, of which 67 are community toilets and the balance 6 are public toilets (**Table 8.18 & Map 8.8**). Out of 73 toilet blocks, currently 52 were in use; 21 blocks were not in use, are not in usable condition and require continuous maintenance. Open defecation is also observed in few areas close to slums and in the peripheral areas (near Madasamy Kovil Street, near Sanjeevi Street, etc.).

Table 8.18: **Snapshot of Sanitation Facilities in Municipal Area**

Total No. of Community Toilets	67
Total No. of Public Toilets	6
Total No. of Toilet Seats	584
Total No. of Urinals	4

(Source: Rajapalayam Municipality)



Legend

- Public-Community Toilets
- National Highway
- State Highway
- Major City Road
- Railway Line
- Ward Boundaries (New)
- Reserved Forests

<p>Public and Community Toilets in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits Rajapalayam Municipality, Field Survey, DGS Infra</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.8: Public/ Community Toilets in Municipal Area

Figure 8.5 shows the community toilet block constructed along the Madasamy Kovil 60-foot Road by Rajapalayam Municipality under Swatch Bharat Scheme during the year 2015-16.

Fig 8.5: **Community Toilet Block in Madasamy Kovil 60 ft. Road**



8.2.1.3. SERVICE ADEQUACY & SERVICE LEVEL INDICATOR

Key issues/indicators and comparison to the benchmark levels are based on review and discussions and data analysis (**Table 8.19**).

Table 8.19: **Service Level Indicators for HH Toilets and Sewerage in Municipal Area**

S.No.	Indicators	Current Situation	Benchmark Levels
1	Coverage of Wastewater network service	0% (to be 100% after UGSS is implemented)	100%
2	Toilets in every household	100%	100%
3	Collection efficiency of Wastewater network	NA	100%
4	Adequacy of Wastewater treatment capacity	0% (to be 100% after UGSS is implemented)	100%
5	Quality of Wastewater treatment	NA	100%
6	Extent of reuse & recycling of treated Wastewater	NA	20%
7	Extent of cost recovery in Wastewater management	NA	100%
8	Coverage of toilets	100% (but few toilets not functional)	100%

8.2.1.4. HOUSEHOLD SURVEY ANALYSIS

A household survey was conducted covering 554 households. The samples were collected in proportion to wards and covered each ward. Similarly, it is to be noted that the wards mentioned here are pre-2022/ old ward boundaries, which were in vogue while the survey was conducted. Data related to the sewerage survey are presented in **Maps 8.9-8.11**.

Sewerage Connection

The Underground Sewerage System (UGSS) is being implemented in the municipal area as an urban flagship investment project. Pipelines in the municipal area were laid and some of the households were connected to the network and some components need to be constructed and connected to the network. UGSS will be expected to operate by 2023. From the household survey it is ascertained that 80% of the households surveyed have sewerage connection. After the completion of UGSS, it is expected that sewerage connection in municipal area will be 100%.

Ward-wise analysis indicates some wards such as old wards 22, 32, 38 need to be given priority in giving connection as more than 50% households surveyed did not have sewerage connection and old wards 14, 15, 16, 24, 25, 26 & 27 are fully covered under sewerage connection.

Sewerage Clogging

As there is no sewerage system in the municipal area, only 18% of the respondents have issues of clogging in the existing system of sewage disposal like drains/ septic tanks. From the ward wise analysis, it is noted that the old ward nos.16, 23, 25 & 27 seem to have more water clogging issues as 50-80% of the respondents of these wards have highlighted it (**Map 8.9**).

User Charges

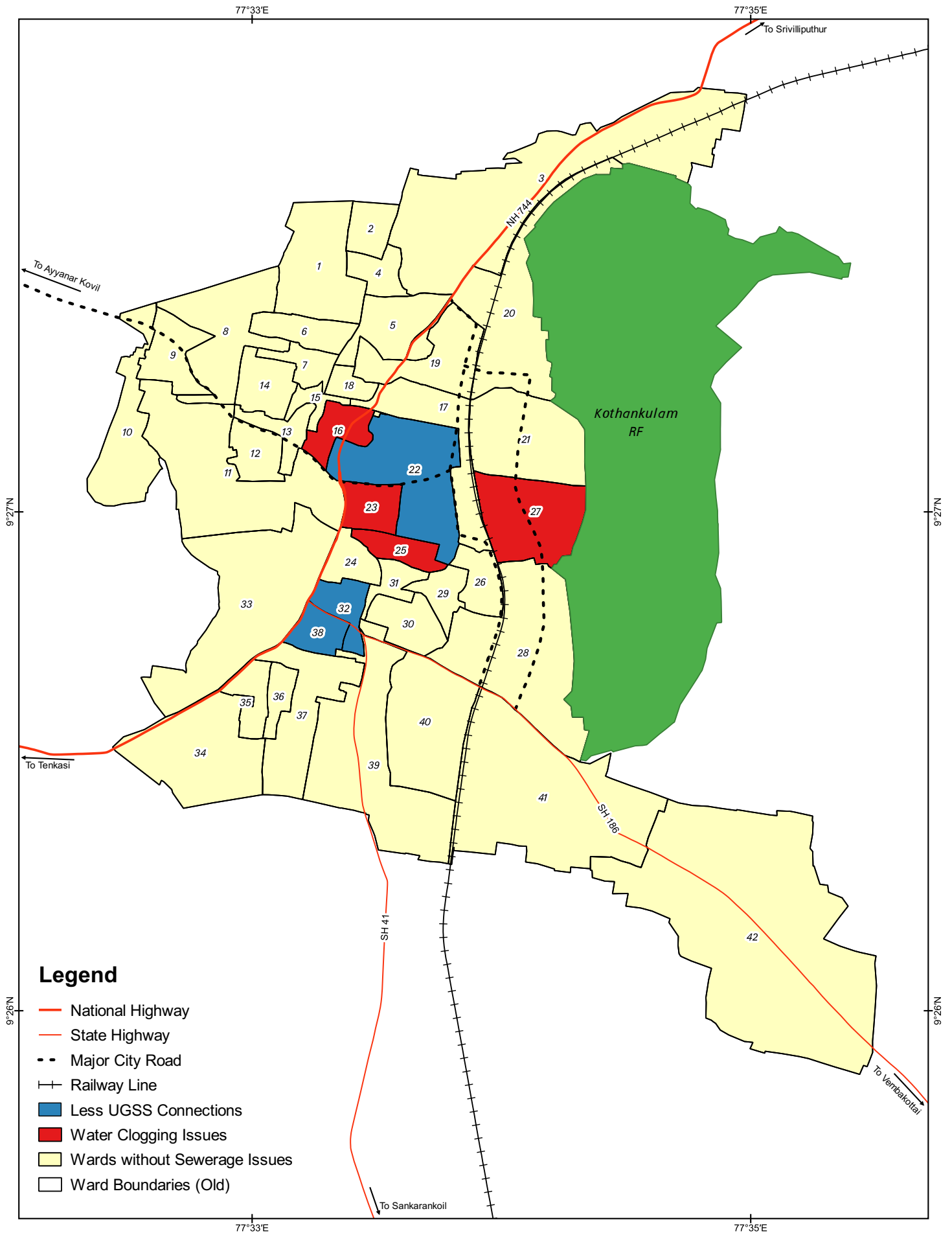
From the sample survey, 61% of the people were not willing pay for the UGSS in the municipal area similar to water supply, and only 32% of the households were willing to pay.

Sanitation Facilities – Availability of Toilets

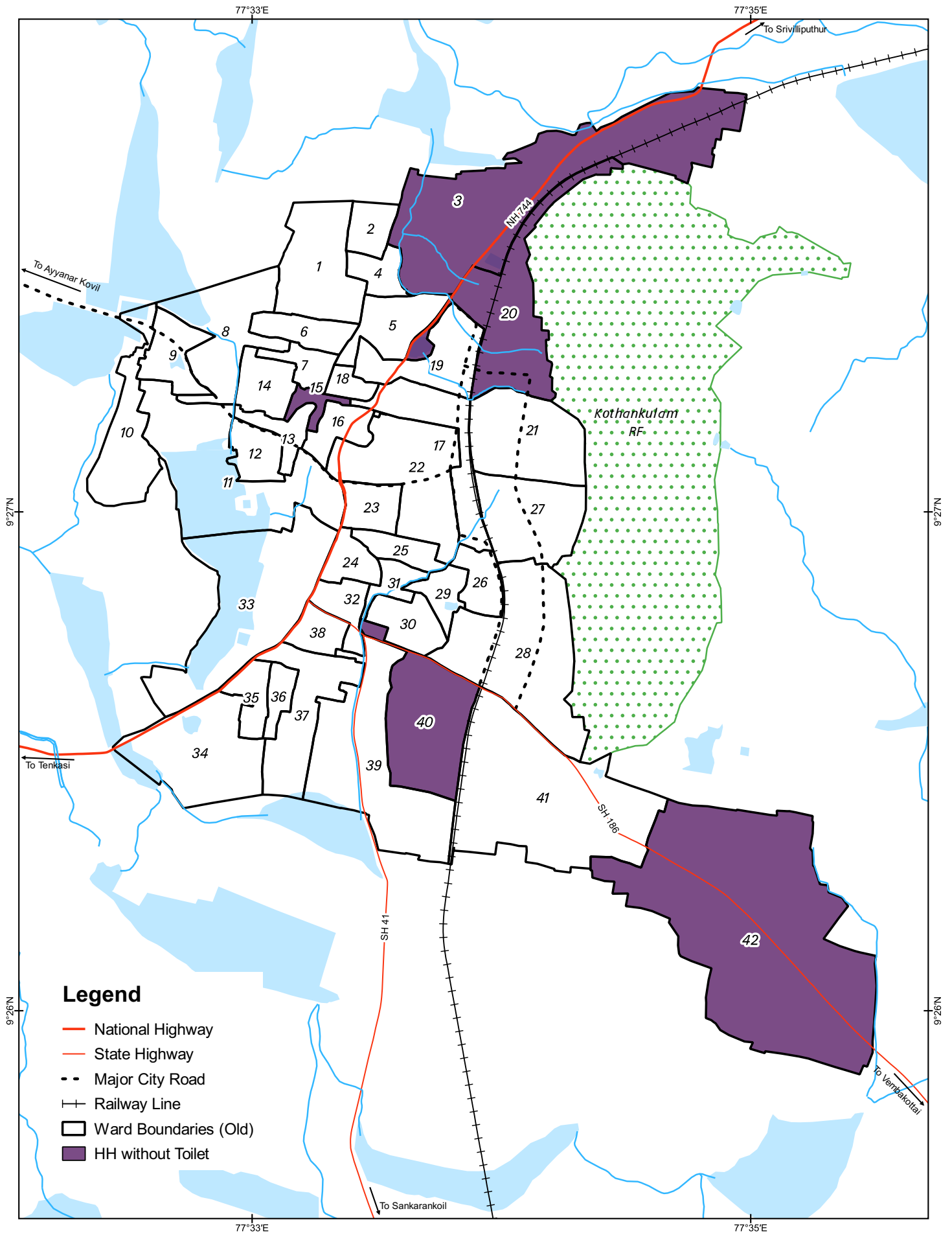
Toilet facilities for every individual household is one of the top national priorities. Municipal records state 100% coverage of households for toilet facilities. Sample survey data indicated that individual toilet facilities were predominant i.e., 83% of the households from the sample survey have toilets in their premises and 8% use community toilets. Around 5% of the households don't have a toilet, which leads to open defecation and around 4% already practise open defecation and insist on building more sanitary facilities in the municipal area. Wards with highest deficiency in HH toilets based on sample survey is presented in **Map 8.10**.

Ward wise analysis shows that in ward no.16 around 80% of the participating households depended on community toilets, 30-40% of the households in the ward nos. 12, 15 & 35 depend on community toilets. In ward nos. 2, 25 & 42, 40-50% respondent households practiced open defecation (**Map 8.11**). In ward no.3, 15 and 20 nearly 30% households claim they do not have toilets in their households. In ward 8 and 21 nearly 15% of the households claim to not have toilets.

During the HH sample survey 14% of respondents in municipal area mentioned the prevalence of open defecation in their area. Around 24 respondents go up to 50 feet for open defecation, which indicates locational availability also stimulates open defecation to some extent. On the other hand, around 33 respondents travel 200 or more feet for open defecation, which indicates the non-availability of toilets in certain wards. Of a total of 172 respondents, 50% indicated that community toilets were at a distance of less than 50 feet from their households.



Map 8.9: Critical Zones for Waste Management in Municipal Area
(Note: Map based on old ward division)



Wards with Highest No. of Household without Toilets in Rajapalayam Municipal Area

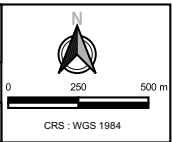
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes
The Map is a representation based on the Data collected from the Household Survey

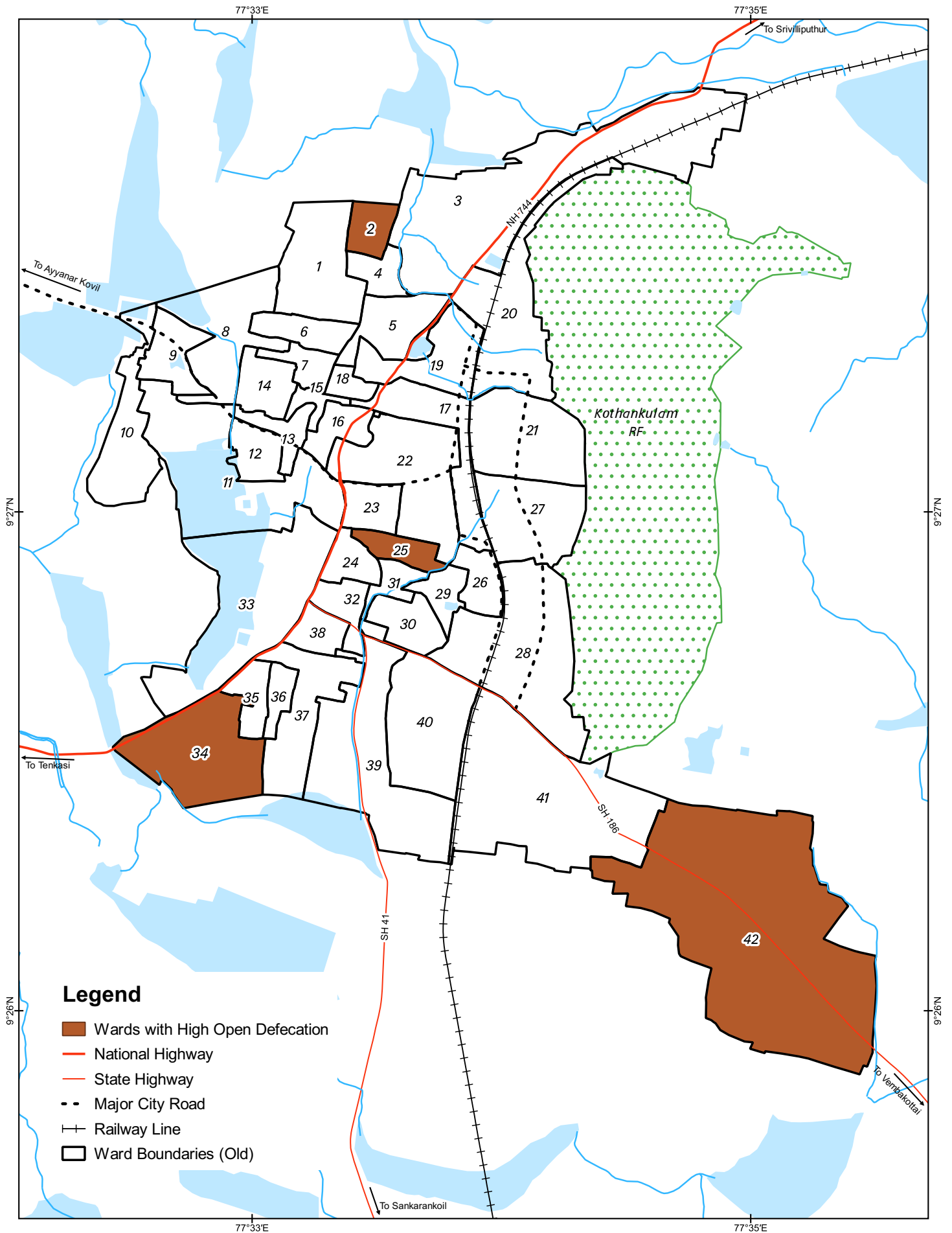
Data Credits
Rajapalayam Municipality, Field Survey

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville



Map 8.10: Wards with Highest Deficiency in HH Toilets in Municipal Area
(Note: Map based on old ward division)



Legend

- Wards with High Open Defecation
- National Highway
- State Highway
- Major City Road
- Railway Line
- Ward Boundaries (Old)

<p style="text-align: center;">Wards with High Open Defecation in Rajapalayam Municipal Area</p>	<p><small>Notes</small> The Map is a representation based on the Data collected from the Household Survey</p>	<p><small>Data Credits</small> Rajapalayam Municipality, Field Survey</p> <p><small>Client</small> DTCP Virudhunagar</p> <p><small>Prepared By</small> Tapasya Design Studio, Auroville</p>
<p style="text-align: center;">AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<div style="display: flex; align-items: center; justify-content: flex-end;"> <p style="font-size: 8px; margin-left: 5px;">CRS : WGS 1984</p> </div>	

Map 8.11: Open Defecation Prevalence in Municipal Area
(Note: Map based on old ward division)

Sanitation Facilities – Quality of Community Toilets

Around 92% of the community toilets were rated as falling between 3-5 and 8 % were rated very low, as there is no proper maintenance. The Rajapalayam Municipality record also backs the statement as 52 toilets in the municipal area is in working condition and 21 were not in use.

8.2.2. Proposed Underground Sewerage System (UGSS)

Rajapalayam Municipality proposed to provide underground sewerage system to cover the entire municipal area comprising 3 zones and 42 municipal wards, and is the implementation agency for this subproject. The DPR for the UGSS has been prepared by TWAD Board; it is supporting the Municipality in the implementation of the project (**Map 8.12**).

8.2.2.1. PROJECT DETAILS

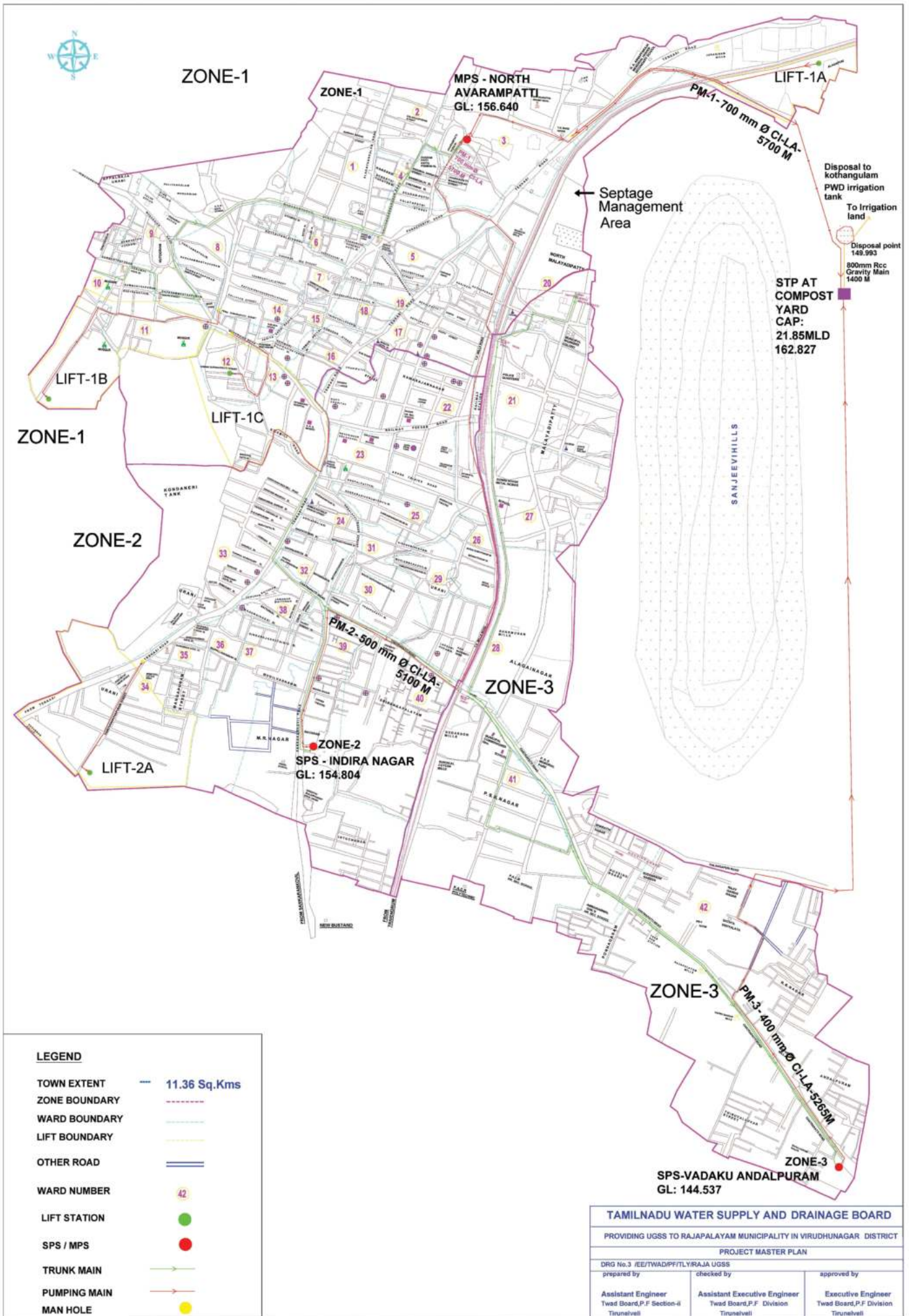
UGSS is proposed for Rajapalayam Municipality, spread over an area of 11.36 sq.km and population of about 1,30,442, as per the project report. The project area is split into three zones comprising 42 wards and covering a road length of 153.98 km. The base year population as per the projection is 1,55,000 by 2020 and designed for the ultimate year population of 2,20,000 by the year of 2050.

The system is designed as a separate underground system catering only to domestic wastewater; storm runoff generated during rains will be carried by existing open drains and dispose into natural streams/ water bodies. Industrial wastewater will not be disposed into sewers. The water supply rate of 135 LPCD is considered in the design for working out the total sewage flow. The system is designed for 115 LPCD, based on the sewage generation rate of at least 80% of water supply system. The system is designed with gravity flow as far as possible, however topography does not permit a complete gravity system from collection to inlet at the STP, and therefore wherever required sewage lifting and pumping stations are introduced to optimize the system design. **Map 8.13** shows the Network drawing of UGSS.

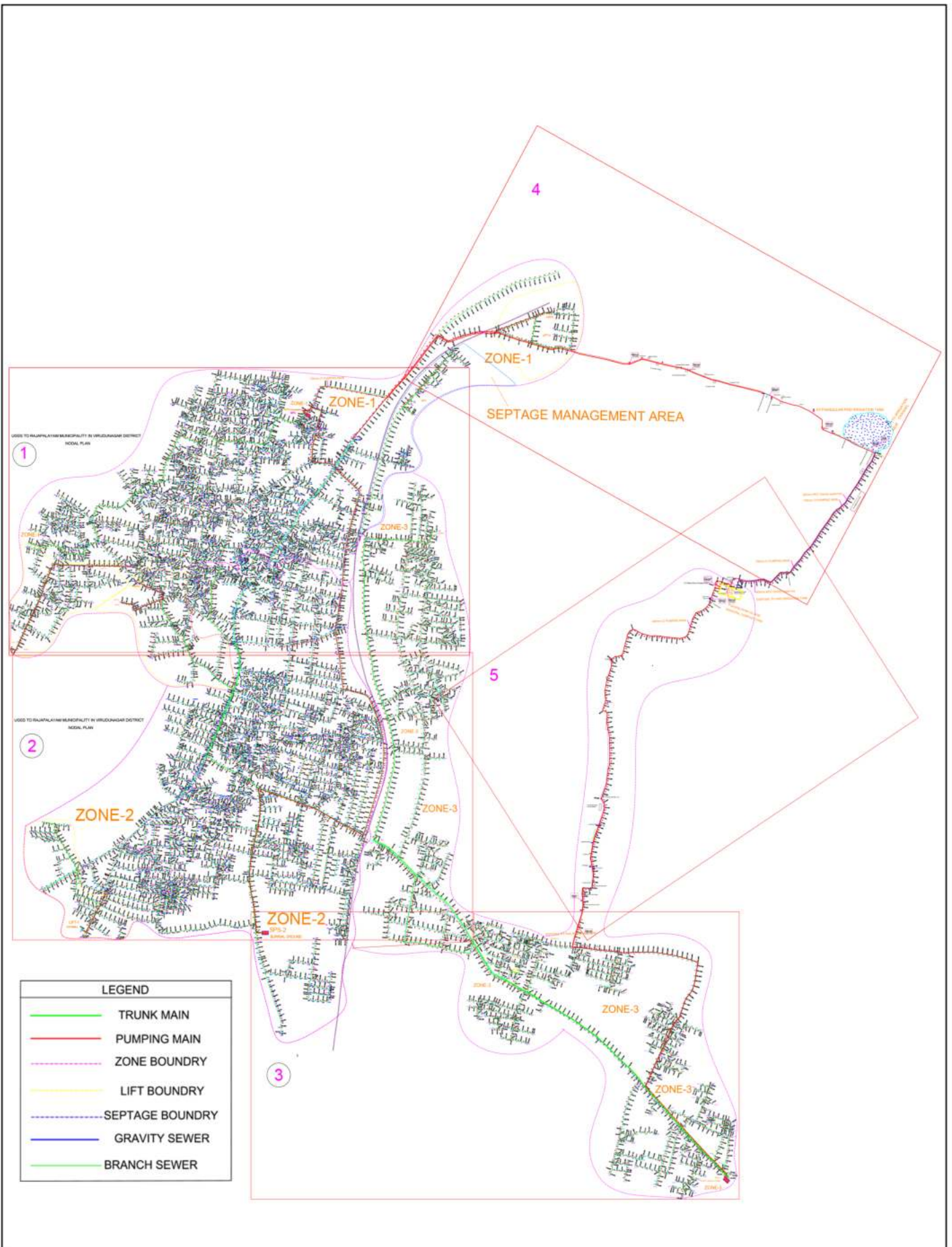
The Underground Sewerage Scheme to Rajapalayam Municipality is implemented in two packages:

- Package 1 – 157.174 km collection system, 20.642 km pumping main, 4 lift stations, 3 sub-pumping stations and 1 main pumping station
- Package 2 – STP of 21.85 MLD capacity and 1.4 km outfall sewer for disposal into Kothankulam irrigation tank

The contract for packages 1 and 2 was awarded to M/s. Eco Protection Engineers Private Limited, Chennai on 10 October 2018.



Map 8.12: Proposed Sewerage Zones
 (Source: UGSS, Resettlement Plan Report)



<p>Underground Sewerage System (UGSS) Plan for Rajapalayam Municipal Area</p>	<p>Notes :</p>	<p>Data Credits Primary Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client</p> <p>Prepared By TWAD, Tirunelveli</p>	

Map 8.13: **UGSS, Network map in Rajapalayam Municipality**
(Source: TWAD Board, UGSS Project Division)

The salient details of the UGSS for the municipal area are presented in **Table 8.20**.

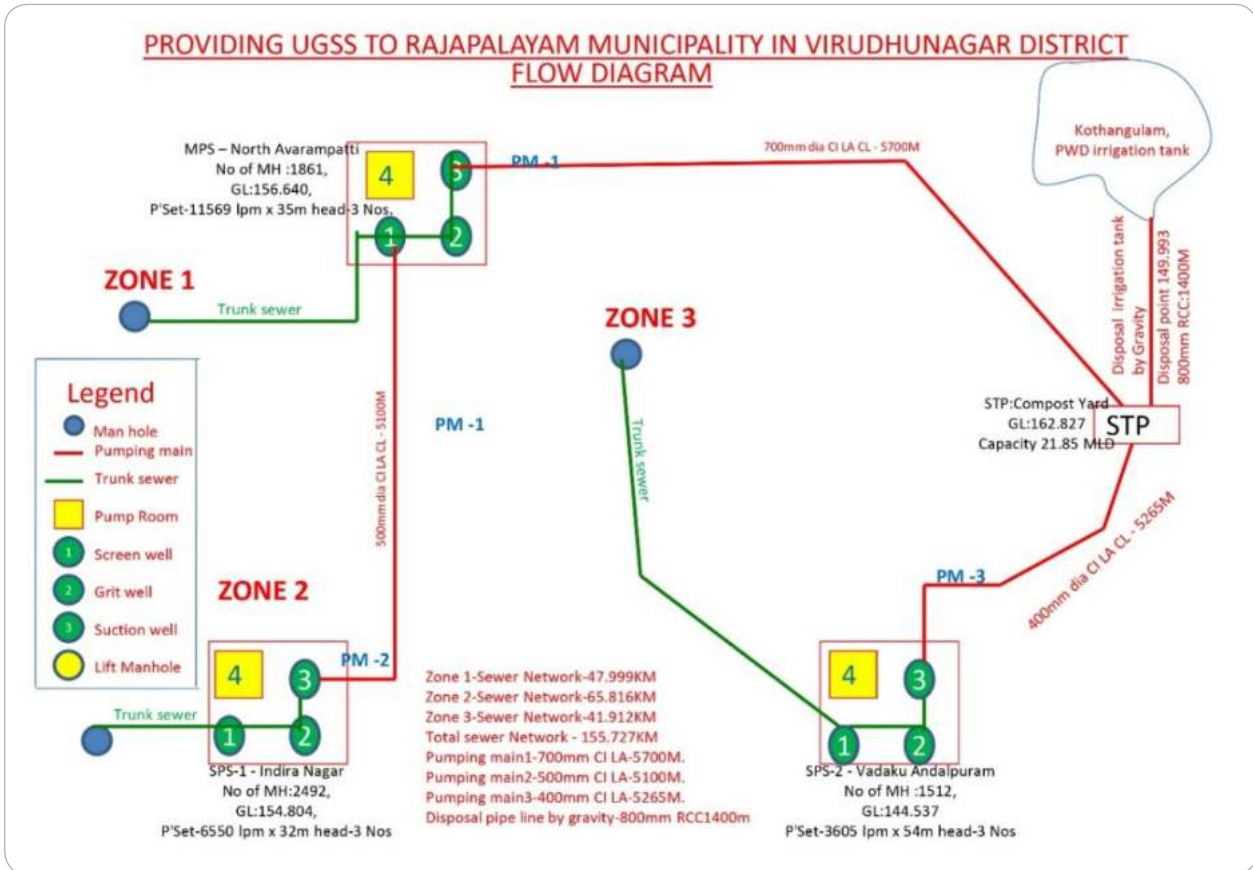
Table 8.20: **Salient Details of UGSS for Municipal Area**

1	Project Name	UGSS to Rajapalayam Municipality			
2	Town Area	9.59 sq.km			
3	Area Covered	9.59 sq.km			
4	Length of Roads in Project Area	153.98 km			
5	No. of Wards in Project Area	42 No.			
6	No. of Zones	3			
7	Variation in Ground-level Contour Ranges				
	Zone I	156.00 m - 172.00 m			
	Zone II	154.00 m - 168.00 m			
	Zone III	144.00 m - 183.00 m			
8	Year	Population			
	Census 2011	1,30,442			
	Base year 2020	1,55,000			
	Intermediate year 2035	1,90,000			
	Ultimate year 2050	2,20,000			
9	Per capita sewage contribution	115 LPCD			
10	Zone-wise Coverage of Population by Sewer and Sewage Generation				
		Population covered			
	Year	Zone-1	Zone-II	Zone-III	Total
	2020	51,270	66,905	36,825	1,55,000
	2035	62,847	82,013	45,140	1,90,000
	2050	72,770	94,962	52,268	2,20,000
	Sewage Generation in MLD				
	Year	Zone-1	Zone-II	Zone-III	Total
	2020	5.896	7.694	4.235	17.825
	2035	7.227	9.432	5.191	21.85
	2050	8.369	10.920	6.011	25.30
11	Manholes				
	Zone No.	Total No. of Manholes	Brick manhole (No.)	RCC manhole (No.)	
	Zone I	1,861	1,561	300	
	Zone II	2,492	2,109	383	
	Zone III	1,512	1,275	237	
	Total	5,865	4,945	920	
12	Pumping Stations and Pumping Mains				
13	House Service Connection (HSC)				
	Domestic (110 mm - UPVC)			37,631 no.	
	Non-Domestic (160 mm - UPVC)			955 no.	
		Total		38,586 no.	
14	Sewage Treatment Plant				
	Methodology			SBR Technology	
	Design Quantity (Int. 2035)			21.85 MLD Capacity	
15	Disposal Arrangements			PWD Irrigation Kothankulam Kanmai	

(Source: TWAD Board, UGSS Project division)

The flow diagram of UGSS with the schematic locations of manholes, trunk sewers, pump rooms, lift manholes, etc. is shown in **Figure 8.6**.

Fig 8.6: **UGSS Flow Diagram of Municipal Area**



(Source: TWAD Board, UGSS Project Division)

8.2.2.2. LOCATION OF SEWERAGE TREATMENT PLANT

The STP being constructed is located on the eastern side of the town in Pudhupalayam revenue village (survey no. 28 and 29) in the vicinity of Vada Malai away from the habitation (**Map 8.12**). Site is selected within the existing solid waste disposal facility (compost plant); of the total 20.35 acres area, 5 acres is allotted for the STP. The STP and all the lifting and pumping station sites are situated on the Municipality owned vacant land parcels, and sewers will be laid on the public roads. All the sub-project components are located within the urban environment. There are no streams/ rivers flowing through or close to Rajapalayam municipal area. It is proposed to discharge treated wastewater from STP into Kothankulam Irrigation Tank, which is located at about 1.4 km north of the STP site.

8.2.2.3. SWOT ANALYSIS OF UGSS

The SWOT analysis of the UGSS in Rajapalayam Municipality is presented in **Table 8.21**.

Table 8.21: **SWOT Analysis of Proposed UGSS in Municipal Area**

Strength	<ul style="list-style-type: none"> • The UGSS is designed for the Ultimate year of 2050 with the capacity of 25.30 MLD, hence the laid system will meet the current requirements. • New UGSS avoids untreated sewage discharge • Grey water treatment & disposal effectively handled • Improved Sanitation Service Delivery & O&M Revenues • Improved climate resilience of drainage system to handle CC linked risks of higher intensity rainfall – Avoidance of combined sewer + storm flows
Weakness	<ul style="list-style-type: none"> • Higher O&M requirement for sewage collection system to handle lowered flows in water stressed region • Residual Faecal Sludge Management (FSM) costs to ensure service delivery to unserved sections (urban poor, physical limitation prone areas)
Opportunities	<ul style="list-style-type: none"> • Potential for captive treated wastewater re-use – GW local water body recharge • Improved and safe liveable communities with full-fledged sanitation • Improved community health prospects – untreated sewage discharge avoidance • Potential for private sector participation in UGSS O&M – Skill upgrading of ULB staff and technology absorption
Threats	<ul style="list-style-type: none"> • Risk of under-utilization of UGSS infra (STP & PS) – Need for aggressive migration from septic tanks to piped sewer system • Higher per-capita O&M costs (energy charges under lowered sewage flow conditions) • If the municipal area is expanded beyond the current limits, the proposed system may be inadequate and may require additional infrastructure

8.2.3. Sanitation in Non-Municipal Area

8.2.3.1. OVERVIEW

Like the municipal area, the revenue villages in the LPA also do not have septage management system. Sewage water from the toilets/ septic tanks in households were let out into the drains along the roads wherever available (**Fig. 8.7**); this then flows into the water bodies in or near the villages or water from the septic tanks are collected in private tankers and disposed into the nearby open lands/ water bodies. In general, Rajapalayam Block scores only 0.18 in open defecation rating under the Human Development Index, underscoring the severity of the prevalence of open defecation practice in this area.

Fig 8.7: **Sullage in Open Drains in Non-Municipal Area (Sholapuram Village)**



8.2.3.2. DETAILS OF HOUSEHOLD TOILETS

From the site visits and interactions with the panchayat officials, it was noted that most of the households in the non-municipal area have individual toilet facility in some villages and lack toilet facility in some villages (**Table 8.22**), which then leads to open defecation on the open lands or near water bodies.

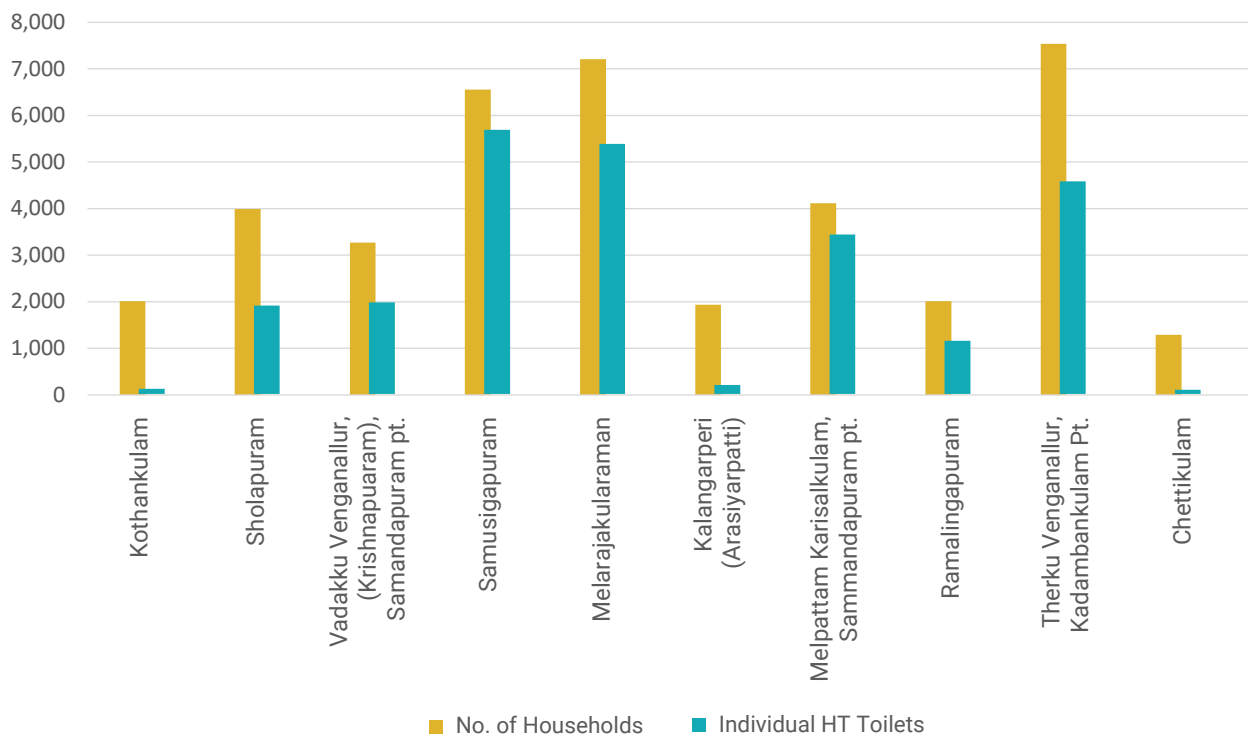
Table 8.22: **Village-wise Details of Individual HH Toilet Blocks**

S.No.	Village Name	No. of HHs	No. of HH Toilets (scheme)	Own Toilets
1	Kothankulam	2,008	360	110
2	Sholapuram	3,992	778	1,896
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	3,268	577	1,962
4	Samusigapuram	6,558	889	5,669
5	Melarajakularaman	7,209	1,208	5,364
6	Kalangaperi (Arasiyarpatti)	1,932	312	186
7	Melpattam Karisalkulam, Sammandapuram pt.	4,113	474	3,417
8	Ramalingapuram	2,014	889	1,135
9	Terkuvenganallur, Kadambankulam pt., Puhupalayam pt.	7,537	1,257	4,561
10	Chettikulam	1,292	386	84
	TOTAL	39,923	7,130	24,384

(Source: Block Development Office, Rajapalayam)

It can be noted that, on average only about 61% of households in non-municipal areas have individual toilets (**Fig. 8.8**). About 29% of HH toilets are funded under the Swachh Bharath Scheme.

Fig 8.8: **Village-wise Total of Household Toilets**



As per the data from BDO office, Panchayats like Samusigapuram and Ramalingapuram have 100% household toilets. However, on discussion and observations in villages, it may not have 100% coverage.

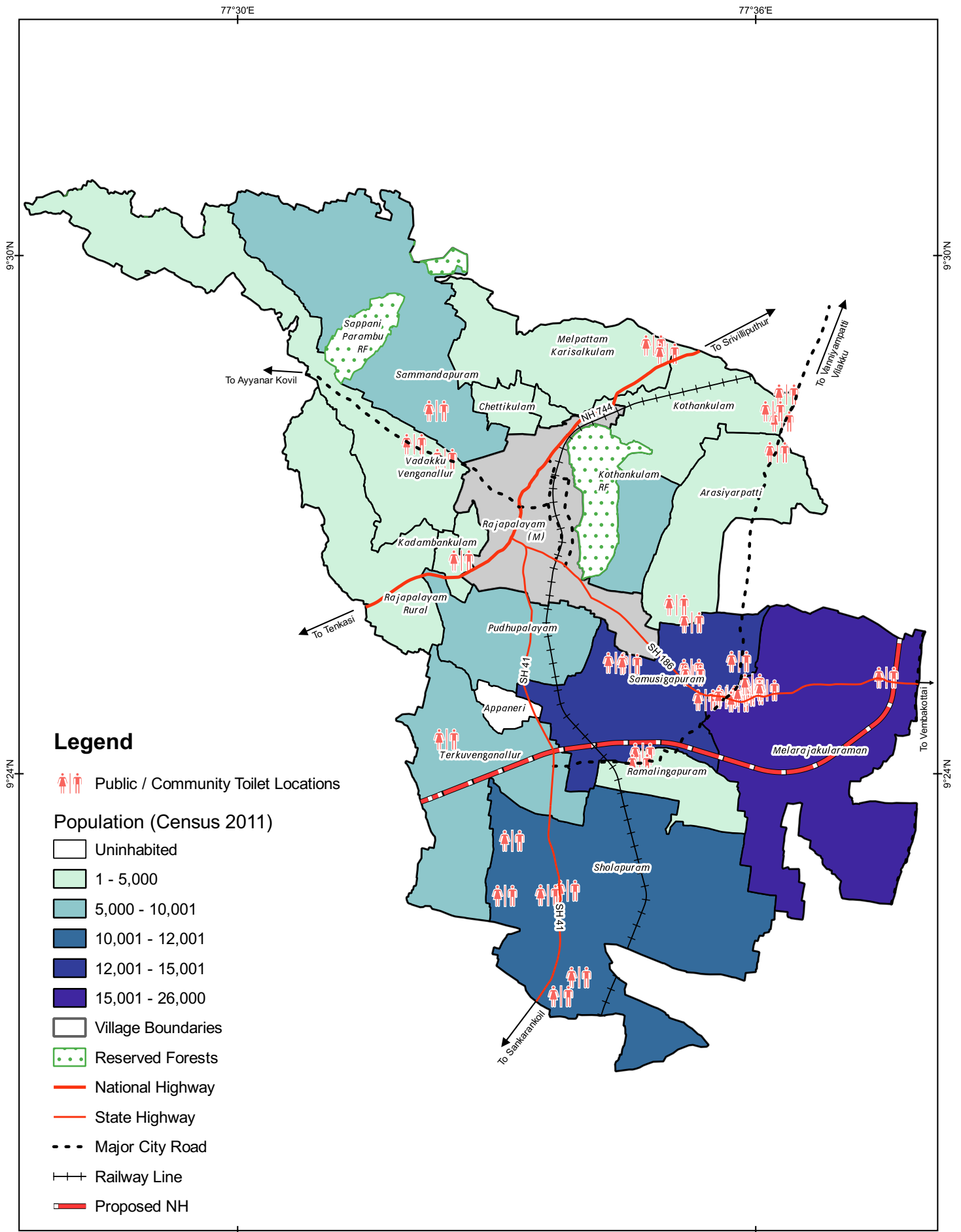
8.2.3.3. DETAILS OF COMMUNITY TOILETS

There are about 39 community toilets currently in non-municipal area. Each community toilet has on an average 6 toilet seats. Community toilets in the villages were mostly used by the women. Even the toilet blocks constructed for men were used by women. About 31 community toilets are being constructed and in various stages of development (**Table 8.23**). The population & location of public/ community toilet in Rajapalayam LPA is shown in **Map 8.14**.

Table 8.23: **Village-wise Toilet Facilities in Non-Municipal Area**

S.No.	Village Name	Total Community Toilets Seats
1	Kothankulam	42
2	Sholapuram	90
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	36
4	Samusigapuram	120
5	Melarajakularaman	66
6	Kalangaperi (Arasiyarpatti)	24
7	Melpattam Karisalkulam, Sammandapuram pt.	12
8	Ramalingapuram	0
9	Terkuvenganallur, Kadambankulam pt., Pudhupalayam pt.	18
	Total	408

(Source: Block Development Office, Rajapalayam)



Population & Location of Public/ Community Toilets in Rajapalayam Non Municipal Area	Notes	Data Credits Office of the Panchayat Union, Field Survey, DGS Infra, IGC	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	Prepared By Tapasya Design Studio, Auroville

Map 8.14: Population & Location of Public/ Community Toilets in Rajapalayam LPA

8.2.3.4. SERVICE ADEQUACY & SERVICE LEVEL INDICATOR

Key issues/ indicators and comparison to the benchmark levels are based on review and discussions and data analysis (Table 8.24).

Table 8.24: Service Level Indicators for HH Toilets and Sewerage in Non-Municipal Area

S.No.	Indicators	Current Situation	Benchmark Levels
1	Toilets in every household	61%	100%
2	Collection efficiency of Wastewater network	NA	100%
3	Adequacy of Wastewater treatment capacity	NA	100%
4	Extent of reuse & recycling of treated Wastewater	NA	20%
5	Scientific disposal method	Haphazard	100%

8.2.3.5. HOUSEHOLD SURVEY ANALYSIS

In the non-municipal areas consisting of 15 revenue villages, a total of 462 households were covered as part of primary data collection. The households were proportionately spread with respect to each settlement in the revenue villages.

Willingness to Pay for Sewerage Connection

Though the households in the non-municipal areas are not provided with underground sewerage connections, about 14% perceived that their households have sewerage connection. Most of the respondents were not willing to pay (94%) for a sewerage connection in the non-municipal area.

Sewerage Clogging

About 78% of the households didn't have any internal clogging issues and about 20% had internal clogging issues. On deeper analysis, it is noted that, Arasiyarpatti, Melarajakularaman, Pudhupalayam, Sholapuram and Terkuvenganallur have higher incidence of internal water clogging.

External flooding was not reported in many gram panchayats. Only about 5% of respondents felt some challenges due to external floodings. The presence of water bodies and natural slopes in the villages may have aided the automatic disposal of storm water.

About 69% of respondents used septic tanks as disposal mechanism for toilets and 47% used open drain as disposal mechanism for kitchen water. About 9% of the toilet water and kitchen water was also left in the open as per the survey.

Sanitation Facilities – Availability of Toilets

About 65% of the households had toilets in their households. About 20% didn't have toilets and 12% were used to open defecation. Only about 3% use the community toilets. About 31% of the respondents, do not use the toilet facilities available to them and the reason for the same is attributed to non-availability of toilets (70%) and practice of open defecation (14%).

8.3 Solid Waste Management

During the HH sample survey, 43% of respondents in non-municipal areas mentioned the prevalence of open defecation in their area. On a micro analysis of the data, all the villages except Ramalingapuram, Samusigapuram majorly agree there is open defecation in their gram panchayats.

More than 48% of respondents felt the open defecation location was more than 500 feet from their households. However, about 38% & 14% of the respondents felt the open defecation location is 50-500 feet and less than 50 feet respectively.

Sanitation Facilities – Community Toilet

76% of the respondents did not know or acknowledge the presence of community toilets in the gram panchayats, specifically Melpattam Karisalkulam, Melarajakularaman and Samusigapuram acknowledged the presence of community toilets in locality and the rest did not.

With respect to the distance of community toilets from the households, it was noted that, 46% and 36% of household toilets had community toilets in <100 feet and 100-500 feet respectively.

About 67% of the households felt they need more community toilets in their locality. The rating for the existing community toilets were mixed. About 40% of the respondents gave rating below 3 out of 5 for the community toilets. Irrespective of the mixed rating, most of the respondents (83%) felt there was no threat of any disease due to the sanitation issues in the non-municipal areas.

8.3.1. SWM in Municipal Area

8.3.1.1. EXISTING SITUATION

Within the municipal area, Rajapalayam Municipality is responsible for waste management, while the rest of the LPA is managed by the respective local body. The waste management in 24 wards has been outsourced to a private agency – AVM, which operates with about 303 labours. Solid waste management for the balance wards (18 wards) are being managed by the Municipality. From site observations and interaction with line agency officials, it is noted that the municipal area is heading towards a bin free city in the near future by achieving a 100% door to door collection and source segregation. Despite these efforts still solid waste was seen dumped along the roads, nallahs/ water bodies and open lands (**Fig. 8.9**). Often the wastes were also burned which leads to air pollution.

Fig 8.9: **Solid Waste Dumped in Nallah in Municipal area**



8.3.1.2. QUANTITY OF WASTE GENERATION

Rajapalayam Municipality generates a total of 46.5 to 48.5 Metric Ton of Solid Waste per Day collected from 50,772 residential and commercial establishments. The per capita generation is 335 gm/day. The sources and types of waste obtained by conducting random sample survey in three different areas - Residential, Commercial and Slums during three different occasions - week days, holidays and festival occasion is listed in **Table 8.25**.

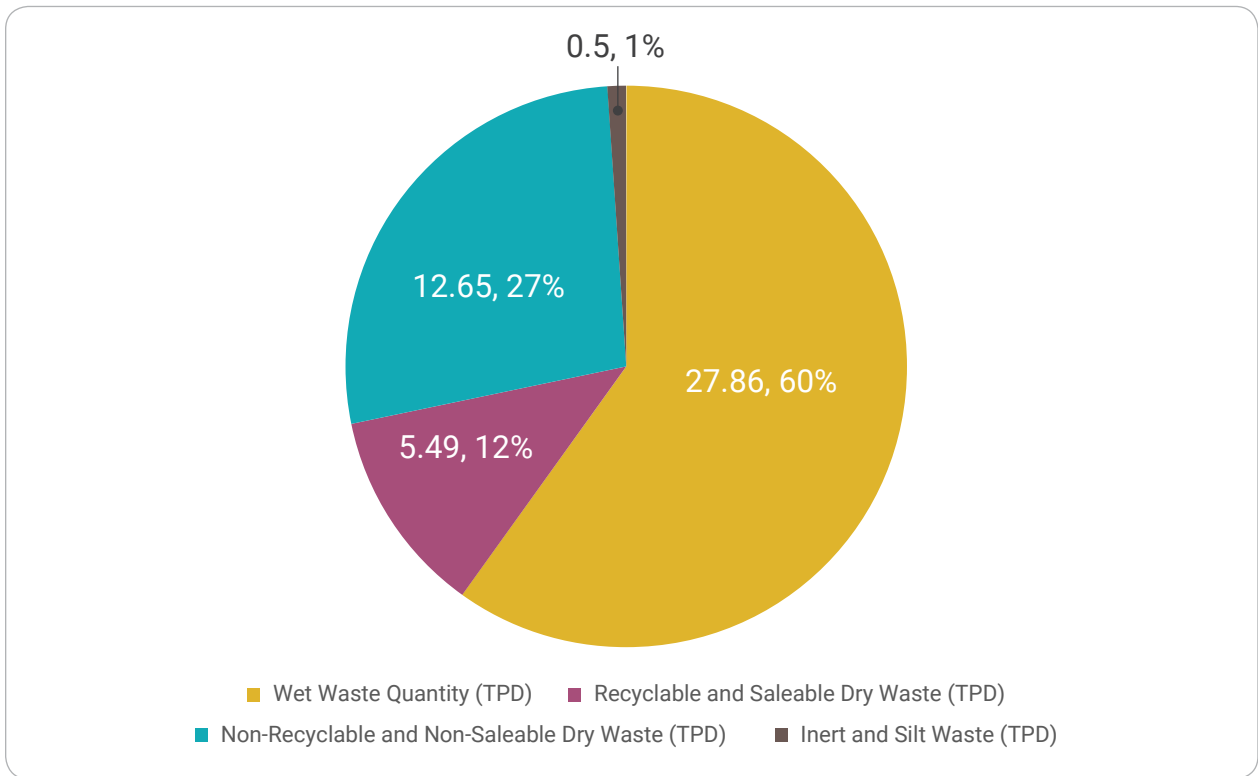
Table 8.25: **Quantification & Characterization of Solid Waste in Municipal Area**

1. Waste Quantification					
Total No. of Wards	Total No. of Households (Residential + Commercial)	Total Population		Total Quantity of waste generated per day (TPD)	
		as per 2011 census	as on 2018/2019	as per Gazette	after Resurvey
42	50,772	1,30,442	1,50,769	46.5	48.5
2. Waste Characterization					
Total Quantity of Waste Generated Per Day (TPD)	Wet Waste Quantity (TPD)	Dry Waste Quantity (TPD)	Recyclable and Saleable Dry Waste (TPD)	Non-Recyclable and Non-Saleable Dry Waste (TPD)	Inert and Silt Waste (TPD)
46.5	27.86	18.64	5.49	12.65	0.5

(Source: Rajapalayam Municipality)

From the total 46.5 tons of waste from the municipality, 27.86 tons (60%) is wet waste, and 18.64 tons (40%) is dry waste. Dry waste is further categorized as recyclable & saleable dry waste, non-recyclable & non-saleable dry waste and inert & silt waste. 27% of waste generated in the Rajapalayam Municipality is non-recyclable dry waste which is taken to the land fill site (**Fig. 8.10**).

Fig 8.10: **Types of Waste Generation in Municipal Area**



Ward-wise waste generation details of Rajapalayam Municipality is given in **Table 8.26**, which infers that the average waste generated from each ward is about 1.3 MT (**Map 8.15**).

Table 8.26: **Ward-wise Waste Generation in Municipal Area**

Old Ward No	Household (CSP Report)	Population (CSP Report)	Generation in MT	Collection in MT
1	1,198	3,679	1.55	1.55
2	833	3,067	1.3	1.3
3	1,018	3,474	1.45	1.45
4	1,001	2,718	1.15	1.15
5	906	2,370	1	1
6	687	2,044	1	1
7	772	2,278	1	1
8	914	3,378	1.45	1.45
9	805	2,913	1.25	1.25
10	775	2,918	1.25	1.25
11	1,761	3,473	1.45	1.45
12	958	4,273	1.8	1.8
13	709	2,148	1	1
14	638	2,193	1	1
15	805	2,542	1	1
16	1,186	3,160	1.3	1.3
17	1,188	3,439	1.45	1.45
18	639	2,124	1	1
19	1,045	3,478	1.4	1.4

Old Ward No	Household (CSP Report)	Population (CSP Report)	Generation in MT	Collection in MT
20	1,523	5,671	2.4	2.4
21	1,811	5,606	2.3	2.3
22	1,324	1,578	1	1
23	750	2,375	1	1
24	938	2,377	1	1
25	899	2,131	1	1
26	891	3,091	1.3	1.3
27	1,162	4,160	1.7	1.7
28	1,234	3,550	1	1
29	866	2,342	1	1
30	1,159	3,465	1.45	1.45
31	1,046	2,446	1	1
32	743	2,196	1	1
33	1,404	2,755	1.15	1.15
34	1,129	3,257	1.3	1.3
35	769	3,087	1.25	1.25
36	816	3,100	1.3	1.3
37	920	3,138	1.3	1.3
38	701	1,930	1	1
39	1,768	5,183	2.1	2.1
40	1,283	3,677	1.55	1.55
41	1,159	3,284	1.4	1.4
42	1,400	4,051	1.7	1.7

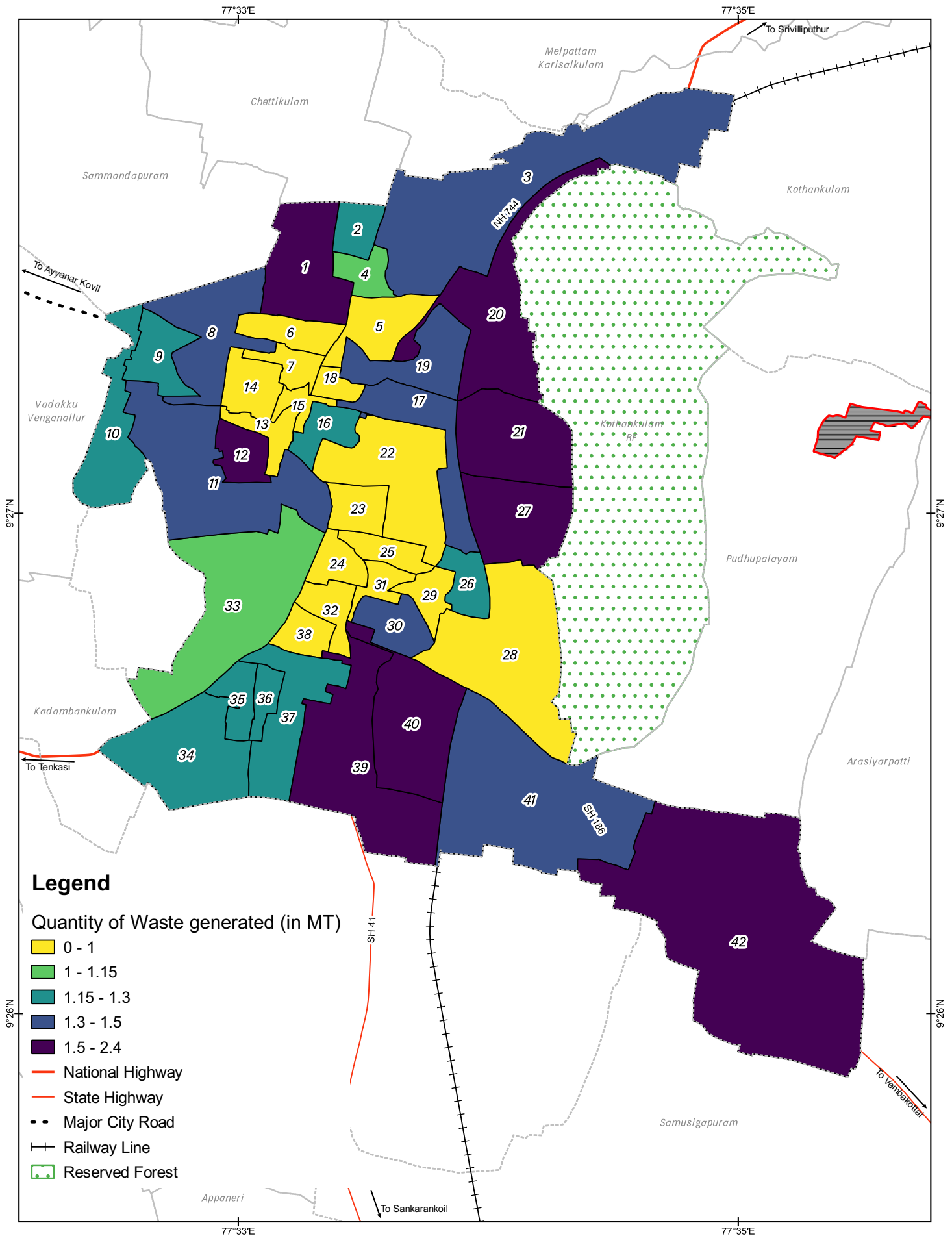
(Source: City Sanitation Plan, Rajapalayam Municipality)

In the municipal area 8 locations were demarcated as Critical zones (**Table 8.27**), where most of the people/households dispose the waste into vacant land/ drains/ nallahs/ other water bodies.

Table 8.27: **Critical Zones for Solid Waste Management**

S.No.	Area Name	Old Ward No.	Remarks
1	Arivoli Nagar	8	Most of the people dispose the garbage to the open ground
2	Somyyapuram	10	Most of the people dispose the garbage to the Puliyankulam pond, at Mudangiyaru Road
3	Church Street	17	Most of the people dispose the garbage into open drain
4	Avaramapatti	2, 3	Most of the people dispose the garbage into open drain
5	Malaiyadipatti	20, 21	Most of the people dispose the garbage to the open ground
6	Duraisampuram Street	28	Most of the people dispose the garbage to the open ground
7	Mangapuram Street	35	Most of the people dispose the garbage to the open ground
8	Sankaran Kovil Road	39	Most of the people dispose the garbage to storm water drain

(Source: City Sanitation Plan, Rajapalayam Municipality)



<p>Ward-wise Waste Generation in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits City Sanitation Plan, Rajapalayam Municipality</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.15: Ward-wise Waste Generation in Rajapalayam Municipal Area
(Note: Map based on old ward division)

8.3.1.3. COLLECTION & TRANSPORTATION

100% door-to-door collection has been ensured for all the 42 wards in Rajapalayam Municipality. The waste collected from the primary source via pushcarts (Fig. 8.11) is transferred to the secondary collection point from where the waste is again segregated & transferred to compost centers/ land fill site using tippers (Fig. 8.12). Details of collection and transportation are as follows:

1. Batter Operated Vehicles (BOV) used at 400 HH/ vehicle/ day (covering 3 trips). During site visits, it was noticed that most of the BOVs require maintenance and are not in use. Light Commercial Vehicles (LCV) are used at 1,200 HH / vehicle/ day (covering 3 trips).
2. Primary collection at doorsteps is being done and waste collected are directly transported to the processing center using
 - 31 BOVs and 10 LCVs for 47,526 HHs (Residential + Commercial)
 - 2 no. tipper and 1 no. dumper placer for 927 commercial establishment waste
 - 1 tipper lorry for market waste
3. Secondary collection and transportation is partially achieved
4. Collection of wet waste is not being done from identified 45 nos. of bulk waste generators; they have been instructed to create their own processing at their premises
5. The bio-medical waste from 31 hospitals and clinics are being collected by the TNPCB and IMA authorized facilitator M/s Ramky Energy Environment Ltd.

Fig 8.11: **Door-to-Door Waste Collection using Pushcart in Municipal Area**



Fig 8.12: **Secondary Collection Point in Municipal Area (Near Palayapalayam)**



8.3.1.4. SOURCE SEGREGATION & PROCESSING

As per Rajapalayam Municipality records the municipal area achieves 80% in source segregation (**Table 8.28**). Collected wet waste is processed via composting. In the Municipality 1,225 households were identified for home composting, of which 224 households currently practice it and 45 households are ready to practice but have not yet started. 0.4 tons per day were processed via home composting. 8 municipal parks of capacity 4.5 tons per day are used as an on-site composting center; 3 micro composting centers of total capacity 12.00 tons per day and 1 windrow composting center of capacity 2.00 tons per day are used for processing the wet waste. 1 bio-methanation plant of processing capacity 5 tons per day is used to process the waste and 32 kw of electricity is produced so far.

Table 8.28: **Solid Waste Collection & Processing in Municipal Area**

1. Door-to-Door Collection & Source Segregation					
Total No. of Households (Residential + Commercial)	Door-to-Door Collection		Source Segregation		
	Practiced	%	Practiced	%	
42	47,526	100	38,020	80	
2 a. Wet Waste Processing – Home composting					
No. of HHs Identified for Home Composting	No. of HHs Practicing Home Composting	Quantity of Wet Waste Handled in TPD	No. of HHs Ready to Practice Home Composting with space	No. of HHs Without Space for Home Composting	No. of IEC Activities Conducted for Home Composting
1,225	224	0.4	45	44,846	12
2 b. Wet Waste Processing – MCC/ OCC/ Windrow/ Vermicomposting					
No. of parks with On-site Composting Centers (OCC)	No. of Micro Composting Centers (MCC)	No. of Windrow composting centers	No. of Vermi Composting Centers		
8 (4.5 TPD capacity)	3 (12.00 TPD capacity)	1 (2.00 TPD capacity)	0		
2 c. Wet Waste Processing – Bio-methanation Plants					
No. of Bio-methanation plants	Capacity (TPD)	Electricity Produced so far	Remarks		
1	5	32 kw	Nil		

(Source: Rajapalayam Municipality)

Micro level compost centres are being established on a decentralized basis by dividing the town into 6 segments (covering 5 to 6 wards), in 5 locations covering 26,874 Households.

Figure 8.13 shows the micro compost center located within the Municipal office complex with a capacity of 2 metric ton. From the Municipality records it is observed that of the sanctioned five micro compost centres, only three micro compost centres are currently functional processing a of total quantity 12 MT and other two were on hold due to on-going court case based on objections from the locals. Replacement areas for establishing these MCCs have been sent to DMA office. The details of Micro compost centres are shown in **Table 8.29**.

Fig 8.13: **Municipal Office Micro Compost Center**



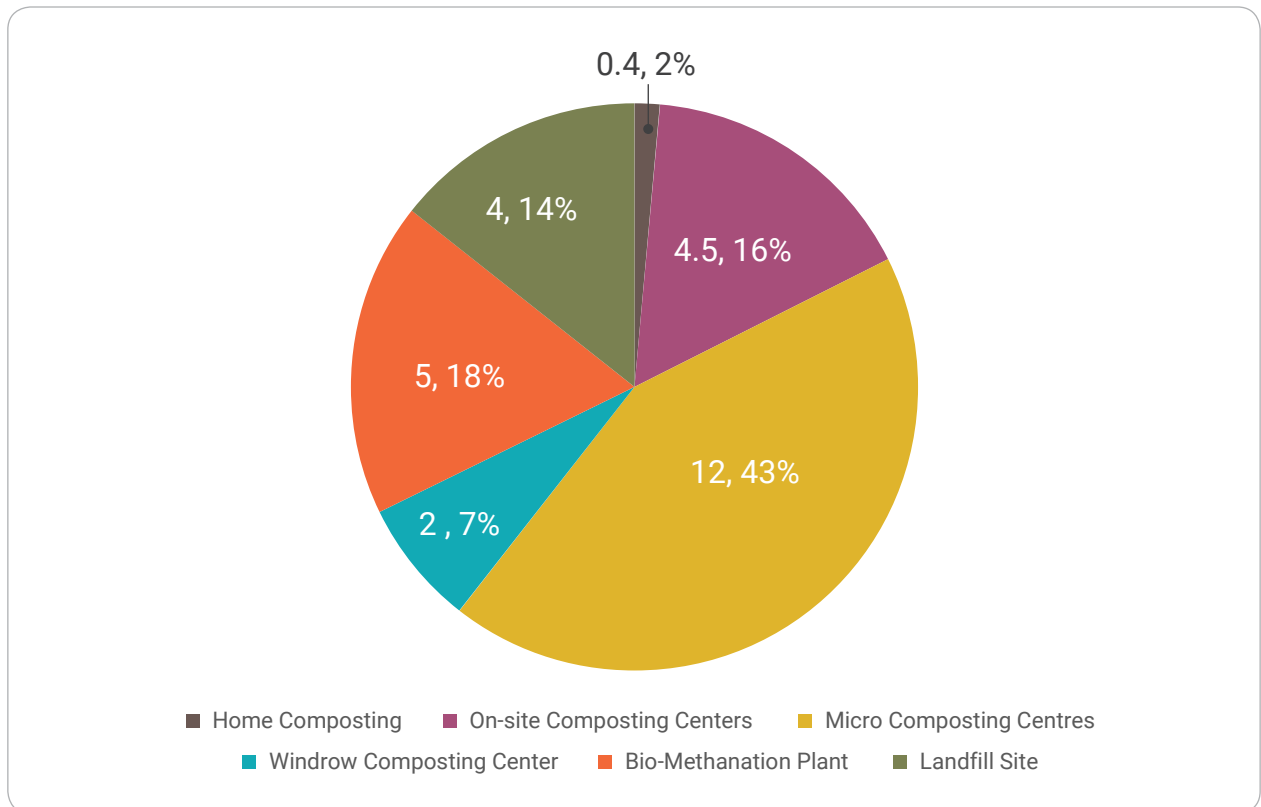
Table 8.29: **Details Micro Compost Centers in Municipal Area**

S.No.	Location	Capacity (MT)	Total No. of HH
Functioning Micro Compost Centers			
1	Municipal office	2	3,241
2	Mangapuram	5	6,856
3	P.S.K.Nagar	5	6,882
Non-Functioning Micro Compost Centers			
1	Sri Rengapalayam	5	6,835
2	Madasamy Kovil 60 ft Road	2	3,060
	Total	19	26,874

(Source: Rajapalayam Municipality)

From the 27.9 tons of wet waste 12 tons (43%) of waste is processed by micro composting centers. The remaining wet waste is processed through home composting, on-site compost centers, windrow composting centers and the bio-methanation plant (Fig. 8.14).

Fig 8.14: **Wet Solid Waste Processing Details in Municipal Area**



On-site compost centers are responsible for processing 4.50 tons of wet waste generated in the Rajapalayam Municipality. Details of the on-site compost centers are provided in **Table 8.30**.

Table 8.30: **Details of On-Site Compost Centres in Municipal Area**

S.No.	On-Site Compost Center Location	Capacity of Wet Waste Processing (TPD)
1	P.S.K.Nagar	1.00
2	Subhash Chandra Bose Park	0.50
3	R.R.Nagar - 1	0.50
4	R.R.Nagar - 2	0.50
5	R.R.Nagar - 3	0.50
6	R.R.Nagar - 4	0.50
7	R.R.Nagar - 5	0.50
8	Ganapathiyapuram	0.50
Total		4.50

(Source: Rajapalayam Municipality)

Bulk Waste Generators (BWG) includes 1 market, 19 hotels, 21 mandapams and 4 industries. Around 8.5 tons of waste has been generated by BWGs, which constitutes 18% of the total waste generated in the Rajapalayam Municipality. The Solid Waste Management Progress Report, 2021 shows that of the 45 BWGs in the municipal area, only 3 have on-site waste management facilities and others disposed via bio-methanation plant (Table 8.31).

Table 8.31: **Details of Bulk Waste Generators (BWG) in Rajapalayam Municipal area**

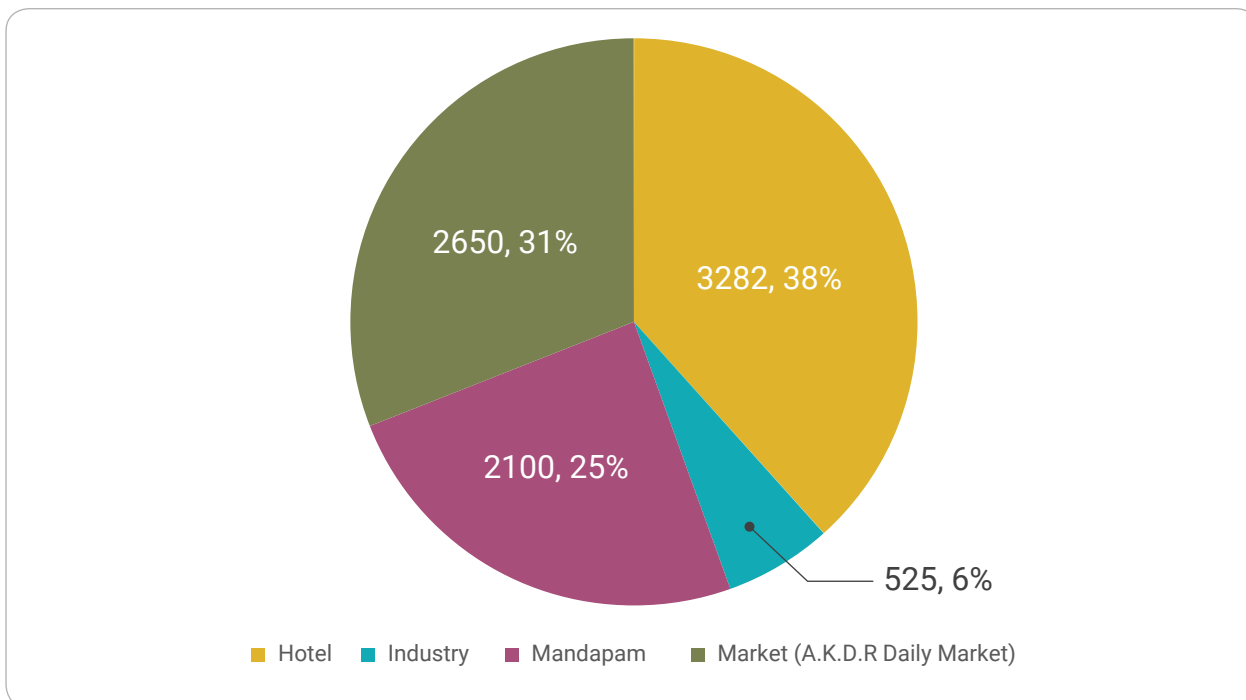
S.No.	Type of BWG	Old Ward No.	Total Waste Generation in kg	Type of Disposal
1	Hotel	3	110	Bio-Methanation
2	Mandapam	3	100	
3	Mandapam	9	100	
4	Mandapam	9	100	
5	Hotel	11	285	
6	Market (A.K.D.R daily Market)	11	2,650	
7	Mandapam	12	100	
8	Mandapam	12	100	
9	Mandapam	13	100	
10	Hotel	16	208	
11	Hotel	16	267	
12	Hotel	23	400	
13	Hotel	15	280	
14	Mandapam	19	100	
15	Mandapam	21	100	
16	Mandapam	21	100	
17	Hotel	22	130	
18	Hotel	22	150	
19	Hotel	22	102	
20	Hotel	22	105	
21	Mandapam	19	100	
22	Mandapam	17	100	

S.No.	Type of BWG	Old Ward No.	Total Waste Generation in kg	Type of Disposal
23	Mandapam	22	100	Bio-Methanation
24	Mandapam	22	100	
25	Mandapam	22	100	
26	Mandapam	23	100	
27	Hotel	24	100	
28	Hotel	24	110	
29	Hotel	24	104	
30	Hotel	24	150	
31	Mandapam	30	100	
32	Mandapam	33	100	
33	Hotel	32	130	
34	Mandapam	35	100	
35	Mandapam	37	100	
36	Hotel	39	100	
37	Hotel	40	104	
38	Mandapam	40	100	
39	Mandapam	40	100	
40	Hotel	42	304	
41	Hotel	42	143	
42	Industry	42	135	
43	Industry	42	110	
44	Industry	42	180	
45	Industry	42	100	Bio-Methanation
Total			8,557	

(Source: Rajapalayam Municipality)

Among the BWGs, 38% waste is generated from hotels. A.K.D.R. market alone generates 31% of the total waste, which is around 2,650 kg per day. 25% waste is from mandapams and the remaining 6% from industries (**Fig. 8.15**).

Fig 8.15: **Waste Generated by BWGs under Rajapalayam Municipality**



8.3.1.5. WASTE DISPOSAL

Wet waste

The recorded wet waste collected in the Rajapalayam Municipality is 1,267 tons (**Table 8.32**). From this 659 Metric Tons of manure is produced by the composting centres so far. Around 655.8 tons of manure is given to farmers at free of cost and the remaining 3.11 metric tons were sold.

Table 8.32: **Wet Waste Disposal Details in Municipal Area**

Quantity of Wet Waste Generated (TPD)	Total quantity of Manure Produced so far (MT)	Quantity of Manure given to Farmers Free of Cost (MT)	Quantity of Manure sold so far (MT)	Quantity of Manure at storage
1,267	659	655.8	3.11	Nil

(Source: Rajapalayam Municipality)

Recyclable Dry waste

The collected recyclable waste is sold to the authorized vendors/recyclers available in and around the Rajapalayam Municipality. The sold amount is distributed to sanitary workers involved in the collection task.

Non-Recyclable Dry waste

From the municipal record 8 metric tons of waste were sent to cement factories, 2.5 metric tons to other agencies and 4 metric tons of combustible dry waste are in storage.

Domestic Hazardous waste

The domestic hazardous waste like sanitary napkins, diapers, blood-stained cottons, etc. are disposed by incineration method and waste like paint containers, pesticide bottles, bulbs, tube light, batteries and electrical chokes, etc. are disposed to Tamil Nadu Pollution Control Board (TNPCB) authorized agency. Both were disposed by M/s.Ramky agencies, Madurai.

Construction & Demolition Waste

The C & D waste generated in Rajapalayam Municipality is mainly consumed by public themselves for filling the basement/ foundation, etc. A space is demarcated in Chidhambarapuram (around 2 acres), where generators will be encouraged to deposit the C&D waste or the ULB will transport the C&D waste on its own using a private operator by levying prescribed fee from the generators and such wastes will be finally used for filling low lying areas and potholes.

E-Waste

E-Waste will be separately collected during the daily waste collection and weekly once sold to the locally available dealers authorized by the Tamil Nadu Pollution Control Board (TNPCB).

8.3.1.6. HOUSEHOLD SURVEY ANALYSIS

A household survey was conducted covering 554 households in the municipal area. The samples were collected in proportion to wards. Similarly, it is to be noted that the wards mentioned here are pre -2022/ old ward boundaries, which were in vogue while the survey was conducted.

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Waste Disposal

As the municipal area is heading towards a bin-free city, community bins in the Municipality are being removed and door-to-door collection is prioritized. This is supported by the HH survey, where 93% households responded that there were no community bins in their neighbourhood. Of the total households, 91% disposed the waste generated via door-to-door collection and only 4% disposed in community bins. The remaining 5% is split between disposal in open spots, burning off, etc. (**Map 8.16**)

Waste Collection

Despite Municipal records mentioning 100% door-to-door collection, only around 85% respondents mentioned the availability of door-to-door waste collection for their household. This number is further reduced to 50-70% in certain wards such as old wards 20, 32, 33, 38 and non-ward settlements. This might be because of co-ordination challenges in the collection timings and frequency between waste collector and the households. Of those receiving

door-to-door collection, 97% of the households mention that door-to-door collection is carried out in the morning hours and 83% of HH mention that the frequency of the collection is on a daily basis.

Waste Segregation

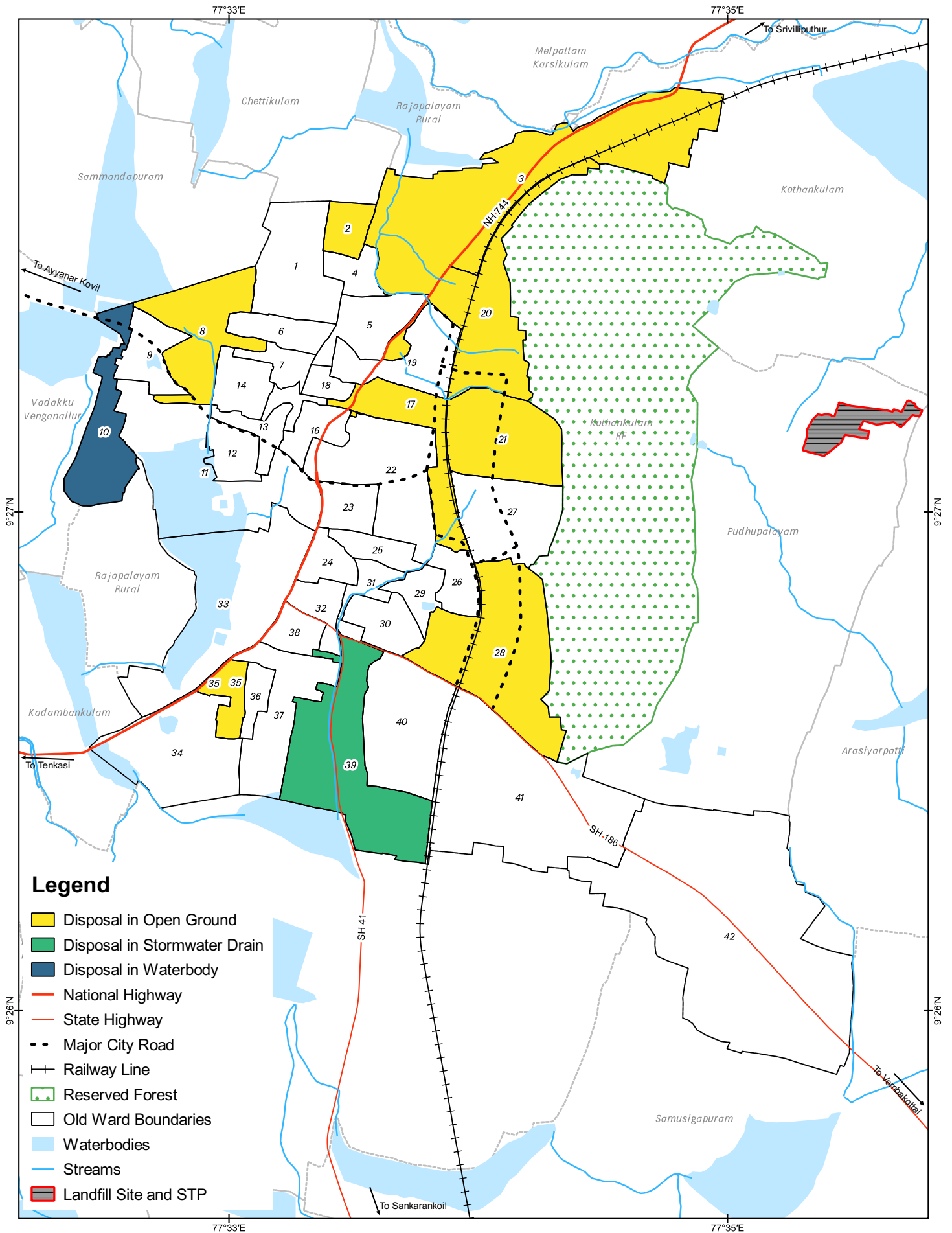
Waste segregation at the household level is the major factor in waste management. Around 73% of the households mentioned that waste segregation was insisted on by the waste collectors during collection. Only 69% of respondents segregated waste at the HH level. Ward nos. 15, 20, 22, 31, 32, 38 had more than 50% respondents who were not practicing waste segregation. These wards can be prioritized for awareness creation on waste segregation (**Map 8.17**).

User Charges & Willingness to Pay

Less than 10% of the respondents pay user charges for waste collection; the majority of them pay around Rs. 50. Willingness to pay for door-to-door collection was low in most wards, between 0-30%. In wards 21, 24, 35, 37 at least half the respondents indicated a willingness to pay.

User Satisfaction

96% of the households in the municipal area were satisfied with the services provided by the Municipality regarding the waste collection, rating the services 3 and above on a scale of 1-5.

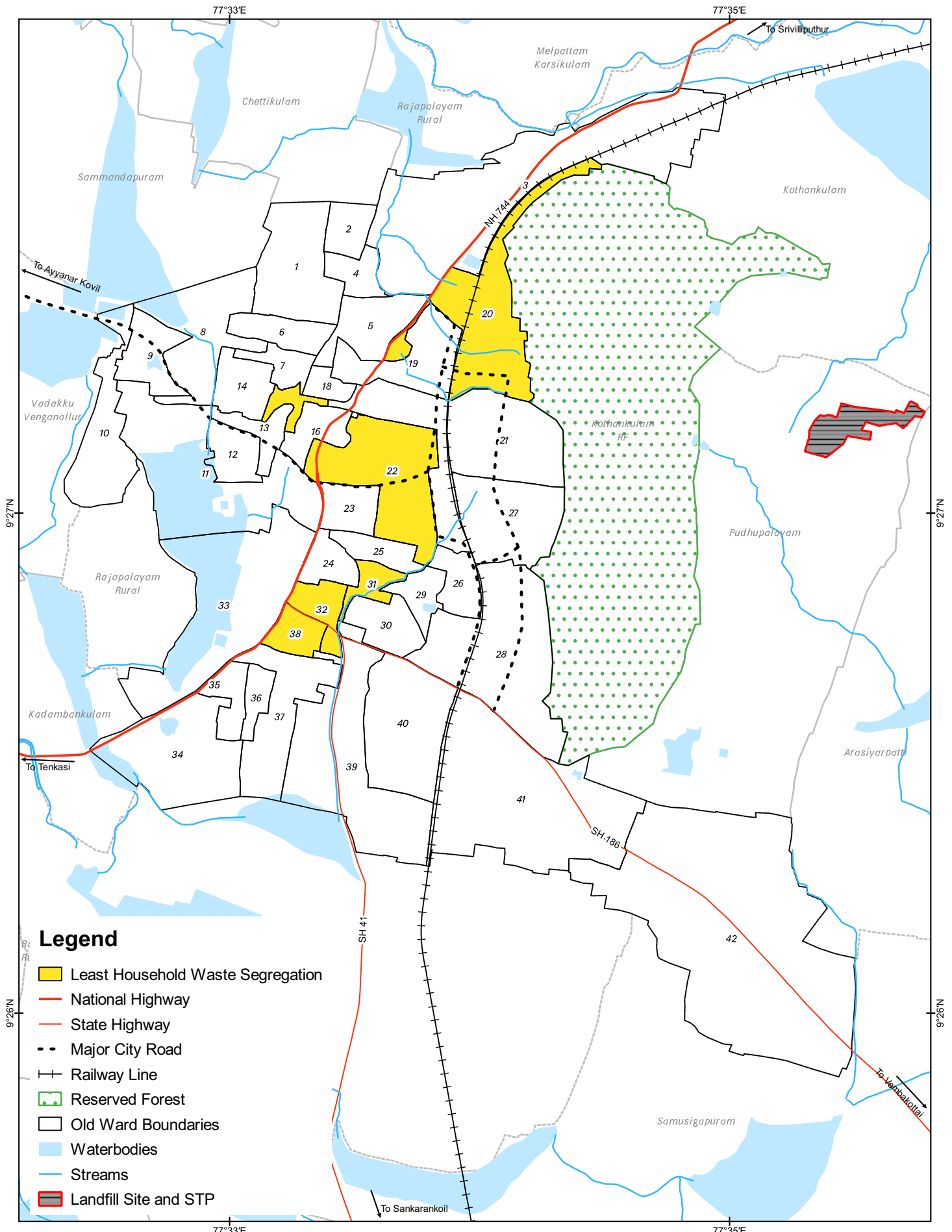


Legend

- Disposal in Open Ground
- Disposal in Stormwater Drain
- Disposal in Waterbody
- National Highway
- State Highway
- Major City Road
- Railway Line
- Reserved Forest
- Old Ward Boundaries
- Waterbodies
- Streams
- Landfill Site and STP

<p>Critical Zones for Solid Waste Management in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits Sample Household Survey, DGS Infra</p>	 <small>CRS : WGS 1984</small>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 8.16: **Critical Zones for Solid Waste Management in Municipal Area**
(Note: Map based on old ward division)



Legend

- Least Household Waste Segregation
- National Highway
- State Highway
- Major City Road
- Railway Line
- Reserved Forest
- Old Ward Boundaries
- Waterbodies
- Streams
- Landfill Site and STP

<p style="text-align: center;">Wardwise Household Waste Segregation in Rajapalayam Municipal Area</p>	<p>Notes</p>	<p>Data Credits Sample Household Survey, DGS Infra</p>	 <small>CRS : WGS 1984</small>
<p style="text-align: center;">AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 8.17: Ward-wise HH Waste Segregation in Municipal Area
(Note: Map based on old ward division)

8.3.1.7. SERVICE LEVEL BENCHMARKS

As per the Rajapalayam Municipality records the municipal area has achieved 100% household level coverage and door-to-door efficiency in collection, when comparing to the URDPFI guidelines. For source segregation Rajapalayam Municipality recorded an 80% segregation and lacks 20% in comparing to the guideline. 68% of the wet waste collected in the municipal area, has been recycled and is less by 12% while comparing to the guidelines; since 2 of the proposed micro compost site of capacity 7 MT are on hold due to the opposition from the locals. Only 30% of the dry waste is recyclable, the remaining non-recyclable waste is given to the required industries. These data are tabulated in **Table 8.33**.

Table 8.33: **Service Level Benchmarks for Solid Waste Management in Municipal Area**

S.No.	Solid Waste Management	Benchmark Levels	Current Level
1	Household level Coverage of Solid Waste Management service	100%	100%
2	Efficiency of Collection of Municipal Solid Waste	100%	100%
3	Extent of segregation of Municipal Solid Waste	100%	80%
4	Extent of Municipal Solid Waste recovered / recycled (Wet Waste)	80%	68%
5	Extent of Municipal Solid Waste recovered / recycled (Dry Waste)	80%	30%

(Source: Rajapalayam Municipality)

8.3.1.8. LAND FILL SITE

Solid waste collected by the Rajapalayam Municipality for the past 16 years is disposed in the compost yard of 20.37 acres located at Arasiyarpatti. The government of Tamil Nadu sanctioned a work order and granted an amount of Rs.396 lakhs for the removal of legacy waste of quantity 67,049 cu.m dumped at Arasiyarpatti dump yard. Based on the administrative sanction accorded by the Commissioner of Municipal Administration, a private agency has been assigned for the removal of legacy waste dumped in the compost yard through bio-mining process, on a Design, Build, Own and Operate (DBOO) basis.

8.3.1.9. SWOT ANALYSIS OF LANDFILL SITE

The SWOT analysis of the landfill site is presented in **Table 8.34**.

Table 8.34: **SWOT Analysis of Landfill Site**

Strength	<ul style="list-style-type: none"> The location of landfill site is adequate and meets the MSW guidelines Controlled land fill The location is easily accessible for the Municipal area Protected from wind effect as Sanjeevi hills falls between the site and municipality (as it obstructs the wind flow) Engagement of specialized waste management organization The evaluation of landfill management is done by an independent consultant (Anna university)
Weakness	<ul style="list-style-type: none"> Pollution caused by transportation of the waste by old trucks If the service provided by the waste management organization is not well executed, waste collection in the site can be delayed Lack of greenery & buffer zone in the landfill area No provision for bio-medical waste, hazardous waste & E-waste

Opportunities	<ul style="list-style-type: none"> • National and local level have policies that support municipal waste management system • Local government authority supporting for land fill operation and improvement • Ready markets available to sell compost & other treated wastes
Threats	<ul style="list-style-type: none"> • Lack of control over operation of disposal site as Municipality does not operate the site • As only municipal waste is disposed in the site, non-municipal waste are dumped near the water bodies or open lands

8.3.2. SWM in Non-Municipal Area

8.3.2.1. EXISTING SITUATION

Solid waste in the non-municipal areas are managed by gram panchayats. Though the Municipality is heading towards a bin-free city, the non-municipal area lacks the management facilities and has a shortage of labour, which leads to dumping of waste along the roads/water banks/open lands (**Fig. 8.16**).

Fig 8.16: **Solid Waste Dumped near Western Ghats in Vadakku Venganallur Village**



8.3.2.2. QUANTITY OF WASTE GENERATION

Total quantity of waste generated in non-municipal area is about 6,640 kg/ day. The per capita waste that is collected in the village panchayats is about 40 gm per day which is much lower than the national standards (300-600 gm/ day). The total waste collected in each village panchayats is shown in **Table 8.35**.

Table 8.35: **Waste Generation in Non-Municipal Area**

S.No.	Village Name	HHs	Population	Waste Collected (kg)
1	Kothankulam	2,008	6,887	640
2	Sholapuram	3,992	13,693	680
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	3,268	11,209	680
4	Samusigapuram	6,558	22,494	1,120
5	Melarakulamaraman	7,209	24,727	960
6	Kalangaperi (Arasiyarpatti)	1,932	6,627	320
7	Melpattam Karisalkulam, Sammandapuram pt.	4,113	14,108	600
8	Ramalingapuram	2,014	6,908	360
9	Terkuvenganallur, Kadambankulam pt., Pudhupalayam pt.	7,537	25,852	1,000
10	Chettikulam	1,292	4,432	280
Total		39,923	1,36,936	6,640

(Source: Block Development Office, Rajapalayam)

The low waste generation may be attributed to improper collection system or weighing systems being practiced in the panchayats. On discussion with the village officials, it was reported that, there is no official system for weighing of waste in the panchayats.

8.3.2.3. COLLECTION & TRANSPORTATION

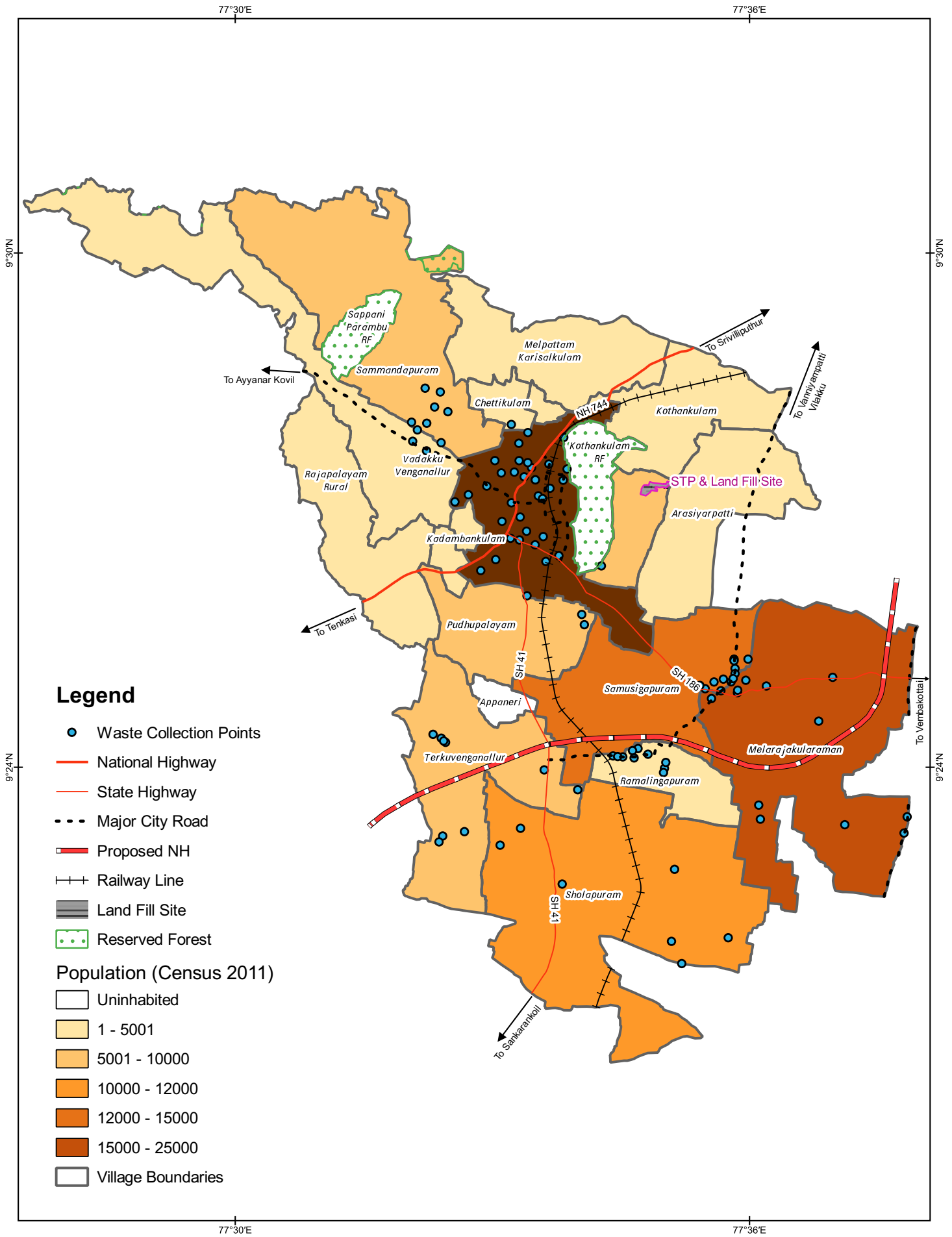
House to house collection system is practiced in many areas. However, due to the improper frequency of collection, waste is generally dumped in the community dustbins and sanitary workers collect it from there. All villages are equipped with Tricycles and Battery-Operated Vehicles (BOVs). The number of vehicles and its adequacy is to be ascertained. It is reported that about 176 persons are employed for collection & disposal of solid waste in panchayats (Table 8.36).

Table 8.36: **Labour Details for SW Collection and Disposal in Non-Municipal Area**

S.No.	Village Name	Total Employed for SWM
1	Kothankulam	16
2	Sholapuram	23
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	21
4	Samusigapuram	35
5	Melarakulamaraman	24
6	Kalangaperi (Arasiyarpatti)	8
7	Melpattam Karisalkulam, Sammandapuram pt.	15
8	Ramalingapuram	9
9	Terkuvenganallur, Kadambankulam pt., Pudhupalayam pt.	25
Total		176

(Source: Block Development Office, Rajapalayam)

On an average 1 person is responsible for collection from every 220 households and the range varies from 126 households to 301 households depending on the settlement. This could be one of the probable reasons for the door-to-door collection not happening on a daily basis. The garbage collection points for both municipal and non-municipal area are in **Map 8.18**.



<p>Waste Collection Points in Rajapalayam LPA</p>	<p>Notes The Village wise Population was considered from Census 2011.</p>	<p>Data Credits Census of India 2011, Field Survey, DGS Infra</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.18: Garbage Collection Points in Rajapalayam LPA

8.3.2.4. WASTE DISPOSAL

There is no official information on scientific disposal of waste in the non-municipal areas nor any identified or designated sites. During our site visits and discussion, it was known that most of the waste is disposed near the water bodies or on the roadside.

8.3.2.5. HOUSEHOLD SURVEY ANALYSIS

In the Non-Municipal areas consisting of 15 revenue villages, a total of 462 households were surveyed as a part of primary data collection. The households were proportionately spread with respect to each settlement in the revenue villages.

Waste Segregation, Disposal & Collection

86% of the households dispose their waste during the door-to-door collection. About 4% dispose in the community bins and the remaining 10% in open spaces in the neighbourhood, burning, etc. The frequency of door-to-door collection according to 72% & 13% of respondents is daily and alternate days, respectively. The remaining 7% feel the collection is unscheduled and varying. 95% of the door-to-door collection happens during the morning hours. Waste segregation into compostable and non-compostable is not prevalent in the non-municipal areas. Around 67% of the households do not segregate waste and also 65% of the households feel there is no insistence from the collection agency to segregate the waste.

User Charges & Willingness to Pay

96% of the households do not pay any user charges for waste collection. Willingness to pay is also low (27%) in the non-municipal area, similar to the municipal area.

User Satisfaction

Majority of the respondents felt that the solid waste collection and management is Gram Panchayat's / Municipality's and their sanitation workers' responsibility. Only a small percentage of respondents perceive SWM as a collective responsibility. 80% of respondents have given a user satisfaction rating of 3 and above on a scale of 1-5 for the current solid waste management related services.

8.4 Storm Water Drain

8.4.1. Existing Situation

The existing storm water drainage condition in the Municipal area consists of the natural streams and manmade open drainage system. Most of the roads/ streets in the Municipal area has open drains on either both sides or one side of the road according to the width of the road/ street (Fig. 8.17).

Fig 8.17: Storm Water Drain in Municipal Area (Near Palayapalayam)



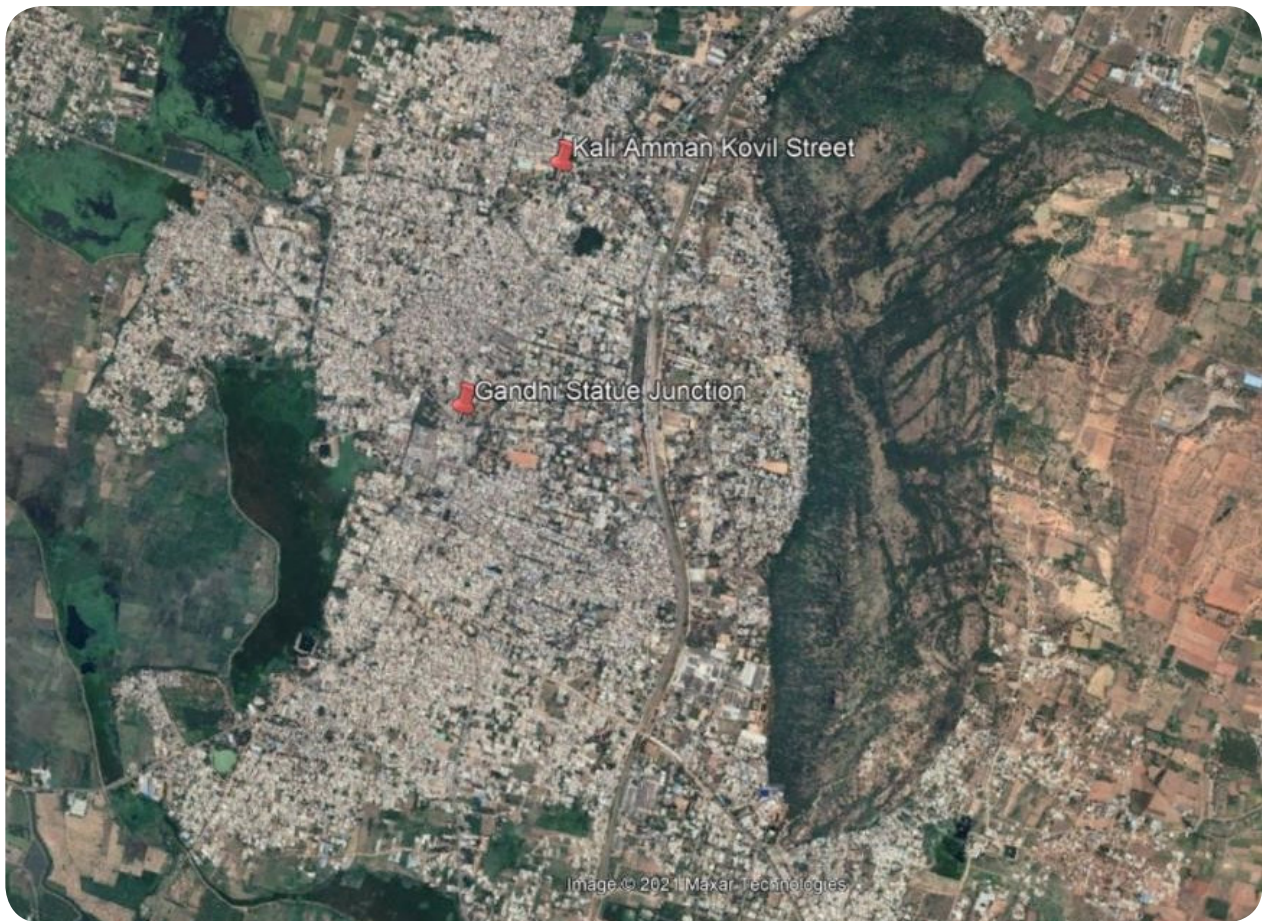
The non-municipal area of Rajapalayam LPA lacks storm water drain facilities in some areas; most of the areas adjoining the Municipal area however, have pucca/kutchra drain running along the roads (Fig. 8.18).

Fig 8.18: Storm Water Drain in Non-Municipal Area



The topography of the town has slopes mainly towards south and west. Despite having a good natural flow profile, during our site visit and discussion with locals, it was noted that the Gandhi Statue Junction & Kaliamma Kovil Street are the major locations of water stagnation in the Rajapalayam municipal area (Fig. 8.19 & Map 8.19). Water stagnation in these areas is mainly due to improper road profile.

Fig 8.19: Major locations of Water Stagnation in Municipal Area



During field visits, it was inferred that the open drain carries the sullage & sewage water overflows also. It was also noted that, these open drains carried the effluents from dyeing process carried out in the household industries. Hence, the mixing of sullage/ effluent water into the open drain causes both environmental and health issues (**Fig. 8.20**). Un-controlled solid waste dumping and encroachments on the banks of odais and ooranis are interrupting the storm water flow, thereby spilling out into the neighbouring areas.

Fig 8.20: Solid Waste & Effluent from Dyeing Process in Nallahs & Waterbodies



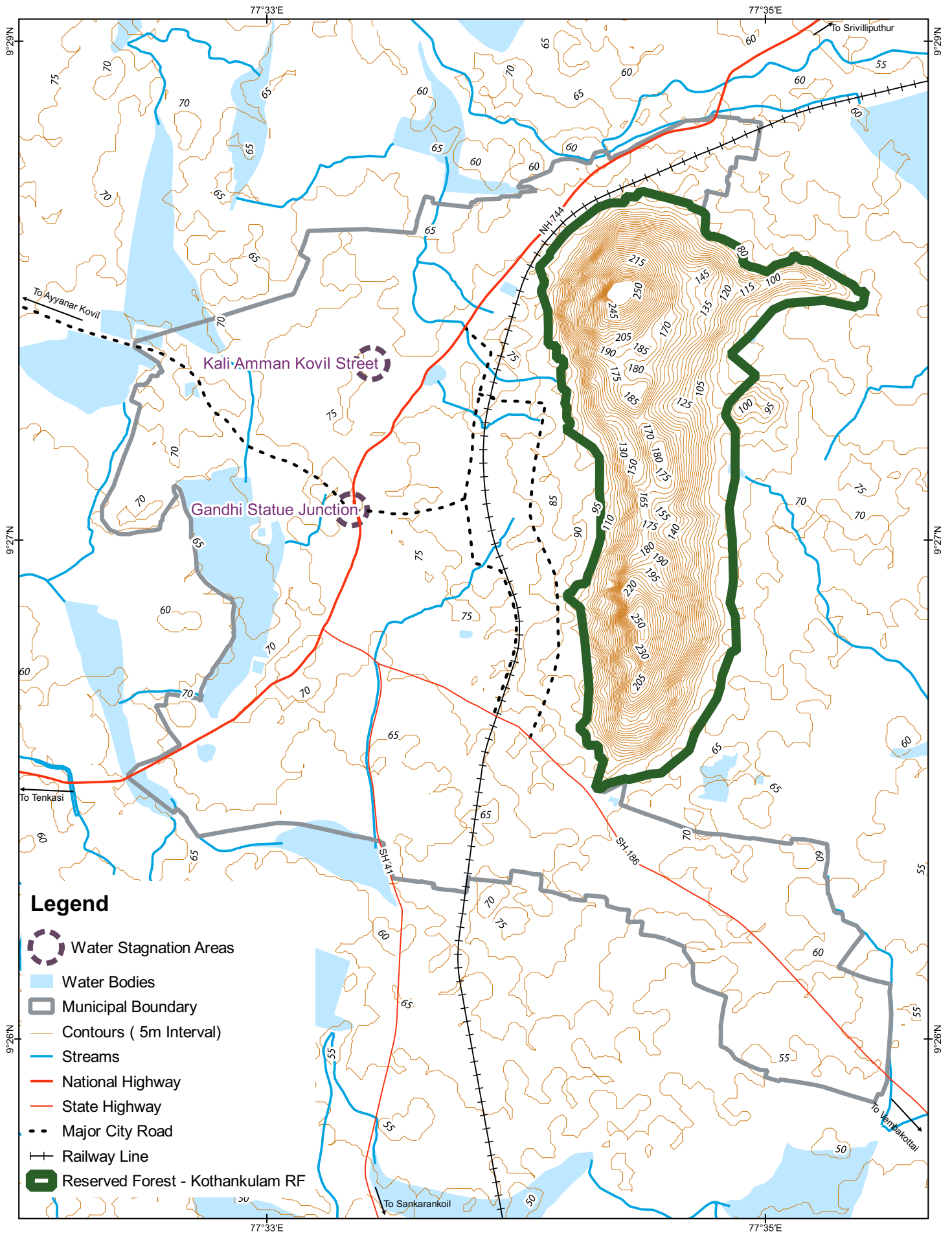
8.4.2. Water Bodies


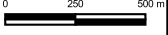
There are 15 water bodies in the municipal area (**Table 8.37**). The existing streams, water bodies along with the topographic details and major water stagnation spots in municipal area is shown in **Map 8.19**. Of the municipal water bodies, the two major water bodies are Kondaneri kanmai and Kadambankulam Kanmai, located in the western side towards the low-lying area, covering over an area of about 114.35 acres, both falling under the PWD department. All the other water bodies are ooranis of less coverage, between 0.6 - 3 acres. The total area covered by the 15 water bodies are 134.32 acres. In the absence of an effective sewerage system, domestic sewage/ effluent water from the households/ commercial/ institutional/ industrial establishments is let into the storm water. This has resulted in pollution of the final disposal points such as the kanmais/ ooranis. Moreover, in the absence of effective management and regular de-silting, most of the water bodies in the Rajapalayam are covered with water hyacinth (aagaya thamarai).

Table 8.37: **List of Water Bodies in Municipal Area**

S.No.	Name of Tank/ Pond/ Oorani	Area of the Tank/Pond/ Oorani (in Acres)	Governing Agency
1	Kondaneri Kanmai	109.8	PWD
2	Kadambankulam Kanmai	4.55	PWD
3	Vaduga Oorani	2.65	Kovil
4	Kuttoorani	2.49	Revenue
5	Santhoorani	1.58	PWD
6	Mayuranathar Swamy Kovil Oorani	0.84	HR&CE
7	Mayuranathar Swamy Kovil Oorani	1.27	HR&CE
8	Pillayar Kovil Oorani	2.45	Kovil
9	Pillayar Kovil Oorani	0.254	Kovil
10	Pethanatchiamman Kovil Oorani	0.72	HR&CE
11	Vandoorani	0.89	Kovil
12	Thiruvananthapuram Oorani	3.02	PWD
13	Singathirulan Kovil Kalloorani	0.607	Kovil
14	Sokkar Kovil Oorani	1.59	Kovil
15	Madasamy Kovil Oorani	1.61	Revenue
Total		134.321	

(Source: Rajapalayam Municipality)



Water Stagnation in Rajapalayam Municipal Area	Notes :	Data Credits SRTM Dem, Field Survey	 
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	CRS : WGS 1984

Map 8.19: Water Stagnation Points in Municipal Area

8.4.3. Drain Capacity Analysis

The municipal area has about 215 km length of open pucca/ surfaced drains as per the Rajapalayam Municipality records (Table 8.38).

Table 8.38: Length of Existing Storm Water Drain in Municipal Area

Drain Type	Length in km
Open Pucca / Surfaced	214.96
Kutcha	0
Total Drains	214.96

(Source: Rajapalayam Municipality)

Apart from the open drains, there are water channels/ nallahs running inside the municipal area. These are part of the natural drainage system of the town and effectively function as a storm water drain. The current drain system works like storm water/ effluent water channels that runs towards the nallahs/ streams which then collect in the ponds/ ooranis/ kanmais in and around the Rajapalayam Municipality. Most of the drains discharge storm water in to the Kondaneri tank located in Kadambankulam on the western side of the town.

The capacity of the existing storm water drain of an area is calculated by taking the peak rainfall data of the area and comparing it with the discharge capacity of the drain. From the rainfall data, it is observed that 921.8 mm in 2018 is the highest rainfall recorded for the past 5 years. By considering run-off co-efficient 0.6, the required discharge capacity needed to carry the storm water is 0.000335 cu.m/ sec considering the available length of storm water drain of 215 km with an average size of 0.3 m x 0.4 m and the self-cleaning velocity of 0.4 m/ sec, the discharge capacity is 0.036 cu.m/ sec. Hence the existing storm water drain itself is sufficient to carry the peak rainfall.

8.5.1. Source of Supply

The details of source of power and sub-stations in Rajapalayam Division are listed in Table 8.39.

8.5 Electricity

Table 8.39: **Details of Sub-Stations in Rajapalayam Division**

S.No.	Sub-Station Name	Source of Power	Total Electricity Demand in Mw	Total Electricity Supply in MW
1	Rajapalayam Sub-Station	230/ 110 KV Anuppankulam & Nallamanaikkanpatti sub-station tie feeder of Rajapalayam feeder - 1	40	64
2	Mudangiyaru Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	14	20
3	Thottiyapatti Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	20	32
4	R.Reddiapatti Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	18	32
5	Alankulam Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	8	20
6	Seithur Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	30	32
7	Nallamanaikkanpatti Sub-Station	230/ 110 KV Nallamanaikkanpatti sub-station	17	20
8	Generation of Electricity	SP Solar at Nallamanaikkanpatti SS in 50 MW		
9	Proposed Power Projects	For the consideration of future load growth in Rajapalayam and its surrounding areas, there is 1 no. new 110/ 11 KV sub-station for the demand of 32 MVA very much essential. TNEB has been searching for land for erection of the newly proposed power plant for more than 3 years. There is no availability of land and this proposal is pending. Hence new sub-station is essential to meet out the future load growth in this area		

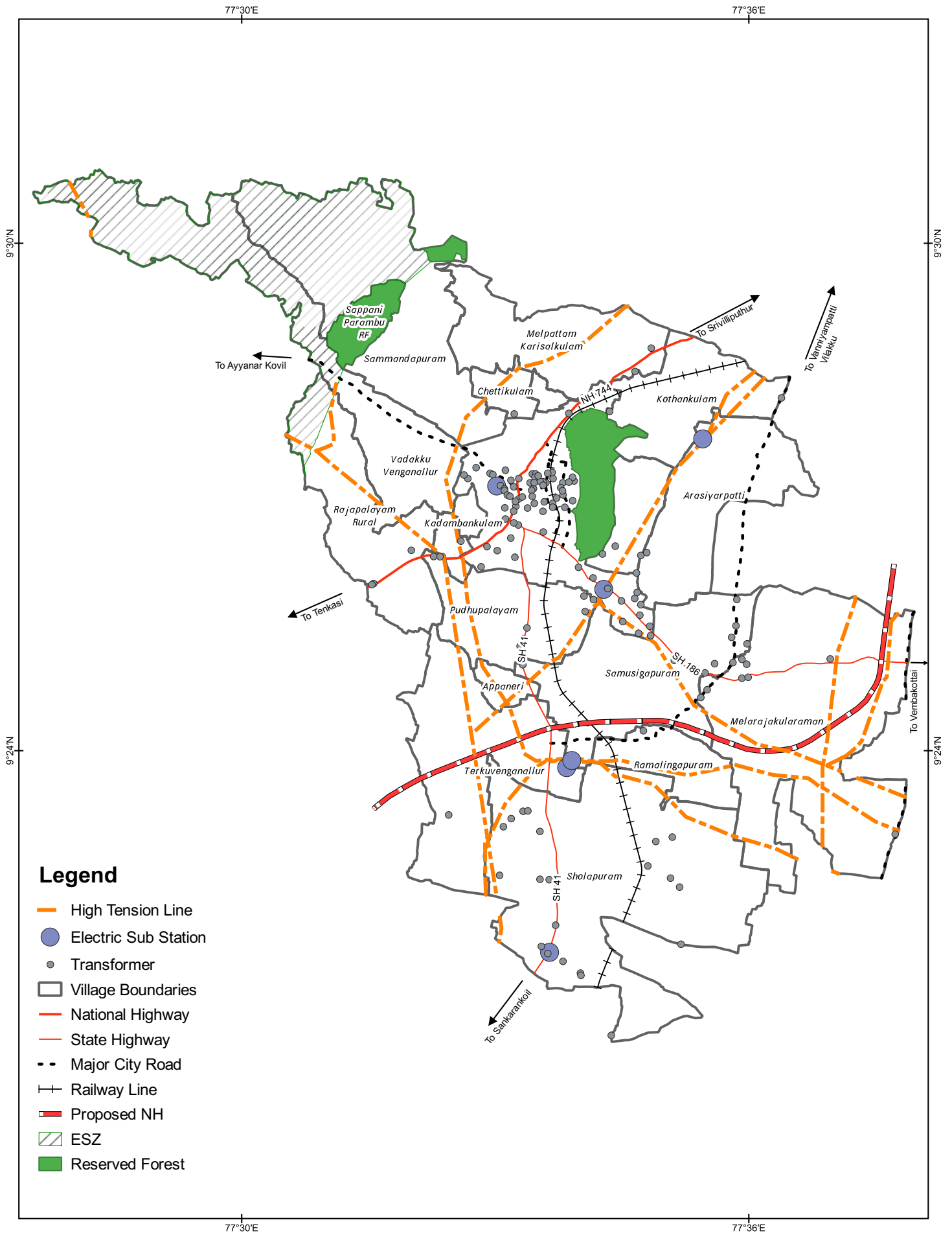
8.5.2. Service Connections

The total number of service connections in the Rajapalayam Division (which includes Rajapalayam LPA – consisting of Rajapalayam Municipality & full or part of 15 revenue villages, and some revenue villages around the LPA) are in the **Table 8.40**. The total number of service connections provided, including all the tariffs were 1,82,599. The location of transformers in the LPA is shown in **Map 8.20**.

Table 8.40: **Services & Tariff Details in Rajapalayam Division**

S.No.	Description	Tariff Code	No. of Services
1	Domestic	I A	1,35,934
2	Huts in Village Panchayat	I B	1,904
3	L.T. Bulk Supply to Police, Railway colonies, etc.	I C	1
4	Public Lighting, Water Supply, etc.	II A	5,054
5	Govt. and Aided Educational Institutions, Govt. Hospitals, etc.	II-B (1)	360
6	Pvt. Educational Institutions and Hostels	II-B (2)	94
7	Places of Public Worship, Mutts, etc.	II-C	758
8	Cottage and Tiny Industries (up to 10 HP)	III-A (1)	1,248
9	Power Looms (up to 10 HP)	III A (2)	2,116
10	Industries	III B	2,486
11	Agri. & Govt. Seed Forms & SFS	IV	9,783
12	Commercial and Others	V	20,719
13	Temporary Supply	VI	2,142
Total			1,82,599

(Source: TANGEDCO, Rajapalayam)



<p>Electrical Infrastructure in Rajapalayam LPA</p>	<p>Notes :</p>	<p>Data Credits Field Survey, DGS Infra</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 8.20: Electrical Infrastructure in Rajapalayam LPA

8.5.3. Streetlights

The details of streetlights in the municipal area are presented in **Table 8.41**. It can be seen that, about 63% of streetlights have CFL lamps and the balance are predominantly sodium vapor lamps.

Table 8.41: **Details of Streetlights in Municipal Area**

S.No.	Road RoW	Sodium Vapor Lamps	CFL Lamps	Other Lamps	Total
1	3.8 m		1,327	05	1,332
2	7.0 m	872	1,085	-	1,957
3	>7.0 m	1,396	1,429	07	2,832

(Source: Rajapalayam Municipality)

8.5.4. Household Survey Analysis in Municipal Area

A household survey was conducted covering 554 household. The samples were collected in proportion to wards. Similarly, it is to be noted that the wards mentioned here are pre-2022/ old ward boundaries, which were in vogue while the survey was conducted.

The sample survey indicates that municipal area has achieved 100% electricity connection, of which 96% are metered and 4% non-metered. The bi-monthly average bill of amount of Rs.100 - Rs.500 is paid by 65% of the households in the municipal area. Around 21% pay less than Rs.100 and 13% of the households pays between Rs.500 – Rs.1,000. Only 1% of the HHs were paying an average between Rs.1,000 – Rs.2,000.

18% of households mention experiencing power outages, predominantly in ward nos.9, 13, 27 & 33. Of these, monthly outages are the most common at 69%, followed by weekly outages (15%) experienced by respondents. 11% say the power outage occur daily, which might be due to maintenance issue or obstruction on the line like a bird or broken branches, etc. Only 9% of the households from sample survey use alternative power sources; 91% of these use inverters and 6% solar. Overall, 89% of the households were satisfied with the power supply in the municipal area.

8.5.5. Household Survey Analysis in Non-Municipal Area

In the non-municipal areas consisting of 15 revenue villages, a total of 462 household were covered as a part of primary data collection. The households were proportionately spread with respect to each settlement in the revenue villages.

The sample survey indicates that in the non-municipal areas of the LPA 99% of the households have electricity connection, of which 93% are metered and 7% non-metered. The bi-monthly average bill of amount less than Rs.500 is paid by 58% of the households in the non-municipal area. In the non-municipal areas, 35% of

8.6 Key Issues

the households use less than 100 units and as per Tamil Nadu state policy no charges are collected. 58% pay between Rs.100 – Rs.500, 6% of households pay between Rs.500 – Rs.1,000 and 1% pay between Rs.1,000 – Rs.2,000, as the non-municipal areas have some household industries.

8.6.1. Water Supply

A multitude of challenges exist in water supply system; the most significant challenges currently faced in water supply in Rajapalayam LPA are:

- **Un-reliable source of water:** The primary source for water supply in the non-municipal area is bore well. Few villages also get bulk water from the CWSS scheme and this is currently used as a top-up water along with water from bore wells. There is an over exploitation of ground water resource currently in the village panchayats leading to a depletion in ground water levels.

Full migration to non-ground water sources is only feasible after suitable recharge measures are implemented. Currently the LPA is a water stressed region, coupled with long-distance access to strained surface source (Thamirabarani River). The current water supply from Western Ghats is presently insufficient to cater to the LPA or at least to Municipality without increasing its source of catchment.

- **Inadequate Connections:** Households in the municipal area are about 43,517 and the number of households connected with piped water connection is 28,196, leaving about 35% households without individual piped water connection. However, it is learnt that, as part of the CWSS initiatives, efforts are being made to cover 100% households with piped water connection

In the non-municipal areas, only 17% of households have individual household connections. In certain villages, such as, Ramalingapuram, Kothankulam, Samusigapuram, Melarajakularaman, Terkuvenganallur, Sholapuram and Melpattam Karisalkulam less than 10% of the total households are covered with individual service connections.

- **Frequency of water supply:** The household sample survey indicated that in the municipal area, 89% of households receive water weekly once and only 6% daily. However, in the non-municipal area, the figure stands at only 28% households getting daily supply, 31% getting weekly supply and 35% every alternate day. The benchmark levels prescribed by URDPFI in the continuity of water supply is 24x7; hence service inadequacy is ascertained and requires source augmentation in both municipal and non-municipal areas.

- **Inadequate per capita supply:** The existing per capita supply in municipal area is 69 LPCD. As per URDPFI guidelines, the per capita supply stands at 135 LPCD, thus leaving a deficiency of at least 65 LPCD. Within the town, the per capita supply of water varies from 40 LPCD to 65 LPCD, which is less for a town falling under the Medium Town category.

In non-municipal area the per capita supply is 55 LPCD. URDPFI prescribes 70 LPCD for non-municipal areas leaving deficiency of 15 LPCD.

- **Ground water exploitation:** Ground water depletion in Rajapalayam LPA is vigorous. There is continued, unmonitored tapping of ground water through bore wells. In the municipal area 26% of the respondents from HH sample survey depend on bore wells for domestic use and in non-municipal area the primary source of water is through bore wells. The current status of underground water table stands as over exploited in the LPA.
- **In-efficient service cost collection:** Bulk water transmission will result in increase in the delivery costs. To meet this increase in cost the government will need to increase per capita charges for water supply; but there is expressed un-willingness to pay for 24X7 water supply as per data collected through the household sample survey. In the municipal area, 52% of the respondents were not willing to pay and in the non-municipal area about 61% are not willing to pay for 24X7 water supply. Either nil or irregular payments are likely to strain local bodies finances and affect O&M service delivery.

8.6.2. Sewerage & Sanitation

The existing challenges of sewerage & sanitation in Rajapalayam LPA are:

- There is **no septage management/ treatment plant** in the non-municipal areas of the LPA. The septages from the septic tanks are collected via private tankers and disposed in the open places or riverbanks. The underground sewerage system is being implemented only in the Municipal area as an urban flagship investment project. Currently the septages from the HHs are disposed into the storm water drains, which flow into and contaminate the water bodies.
- The HH sample survey indicated that 14% of respondents in municipal area and 43% in the non-municipal area mentioned the **prevalence of open defecation** in their area, which indicates the non-availability or dis-use of toilets, especially in slums and squatter settlements; there is a need to improve awareness and introduce control measures within the population of the area.

8.6.3. Solid Waste Management

- **Inadequate coverage:** As per the sample survey data, around 15% of the households in the municipal area report no incidence of door-to-door collection; this could be because of less co-ordination in the collection timings and frequency between waste collector and the households.

The non-municipal area lacks solid waste management facilities. Shortages of labours, management equipments like waste collection Pushcarts, E-Vehicle, etc. Door to door collection system is practiced in many areas. From the household survey analysis, it is ascertained that only 14% of HHs report no incidence of door-to-door collection.

It is reported that about 176 persons are employed for collection & disposal of solid waste in panchayats. On an average 1 person is responsible for collection from every 220 households and the range varies from 126 households to 301 households, depending on the area. This is probably the reason that, the door-to-door collection is not happening on a daily basis in non-municipal areas. However, due to the improper frequency of collection, waste is generally dumped in the community dustbins, on road, along the water bodies, etc. and the sanitary workers collect it from there.

- **Indiscriminate waste disposal:** In the municipal area, solid waste dumping on road sides, along/ in nallahs and water bodies are seen in multiple locations (**Fig. 8.21**). The railway lands on the left side of platform 2, towards the north-eastern side, that opens into the Malaiyadiatti region is not fenced or walled. This has led to this place being used as a dumping site for locals in the area, creating a stench around the area as well as becoming a breeding ground for mosquitoes and diseases. Water stagnation is also observed, which is worsening the issue of sanitation, and increasing the health hazard.

Fig 8.21: **Solid Waste and Dye from HHI in Nallahs/ Waterbodies**



- **Improper waste segregation:** As per the Rajapalayam Municipality records, municipal area achieves 80% source segregation. But, as per the household survey only 69% of HHs are doing waste segregation in Municipal area. During the survey around 29% of the households say that waste segregation was not insisted by the waste collectors during collection.

In the non-municipal area, waste segregation into compostable and non-compostable is not prevalent. About 67% of the households do not segregate waste and also about 65% of the households feel there is no insistence from the collection agency to segregate the waste which infers the lack of awareness.

- **Improper waste processing:** In the non-municipal area, during site visits & discussion with the village president/clerks, it was noted that waste is disposed in a site notified by the panchayat mostly near the water bodies/vacant land/roadside, etc. No proper waste processing and disposal mechanisms exist in the non-municipal area. As only municipal waste is disposed in the landfill site, non-municipal waste is dumped near the water bodies or open lands (**Fig. 8.22**).

- **Ground water pollution:** In the municipal area, solid waste collected by the Rajapalayam Municipality for the past 16 years is disposed in the compost yard of 20.37 acres located at Arasiyarpatti Village (**Fig. 8.22**). This compost yard poses a significant threat because the leachate may enter the aquifers and pollute the entire ground water table. As per the Municipality record, the Government had sanctioned a work order for 67,049 cu.m. and granted an amount of Rs.396 lakhs for the waste removal. The work should be emphasized as a short-term goal to remove the waste and scientific land fill methodology should be implemented.

Fig 8.22: **Solid Waste Dump Yard at Arasiyarpatti Village (Top) & Road-side Dumping in Melarajakularaman Village (Bottom)**





- Clogging of water in the drains due to dumping of solid waste also acts as breeding space for mosquitoes and poses a health hazard.
- Limited utilization of the formal and informal private sector in recycling activities.

8.6.4. Storm Water Drain

Issues related to the storm water drain system in Rajapalayam LPA are:

- **Lack of rainwater harvesting:** There is an absence of sustainable water augmentation methods like rainwater harvesting, etc. in the LPA. Household survey analysis in Rajapalayam municipal area infers that around 60% of the HHs don't have rainwater harvesting facilities. This results in more rainwater flow into the storm open drains along with sullage ending in the water bodies; ground water recharge potential is thus lost.

During the site visit and discussion with the village Panchayats, most of the habitats in the villages in the LPA area were not having storm water drain and also rainwater harvesting facilities. This is also evident from HH survey that majority of the households in non-municipal area do not practice rainwater harvesting in their localities (85%).

- **Open Drains:** Uncovered storm water drains support mosquito breeding and cause water borne diseases. The municipal area has about 215 km length of drain as per the Rajapalayam Municipality records, of which 90% of the drain are open and poses health threats to the community. In the Non-Municipal area also most of the existing drains are not covered, and can lead to in water borne diseases.
- **Encroachments on nallahs/ water bodies:** Shop front encroachments can be seen on nallahs/ water bodies flowing inside the municipal area in major roads like Sankaran Kovil road, Tenkasi to Madurai Road, etc. (**Fig. 8.23**).

Fig 8.23: **Encroachment on Storm Water Drain which is Polluted in Municipal Area**



- **Sullage from HH and dyes from industries:** Sullage from HHs and storm water indiscriminately runs in the drains/ nallahs causing water borne diseases (Fig. 8.24). There is no proper septage management in both municipal & non-municipal area, hence the overflow water from the septic tanks also flows into the storm water drain.

In some areas like Chathrapatti, effluent water from the small-scale industries are also flows into the storm water drain and the water flows into the water bodies causing pollution to both surface and ground water. The two major water bodies in the municipal area - the Kondaneri Kanmai and New bus stand lake show high BOD and COD content due to the polluted water flows from the drains.

Fig 8.24: **Contaminated Nallah Near Netaji Park in Municipal Area**



- **Water Hyacinth:** Due to lack of efficient management and de-silting, most of the water bodies in the Rajapalayam are covered with water hyacinth (aagaya thamarai) (Fig. 8.25).

Fig 8.25: **Kadambankulam Kanmai, Municipal Area**



8.6.5. Electricity

Challenges in electrical distribution in Rajapalayam LPA are:

- There is a 100% reliance on non-renewable energy sources. Already, the norms specify commercial buildings to have roof-top solar and solar water heater. Better awareness and implementation strategies should be in place to ensure there is a transition to renewable energy wherever possible.
- Common issues like transients, interruptions (natural/ manmade), voltage fluctuations and frequency variations are seen.
- Usage of CFL & sodium vapor lamp street lights is predominantly observed in both municipal & non-municipal areas. In the municipal area, about 47% of streetlights use sodium vapour and the balance CFL.





Social Infrastructure



09



315

9.1 Education

9.1.1. Schools

According to data received from the District Educational Officer, Srivilliputhur Division, Virudhunagar District, there are 139 schools present in Rajapalayam LPA. There are a total of 69 schools within the municipal area and 70 schools in the non-municipal area serving a total of 36,119 students (**Table 9.1**).

Table 9.1: **Distribution of Schools Within LPA & Students Enrolled**

	Number of Schools	Students Enrolled
Municipal Area	69	22,350
Non-Municipal Area	70	13,769
Total	139	36,119

(Source: District Educational Office, Srivilliputhur)

9.1.1.1. DISTRIBUTION OF SCHOOLS ACCORDING TO FUNDING SOURCE

Schools are usually categorized as Government schools, fully aided schools, partially aided schools or private schools depending upon the type of financial support or aid they receive from the government or a government recognized organization to run the school. The distribution of schools in Rajapalayam LPA as per their financial aid is listed in **Table 9.2**.

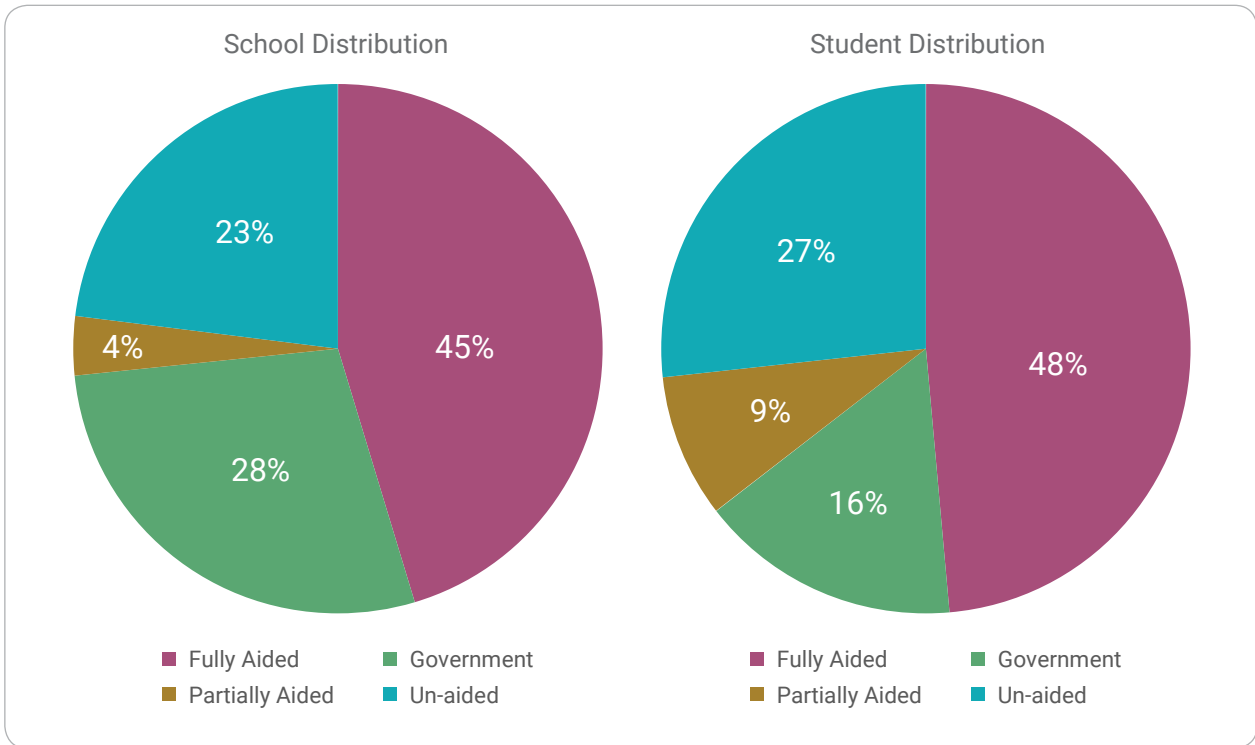
Table 9.2: **List of Schools and Student Strength According to the Financial Aid**

Financial Status	Number of Schools	Students Enrolled
Fully Aided	63	17,548
Municipal Area	45	16,360
Non-Municipal Area	18	1,188
Government	39	5,756
Municipal Area	5	1,730
Non-Municipal Area	34	4,026
Partially Aided	5	3,161
Municipal Area	3	1,440
Non-Municipal Area	2	1,721
Private	32	9,654
Municipal Area	16	2,820
Non-Municipal Area	16	6,834

(Source: District Educational Office, Srivilliputhur)

The majority of schools, 63 nos. (45%) in the LPA are fully aided schools and they also hold 48% of the students, which is close to half of the total student population (**Fig. 9.1**). The second highest category are Government Schools in the LPA, but they only cater to 16% of the total student count. It has to be noted that the private Schools (unaided) hold 27% of the student strength, despite being less in number compared to Government schools.

Fig 9.1: **Distribution of Schools & Students According to Financial Aid**

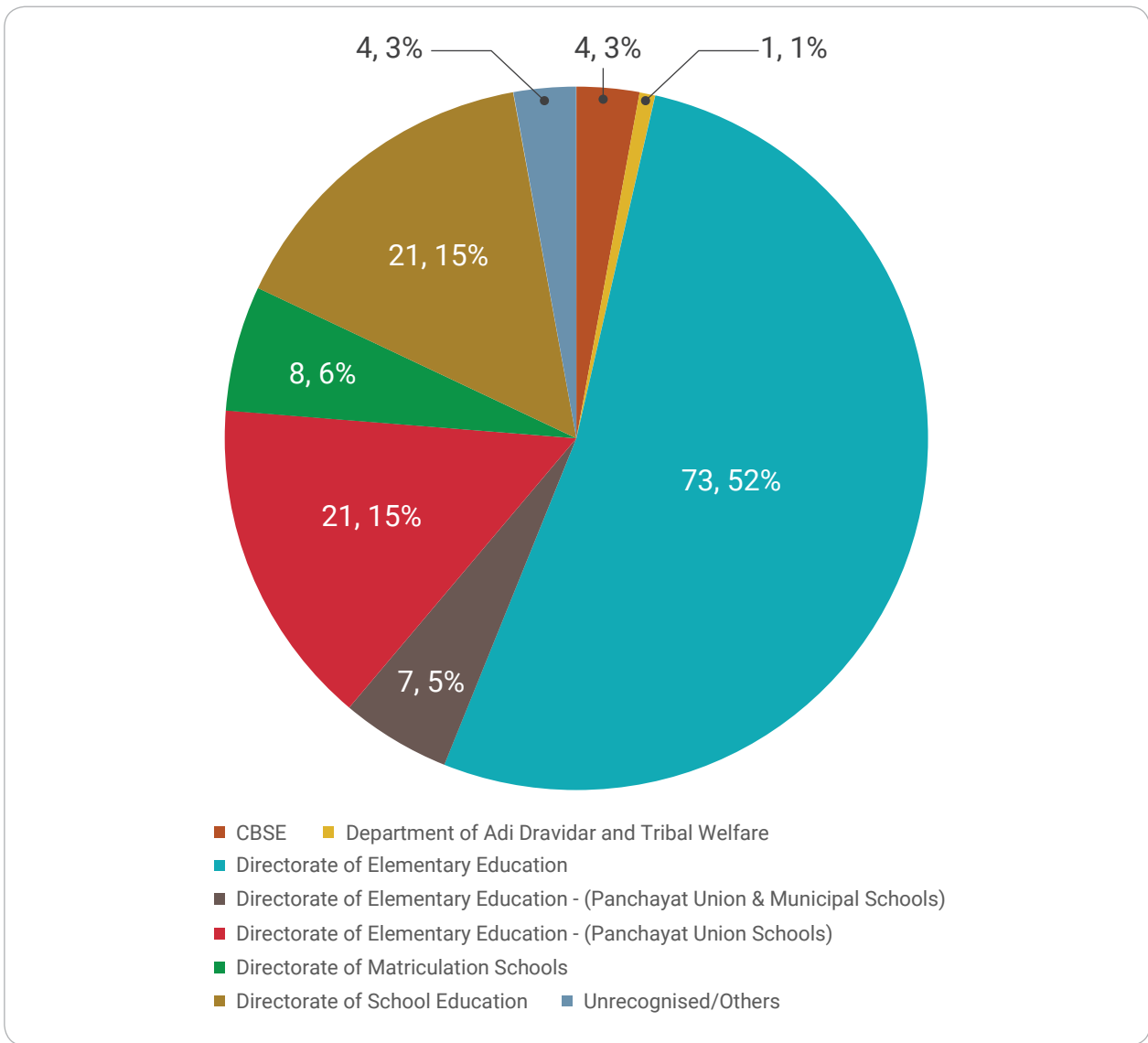


9.1.1.2. DISTRIBUTION OF SCHOOLS ACCORDING TO ADMINISTRATIVE AUTHORITY

Coming to the distribution of the administrative authority, of the 139 schools in the LPA (**Fig. 9.2**)

- 101 schools are administered by the Department of Elementary Education
- 21 schools under Department of School Education
- 8 schools are under the Directorate of Matriculation Education
- 1 school under Department of Adi Dravidar & Tribal Welfare
- 4 schools under the Central Board of Secondary Education
- 4 schools categorized under others

Fig 9.2: **Distribution of Schools According to Administrative Authority**



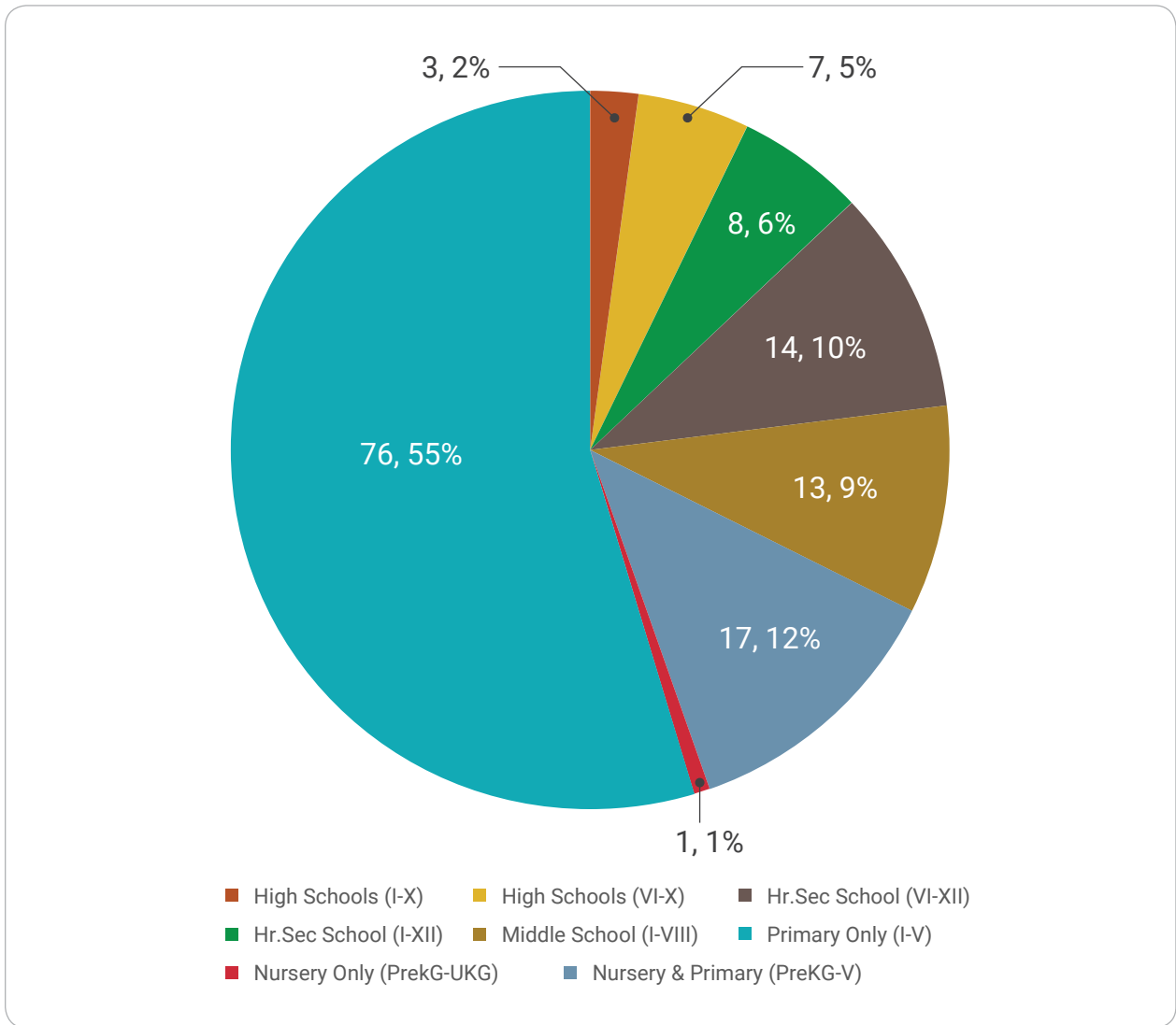
9.1.1.3. DISTRIBUTION OF SCHOOLS ACCORDING TO EDUCATIONAL CATEGORY

According to the District Educational Office, schools in Tamil Nadu are categorized as

- High Schools (I-X)
- High Schools (VI-X)
- Hr. Sec. Schools (I-XII)
- Hr. Sec. Schools (VI-XII)
- Middle Schools (I-VIII)
- Nursery & Primary Schools (PreKG-V)
- Nursery Only (PreKG-UKG)
- Primary Only (I-V)

According to this classification (**Fig. 9.3**), the majority of schools in the LPA are primary schools, constituting 55% (76) of the total registered schools; they are followed by 12% (17) of schools offering primary education along with nursery and preKG, followed by 10% (14) of higher secondary schools exclusively offering VI to XIII standards of higher education.

Fig 9.3: **Distribution of Schools According to Educational Categories**



As seen in **Table 9.3**, it can be noted that among the majority of the schools present, which are primary schools (76), 33 schools are present in the municipal area itself. Among the revenue villages, the highest number of schools are in Melarajakularaman (16 schools), Sholapuram (15 schools) and Sammandapuram (14 schools). While the other revenue villages have single-digit numbers of schools, it should be noted that the villages of Kothankulam, Appaneri (uninhabited village) and Arasiyarpatti have no schools in the villages (**Maps 9.1 & 9.2**).

Table 9.3: **Municipal & Village-wise Distribution of Schools in Rajapalayam LPA**

Revenue Village	Hr. Sec. School (I-XII)	High School (I-X)	High School (VI-X)	Hr. Sec. School (VI-XII)	Middle School (I-VIII)	Nursery & Primary (PreKG -V)	Nursery Only (PreKG-UKG)	Primary Only (I-V)	Grand Total
Kadambankulam	-	-	-	-	-	-	-	1	1
Melpattam Karisalkulam	-	1	-	-	-	-	-	2	3
Melrajakularaman	2	-	-	2	-	-	-	12	16
Pudhupalayam	-	-	-	-	-	1	-	2	3
Rajapalayam (Rural)	-	-	-	1	-	1	-	-	2
Ramalingapuram	1	-	-	-	-	-	-	1	2
Sammandapuram	2	-	1	-	-	-	-	3	6
Samusigapuram	2	-	2	-	-	1	-	9	14
Sholapuram	-	1	1	3	1	1	-	8	15
Terkuvenganallur	-	1	-	-	1	-	-	2	4
Vadaku Venganallur	1	-	-	-	-	-	-	3	4
Kothankulam	-	-	-	-	-	-	-	-	-
Appaneri	-	-	-	-	-	-	-	-	-
Arasiyarpatti	-	-	-	-	-	-	-	-	-
Rajapalayam (M)	-	-	3	8	11	13	1	33	69
Grand Total	8	3	7	14	13	17	1	76	139

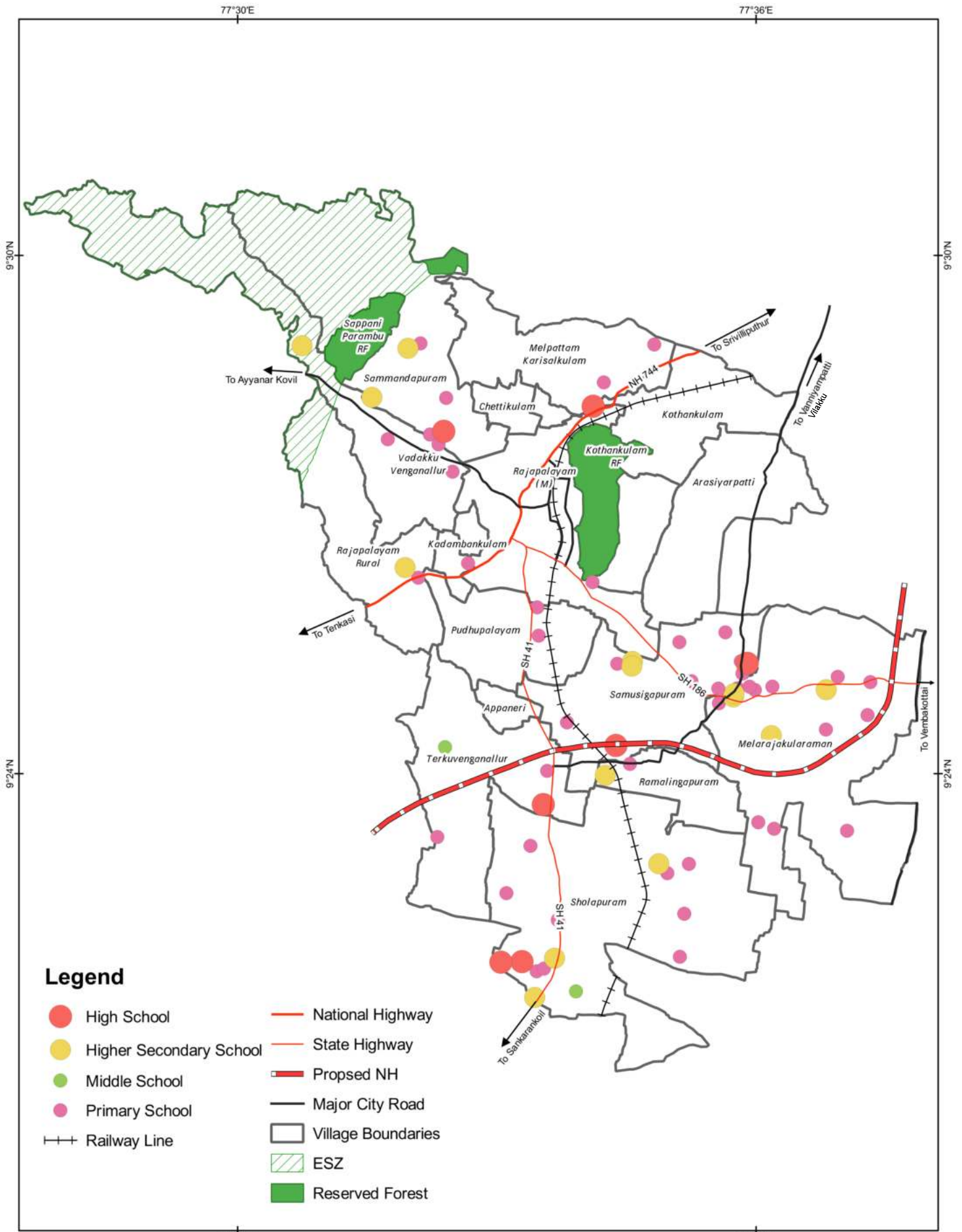
(Source: District Educational Office)

9.1.1.4. DISTRIBUTION OF SCHOOLS IN NON-MUNICIPAL AREA

It can be noted from **Table 9.4** that the strength of enrolment in the schools is almost proportional to the number of schools present in the revenue village. While these numbers are not alarmingly low, they do imply a pattern that people might be preferring schools in the town or established schools in other villages.

Table 9.4: **Revenue Village-wise Number of Schools & Students Strength**

S.No.	Revenue Village	Number of Schools	Students Strength
1	Kadambankulam	1	14
2	Melpattam Karisalkulam	3	286
3	Melrajakularaman	16	2,997
4	Pudhupalayam	3	219
5	Rajapalayam (Rural)	2	773
6	Ramalingapuram	2	570
7	Sammandapuram	6	1,130
8	Samusigapuram	14	3,121
9	Sholapuram	15	3,232
10	Terkuvenganallur	4	579
11	Vadaku Venganallur	4	848
12	Kothankulam	0	0
13	Arasiyarpatti	0	0
14	Appaneri	0	0
	Total	70	13,769



<p>Proximity to Schools in Rajapalayam Non Municipal Area</p>	<p>Notes</p>	<p>Data Credits District Educational Officer, Srivilliputtur</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 9.1: School Locations in Rajapalayam Non-Municipal Area

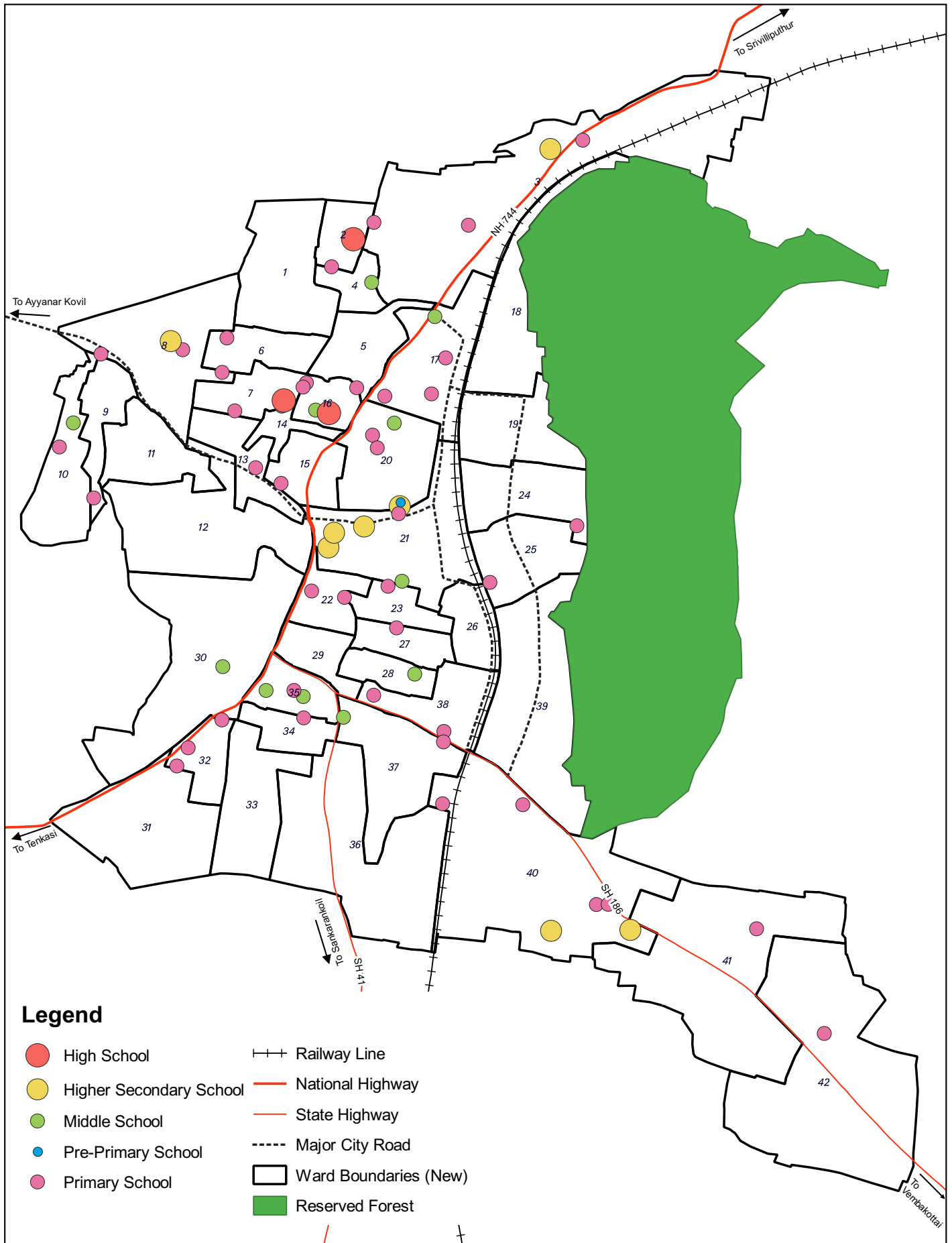
9.1.1.5. DISTRIBUTION OF SCHOOLS IN MUNICIPAL AREA

From **Table 9.5** it is clear that the municipal wards bear a lot of significance in terms of schools, with 69 schools, accommodating 22,350 students, existing in the municipal area. Rajapalayam town, being a significant urban centre in this region will attract students not just from within the town, but also those from the surrounding vicinity. As seen in the **Table 9.5** and **Map 9.2**, most of the schools are present in new ward number 16 & 40 (6 schools), followed by new wards 20, 21 with 5 schools each. However, it must be noted that sometimes two or more registered schools do share the same campus. It can be noticed that new ward nos.1, 5, 12, 18, 19, 16, 26, 29, 31, 33, 36, and 39 do not have any schools present. There are a total of 10 secondary schools offering higher education up to class 12. The majority of schools in the municipal area and LPA are primary schools.

Table 9.5: **Ward-wise School List in Municipal Area**

New Ward No. (post-2022)	Nursery & Primary (PreKG-V)	Nursery Only (PreKG-UKG)	Primary Only (I-V)	Middle School (I-VIII)	High School (VI-X)	Hr. Sec. School (VI-XII)	Total
1	-	-	-	-	-	-	-
2	-	-	1	-	1	-	2
3	-	-	3	-	-	1	4
4	-	-	-	1	-	-	1
5	-	-	-	-	-	-	-
6	-	-	1	-	-	-	1
7	1	-	2	-	1	-	4
8	1	-	2	-	-	1	4
9	1	-	-	-	-	-	1
10	-	-	1	1	-	-	2
11	1	-	-	-	-	-	1
12	-	-	-	-	-	-	-
13	-	-	1	-	-	-	1
14	-	-	-	-	-	-	-
15	-	-	1	-	-	-	1
16	1	-	3	1	1	-	6
17	1	-	2	1	-	-	4
18	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	2	1	-	1	-	1	5
21	-	-	1	1	-	3	5
22	-	-	1	-	-	-	1
23	-	-	2	-	-	-	2
24	-	-	1	-	-	-	1
25	-	-	1	-	-	-	1
26	-	-	-	-	-	-	-
27	-	-	1	-	-	-	1

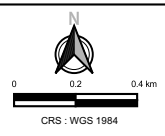
New Ward No. (post-2022)	Nursery & Primary (PreKG-V)	Nursery Only (PreKG-UKG)	Primary Only (I-V)	Middle School (I-VIII)	High School (VI-X)	Hr. Sec. School (VI-XII)	Total
28	-	-	-	1	-	-	1
29	-	-	-	-	-	-	-
30	-	-	-	1	-	-	1
31	-	-	-	-	-	-	-
32	-	-	3	-	-	-	3
33	-	-	-	-	-	-	-
34	-	-	1	-	-	-	1
35	1	-	-	2	-	-	3
36	-	-	-	-	-	-	-
37	1	-	-	1	-	-	2
38	-	-	2	-	-	-	2
39	-	-	-	-	-	-	-
40	2	-	2	-	-	2	6
41	1	-	-	-	-	-	1
42	-	-	1	-	-	-	1
Grand Total	13	1	33	11	3	8	69



Legend

- High School
- Higher Secondary School
- Middle School
- Pre-Primary School
- Primary School
- Railway Line
- National Highway
- State Highway
- Major City Road
- Ward Boundaries (New)
- Reserved Forest

Locations of Schools in Rajapalayam Municipal Area	Notes	Data Credits District Educational Officer, Srivilliputtur
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar
		Prepared By Tapasya Design Studio, Auroville

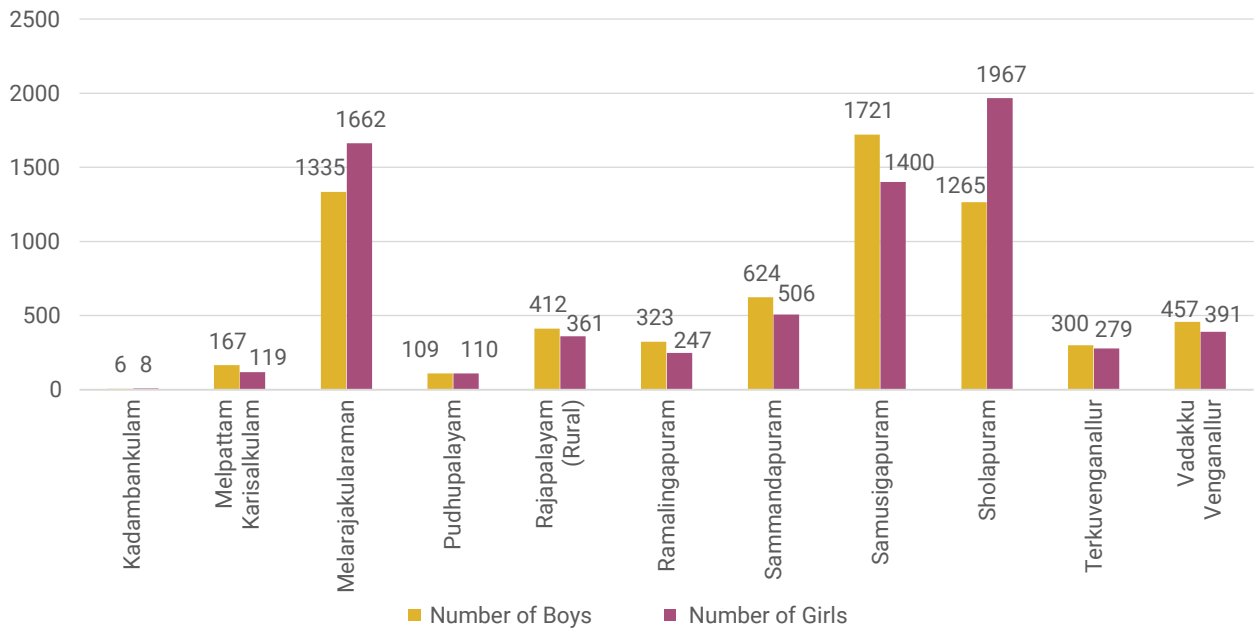


Map 9.2: School Locations in Rajapalayam Municipal Area

9.1.1.6. GENDER DISTRIBUTION

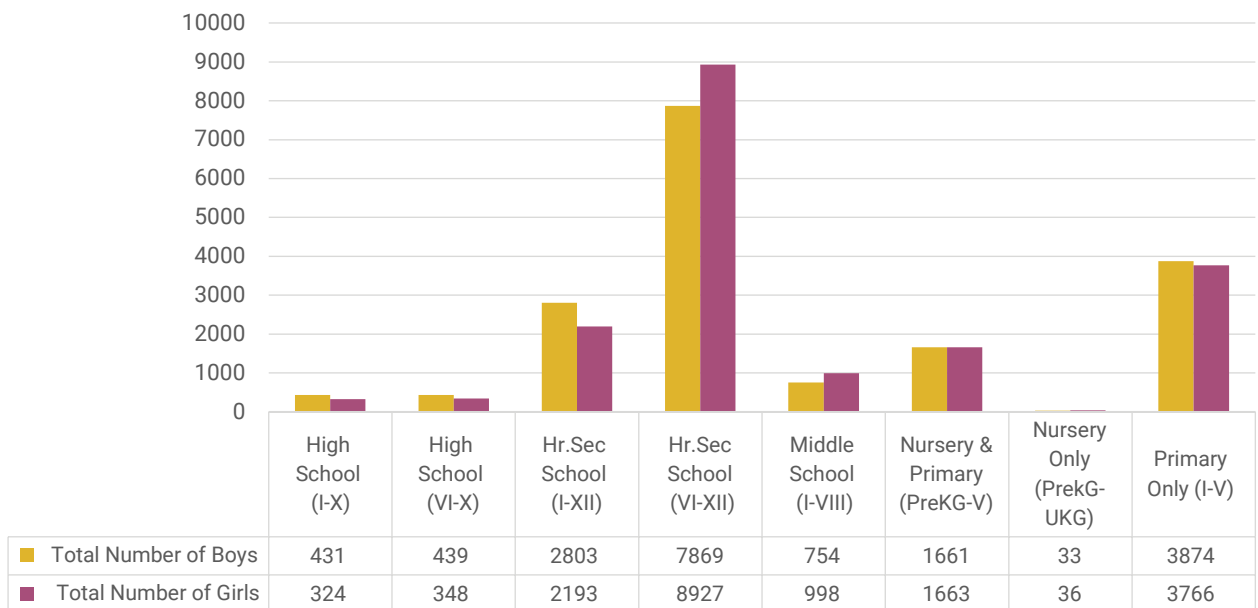
The gender-wise enrolment statistics (**Fig.9.4**) in the LPA villages indicates an inconsistent oscillating pattern, varying from village to village. While Melarajakularaman and Sholapuram have a higher girls enrolment ratio, in Samusigapuram we find higher boys enrolment ratio.

Fig 9.4: Gender-wise Enrolment in Non-Municipal Area



The data (**Fig. 9.5**) shows that the maximum enrolment (Composite LPA) comes from the students enrolled in the higher secondary schools. And it can also be noticed that a greater number of girl students are enrolled than boys in higher secondary schools (VI to XII), almost with a difference of 1,200 students.

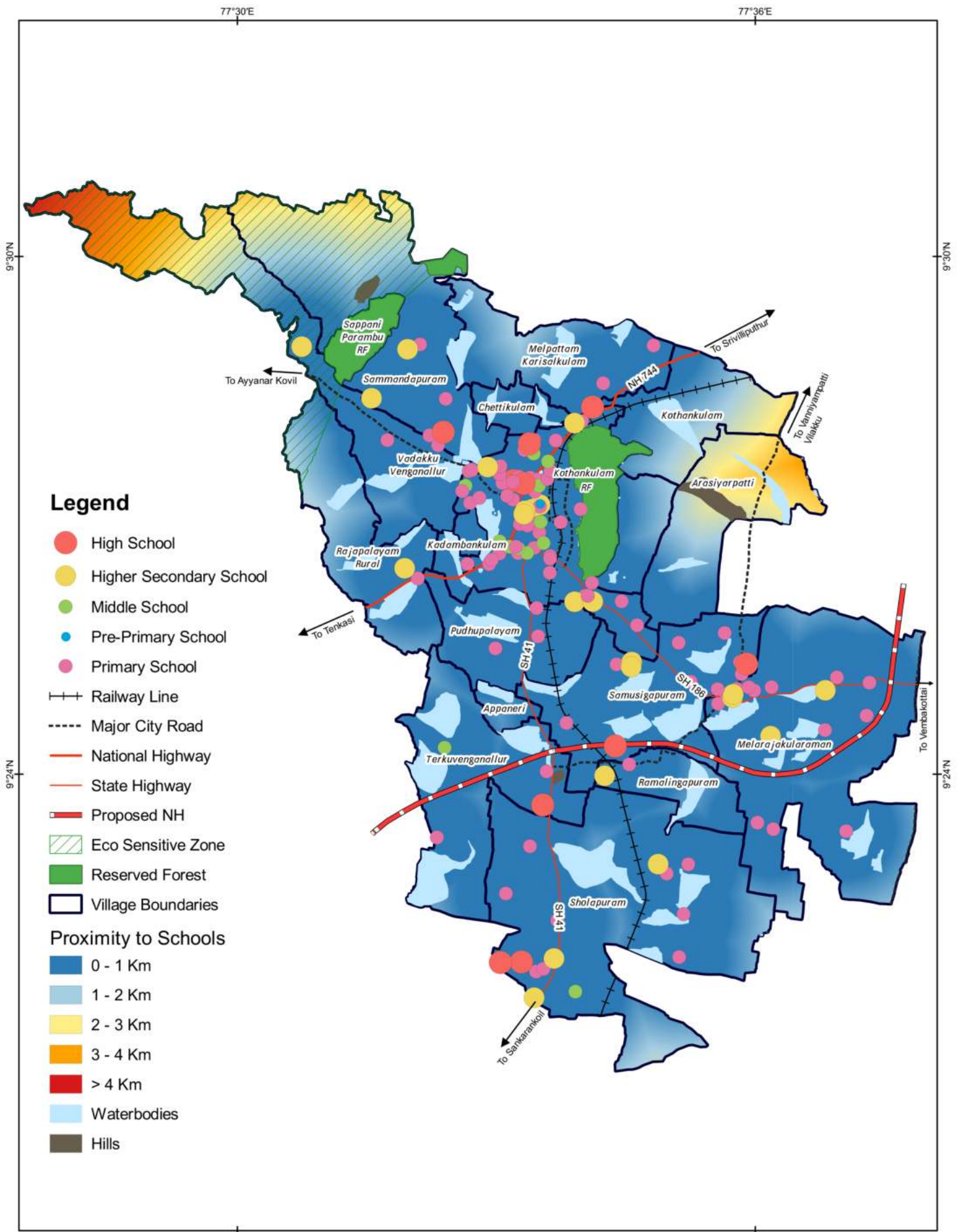
Fig 9.5: Gender Distribution in Categories of Schools



9.1.1.7. PROXIMITY OF VILLAGES TO SCHOOL

While the URDPFI standards provide a good measure of whether the school infrastructure is adequate or not, it does not completely capture the spatial aspects of the schools' distribution. Proximity of the available school from a settlement plays a role that is as important as availability. For example, in the case of Melarajakularaman, the revenue village meets the URDPFI prescribed number of schools, but many of the schools are situated in and around the same area, leading to accessibility issues. Hence, to gauge the proximity and coverage of existing schools and identify the grey areas with little to no coverage, the Euclidean Distance has been calculated from each school as a focal point and a 1 km access buffer has been generated in the ascending order reaching till 6.5 km at the maximum. **Map 9.3** shows this gradient starting from blue colour being the highest coverage, transitioning to yellow being the medium coverage of 2.5 km distance to the nearest school and then to red which has the least coverage, at a maximum distance of 6.5 km.

It can be noted that the villages of Kothankulam and Arasiyarpatti again are in the red zone with the least proximity to the schools. However, they are in very close proximity to Samusigapuram and Melarajakularaman, which have an excess of both primary and secondary schools according to URDPFI standards.



<p>Proximity to Schools in Rajapalayam Local Planning Area</p>	<p>Notes</p>	<p>Data Credits District Educational Officer, Srivilliputtur</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 9.3: Proximity and Coverage of Schools Extracted through Euclidean Distance

9.1.2. Higher Education

There are 10 colleges and institutes of higher education located in Rajapalayam LPA as per the data received from the Statistical Department (**Table 9.6**). It is evident that the town provides significant opportunities for technical education.

Table 9.6: **Higher Education Institutions in Rajapalayam**

Existing Number of Colleges in 2021									
S. No.	Name of Institutions	Type (Finance)	Stream	Students			Teachers		
				Boys	Girls	Total	Men	Women	Total
1	Ramco Institute of Technology	Self-Financing	Engineering	788	465	1,253	71	27	98
2	Rajapalayam Raju's College	Aided and Self-Financing	Arts and Science	1,300	1,196	2,496	40	56	96
3	A.K.D. Dharmaraja Women's College	Aided and Self-Financing	Arts and Science	-	1,258	1,258*	-	52	52
4	P.A.C Ramasamy Raja Polytechnic College	Aided	Polytechnic	1,584	183	1,767	62	23	85
5	N.A. Manjammal Polytechnic College	Self-Financing	Polytechnic	307	24	331	14	10	24
6	Angel Polytechnic College	Self-Financing	Polytechnic	321	32	353	13	8	21
7	A.K.D. Sakkaniamma College of Education for Women	Self-Financing	Education	-	162	162*	-	12	12
8	Angel College of Education	Self-Financing	Education	25	127	152	6	2	8
9	Ramco Private Industrial Training Institute	Private	ITI	481	5	486	30	1	31
10	Oscar Institute of Hotel Management and Catering Industrial School	Private	Hotel Management and Catering	61	-	61	5	3	8
TOTAL				4,867	3,452	8,319	241	194	435

(Note: * Colleges for Women's Education)

9.1.3. Household Survey Analysis

Household surveys were undertaken, covering 555 households in the municipal area and 462 households in the non-municipal area. A set of questions were dedicated to understanding the on-ground reality of characteristics related to education, quality and the perception of the general public towards the overall education scenario in and around the town.

Type of School

Municipal and non-municipal respondents were surveyed on the current school type, either primary or high school that their children were currently studying in. The majority of respondents from the municipal area, between 42-52%, had children attending the private schools, while in the non-municipal area, the majority of respondents, 54-61%, attended Government schools. Aided schools are a significant category of schools in the LPA. Except for the question about primary schools in non-municipal area, Aided schools were chosen by 21-37% of the respondents, except those respondents from non-municipal area using primary schools.

School Selection Criteria

Distance was the primary criteria for selecting schools for all respondents (72-80%) in both municipal and non-municipal area. Quality of education was the next important criteria (12-20%) selected by all respondents.

Gap in Available Education

In the municipal area, “quality of teaching” was the biggest expressed gap in the current available education system for 86% of the respondents. Quality of teaching also was an expressed gap among the respondents in the non-municipal area (61%), followed by lack of extracurricular activities (28%).

Overall Standard of Education

About 50% of respondents in the LPA rated the standard of education as 4 on a scale of 1-5, 1 being the lowest and 5 the highest. The overall satisfaction with the standard of education in the LPA is high, with 90% and 86% of respondents in the municipal and non-municipal area, respectively, rating the education standard as 4 and above.

9.2 Healthcare

9.2.1. Public Health Infrastructure

The public health system is divided into 3 levels:

- Sub Centres (SCs) and Primary Health Centres (PHCs) at the primary level
- Community Health Centres (CHCs) and smaller sub-divisional Hospitals at secondary levels
- Medical Colleges, District/ General Hospitals at tertiary level

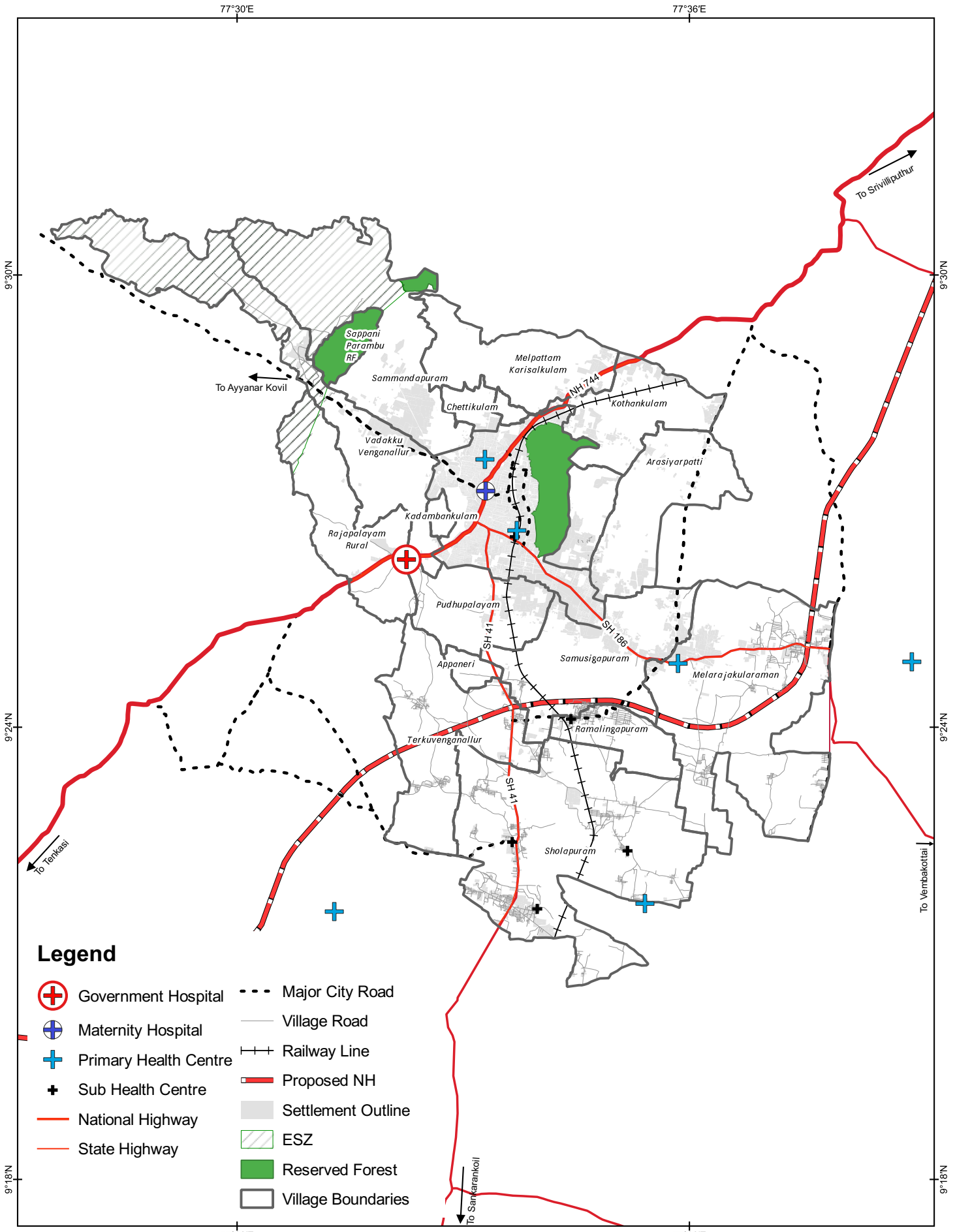
Primary Level – Rajapalayam town is the focal point of health facility and services for the Rajapalayam LPA region. The LPA villages are located within a 2-8 km distance from Rajapalayam Municipality. There are two Urban PHCs in Rajapalayam municipal area – one on T.P. Mills Road and another on Madasamy Kovil Street. Of the two, the PHC in T.P Mills Road is a maternity care center. There is 1 PHC in the LPA villages – 1 in Chathrapatti, and there are 3 PHCs present in 5 km radius from the villages of LPA 1 in Reddiarpatti, 1 in Nathampatti and 1 in Kilavikulam. There is also ESI facility in Rajapalayam to provide medical care for insured labour population. (Table 9.7 & Map 9.4)

Secondary & Tertiary Level – The post-primary health facilities are concentrated within the town. The two main Government Hospitals in the town are the Government Maternity Hospital and the P.A.C.R. Government Hospital.

Table 9.7: Existing Public Health Infrastructure in Rajapalayam LPA

Category	Presence in LPA (As on 2021)	
PHC (Urban)	2	
PHC (Rural)	1 (+3 PHCs available in 5 km radius of LPA)	
CHC	2	
	Allopathy	2
	AYUSH	2
Tamil Nadu Accident & Emergency Initiative (TAEI) Center (Within Government Hospital)	1	

(Source: Rajapalayam Municipality and Existing Land Use)



Legend

- ⊕ Government Hospital
- ⊕ Maternity Hospital
- + Primary Health Centre
- + Sub Health Centre
- National Highway
- State Highway
- Major City Road
- Village Road
- Railway Line
- Proposed NH
- Settlement Outline
- ESZ
- Reserved Forest
- Village Boundaries

Public Healthcare Facilities in Rajapalayam LPA

AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes

Data Credits
Field Survey

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville

Map 9.4: Public Health Facilities in the LPA

9.2.2. Private Health Infrastructure

The public health system is supported by a comparatively large private health infrastructure that is concentrated primarily in the Rajapalayam municipal area. The medical facilities in the LPA include clinics, nursing homes and single specialty hospitals. The number of private health facilities in Rajapalayam municipal area are listed in **Table 9.8**. In the year 2019-20, there have been 1,980 births and 1,188 deaths registered by the Municipality. There are 17 listed causes of deaths: some of them being fire accident, poisoning, accident, suicide, snake bite, heart attack, cancer, liver disease, old age, etc.

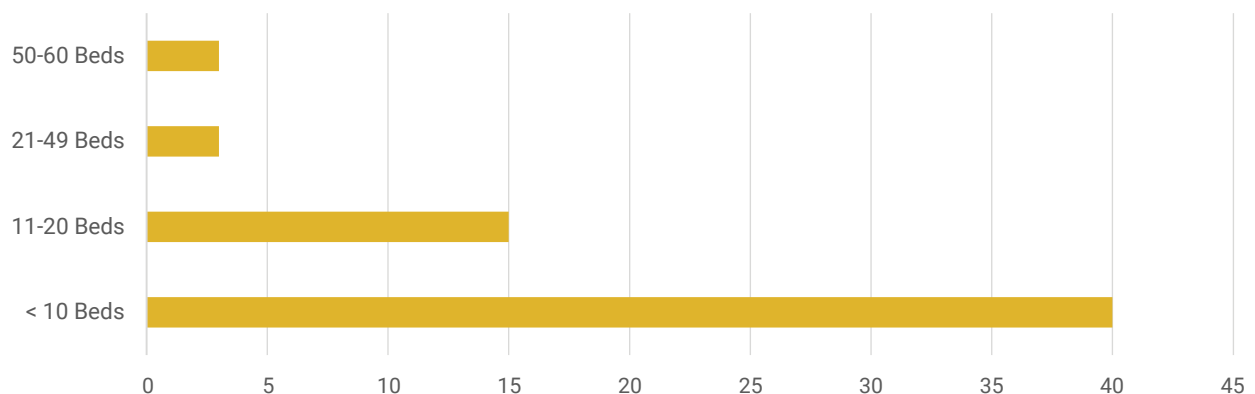
Table 9.8: **Private Health Facilities in the LPA**

Private Health Facilities	No. of Units in LPA	
	Clinics	Allopathy
	AYUSH	18
Other Facilities (Physio/ Diagnostics)	Allopathy	10
	AYUSH	2
Maternal Care / Nursing Home (Within Hospitals)	Allopathy	7
	AYUSH	1
Hospitals	Allopathy	49
		3
No. of Beds		718
Diagnostic Laboratories & Scan Centers		17
Chemists & Druggists		98
Blood Banks		4

(Source: DM&RHS data (2022); Rajapalayam Municipality (2021))

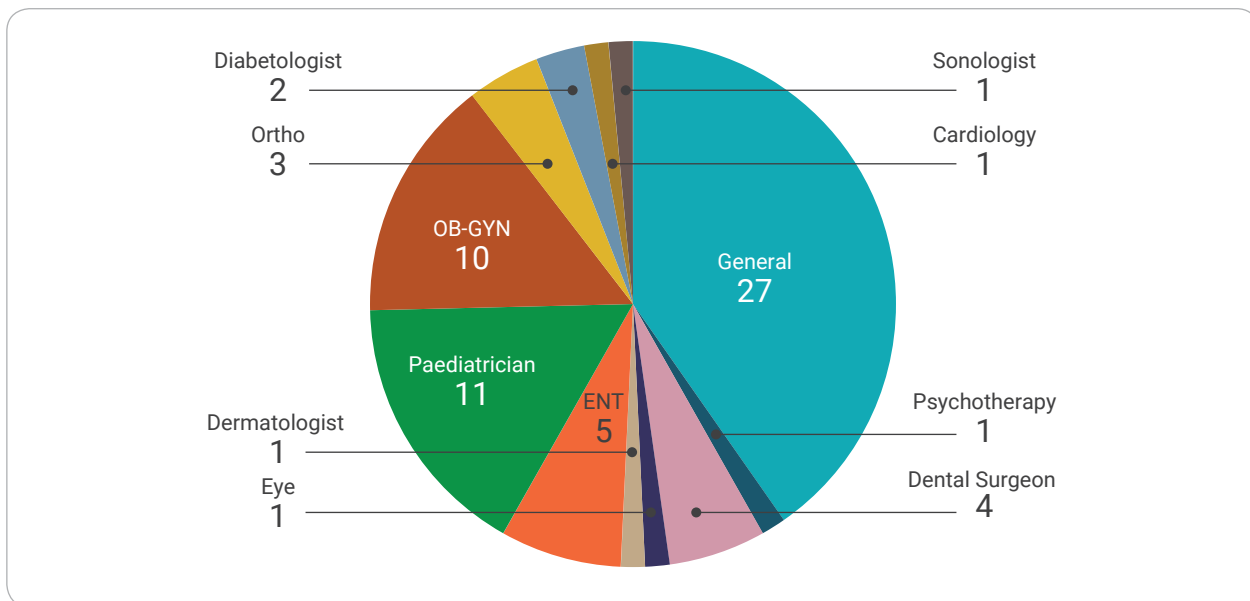
Data indicates that while 92% of health facilities in Rajapalayam municipal area are from the private sector while only 77% of bed facilities are in the private sector. The break-up of the bedded facilities based on the bed strength is shown in **Figure 9.6**.

Fig 9.6: **Facility Type Based on Bed Numbers in the LPA**



Rajapalayam Municipality website lists 67 registered healthcare providers by their specialty and practice location in the town (**Fig. 9.7**)

Fig 9.7: **Speciality-wise Split of Physicians in Municipal Area**



9.2.3. Overall Existing Healthcare Facilities

The public healthcare facilities are supported by a robust private health infrastructure in Rajapalayam LPA. **Table 9.9** shows the details of overall healthcare facilities (public and private health care) available in LPA.

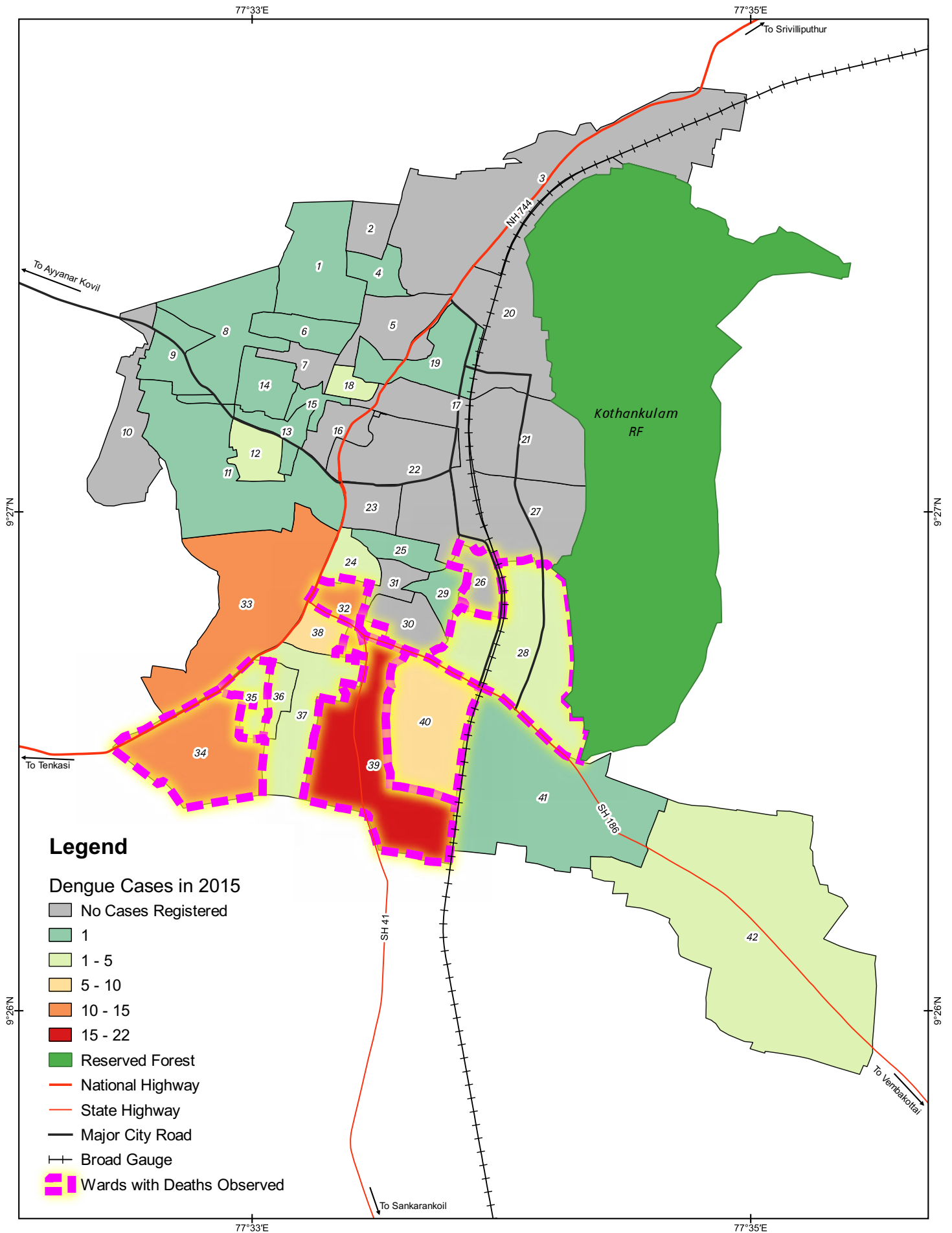
Table 9.9: **Health Facilities in Rajapalayam LPA**

Category	Presence in LPA (As on 2021)
Dispensary	98
Nursing Home, Child Welfare and Maternity Centre	8
Polyclinic	77
Intermediate Hospital (Category B)	56
Intermediate Hospital (Category A)	(Bed Strength Unknown)
Multi-Specialty Hospital (NBC*)	-
Specialty Hospital	-
General Hospital	1
Family Welfare Center	3

(Source: District Health Office, Virudhunagar & Rajapalayam Municipality)

9.2.4. Disease Outbreak – Dengue

Rajapalayam Municipality along with Samusigapuram-Melarajakularaman consisting of Chathrapatti cluster as the epicentre, were two major areas that reported an outbreak of Dengue between December 2014 to February 2015. The deaths due to Dengue in Rajapalayam block accounted for majority of the casualties in Tamil Nadu due to Dengue. A publication in the Journal of Mosquito research had identified deaths occurring in old ward nos. 26, 28, 32, 34, 35, 39, 40; old ward no. 39 contributed to the highest number of cases (22 nos.) followed by old ward no. 34 (12 cases), old ward no. 32, 33 (11 cases) (**Map 9.5**).



Dengue Cases during 2015 Outbreak in Rajapalayam Municipal Area

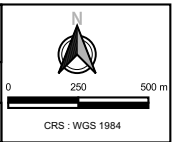
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes

Data Credits
 Paper titled "Aedes Indices and Their Significance on the Evaluation of the Dengue Control Activities in Rajapalayam Municipality of Tamil Nadu, India"

Client
 DTCP Virudhunagar

Prepared By
 Tapasya Design Studio, Auroville



Map 9.5: Dengue Cases in Rajapalayam Municipal Area During 2015 Outbreak
 (Note: Map based on old ward division)

9.2.5. Household Survey Analysis

As a part of the household surveys, a number of questions have been asked to the public related to healthcare, to find understand user patterns, feedback and satisfaction level. The questions asked ranged from the type of facilities selected for basic healthcare, advanced healthcare and a request to grade the health services based on affordability, treatment and facilities. For user satisfaction, the respondents were asked to rate on a scale of 1-5, with 1 being the lowest rated and 5 being the highest.

Facility Preference for General Illness

For basic healthcare needs like cough, cold etc., the majority of the respondents (50%) in the municipal area preferred to visit private facilities, with 43% preferring the government hospital. User satisfaction for basic health service was high, with an average of 88% respondents rating the services as 4 or above, on parameters such as affordability, treatment and facilities.

In the non-municipal area, 68% of respondents used government facilities, followed by 28% who used private facilities. User satisfaction was also high, with 80% of respondents rating the services as 4 or above.

Facility Selection for Chronic Health Needs

For chronic or critical healthcare needs in the municipal area, 53% of respondents used private hospitals and 44% use the Government hospital, whereas in the non-municipal area the majority (69%) used Government facilities and the rest private. Overall user satisfaction for these health services, on the basis of affordability, treatment and facilities was high across the LPA, with 85% of total respondents rating them 4 or above.

Overall, the Government facilities in the LPA are well utilized by the local population. While in the municipal area, there is an almost equal preference for both private and public health facilities, in the non-municipal area there is an overwhelming 83% respondents who specified that they did not prefer private over public facilities. However, there was an expressed need for advanced and multi-speciality health facilities. Other expressed gaps in the existing health system included better road infrastructure to improve access to care, medical camp facilities, etc.

Recurring Public Health Issue

Mosquito breeding is the biggest health hazard observed by the respondents across the LPA. This could be actually a sizeable issue considering the dengue outbreaks in the recent years. The second most predominant issue was seasonal diseases.

9.2.6. Mental Health – Survey Findings

There is a sense that mental health is a neglected issue in Rajapalayam. Access to quality mental healthcare is a major hurdle and is further compounded by social stigma and myths and general lack of awareness. Issues related to mental wellness are found to be growing in recent times. Changes in different spheres of society are seen as key stressors that affect the mental health of the inhabitants – these include growing intergenerational gaps, changing gender roles, increasing pressure on children and inadequate town infrastructure.

Focus group discussions and depth interview were conducted as part of a community based mental wellness program, Ātmapasāra, among 543 participants (327 male & 216 female) comprising of students, teachers, Ramco employees and housewives. The findings from the stakeholder interactions can be summarized as follows:

- Television is the primary source of information on mental health among participants. Social media too is an important platform for information.
- 1 in 5 people are aware of an acquaintance in their social circle suffering from mental illness. The number is higher among teachers (1 in 4) and blue collared factory workers (1 in 3).
- COVID has triggered stress levels across segments. Two-thirds of the participants impacted to some degree, thereby worsening the mental illness problem.
- Based on the survey the state of mental health and key stress points are:
 - Changing Value System (changes in the societal and familial fabric are key stress buttons in the community)
 - Growing Intolerance
 - Quality of life (limited opportunities for professional growth)
 - Lack of infrastructure in the town leading to wasting of productive time

The research found that there are changes noticed in the community, with different stress points being faced by the members of the community, especially so in the times of COVID-19. However, changes in social fabric & value system remained a key stress point for all.

- 1 in 3 associate mental illness with aggression and violent behaviour. 1 in 5 believe that it is part of life and not to be taken seriously.

9.3 Police and Fire

- Majority of the respondents believe that people suffering from mental illness in their community are not taking any treatment. Of those seeking care, taking psychiatric help/ professional counselling is not uncommon in the community.
- Willingness to seek any professional help high; especially amongst upper section, weakens as we move down the socio-economic class. Youngsters and older age groups need more conviction.

9.3.1. Tamil Nadu Police Department

According to Deputy Superintendent of Police, Rajapalayam, there are 5 police stations in Rajapalayam Area, which collectively serve a combined radius of 11.36 sq.km. This covers the majority of the Rajapalayam LPA. The following are the 5 police stations:

- Rajapalayam South Police Station
- Rajapalayam North Police Station
- Rajapalayam All Women Police Station
- Rajapalayam Town Traffic Police Station
- Rajapalayam NH Traffic Police Station

The majority of the cases in Rajapalayam pertain to fatal and non-fatal accidents (**Table 9.10**). In general, the most common crime reported apart from accidents are theft, followed by burglary and crimes against women. It is of note that there has been a rise in crime reported against women, especially from 2018. Compared to the Tamil Nadu State Crime Rate (crime per 1 lakh population) which stands at 661.5 in 2018 and 600.3 in 2019, Rajapalayam's crime rates are 16.8 and 21.3, respectively, way lower than state crime rate.

Table 9.10: Crimes Reported in last 5 years

Year-wise Crimes Reported (No.) for Last Five Years						
S.No.	Type	2020	2019	2018	2017	2016
1	Theft	8	20	18	13	22
2	Burglary	3	10	8	3	11
3	Kidnapping	-	-	-	-	-
4	Robbery	1	2	3	1	1
5	Riots	1	-	2	1	1
6	Murder	6	5	7	5	3
7	Crimes against Women	11	1	10	4	1
8	Fatal Accidents	25	35	21	11	33
9	Non-Fatal Accidents	53	59	63	32	88
10	Cyber Crimes	-	-	-	-	-

(Source: Tamil Nadu Police Department)

9.3.1.1. POLICE PERSONNEL STRENGTH

According to the Police Department, in the 5 police stations present there is a total strength of 241 police personnel present (Table 9.11). Out of the 241 personnel, 53 are traffic police and 188 are general police. The All-Women Police Station has a count of 24 personnel.

Table 9.11: Police Manpower in Rajapalayam

S.No.	Station	Actual Strength						Total
		Inspector		SI/SSI		Other Ranks		
		Male	Female	Male	Female	Male	Female	
1	Rajapalayam South	2	0	11	0	54	18	85
2	Rajapalayam North	0	1	16	1	49	12	79
3	RJPM AWPS	0	1	0	1	0	22	24
4	RJPM Town Traffic	0	0	3	0	24	8	35
5	RJPM NH Traffic	1	0	5	0	9	3	18
	Total	3	2	35	2	136	63	241

(Source: Tamil Nadu Police Department)

9.3.1.2. SECURITY AND VIGILANCE

According to the town police department, there are a total of 314 locations in town (both private and government buildings) that have CCTV security cameras installed. There are a total of 2,347 installed cameras in town, out of which 2,308 are working and operational.

9.3.2. Fire Department

There is 1 fire station located in Rajapalayam urban area near Rajapalayam Court, Madaswamy Kovil Street; this covers 42 villages in and outside of Rajapalayam Block. The fire station has 23 firemen, 2 fire engines, 1 ambulance and 1 mobile ambulance. They cover cases from fire damage to emergency rescues, venom bites, etc (Table 9.12).

Table 9.12: Last 5-year Fire Accident Numbers in Rajapalayam

S.No.	Year	No. of Fire Accidents	Damage Value	Captured Value
1	2016	5	22,000	83,000
2	2017	7	28,500	1,41,500
3	2018	4	13,000	72,000
4	2019	10	56,500	7,23,500
5	2020	2	16,000	4,34,000

(Source: Tamil Nadu Fire and Rescue Services)

9.4

Recreational Facilities – Parks, Open Spaces & Sports Facilities

As per the primary survey and interviews conducted, the fire brigade officer has recommended that there had to be a sub-fire station set up in areas having larger industrial activities. Majority of the fire accident cases occur in and around the Chathrapatti village area, where a lot of surgical gauze bandage and cotton-based household industries are present.

9.4.1. Parks & Open Spaces

There are a total of 9 city parks/ gardens maintained by Rajapalayam Municipality, out of which 5 parks are AMRUT funded parks located in old ward no. 42 alone (Table 9.13).

Table 9.13: List of Parks/ Gardens in Municipal Area

S.No.	Existing Parks in Municipal Area	Existing Area (in Hectares)
Municipality Maintained Parks		
1	Nethaji Subhash Chandra Bose Park, Mudangiyaru Road	0.194
2	PSK Park, Tenkasi Road	0.057
3	Bharathi Nagar Housing Board Park, Opposite to Ammaniammal School	
4	RR Nagar Extension New Park, 5th Street, Ward No.42	0.045
5	RR Nagar Extension New Park, 8th Street, Ward No.42	0.069
6	RR Nagar Extension New Park, 7th Street, Ward No.42	0.025
7	RR Nagar Extension New Park, 8th Street, Ward No.42	
8	RR Nagar Extension New Park, 9th Street, Ward No.42	0.068
9	Ganapathipuram Extension Park, Near Vaima School	0.249
Other Parks		
10	Park Inside PSK Nagar, Ward 41	0.357
11	PSK Memorial Park, Ward 41	0.391
12	PACR Memorial Park, Ward 41	0.361
13	PSK Nagar Park - 2	0.194
14	Vignesh Raja Park, Ward 8	0.162
15	Shanti Sthal Memorial Garden, Ward 3	0.19
TOTAL AREA (in Hectares)		2.46
TOTAL AREA (in sq.km)		0.0246

(Source: Rajapalayam Municipality)

9.4.2. Sports Facilities

In terms of designated playgrounds and sports facilities in the LPA, according to the Government Order released in 2009 under the Tamil Nadu Parks, Playfields and Open Spaces (Preservation and Regulation) Act, 1959, 7 school grounds and 5 other maithanams (Open Spaces) that include public open spaces and private club open spaces are designated as open spaces in the municipal area (**Table 9.14**), which equate to 8.49 hectares. Based on field survey the play grounds mentioned in the G.O are not utilised as playground instead used as a parking lot. When it comes to the non-municipal area as well, no designated public playgrounds or sports facilities are available in villages. However, a private sports facility has been recently established adjacent to the municipal area, in the revenue village of Melpattam Karisalkulam.

Table 9.14: **Existing Parks in Rajapalayam Municipal Area**

S.No.	Playgrounds (As per G.O.)
1	SM Road, High School Playfield
2	AKD Dharmaraja Girls Higher Secondary School Playfield
3	Nadar Higher Secondary School Playfield
4	PACM Higher Secondary School Playfield
5	SS Board Higher Secondary School
6	Playfield and School reserved in Pudhupalayam Town Panchayat
7	Playfield reserved in East of Railway Line Town Panchayat Scheme Area
Maithanam (Open Spaces) (As per G.O.)	
1	Subhash Chandra Bose Maithanam
2	Jawahar Maithanam
3	Ponvizha Maithanam
4	Ramco Club Maithanam
5	Pannaiyar Recreation Club
Other Playgrounds (As per Field Survey)	
1	PACR Polytechnic Playground
2	NAAR Higher School Playground
3	Chinmaya Vidyalaya PACR Matriculation HSS Playground
4	Chinmaya Vidyalaya Smt. SLR Matriculation HSS Playground
5	Ramco Institute of Technology Playground
6	Rajapalayam Raju's College Playground

(Source: Rajapalayam Municipality)

Hence it is safe to conclude that no specific designated Government playgrounds or sports fields are existing in the rest of the revenue villages, and there is a need for playgrounds and sports.

9.4.3. Major Sports

Basketball is a famous and widely practised sport in Rajapalayam. In the past 50 years, Rajapalayam has contributed 9 National team players to represent the Indian national team, 24 players as part of State, Railways, services and other teams who have participated in national tournaments and at least 27 University players. This is self-evident of the rich culture of Basketball as a sports form practised in the LPA. However, there is no designated stadium or ground to practice basketball except for basketball courts present as a part of schools or the Polytechnic college campus playground. The Tamil Nadu State Basketball Association conducts State-level basketball championships annually for which the trophy distributed is named as the Rajapalayam Trophy in honour of the rich tradition of Basketball in Rajapalayam. Hockey and Volleyball are the other sports activities common in the LPA.

9.4.4. Household Survey Analysis

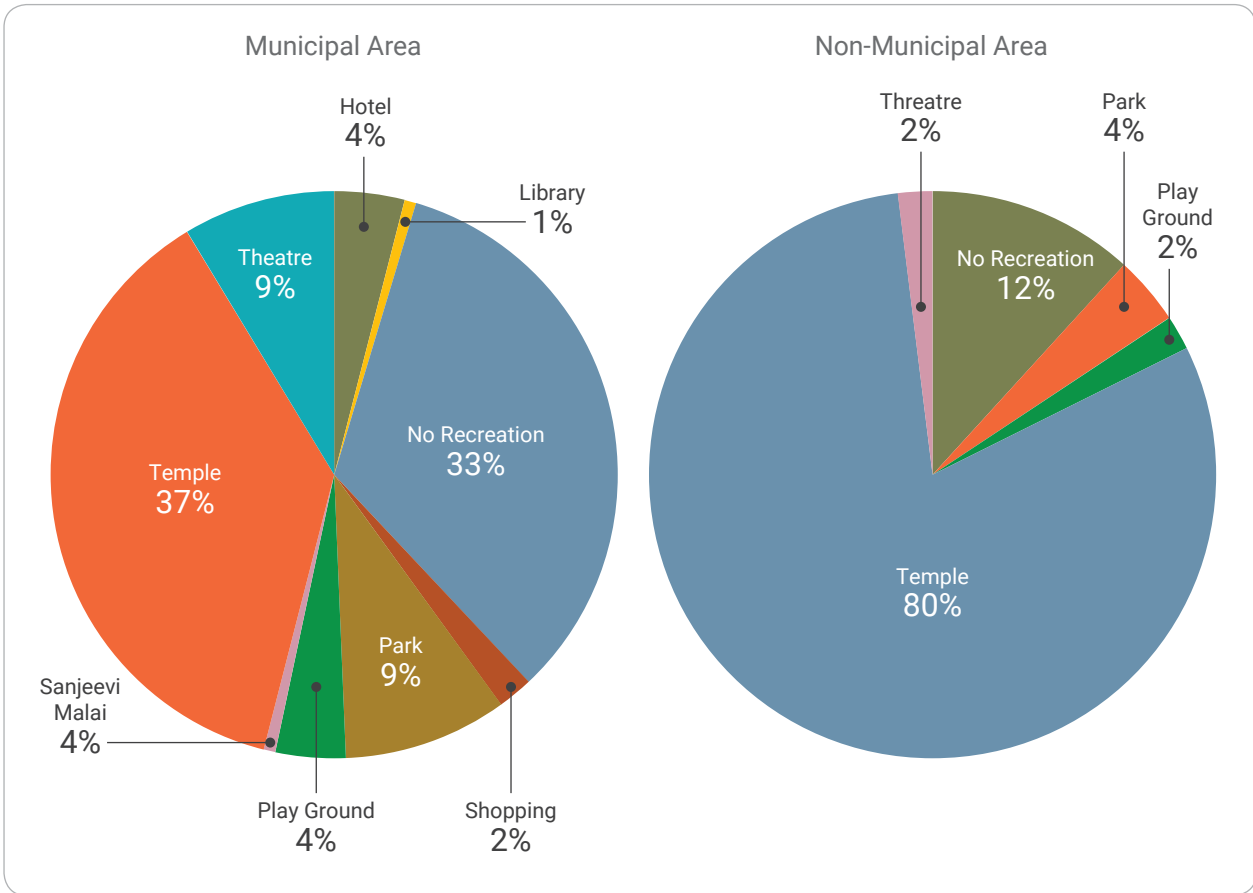
A household survey exercise conducted covering around 555 households in municipal area and 462 households in non-municipal area, in which a set of questions related to recreation and use of such spaces were included. The following section includes the responses from the survey.

Preferred Recreational Spaces by Citizens

Analysis of survey data indicates that in the municipal area, 33% of the respondents replied that they do not have any places to visit for recreational purposes (**Fig. 9.8**). 37% of the respondents say that they visit places of worship for their recreational purposes. The noteworthy point is that only 13% of the respondents prefer a park or a playground as a recreational spot. 9% of the respondents replied by saying that going to a cinema theatre is their recreation. This only strengthens the fact that there is a void for parks and open spaces in the town not only physically but also in a sociological sense.

In non-municipal areas, 12% of the respondents say they do not visit any spaces for recreation (**Fig. 9.8**), 80% of the respondents consider making a visit to places of worship as recreation, while 6% of the total respondents said they visit a park or a playground, only 2% visit the theatres once in a while as their primary recreational need. As non-municipal areas are rural, a lack of recreation can be understandable with minimal parks and organized green spaces.

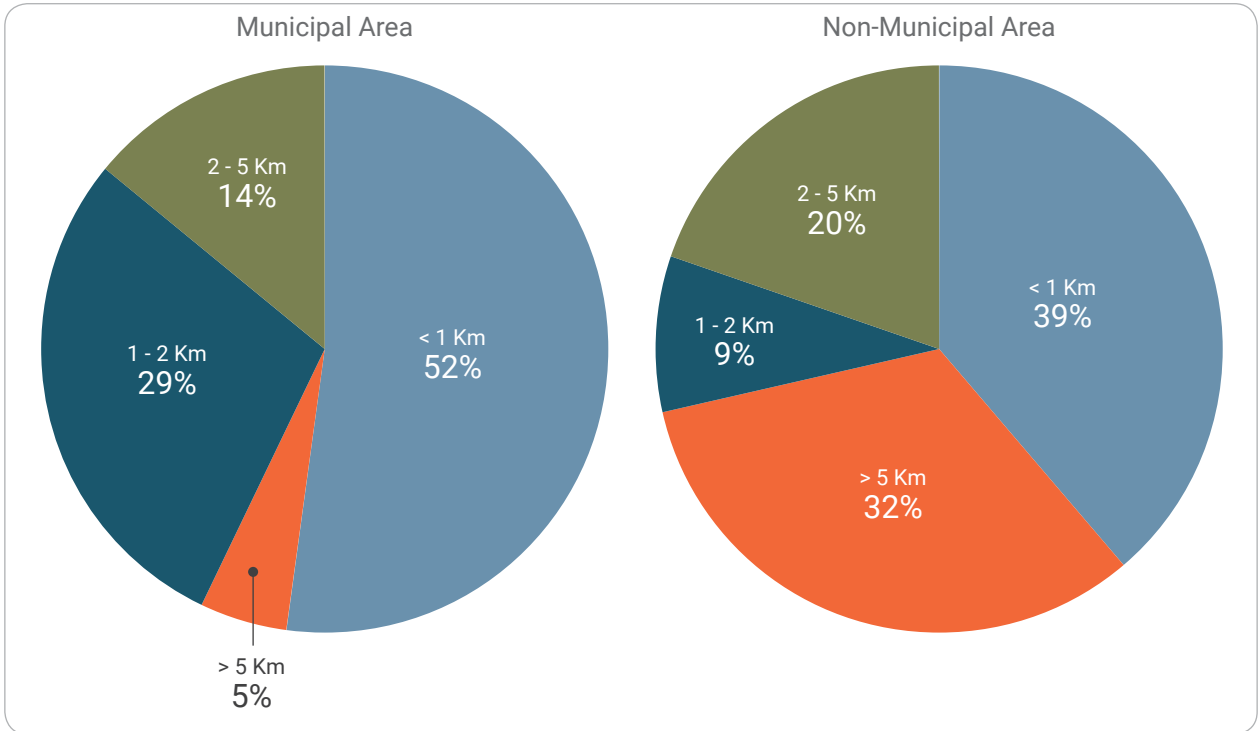
Fig 9.8: Preferred Recreational Facility in Municipal & Non-Municipal Area



Distance to Nearest Park

A question about the proximity to the nearest park has been asked in the survey to gauge the awareness of the citizens and accessibility to their nearest available park. In the municipal area, 52% of the citizens in the sample responded that the nearest park is less than a kilometre, which falls in the walkable range (**Fig. 9.9**). 29% replied that a park is in the 1-2 km range, 14% replied that it is 2-5 km range and only 5% replied it's greater than 5 km away. With the whole radius of the park zone of influence being less than 3.5 kms in the municipal area, this shows that there is no awareness and lack of interest in using the existing parks.

Fig 9.9: Distance to Nearest Park in Municipal & Non-Municipal Area

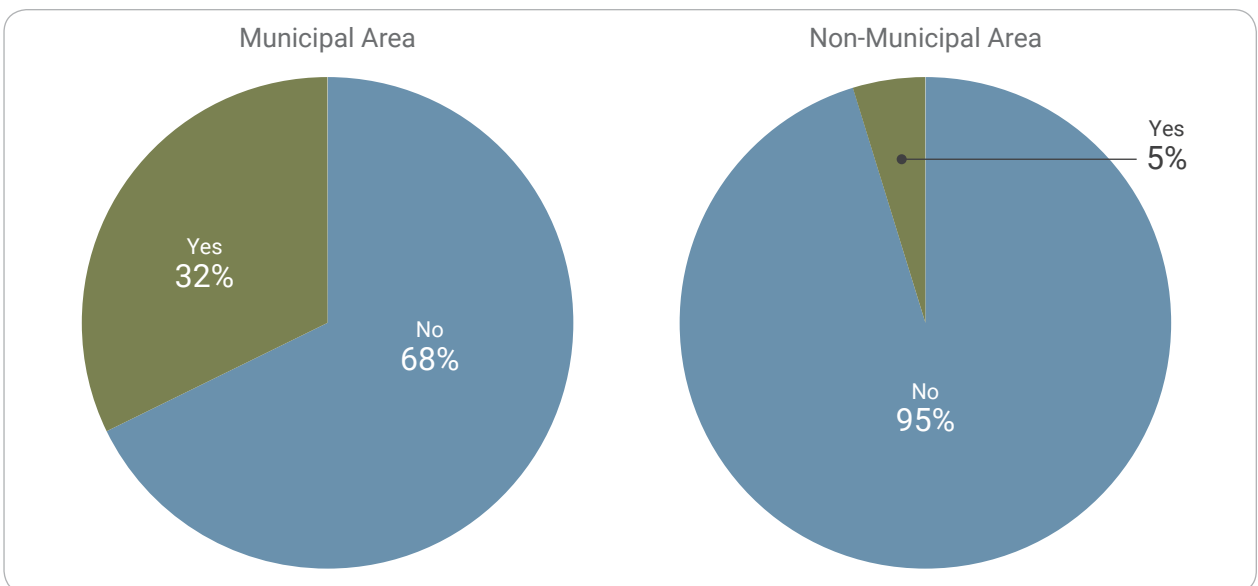


In the non-municipal area, only 39% respondents mention the presence of a park or play area within 1 km proximity (Fig. 9.9). It is also to be noted that the majority of the responses said that the park is less than a kilometre, in the villages adjoining the municipal area.

Usage of Parks

When asked about whether the citizens are actually using the existing park near to them at all, 68% of the people living in the urban area do not use the nearest park. Only 32% of the people living in the municipal area use the parks. When it comes to the non-municipal area, 95% of the population do not use the parks (Fig. 9.10).

Fig 9.10: Usage of Parks in Municipal and Non-Municipal Area



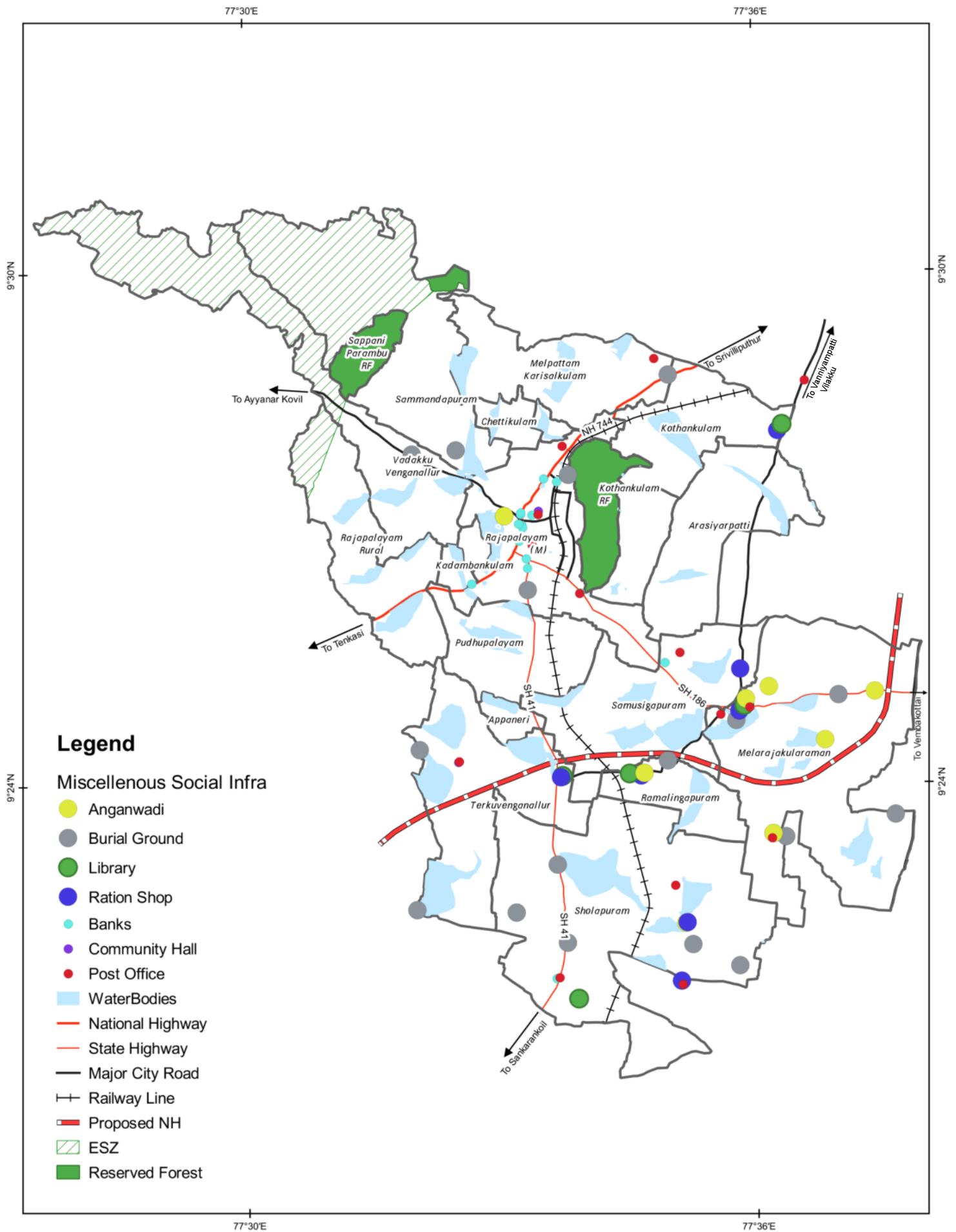
9.5

Miscellaneous Amenities

Table 9.15 outlines the other essential social infrastructure available in Rajapalayam LPA (**Map 9.6**).

Table 9.15: **Currently Available Miscellaneous Facilities in Rajapalayam LPA**

S.No.	Category	Availability in Rajapalayam Municipal Area	Availability in Non-Municipal Area	Overall Availability in Rajapalayam LPA
1	Anganwadi	1	10	11
2	Community Hall	1	1	2
3	Recreational Club	1	-	1
4	LPG Godown/ Gas Godown	-	2	2
5	Bank With Extension Counters with ATM Facility	14	4	18
6	Bank with Locker, ATM and other Banking Facilities			
7	Post Office	5	15	20



Legend

Miscellaneous Social Infra

- Anganwadi
- Burial Ground
- Library
- Ration Shop
- Banks
- Community Hall
- Post Office
- WaterBodies
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- ESZ
- Reserved Forest

Miscellaneous Social Infra in Rajapalayam LPA	Notes :	Data Credits On Field Mapping
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar
		Prepared By Tapasya Design Studio, Auroville

0 1 2 km

CRS : WGS 1984

Map 9.6: Miscellaneous Social Infrastructure Facilities in LPA

9.6

Key Issues

9.6.1. Lack of Designated Accident and Trauma Care Facility

NH-744 passes through the Rajapalayam town and serves as the major connecting route. There have been a number of accident hotspots identified along this National Highway (NH-744) stretch. Rajapalayam traffic police division data records shows that in the year 2020, 28 fatal and 120 non-fatal accidents were recorded in Rajapalayam municipal area alone.

The Department of Health and Family Welfare suggests incorporation of Trauma Centre in highways cutting across urban local authority jurisdiction. Presently there is no Trauma center or Trauma care facility available in hospitals within LPA. Both the Fire Rescue Department and the Police Department have mentioned that for treatment in cases of accidents and injuries, the patients currently are transported to hospitals in Madurai and Tirunelveli Districts (approx. 95 -100 km away).

9.6.2. Epicentre for Dengue Outbreaks

Out of 41 waterbodies within LPA 5 water bodies, namely Pirandaikulam tank, Puliyankulam kanmai, Kondabneri kanmai, Periyaadhukulam tank, Keelalliplangkulam are highly polluted. These water bodies are situated near residential zones of Rajapalayam municipal area; there is a high risk for mosquitoes borne disease in these areas. There have been major dengue outbreaks recorded in the municipal area between December 2014 to February 2015, resulting in more than 50 deaths.

9.6.3. Lack of Adequate Fire Stations or Fire Sub-Stations

As per the primary survey and interviews conducted, the Assistant District Officer, Fire Brigade of Virudhunagar has reported that fire accident cases mainly occur in the Chathrapatti Village area, where a lot of surgical gauze bandage and cotton-based household industries are present. There have been 28 fire accidents reported and 58 rescue calls from that area alone. The department has also stated that 18 people have lost their lives due to accidents. Due to lack of manpower and infrastructure and the coverage area being too large, the emergency response capacity of the department has reduced.

9.6.4. Lack of Recreational Open Spaces

Overall, within Rajapalayam LPA, recreational spaces such as parks and playgrounds are currently spread over an area of about 0.027 sq.km, which is far below the 1.30 – 2.08 sq.km range recommended by the URDPFI guidelines. This data indicates the

gross inadequacy in the availability of recreational open space in Rajapalayam LPA. This is further supported by participant responses in the household survey, where less than 10% and 5% respondents in the municipal and non-municipal areas, respectively, choose parks as their preferred recreational space. Recreational and open public spaces are critical not only for physical and mental wellness, but also to enhance neighbourhood interactions and community ties.

9.6.5. Lack of Public Spaces for the Elderly and Disabled

Based on the field observations almost all the public buildings, schools etc. in Rajapalayam LPA are not planned to provide access for persons with disabilities and the elderly. The Government of India has notified the Rights of Person with Disabilities Act, 2016. There are gaps in the efforts taken to create barrier-free access for persons with disabilities and old age people in all government offices, public as well as private hospitals and other healthcare institutions. Proactive regulations can be put in place to ensure the necessary standards of accessibility in physical environment, different modes of transports, public buildings, etc. are adopted.

9.6.6. Need for Sports Facilities

There is huge support for basketball, and also for volleyball and hockey. Rajapalayam has contributed to the basketball national team despite not having professional sports infrastructure in the region.

9.6.7. Need for Green Crematoriums

The town, despite its low urban population, follows a very communal approach to managing cremation. Many of the communities have their own designated burials/ cremation sites where they perform the last rites according to their customs. The majority of the cremation grounds are situated inside the waterbodies are on the odai poramboke. This will be a hindrance to rejuvenating the water bodies and connecting the different water bodies through the odai poramboke. In the future, with increasing population, potential challenges include land scarcity and possible disturbances to communal harmony.





Housing



10

10.1

Number of Households in Rajapalayam LPA

10.1.1. Number of Households in Municipal Area

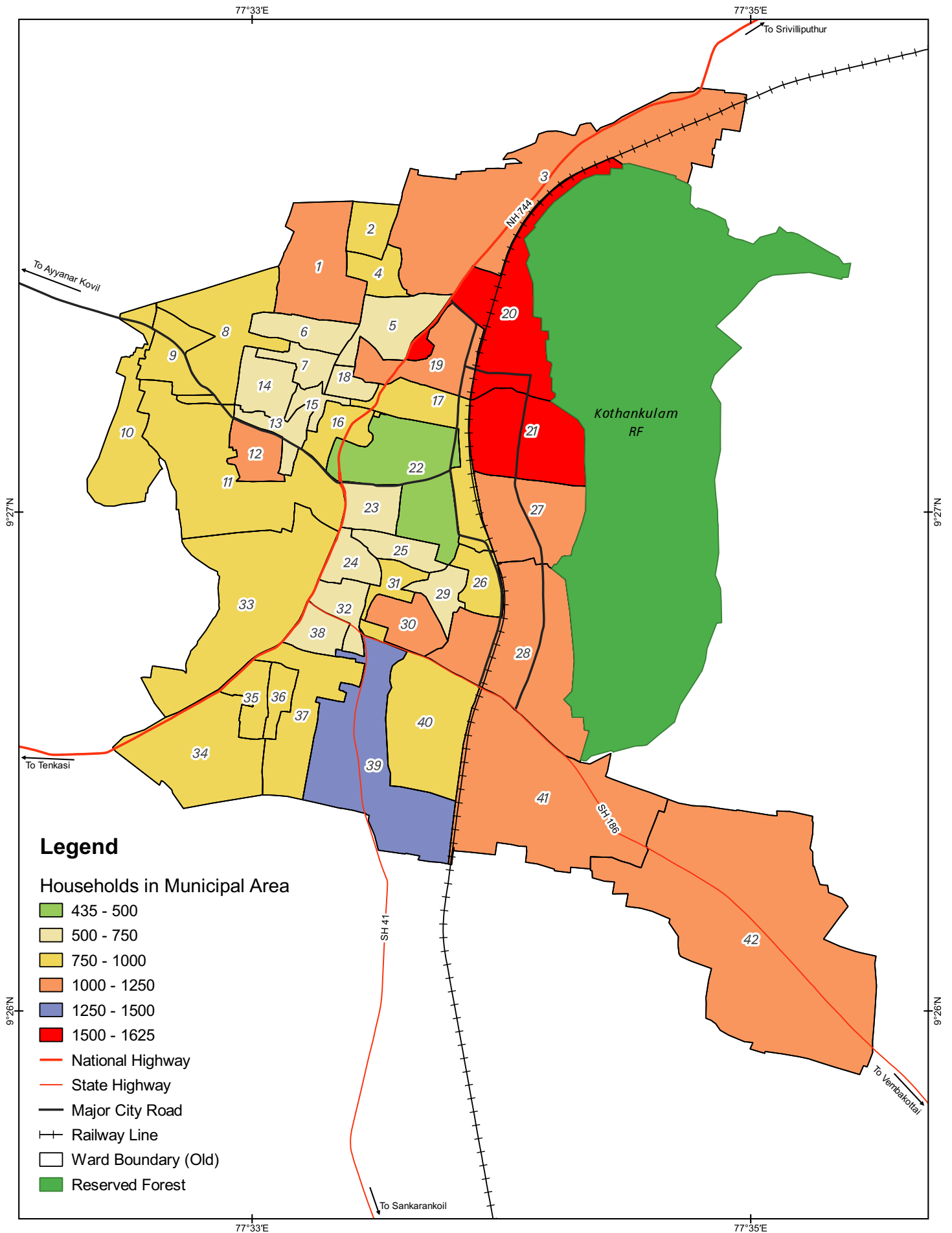
As per the 2011 census, Rajapalayam municipal area has 1,30,442 people living in 37,797 households (**Table 10.1**), which is an estimated average household size of 3.45 persons per household. It can be inferred from the table that the ward number 20 and 21 (old ward numbers) have the highest number of households with 1,625 HHs each; these wards fall on the east of the railway track area and are predominantly located in Malaiyadipatti, which is a notified slum. From (**Map 10.1**), the spatial distribution of households can be observed; here it can be seen that it follows an inverse pattern from the core, i.e., with the core areas of the city near the Railway station and Old Bus stand (old ward nos. 17, 22, 23, 24, etc.). Despite being densely built-up, these wards cater to commercial and other predominant non-residential uses.


Table 10.1 : Ward-wise Households in Rajapalayam Municipal Area, 2011

Ward Number (Old Ward Numbers)	Total Population	Households
1	3,719	1,096
2	3,069	953
3	3,481	1,002
4	2,728	869
5	2,371	688
6	2,042	612
7	2,283	621
8	3,376	957
9	2,912	842
10	2,978	779
11	3,473	855
12	4,271	1,203
13	2,147	607
14	2,200	646
15	2,535	722
16	3,152	894
17	3,139	872
18	2,426	693
19	3,482	1,017
20	5,672	1,625
21	5,807	1,625
22	1,579	435
23	2,369	648
24	2,377	692
25	2,128	669
26	3,090	928
27	4,159	1,175
28	3,550	1,027
29	2,342	717

30	3,471	1,075
31	2,451	828
32	2,193	633
33	2,756	832
34	3,259	995
35	3,099	914
36	3,098	878
37	3,130	948
38	1,928	597
39	5,186	1,471
40	3,004	870
41	3,963	1,139
42	4,047	1,148
Total	1,30,442	37,797

Source: Census, 2011



Households in Rajapalayam Municipal Area	Notes	Data Credits Census of India, 2011	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	Prepared By Tapasya Design Studio, Auroville

Map 10.1 : Household Distribution in Rajapalayam Municipal Area (Census 2011)
(Note: Map based on old ward division)

10.1.2. Number of Households in Non-Municipal Area

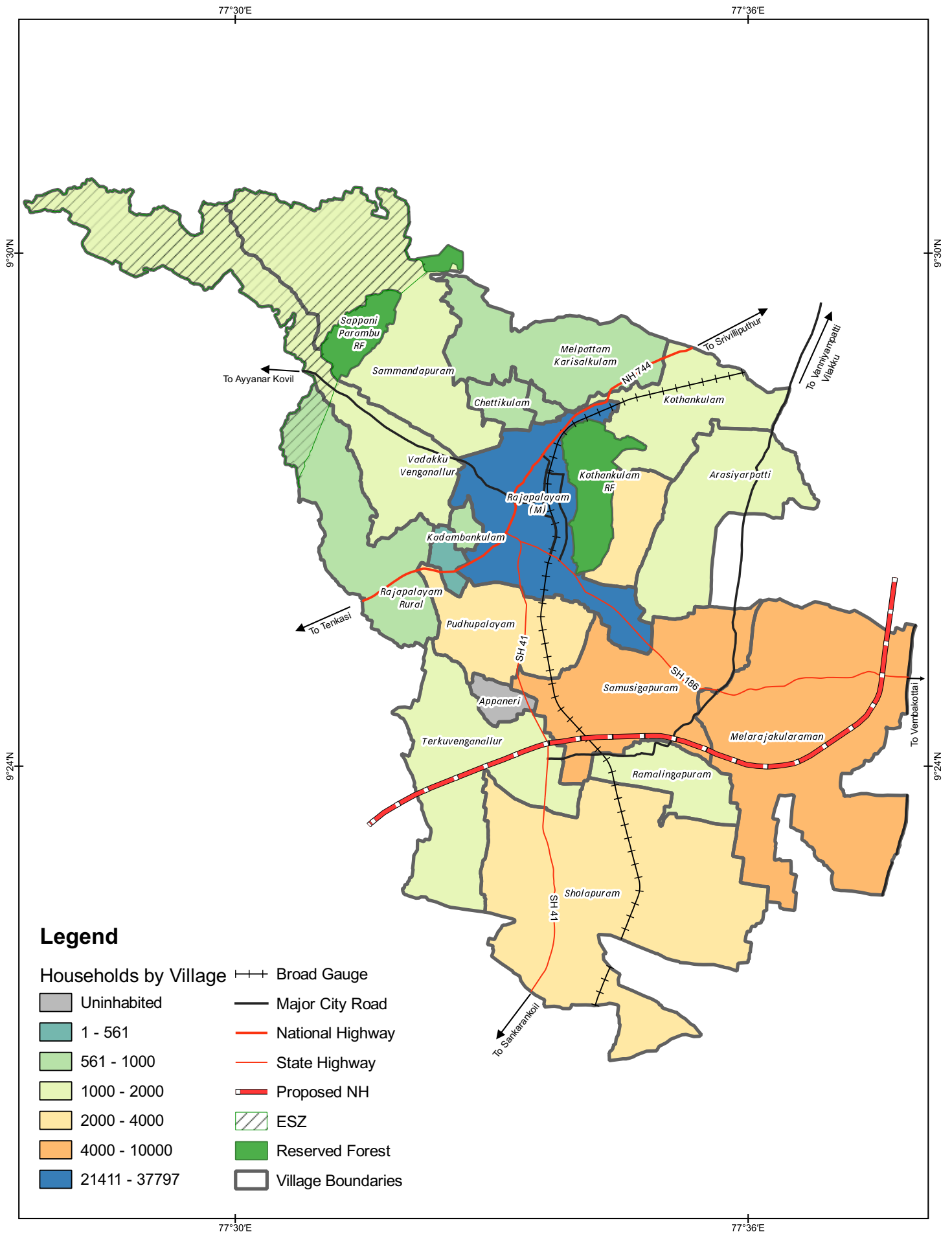
As per 2011 Census

Table 10.2 gives the number of households in the non-municipal area. It can be inferred that Melarajakularaman has the highest number of households (5,238 nos.) followed by Samsigapuram which is a Census town (4,329 nos.) (**Map 10.2**). The total number of households stands at 25,111 as per 2011 census.

Table 10.2: **Village-wise Households in Revenue Villages of Rajapalayam LPA, 2011**

S.No.	Village Name	Number of Households
1	Vadaku Venganallur	1,253
2	Sammandapuram	1,470
3	Melpattam Karisalkulam	747
4	Kothankulam	1,407
5	Arasiyarpatti	1,050
6	Rajapalayam (Rural) + Chettikulam	756
7	Kadambankulam	303
8	Melarajakularaman (Part)	5,238
9	Pudhupalayam	2,241
10	Terkuvenganallur	1,678
11	Sholapuram	3,248
12	Samusigapuram (CT)	4,329
13	Ramalingapuram (CT)	1,391
14	Appaneri	-
15	Kothankulam (RF)	-
16	Sappani Parambu (RF)	-
Total as of 2011		25,111

Source: Census, 2011



Legend

- | | |
|-----------------------|--------------------|
| Households by Village | ---+ Broad Gauge |
| Uninhabited | Major City Road |
| 1 - 561 | National Highway |
| 561 - 1000 | State Highway |
| 1000 - 2000 | Proposed NH |
| 2000 - 4000 | ESZ |
| 4000 - 10000 | Reserved Forest |
| 21411 - 37797 | Village Boundaries |

Households in Rajapalayam LPA	Notes The Village wise Population was considered from Census 2011.	Data Credits Census of India 2011	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 10.2 : Household Distribution in Rajapalayam LPA (Census 2011)

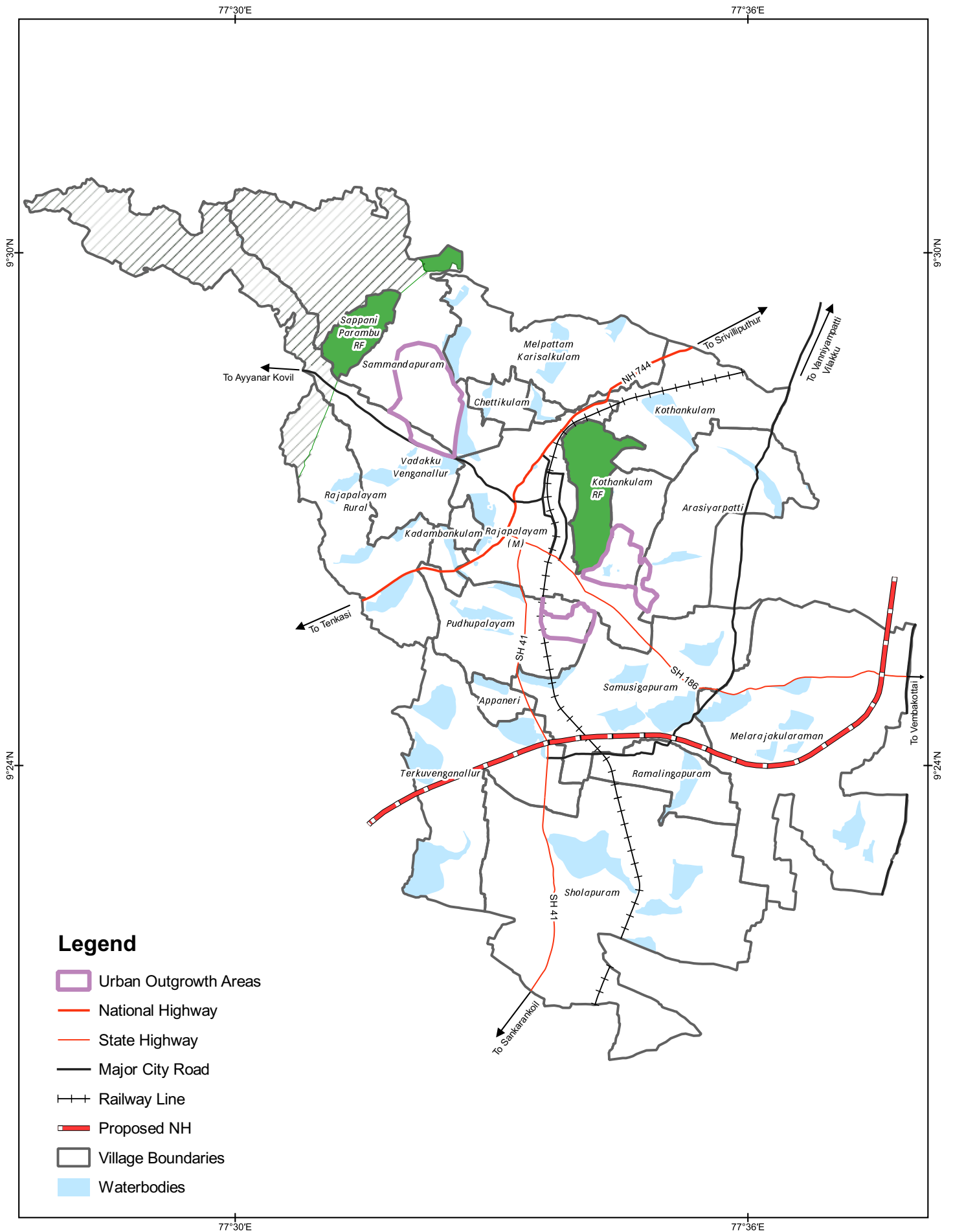
As of 2021 (Based on data collected)

Data collected from BDO and Village Panchayats indicates the most recent available total number of households in the non-municipal area is 39,923. The village panchayats and demography details in the LPA area are listed in **Table 10.3**. The number of households is highest in Melarajakularaman (7,209 nos.). As per the 2011 census, it stood highest with 5,238 households. However, it is to be noted that the areas consisting of Terkuvenganallur, Kadambankulam and Pudhupalayam, which lie on the western side of Rajapalayam town has seen significant growth in the number of households (7,537 nos.). The areas of growth have been indicated in **Map 10.3**.

Table 10.3 : **List of Village Panchayats, Number of Households & Population**

S.No.	Village Name	Total Households
1	Kothankulam	2,008
2	Sholapuram	3,992
3	Vadaku Venganallur (Krishnapuram), Sammandapuram pt.	3,268
4	Samusigapuram	6,558
5	Melarajakularaman	7,209
6	Kalangerperi (Arasiyarpatti)	1,932
7	Melpattam Karisalkulam, Sammandapuram pt.	4,113
8	Ramalingapuram	2,014
9	Therkuvenganallur, Kadambankulam pt., Pudhupalayam pt.	7,537
10	Rajapalayam Rural + Chettikulam	1,292
11	Appaneri	-
12	Kothankulam (Reserved Forest)	-
13	Sappani Parambu (Reserved Forest)	-
Total		39,923

Source: Office of Block Development Officer & Village Panchayat



Legend

- Urban Outgrowth Areas
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- Village Boundaries
- Waterbodies

Urban Outgrowth in and around Rajapalayam Municipal Area	Notes	Data Credits Satellite Imagery, Google Earth
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar
		Prepared By Tapasya Design Studio, Auroville

CRS : WGS 1984

Map 10.3 : **Outgrowth In and Around Rajapalayam Municipal Area**

10.2

Existing Housing Situation

It is essential to understand the characteristics of housing in order to estimate the quality of shelter and the standard of living. The UN SDGs in their goal explicitly mention that “Safe” housing is to be ensured for the same reason. The quality of houses, their structural conditions, number of rooms per dwelling, etc., directly and indirectly influence both physical and mental wellbeing of the individual living in a household.

10.2.1. Housing Characteristics in Municipal Area – Census 2011

10.2.1.1. CENSUS HOUSES ACCORDING TO THEIR USE

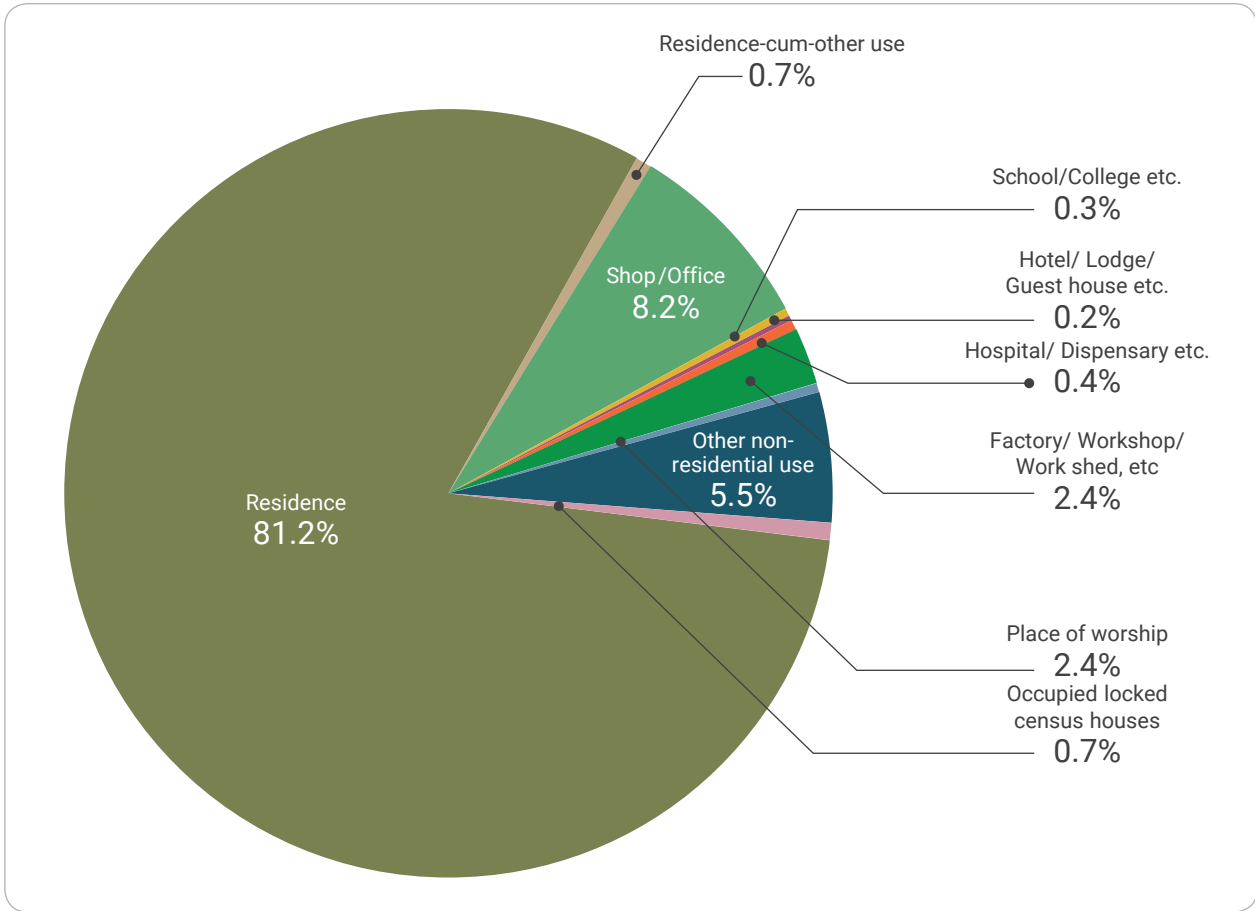
According to the 2011 census data, there are a total of 46,317 identified occupied census houses in the municipal area, out of which 37,608 houses are residences, which constitutes 81% of the census houses (**Table 10.4 & Fig. 10.1**). This matches closely with the total number of census households 37,797.

Table 10.4 : Census House by its Use

S.No.	Type	No. of Houses
1	Residence	37,608
2	Residence-cum-other use	315
3	Shop/ Office	3,798
4	School/ College, etc.	149
5	Hotel/ Lodge/Guest house, etc.	103
6	Hospital/ Dispensary, etc.	197
7	Factory/ Workshop/ Work shed, etc.	1,104
8	Place of worship	174
9	Other non-residential use	2,537
10	Occupied locked census houses	332

Source: Census, 2011

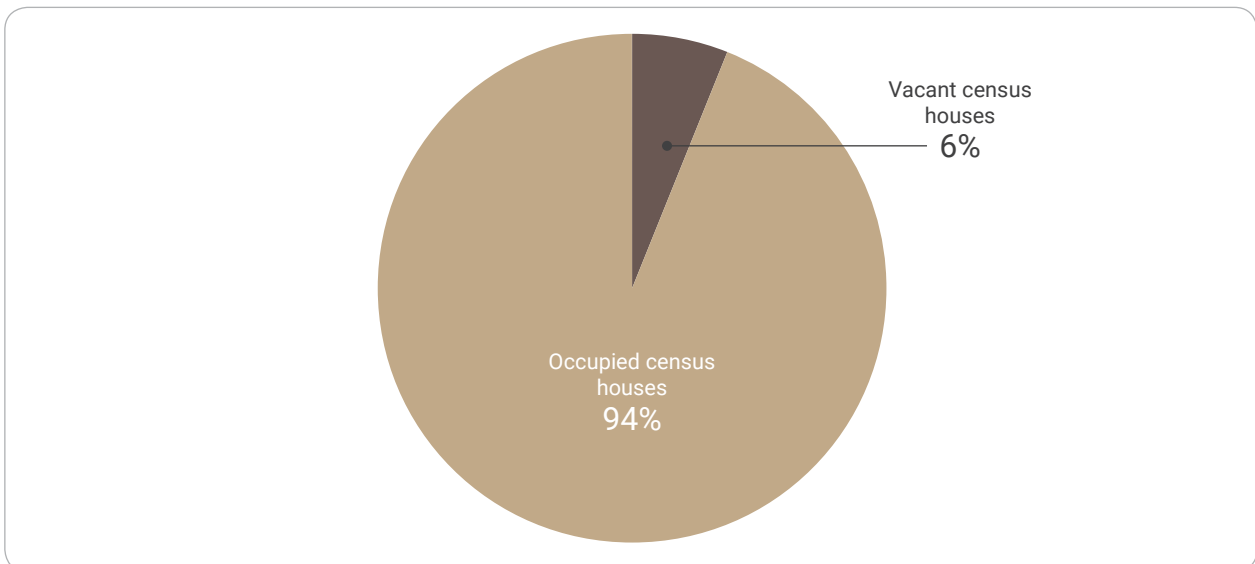
Fig 10.1 : **Distribution of Census Houses by its Use**



10.2.1.2. OCCUPANCY

According to the Census of India, out of the total 49,328 census houses (residential households + commercial and other dwelling units identified in census house listing), 46,317 i.e., 94% of the houses are occupied in the municipal area, whereas only 3,011 houses (6%) are vacant (**Fig. 10.2**).

Fig 10.2 : **Occupied and Vacant Housing Stock in Municipal Area**



10.2.1.3. OWNERSHIP

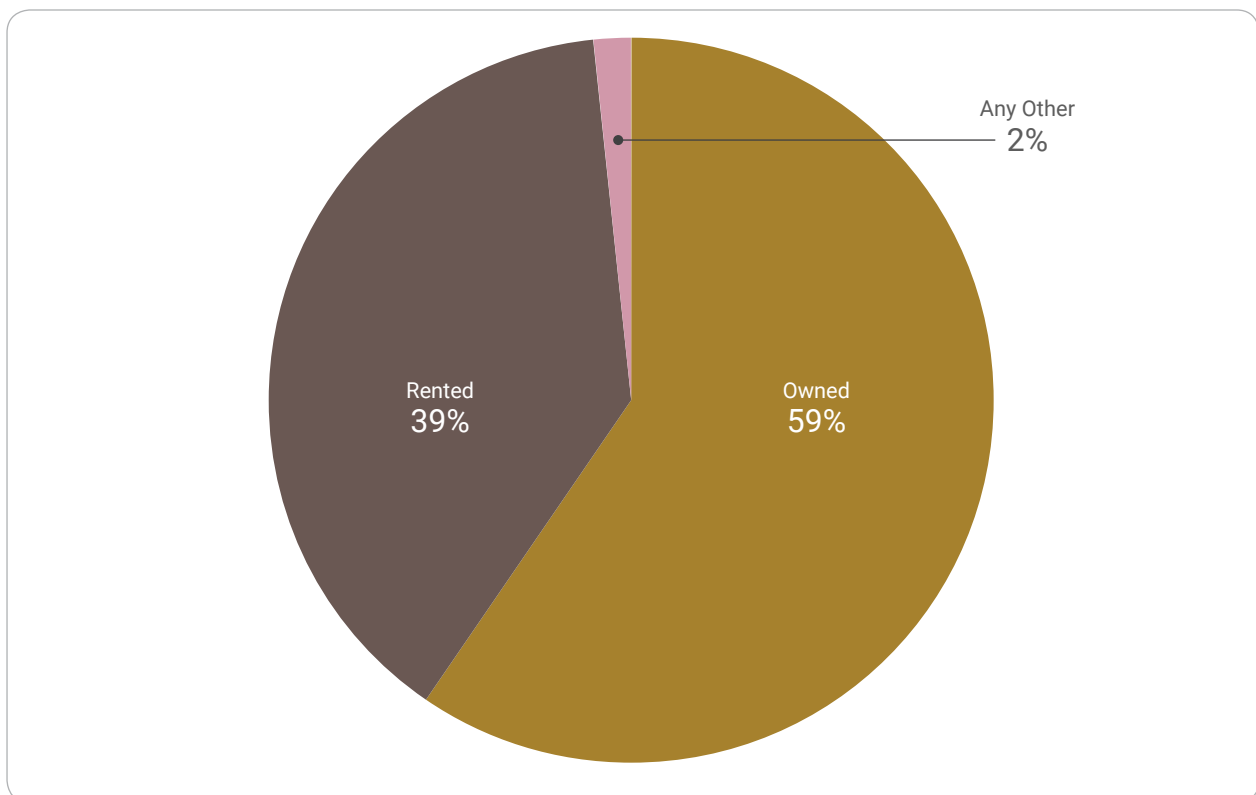
Census 2011 data indicates that out of 37,945 occupied residential households in Rajapalayam municipal area, it can be observed that the majority (59%) of households in the municipal area are owned by the resident individuals (**Table 10.5 & Fig. 10.3**). 39%, which is 14,706 households are occupied by tenants. This could be due to the fact that majority of the settlements are old settlements.

Table 10.5: **Census Houses by Ownership Status**

Ownership Status	Total Number of Households
Owned	22,604
Rented	14,706
Any Other	635
Total	37,945

Source: Census, 2011

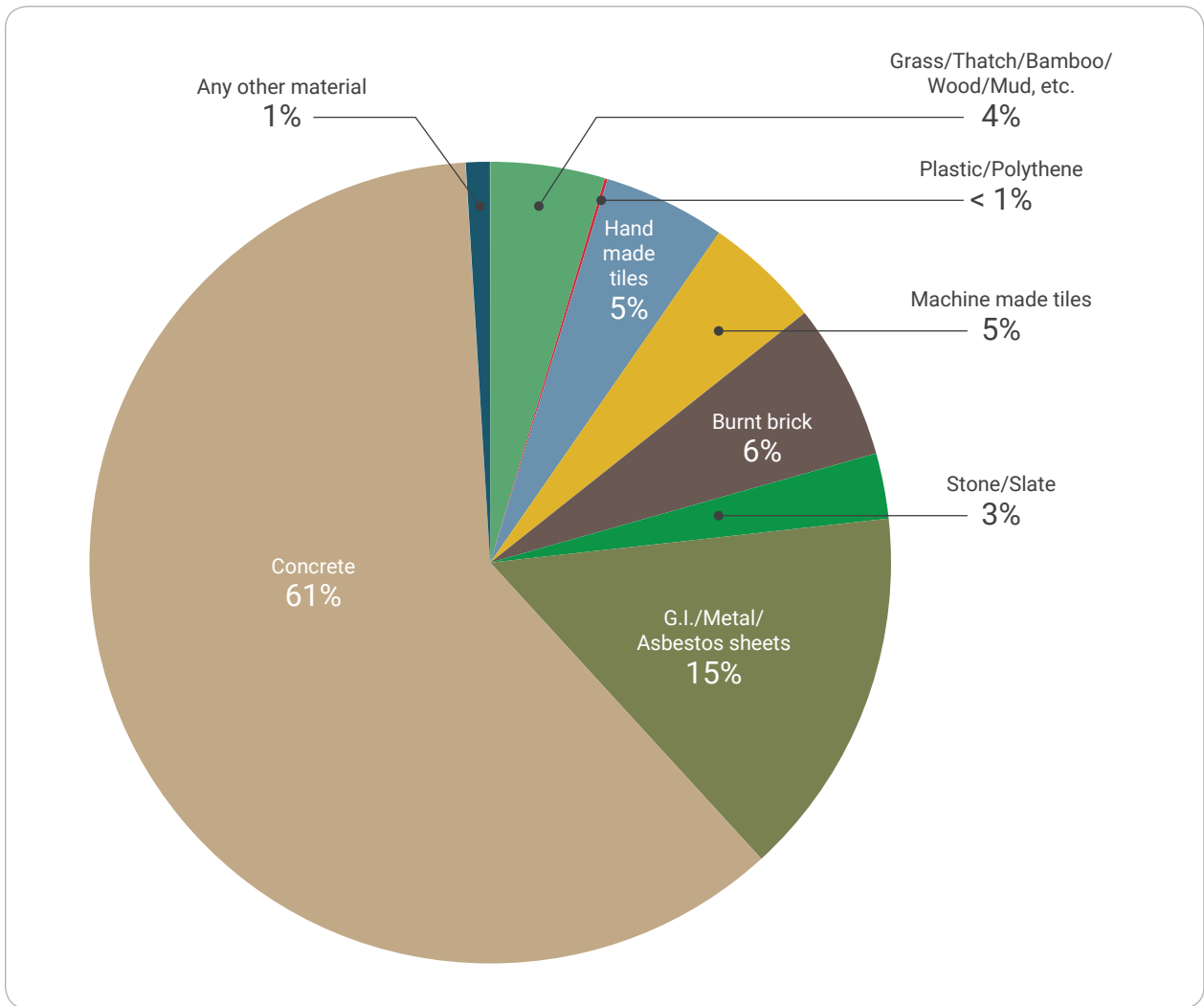
Fig 10.3 : **Distribution of Census Houses by Ownership Status**



10.2.1.4. TYPE OF ROOF MATERIAL

Classification of the houses by type of roof, according to census, indicates that 61% of all the houses have Reinforced Cement Concrete (RCC) roofs (**Fig. 10.4**). This is followed by 15% of houses having roofs made of GI sheets, metal or asbestos sheets. 10% of the rest of the houses are made of tiles. Only 7% of the houses are made of kutcha materials like grass, thatch, bamboo, stone, slate or rocks, etc. The distinctive architecture of Rajapalayam, which can be found even today, is found in areas of Palayapalayam (old wards 7, 8, etc.).

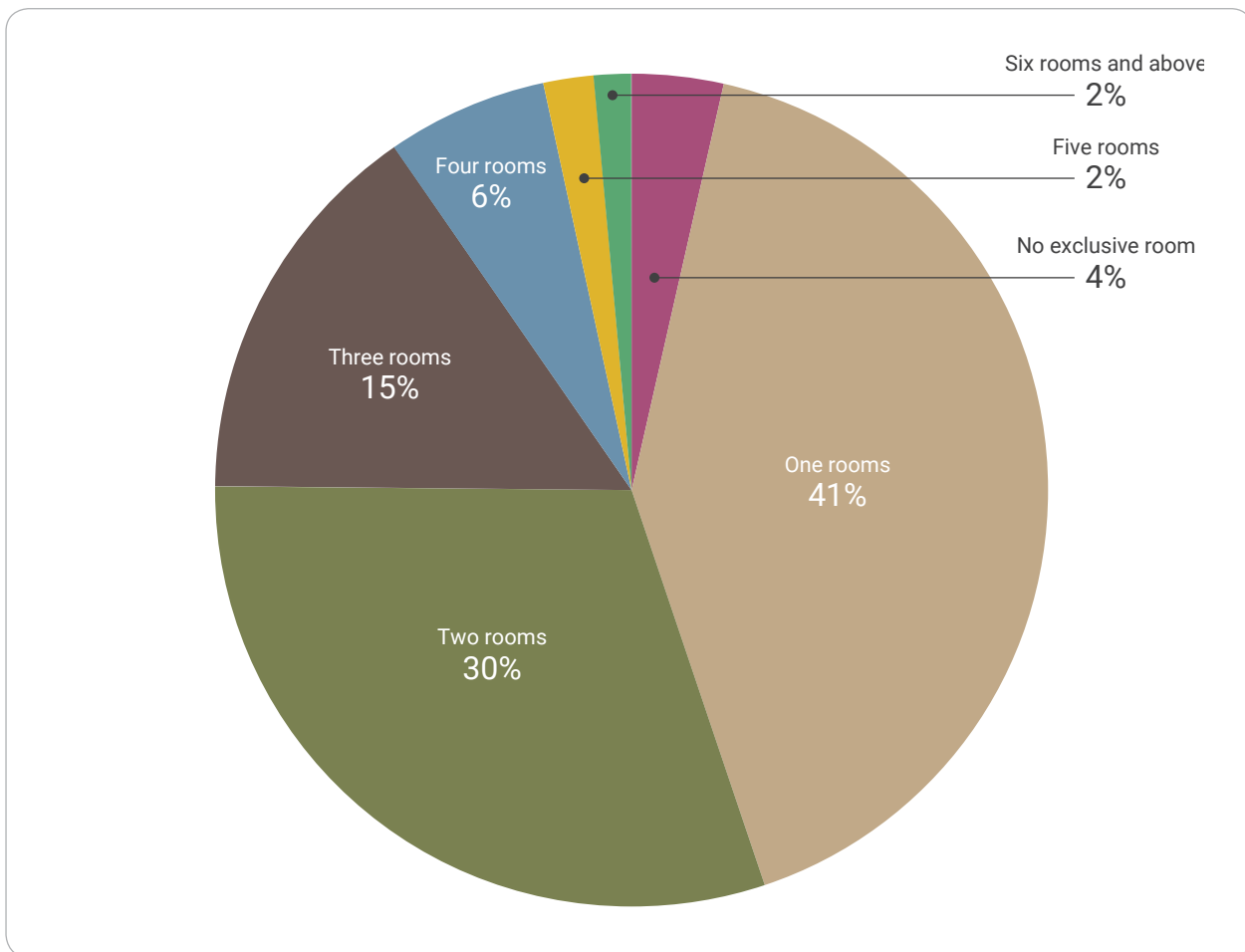
Fig 10.4 : Census Housing by Type of Roof Material



10.2.1.5. ROOMS PER DWELLING UNIT

The majority of the houses are single (41%) or two rooms (30%) (Fig. 10.5). This could be due to the high prevalence of daily workers in textile industry and agriculture sector.

Fig 10.5 : Census DUs Classified by Number of Rooms



10.2.2. Housing Characteristics in Non-Municipal Areas – Census 2011

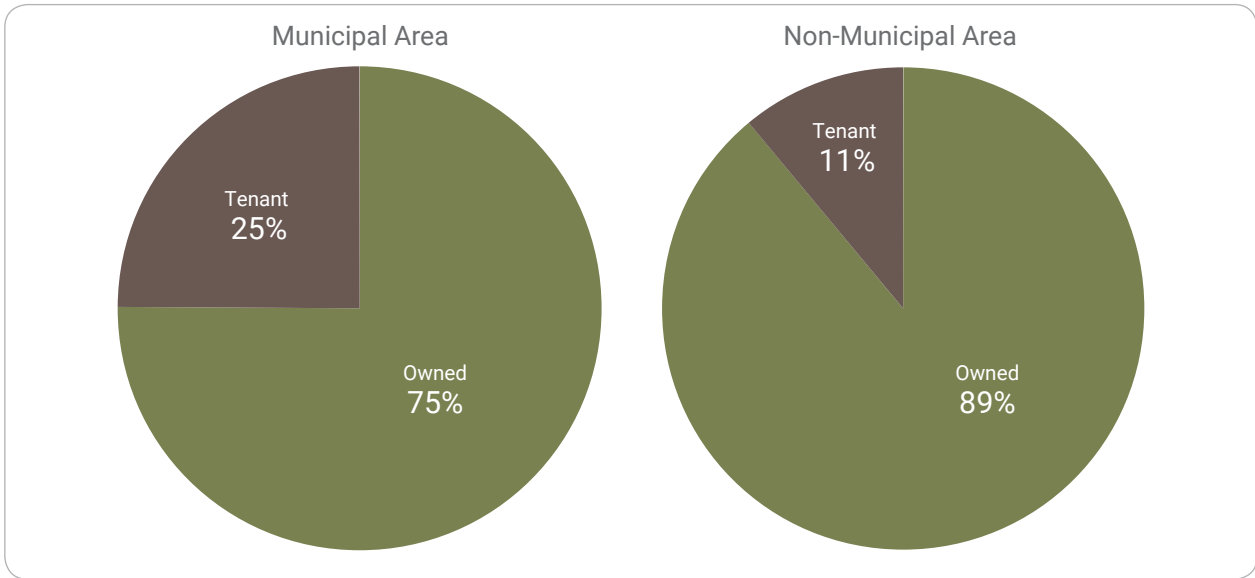
As there is no data available in the 2011 Census regarding the housing characteristics of the non-municipal area, the sample survey conducted to infer the housing characteristics might provide the required inferences.

10.2.3. Housing Characteristics – Sample Survey

10.2.3.1. OWNERSHIP

According to the sample household survey, in the municipal area, 75% of the respondents own the house they live in, whereas 25% are tenants. However, as per the 2011 census, only 59% are own houses. In the non-municipal area, 89% live in owned houses, while only 11% are tenants (**Fig. 10.6**). These data indicate that the majority of dwellers in Rajapalayam LPA live in their own houses.

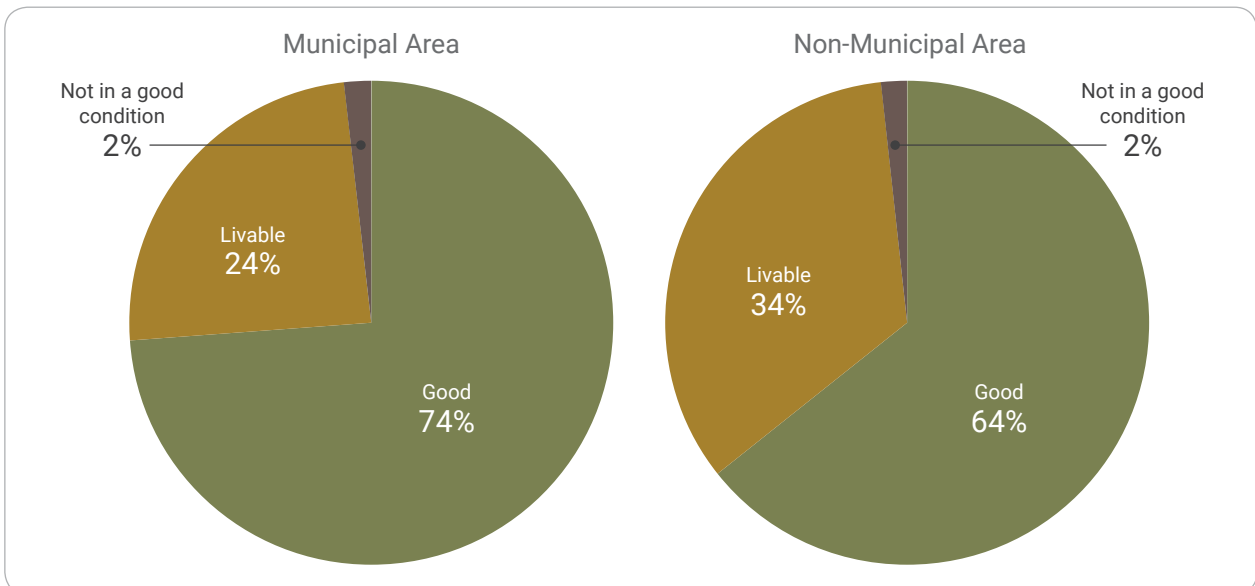
Fig 10.6 : Ownership Status in Municipal & Non-Municipal Area



10.2.3.2. HOUSING CONDITION

The enumerators were instructed to classify the respective house condition as either Good, Liveable or Dilapidated by both questioning as well as inspection. The criteria for classification is taken from the census operational guidebook i.e., those houses which are showing signs of decay or those breaking down and require major repairs or those houses decayed or ruined and are far from being in conditions that can be restored or repaired may be considered as 'Dilapidated', houses which require minor repairs may be considered as 'Liveable', and houses which do not require any repairs and in good condition may be considered as 'Good'. In both the municipal area and non-municipal area, it was observed that only 2% of the houses are in a dilapidated condition (Fig. 10.7). While 74% of municipal households are in good condition, for the non-municipal area only 64% of houses are rated as being in good condition by the respondents.

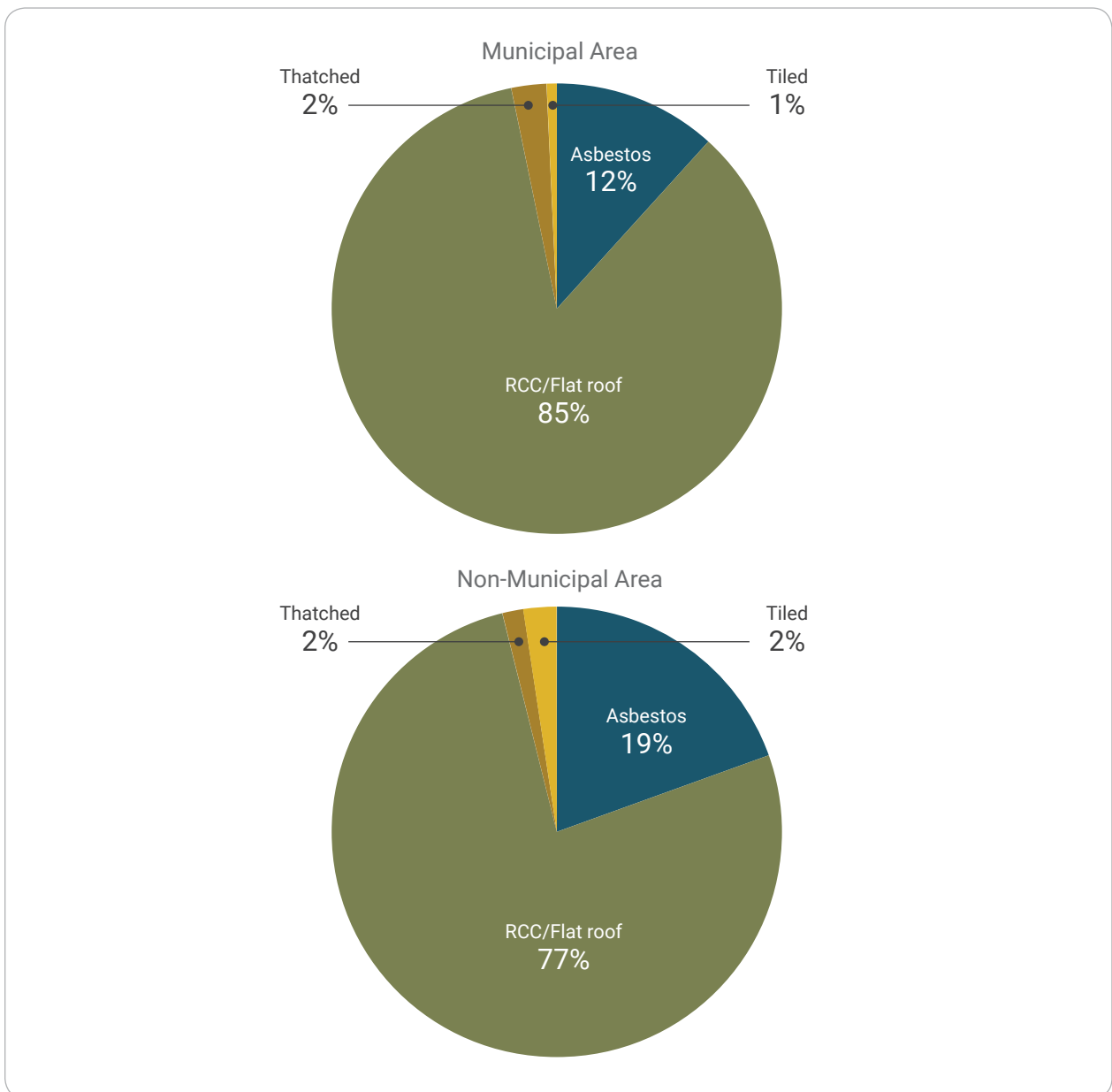
Fig 10.7 : Housing Condition in Municipal & Non-Municipal Area



10.2.3.3. TYPE OF ROOF

In terms of roof types, in the municipal area 85% of the households of the respondents had Reinforced Cement Concrete roofs. Only 12% had asbestos or GI roofs and only 2% of households have roofs made of kutcha materials like thatched roofs (Fig. 10.8). Interestingly, in the non-municipal area, only 2% of the sampled households had kutcha roofs. The RCC roofs though, make up for 77% of the non-municipal area, 7% lesser than compared to that of municipal area.

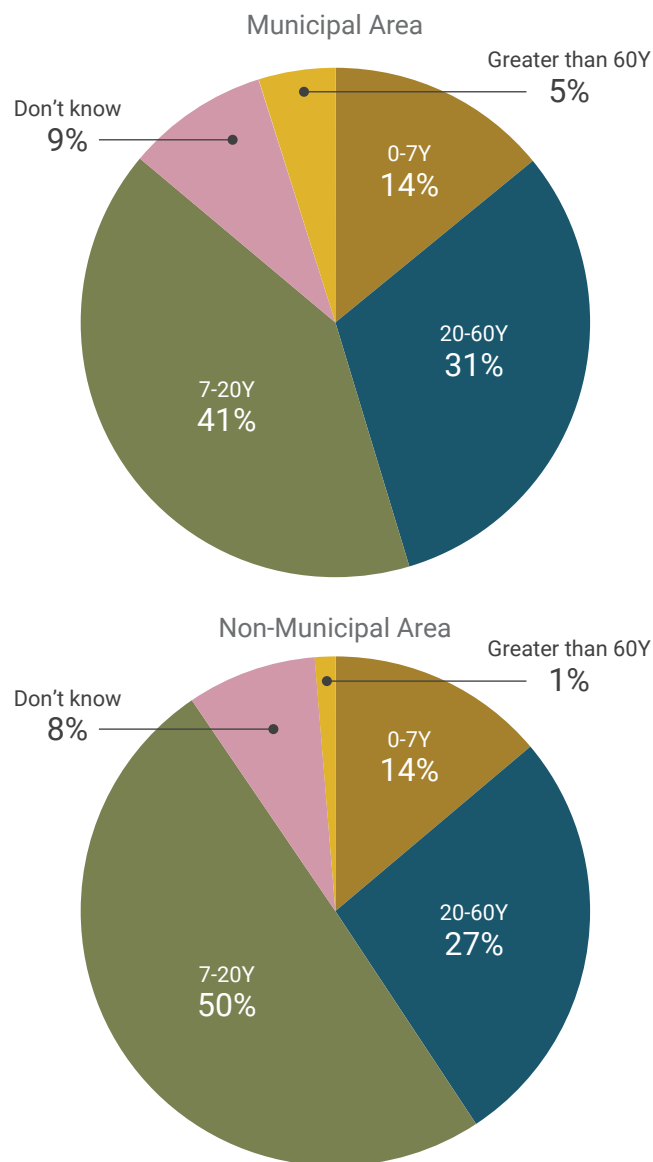
Fig 10.8 : Predominant Roofing Type in Municipal & Non-Municipal Area



10.2.3.4. AGE OF THE HOUSE

When asked about the age of the house they lived in, 41% of the household respondents in the municipal area and 50% in the non-municipal area picked between 7-20 years old, whereas 20-60 years old was selected by 31% and 27% in municipal and non-municipal area respectively (Fig. 10.9). Interestingly, the houses constructed in the last 7 years constitute about 14% of the household samples in both municipal area and non-municipal area.

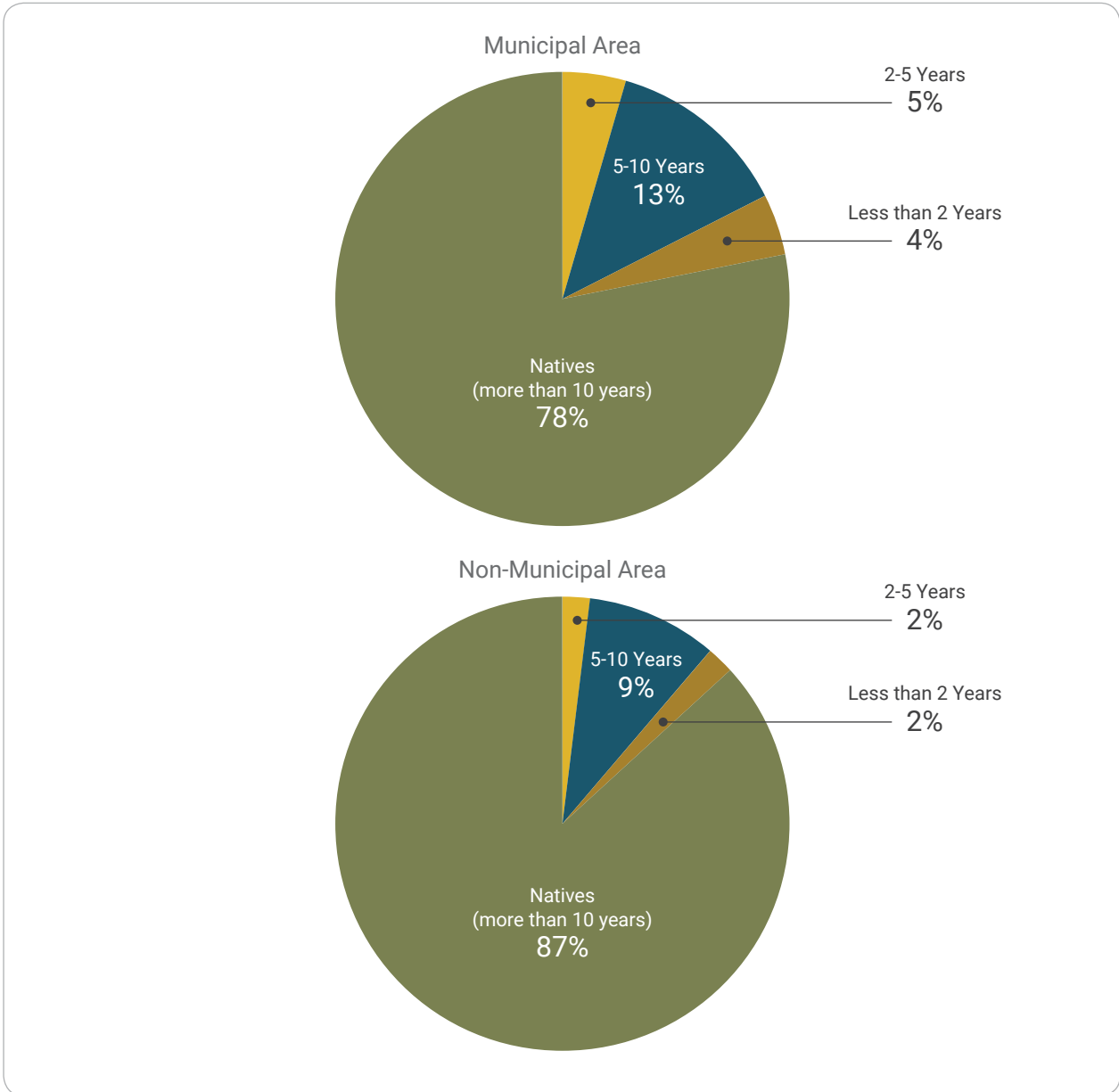
Fig 10.9 : Age of House in Municipal & Non-Municipal Area



10.2.3.5. DURATION OF STAY

It can be observed that 78% of the household respondents in the municipal area are residing for more than 10 years in the same house. In the non-municipal area, 87% of households are residing for more than 10 years in the same house (**Fig. 10.10**).

Fig 10.10 : Duration of Stay in Rajapalayam LPA



10.3 Government Housing Units

10.3.1. Tamil Nadu Housing Board Units

From the data received from the Tamil Nadu Housing Board (TNHB), Madurai there are 3 housing board undertakings in the Rajapalayam LPA. They are located in the revenue villages of Sammandapuram, Pudhupalayam and Vadakku Venganallur. Of these, Sammandapuram is under the SMT scheme and the Pudhupalayam layout is under the SIHS scheme (**Table 10.6**).

Table 10.6 : List of TNHB Dwelling Units

S.No.	Name of the Project	Number of Dwelling Units
1	Sammandapuram	861 Units
2	Pudhupalayam	312 Flats, 9 Plots and 33 Houses
3	Vadakku Venganallur & Sammandapuram	312 Units

Source: Tamil Nadu Housing Board

TNHB also specifies that all of these units are built on the land vested under TNHB. The dwelling units for the tenements in Sammandapuram are 18 m X 10 m for HIG, 15 m X 10 m for MIG and 12 m X 6 m for LIG. In the Sammandapuram and Vadakku Venganallur layout, the dwelling unit sizes prescribed are 13.5 m X 19.5 m for the MIG, 9 m X 13.5 m for the LIG and 7.6 m X 12 m for the EWS groups.

In the Pudhupalayam layout, there are only HIG housing units with dwelling units with sizes of 22.8 m X 11.5 m, 14 m X 10 m and 18 m X 12 m dimensions.

All of these projects are completed and TNHB has stated that it has identified Thendral Nagar (part of Sammandapuram), Bharati Nagar (located in old ward no. 41 and extending into Pudhupalayam) and Thiruvalluvar Nagar as the potential locations for affordable housing.

10.3.2. Tamil Nadu Police Housing Corporation

The Tamil Nadu Police Housing Corporation (TNPHC) is specifically set up as a wholly owned company of the Tamil Nadu government with a goal of providing housing to the police personnel and staff of the department. According to the data received from TNPHC, 57 dwelling units were built, out of which 16 residences are for the Fire and Rescue services quarters constructed in the year 2008 and 41 tenements for Police staff quarters in Rajapalayam. These are located in between the road parallel to the railway line and Malaiyadipatti Road, in old ward no. 21 (new ward no. 19).

10.4.1. Slums Origin

Rajapalayam being the industrial town, and a hub of textile and spinning industries right from the pre independence era, has been a magnet for in migration since the early 1900s, especially for rural areas in and around in the district (Table 10.7). Till 1990s, there has been a consistent annual growth rate over 10% per decade with 1950s being the highest, attracting a 31.48% growth rate. It is only after the 2000s that the growth rate started declining indicating a minor stagnation. This indicates that the industrial establishments set up after independence were the major driver of growth, because of which there is a possibility that many of the migrants moved to Rajapalayam municipal area in search of a job leading to formation of unliveable slum-like conditions.

Table 10.7 : **Population Growth Rate of Rajapalayam Municipal Area**

Year	Total Population	Growth Rate (%)
1901	25,360	
1911	28,412	12.03
1921	33,184	16.80
1931	38,693	16.60
1941	46,289	19.63
1951	60,861	31.48
1961	71,203	16.99
1971	86,952	22.12
1981	1,01,640	16.89
1991	1,14,202	12.36
2001	1,22,307	7.1
2011	1,30,442	6.65

Source: Census 2011

10.4.2. List of Slums – Tamil Nadu Urban Habitat Development Board (TNUHDB)

According to the Tamil Nadu Urban Habitat Development Board (TNUHDB), there are 11 slums in the municipal area, out of which two slums are non-notified (**Table 10.8**). Within these, there are a total of 4,352 households with a population of 16,103 persons living in them.

Table 10.8 : **List of Slums as per TNUHDB**

Old Ward Number	Slums	Slum Household	Slum Population	Status
2	Mela Avaramapatti	400	1,498	Notified
3	Keela Avaramapatti	364	1,701	Notified
9	Somaiyapuram	95	442	Notified
10	Somaiyapuram	372	1,851	Notified
16	Kumaran Street	609	1,978	Notified
16	Oorani Patti	316	1,065	Notified
20	Malaiyadipatti	109	500	Notified
21	Malaiyadipatti	148	642	Notified
26	Duraisampuram	479	1,804	Notified
30	Thopupatti Street	369	1,280	Notified
34	Mangapuram	403	1,027	Notified
35	Mangapuram	420	1,376	Notified
42	Thiruvallur Nagar	113	396	Non-Notified
17	Church Street	155	543	Non-Notified
	Total	4,352	16,103	

Source: TNUHDB

10.4.3. List of Slums – Rajapalayam Municipality

According to data collected from the Rajapalayam Municipality (Table 10.9 & Map 10.4), there also are 11 slums in the town, out of which 9 slums are notified and the remaining two slums are non-notified. There are differences between both the data when it comes to the population and number of households located in the slums. Despite these differences, for the most part the slum locations, names and ward numbers do coincide.

Table 10.9 : List of Slums as per Rajapalayam Municipality

Old Ward Number	Slums	Slum Household	Slum Population	Status
2	Mela Avaramapatti	507	1,407	Notified
3	Keela Avaramapatti	682	1,575	Notified
10	Somaiyapuram	694	1,898	Notified
15	Kumaran Street	583	2,642	Notified
16	Ooranipatti Street	127	746	Notified
17	Church Street	347	2,560	Non-Notified
20	Malaiyadipatti	840	3,317	Notified
21	Malaiyadipatti	800	2,680	Notified
26	Duraisampuram	420	1,367	Notified
27	Malaiyadipatti	640	2,642	Notified
30	Thopupatti Street	425	2,382	Notified
35	Mangapuram	650	1,753	Notified
42	Thiruvallur Nagar	112	455	Non-Notified
	Total	6,827	25,424	

Source: Rajapalayam Municipality

10.4.4. Slum Profile

Malaiyadipatti

Malaiyadipatti is the largest slum in Rajapalayam in terms of geographical area. According to the data from the Municipality, the slum spreads across old ward nos. 20, 21 and 27 (new ward nos. 18, 19, 25). It falls within the erstwhile East of Railway Station Area Town Planning Scheme, between the railway line and the Kothankulam Reserved Forest, also known as Sanjeevi Malai. It is very important to note that Malaiyadipatti extends outside the boundary limits of the Rajapalayam Municipality, into the extents of the Kothankulam Reserved Forest, which is a designated no development zone and all the dwelling activities are prohibited.

Mela Avaramapatti

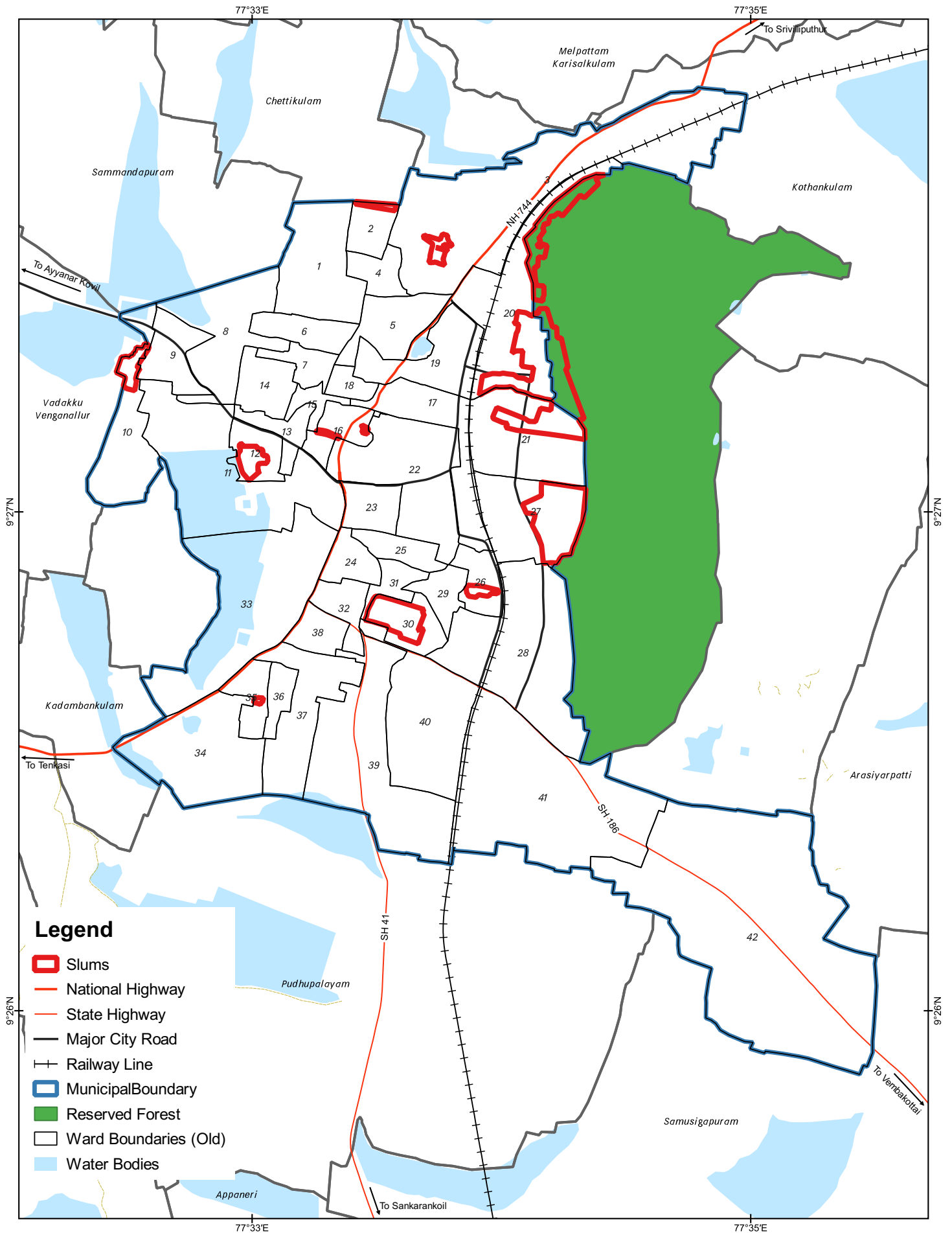
Mela Avaramapatti is located in ward number 2 of the Rajapalayam municipal area, in the northern side of the town and is right at the border of the town, adjoining the revenue village of Chettikulam, and having an area of approximately 5,516 square meters (0.005 sq.km.). It has 507 households, with a population of 1,407 living in it. It is a narrow stretch on a street and is a notified slum.


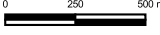
Keela Avaramapatti

Keela Avaramapatti is a slum located in ward no.3 of the municipal areas and is located below the Mayuranatha Swamy Kovil Street, up to the Panchu market bus stop. It has 682 slum households, with a population of 1,575 people.

Duraisampuram

Duraisampuram is a slum located in ward 26. It has 420 households and a population of 1,376. It is located very close to the railway station and is mostly dominated by urban daily wage labourers.



<p>Slums in Rajapalayam Municipal Area</p>	<p>Notes The Extent of Slums were marked Field Survey with the presence of officials from the Rajapalayam Municipality</p>	<p>Data Credits Rajapalayam Municipality, Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	 <p>CRS : WGS 1984</p>

Map 10.4 : Location of Slums in Rajapalayam Municipal Area
(Note: Map based on old ward division)

10.5

Key Findings

- From the 2011 Census data and field observations, the presence of kutchha and semi-pucca houses are relatively higher in parts of Melarajakularaman, Sholapuram, and Samusigapuram. This indicates that interventions are required to upgrade the housing condition in these locations.
- There are total of 6,872 households in the Slums as per Municipality records. Out of the 1,30,442 residents of the municipal area, as per Municipality records, nearly 25,424 reside in 6,827 households in 11 notified and 2 non-notified slums. The great majority of the population are natives from within the LPA region who have lived in the town for over a decade. These inhabitants constitute 20% of the total municipal population. Therefore, inadequate living conditions for a 5th of the town population constitutes a major issue, as these will have implications on town development as well as physical and mental health.
- Of the 11 slums in Rajapalayam, Malaiyadipatti is the largest slum in terms of geographical area. According to the data from the Municipality, the slum spreads across old ward nos. 20, 21 and 27, to the east of the town next to the railway track and at the foothills of Sanjeevi Malai (Kothankulam RF). It is very important to note that Malaiyadipatti extends outside the boundary limits of the municipal area, into the extents of the Kothankulam Reserved Forest, which is designated a no development zone where dwellings are prohibited. Moreover, the frequent forest fires in Sanjeevi Malai poses a threat to surrounding slum settlements.





Heritage & Culture



11

11.1

Architectural and Built Heritage

Heritage and Culture is an important layer of the physical and social fabric of a place; it fosters a stronger sense of belonging and facilitates the passage of unique values of the land down to next generation. It is a vehicle to create meaningful and peaceful platforms for dialogue among the community. Raising awareness about local heritage encourages more creativity and harmonious living, especially in a multicultural society. It will also help policymakers and decision makers respectfully deal with important sectors like tourism, education, environment, etc. and creates strong inspiration tools for every person in the society.

Rajapalayam LPA is very rich in heritage and archaeological significance, with a unique history. Rajapalayam owes its name and origin to the 'Rajus', an enterprising community who settled here as military units, during the reign of the Vijayanagara Kings in Madurai. The term 'palayam' denotes 'A cantonment or fort'. The settlement was originally called 'Palayapalayam' (at present the historical part of the town), later 'Rajupalayam' and then finally as 'Rajapalayam'. Rajus, are the predominant community in the town.

11.1.1. Palayapalayam

The traditional buildings of Rajapalayam town, especially those situated in the area of Palayapalayam, are remarkable structures carrying unique architectural characteristics not found in any other part of the country. The architectural style, as well as the layout, are unique in their own aspects, reflecting the tradition of the Raju community of yore.

The Palayapalayam area, which forms the core of the town, is the first urban settlement in Rajapalayam. The area primarily falls under old ward numbers 6, 7 and 8. The area starts from the south of Madasamy Kovil Street, starting from the Rajapalayam North Police Station and is bound by the Madasamy Kovil Street till the Srimathi Sakkaniamma Dharmaraja School on the west, and is bound by Thambapillai Street on the south. The extent stretches up to the North Police Station Street that starts at Rajapalayam North Police Station and joins the Ayyanar Kovil Road right before the Clock Tower Junction. This is a historical settlement with buildings of unique architectural character (**Fig. 11.1**).

11.1.1.1. HISTORY

Rajapalayam means Raja's Fort. Rajapalayam is inhabited chiefly by people who came from the old Vijayanagaram state. Chinna Raja, a lineage descendant of the king of Vijayanagar migrated to the south along with his followers and settled at Kilarajakularaman at the first instance and they moved their settlements to Palayapalayam in 1483 A.D.

11.1.1.2. LAYOUT OF PALAYAPALAYAM

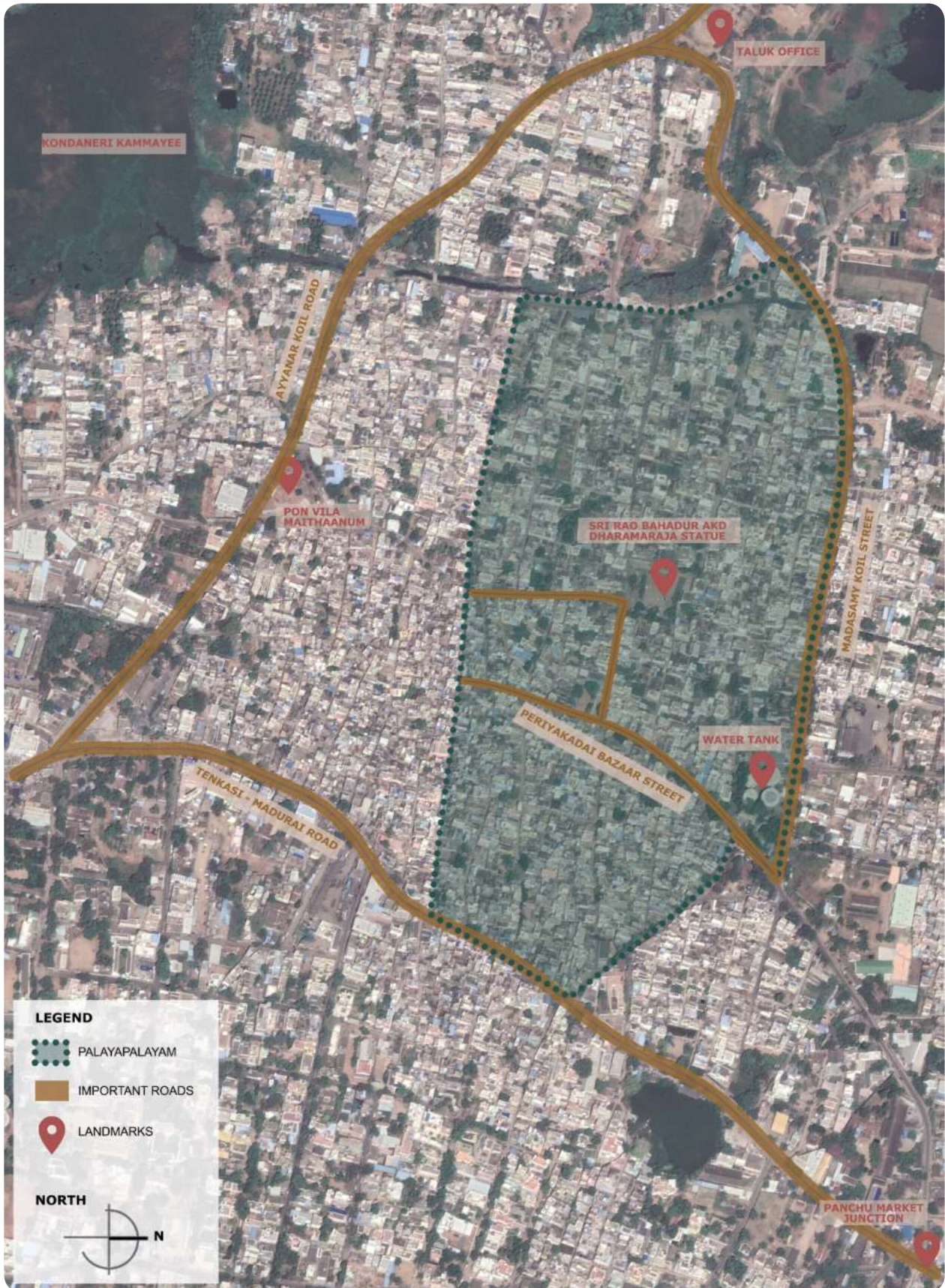
Palayapalayam is the oldest settlement in Rajapalayam, with the Tenkasi – Madurai Arterial Road on the east, Madasamy Kovil Sub-Arterial Road on the north, Ayyanar Kovil Arterial Road on the south, as shown in **Figure 11.1**. Periyakadai Bazaar Street (running north to east) is one of the first important commercial streets of the settlements.

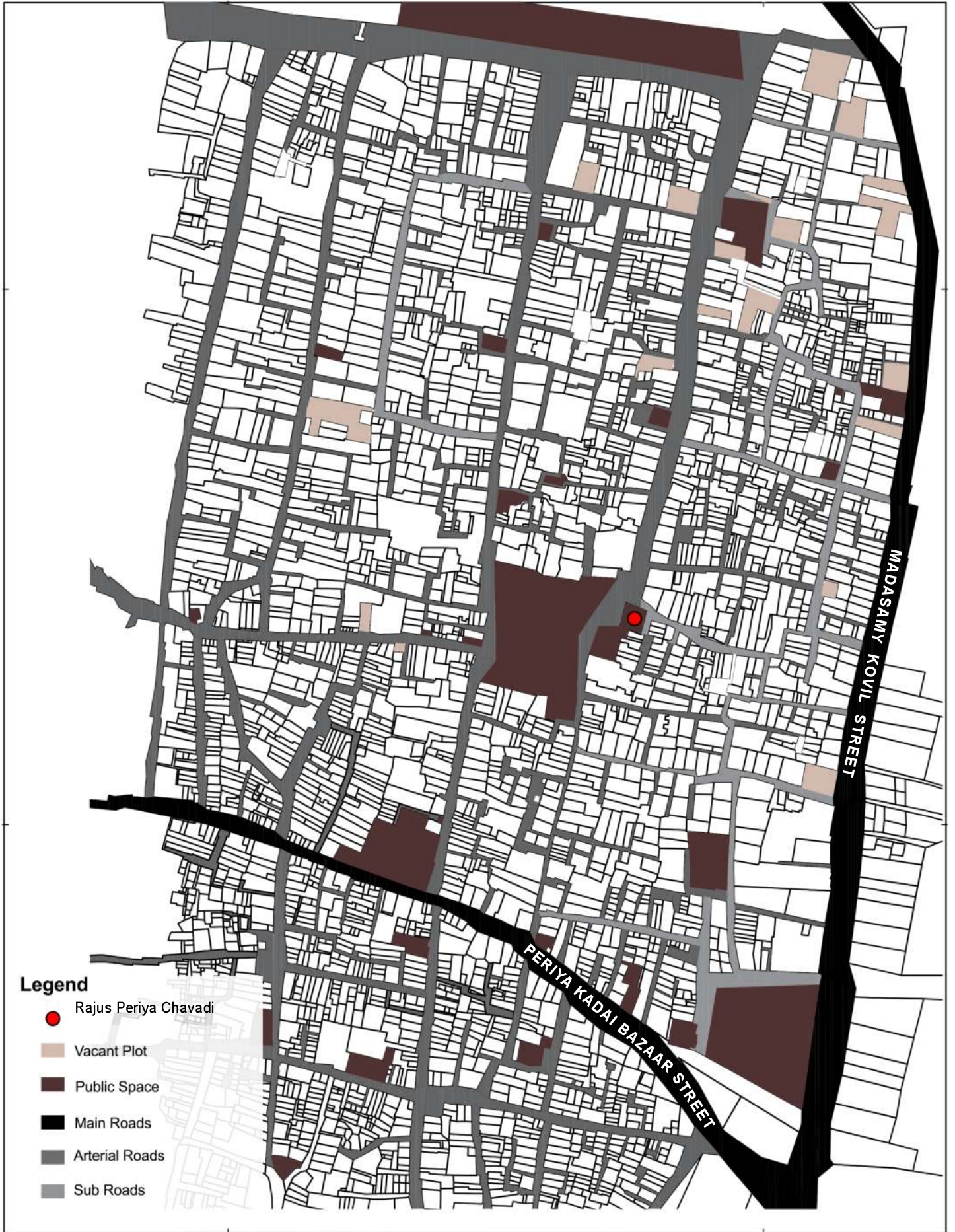
Palayapalayam has two major sub arterial roads – 1. Madasamy Kovil Street (min. width – 4 m, max. width – 7 m, av. width – 5.5 m) and 2. Periyakadai Bazaar Street (min. width – 3 m, max. width – 6 m, av. width – 4 m), from which the other local streets (av. width – 3.5 m) are connected and narrow access lanes (av. width – 1.5 m) connect the residential sub-clusters with the major roads and public spaces. Roads and access ways covers 24% of the total settlement area (**Map 11.1**).

Open spaces play an important feature in Palayapalayam and in general the cultural life of Rajapalayam. “Chithirai Thiruvizha” is one of the important festivals celebrated at the open spaces next to “Periya Chavadi”. This festival is celebrated to commemorate the Tamil New year.

An average individual plot size in Palayapalayam is about 80 sq.m. Only 33% of the Palayapalayam is built space (**Map 11.2**) and the remaining are roads, open spaces, etc.

Fig 11.1: Palayapalayam with Roads & Landmarks





<p>Palayapalayam Road Network and Public Spaces</p>	<p>Notes and Inferences :</p>	<p>Data Credits Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 11.1: Palayapalayam Road Network & Public Spaces



<p>Palayapalayam Built Spaces & Open Spaces</p>	<p>Notes and Inferences :</p>	<p>Data Credits Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 11.2: Palayapalayam Built Spaces & Open Spaces

11.1.1.3. UNIQUE RESIDENTIAL SUB-CLUSTER

The architectural style as well as the layout in Palayapalayam are unique in their own aspects, reflecting the tradition of the Raju community. The typical layout found here consists of a sub-cluster of houses sharing a common courtyard, at the rear side of the residence. This common courtyard has a Mandapam used for household festivals and family functions, within a close-knit cluster. This is a unique aspect found nowhere else in Tamil Nadu (**Fig. 11.2**).

The main entrance to important sub-clusters or important houses is through the common space at the rear side of the residence and is usually well decorated (**Fig. 11.3**). The entrance from the local street is mainly used by the workers and as a service entry. All the entrances from the street have a unique canopy design which reflects the wealth of the house (**Fig. 11.3**). The entrance compound wall is usually around 13 feet in height and has 2 windows on either side of the canopied entrance.

The residences are usually ground +1 structures. The overall plan symbolizes a close-knit and protected social order. Here, we have public streets devoid of any "Thinnai", commonly found in traditional tamizh towns. However, there is a labyrinth of interconnecting common courtyards and a larger common courtyard on the rear side, which gives opportunity for a lot of interactions and public activity within a close-knit family cluster (**Fig. 11.2**).

The main entrance of the residence is from the common open space (Vaahatti) followed by a semi-open thinnai with a series of columns, which is used mainly by the male members of the residence for meeting with the same close-knit cluster people (**Fig. 11.4**). Then comes the hall (Mallavu), where the main activities of the house happen, and the "Ralli", a multifunctional space mostly used as a dining room, which are semi-public spaces of the residential unit till where the relatives are entertained. Following that, "Ali" bedroom, "Poikhadi" kitchen, and the toilet, which are private areas of the residence, are only used by the residents. The rear entrance from the local street is mostly used by the workers as a service entry. The decorated rear entrance also has a courtyard "Maanavali with a thinnai" where the people of the house meet other village people.

Fig 11.2: Plan of a Typical Residential Sub-Culster with Common Open Spaces



Fig 11.3: Plan of a Typical Palayapalayam Residence

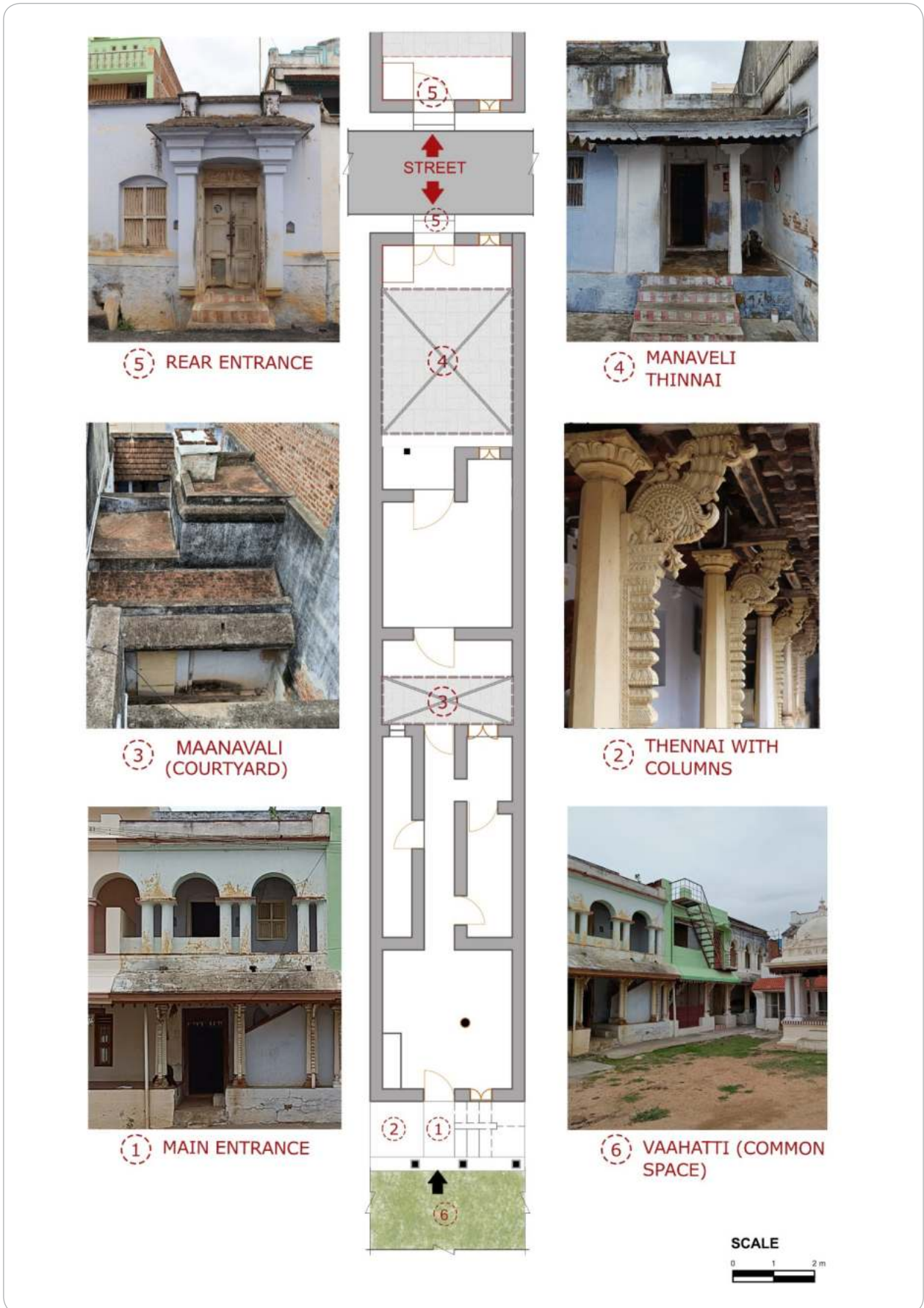
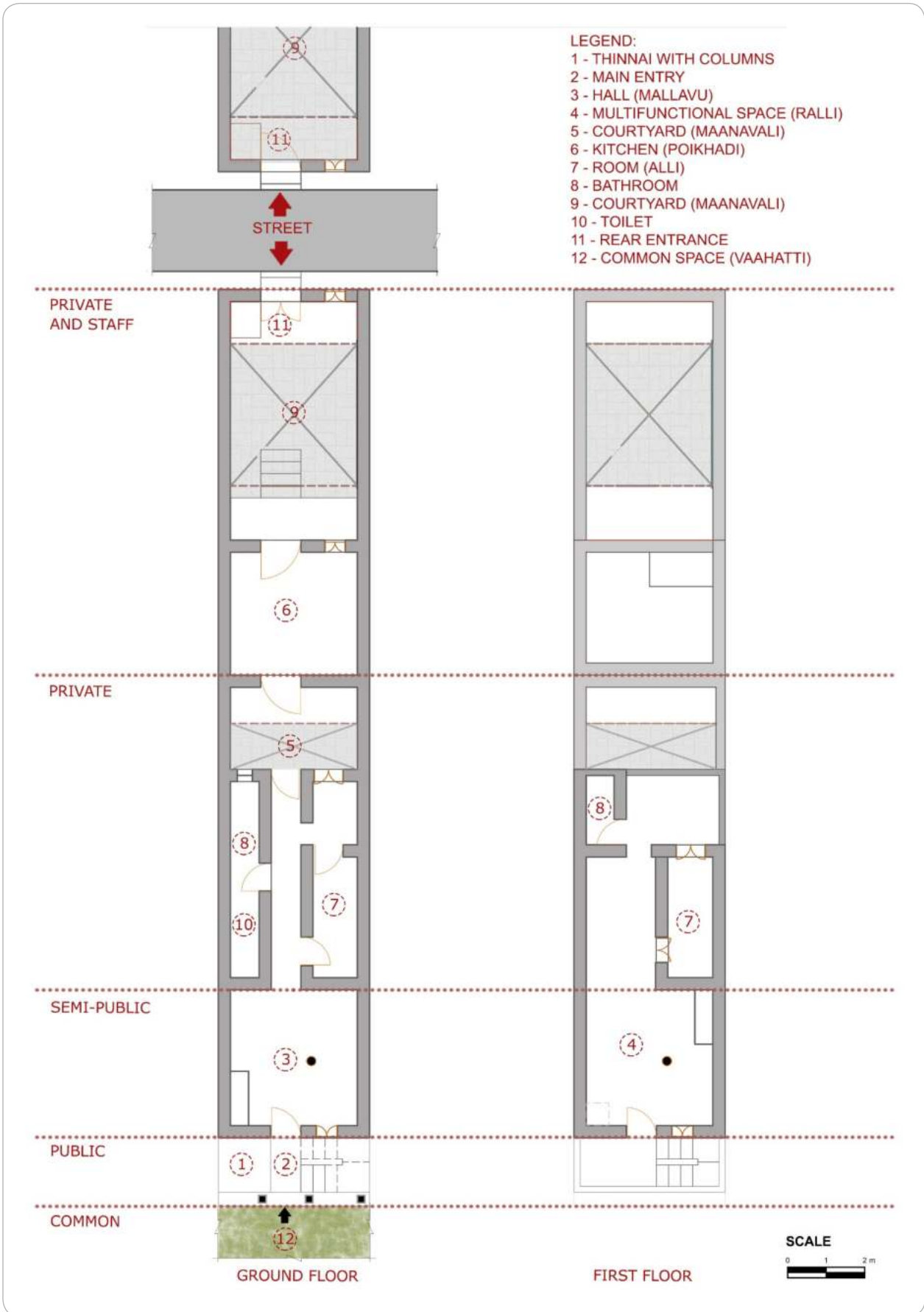


Fig 11.4: Spaces & Social Order in Typical House in Palayapalayam

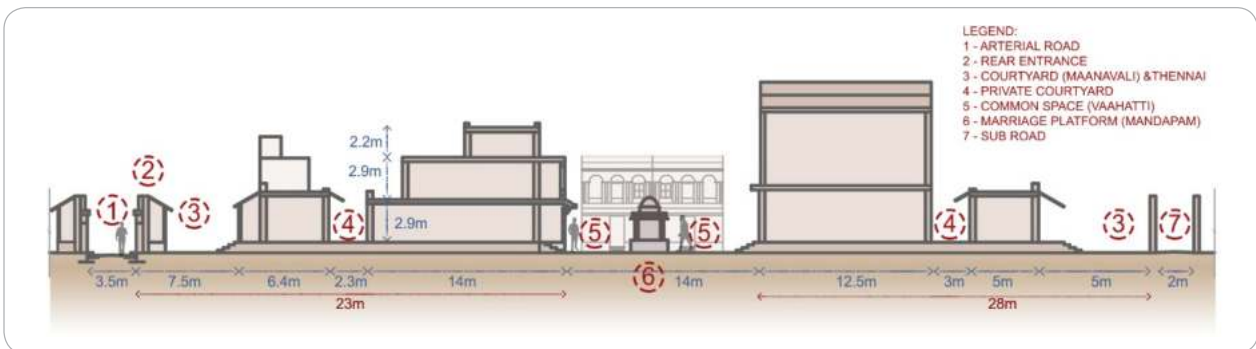


The walls of the houses are traditionally built with small bricks (chitu kal), river sand and lime. The roof is made of wood, brick and lime in “Madras Terrace” style (katakuthi sengal parapu), possibly for better thermal insulation and for security reasons. The flooring mostly pressed clay tiles and stones.

A cross-section of a typical sub-cluster (**Fig.11.5**) shows the importance of the open public space with the Mandapam at the center. This space clearly acts as a focal point onto which all the windows, thinnais, first floor covered verandas open up.

The proportion of the width of the lane to the height of the compound wall are usually at 1:1.3. However, just behind the compound wall, we again have an open space. Thus, we need to consider the actual setback of the buildings as starting at least 15 feet from the main building. Considering the narrow linear width of a typical layout, these internal courtyards which act as punctures, are crucial for ventilation and bringing in natural light.

Fig 11.5: Cross-Section of a Typical Sub-Cluster



11.1.1.4. KEY INFERENCES

1. Percentage of built and open space of a single residence unit

- 1.1. Built up space – 72.8%
- 1.2. Total open space– 17.53%
- 1.3. Semi Open Space – 9.67%

2. Setback

- 2.1. Front (From the common space) – 4 m
- 2.2. Rear (From arterial road) – 0.8 m
- 2.3. Side setback – Wall to wall Construction

3. Percentage of common open space in a sub-cluster

- 3.1. Built space – 85.17%
- 3.2. Common open space – 12.83%

4. Front Compound wall height – 4.0 m

11.1.1.5. UNIQUE ARCHITECTURAL CHARACTERISTICS/ ELEMENTS

The unique architectural and layout pattern of Rajapalayam has been able to sustain itself for the last 400 years without losing its cultural value. It is however, surely fading away largely due to the demands of urbanisation and unplanned development. Proactive and concentrated efforts need to be undertaken to re-claim and preserve these spaces of local cultural identity. **Map 11.3** shows the buildings which still have heritage architectural features and/ or are able to retain their original layouts.

In addition to the unique residential sub-clusters and communal public spaces of heritage values (**Fig. 11.6**), some unique architectural elements seen in the houses in Palayapalayam include common open spaces with mandapam, decorative entrances, thinnais with decorative columns, etc (**Fig. 11.7**).



Legend

- Plots retained with Heritage Architectural features & Spatial Layout
- Plots retained with Heritage Architectural features
- Plots with New construction
- Semi - Open spaces
- Rajus Periya Chavadi

<p>Palayapalayam Heritage Analysis - Building Typology</p>	<p>Notes and Inferences :</p>	<p>Data Credits Field Survey</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 11.3: Traditional Building Typology at Present Condition

Fig 11.6: **Buildings of Unique Architectural Character in Palayapalayam**

RAJUS PERIYA CHAVADI



COMMON COURTYARD VIEW OF A RESIDENTIAL SUB-CLUSTER



TRADITIONAL GRANARY



Fig 11.7: **Unique Features in Palayapalayam Residences**

DECORATIVE ENTRANCEWAYS



MANDAPAMS IN RESIDENTIAL SUB-CLUSTERS

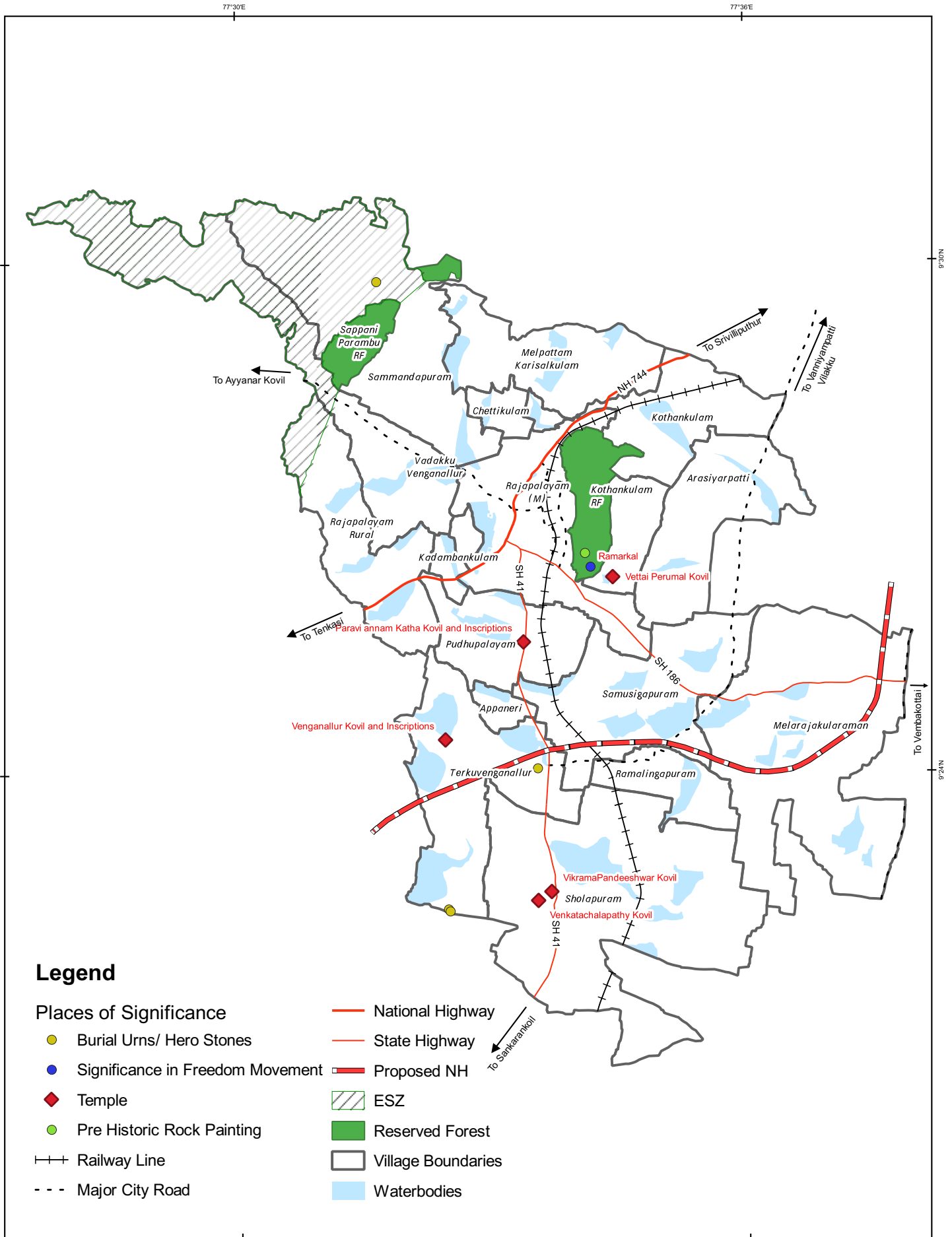


THINNAIS WITH COLUMNS



11.1.2. Places of Archaeological and Historical Significance

Places of archaeological and historical significance within the LPA are listed in this section (**Map 11.4**).

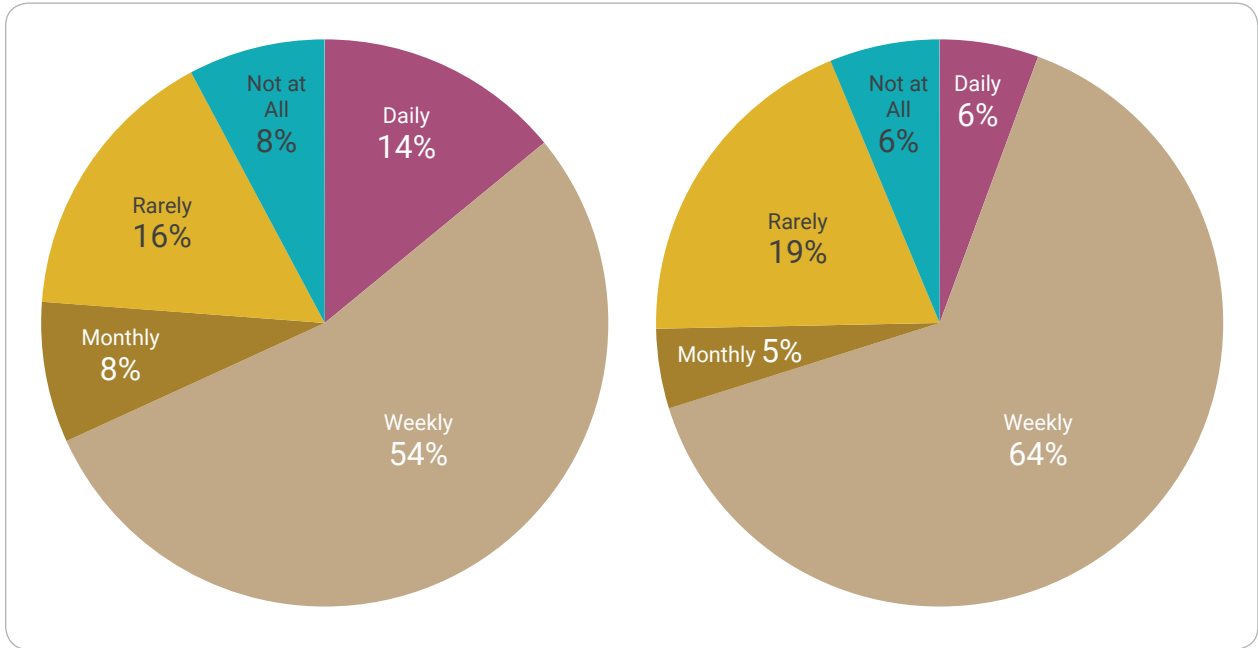


Places of Heritage & Cultural Significance in Rajapalayam Non Municipal Area	Notes	Data Credits Field Survey	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	
		Prepared By Tapasya Design Studio, Auroville	

Map 11.4: Places of Heritage & Cultural Significance in Non-Municipal Area

During household surveys conducted in the LPA, 37% and 80% of the respondents in the municipal and non-municipal areas, respectively, chose places of worship as their preferred place for recreational purposes. Among the respondents, 68-70% of the respondents visit the temple at least once a week (**Fig. 11.8**).

Fig 11.8: **Frequency of Visit to Temple in Municipal & Non-Municipal Area**



Singathirulapan Temple

Singathirulapan temple is located near the New Bus Stand inside the municipal limits. The temple dates back to the 14th century A.D. It is very closely associated with the origins of the Raju community in the area. The temple is said to have been demolished in the early 1900s and the current structure is rebuilt. Remnants of some of the early inscriptions can still be seen in the temple. The temple has all the basic infrastructure like electricity, drinking water and toilet facilities for the devotees.

Parvai Annam Katharuliya Swamy Kovil

Located on the outskirts of the town, on the State Highway 41, this temple is dedicated to the deity of Lord Shiva (**Fig. 11.9**), and was constructed during the 13th century A.D. This temple is said to date back to early Pandyan era. As of today, only the ruins of the actual temple remain with walls and columns and some historic inscriptions scattered all across the site. It has inscriptions of Jatavarman Srivallabha and Maravarman Sundara Pandya II. The actual shrine as it stands today is a relocated shrine adjacent to the ruins with very minimal infrastructure.

Fig 11.9: **Paravai Amman Katharuliya Kovil**



Muthukudi

Muthukudi is a small village located in the revenue village of Terkuvenganallur. It consists of a tank on the northern part of the village. Legends say that when the tank was about to overflow, a villager sacrificed himself while trying to control the bund and saved thousands of lives. Hence the local king has put up a Hero Stone on the tank dedicated to him (**Fig. 11.10**). Locals claim that many other prehistoric artefacts are also found in and around the tank.

Fig 11.10: **Muthukudi Hero Stone**



Sholapuram

The Vikrama Pandeshwar Temple in Sholapuram is a famous shrine in the area (**Fig. 11.11**). This shrine is dedicated to Lord Shiva and it dates back to approximately 1143 A.D. according to the temple inscriptions. It is called Vikrama Pandeshwar Temple because in the 11th century when Parakrama Pandya built the temple, he dedicated it to his father Vikrama Pandyan, hence giving the name. The temple and its surroundings still stand strong structurally to this date. According to local sources archaeological excavations were done by ASI in early 2000s and many gold coins, idols and inscriptions as well as foreign coins from China and Rome, etc. were found in the temple premises, making it a potential site for future excavations and signifying the presence of a local trading civilisation.

Fig 11.11: **Vikrama Pandeshwar Temple, Sholapuram**



Sholapuram Venkatachalapathy Perumal Kovil

In the same village, 200 m behind the Vikrama Pandeshwar Temple to the east, lies a small shrine dedicated to Lord Venkateswara. It is also a relocated shrine with the original temple destroyed and just the remains of the gopuram standing till date. Inscriptions formed during the reign of Jatavarma Srivallabha (1131-1140 A.D.) and later Pandya inscriptions from the 13th century A.D. are found here.

Kunangulam

In the village of Kunangulam located in the revenue village of Terkuvenganallur, in the edges of the LPA limits, is located a pond, which is said to be the ancient burial site of the Sholapuram village. Many burial urns were said to be found in the area alongside inscriptions and coins dating back to 9th–14th century A.D.

Venganallur Chidambareswar Kovil

The Venganallur Chidambareswar Kovil is a temple present in the village of Terkuvenganallur (**Fig. 11.12**). It is a temple dedicated to Lord Shiva and is said to be in ruins. However, in the last 2-3 years, the temple was completely renovated and is still being renovated.

Records of Maravarman Sundara Pandya I, Maravarman Sundara Pandya II and Tirunelveli Perumal alias Dharmaperumal are found on the premises. An epigraph dated to 1562 A.D. of Tirunelveli Perumal, found near the Shiva temple Chidambaresvara Kovil, refers to a land grant made for the performance of abhisheka in the temple by Chinnasevaka Perumal Pirattiyar. The inscriptions as of today are just lying outside the temple and are to be retrofitted inside. However, the villagers claim that there are many treasures and wealth buried inside and around the temple, and some coins were also found, making it a potential archaeological site.

Fig 11.12: **Venganallur Chidambareswar Kovil**



Ananthali Vinayagar Temple – Sappani Parambu Foothills

Sappani Parambu is a hill located in the northern part of the LPA and is a protected reserved forest. Being in close proximity to the Western Ghats, this mountain has had a rich ecological as well as cultural significance to it. On the foothills of Sappani Parambu near the Ananthali Vinayagar temple locals found iron tools and forks potentially dating back to pre-historic age.

Sri Vettai Venkatesa Perumal Kovil

Sri Vettai Venkatesa Perumal Kovil is located in the revenue village of Pudhupalayam, a part of the Terkuvenganallur Grama Panchayat of the Rajapalayam taluk (Fig. 11.13). Geographically,

Fig 11.13: **Sri Vettai Venkatesa Perumal Kovil**



it is situated on the foothill of the south-eastern face of Sanjeevi Malai, which formally goes by the name of Kothankulam reserved forest. The temple historically dates back to the 13th century A.D. It also has a very rich heritage value with many inscriptions and records dating back to 13th century Pandya era.

Pethavanallur Mayuranatha Swamy Temple

The Pethavanallur Mayuranatha Swamy Temple is one of the prominent temples in the area (**Fig. 11.14**). The temple is located in the northern part of the town. A festival is held here in the month of January and lasts for nine days. This temple is well connected and is on the main highway towards Srivilliputhur. The temple complex also includes some staff residential complexes.

Fig 11.14: **Pethavanallur Mayuranatha Swamy Temple**



Draupathi Amman Kovil

Located right in the heart of the town, the Draupathi Amman Temple (**Fig. 11.15**) is also famous in town for its annual procession. The temple flag is hoisted during the month of Panguni followed by 10 days of rituals and the procession of the deities through the streets of the town. The Pookuli festival is conducted at the end of the ten days.

Fig 11.15: **Draupathi Amman Kovil**



Fig 11.16: **Ramaswamy Kovil**



Ramaswamy Kovil

Located in the eastern end of the town, adjacent to the Appal Raja Oorani, the Ramaswamy Kovil is a temple dedicated to the deity of Lord Rama (**Fig. 11.16**). It is a famous social space among the residents and is host to many celebrations and processions.

Chokkar Kovil

The Chokkar Kovil flag is hoisted during the month of Maasi followed by 10-day rituals and the procession of the deities through the streets of the town (**Fig. 11.17**). During Maasi Magam, the Theppa Thiruvilla is conducted in this temple.

Fig 11.17: **Chokkar Kovil**



Infrastructure Facilities Available in Temples in the LPA

Temples within the LPA have access to only minimal infrastructural facilities (Table 11.1).

Table 11.1: Infrastructure Facilities Available in LPA Temples

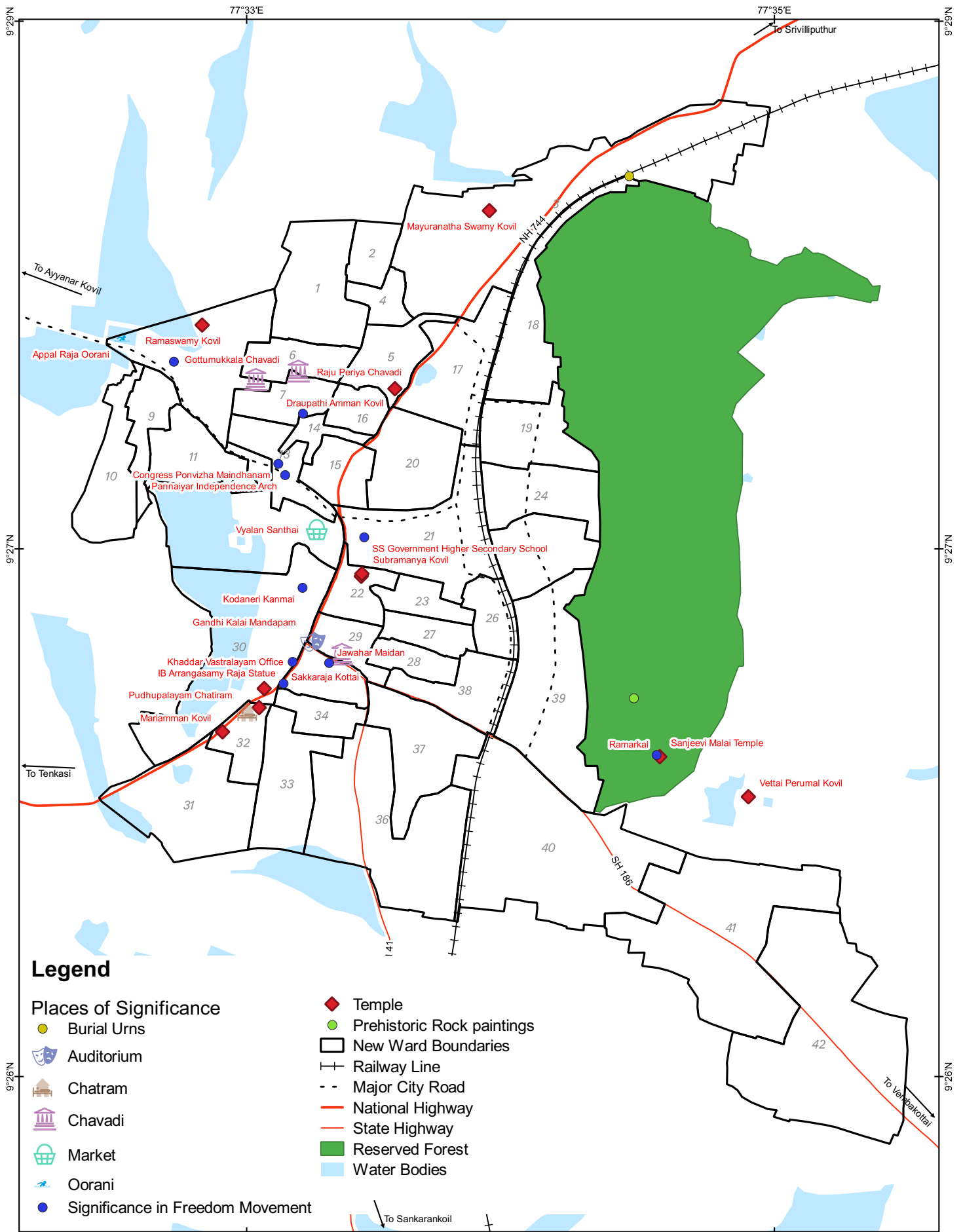
S. No.	Name	Type	Location	Access to Public Transport	Water Supply	Toilet Facilities	Street-lights	Signages	Seating Area
1.	Singathirulapan Temple	Religious - Historical Inscriptions	Municipal area	Yes	Yes	Yes	Yes	No	Yes
2.	Parannagathar Paravi Annam Katha Kovil	Religious - Ruins - Historical Inscriptions	Pudhupalayam	Yes	Yes	No	No	Yes	No
3.	Vikrama Pandeshwar Kovil	Religious - Historical Inscriptions	Sholapuram	Yes	Yes	Yes	Yes	No	No
4.	Venkatachalapathy Kovil	Religious - Ruins - Historical Inscriptions	Sholapuram	Yes	Yes	No	No	No	No
5.	Chidambareswar Kovil	Religious - Historical Inscriptions	Terkuvengannallur	No	Yes	No	No	No	Yes
6.	Vettai Perumal Kovil	Religious - Historical Inscriptions	Pudhupalayam	No	Yes	Yes	Yes	No	Yes
7.	Mayurnatha Swamy Kovil	Religious	Municipal area	Yes	Yes	No	No	No	Yes
8.	Draupadi Amman Kovil	Religious	Municipal area	Yes	Yes	No	Yes	Yes	No
9.	Ramaswamy Kovil	Religious	Municipal area	Yes					
10.	Chokkar Kovil	Religious	Municipal area	No					
11.	Kothanda Rama Kovil	Religious	Municipal area	Yes	Yes	Yes	Yes	Yes	Yes
12.	Mariamman Kovil	Religious	Municipal area	Yes	Yes	Yes	Yes	Yes	Yes
13.	Subramanya Swamy Kovil	Religious	Municipal area	No	Yes			No	No

11.2

Places of Significance – Independence Movement

Rajapalayam has hosted events of historical significance during the freedom movement. Most of the places associated with these events are just points and landmarks with no specific site areas (**Map 11.5**). A few of the locations within the municipal area where freedom related events took place are noted below:

- IB Arrangasamy Statue - First boycott programme was started by Mr. I.B.R Raja, who was arrested as the first satyagrahi of Rajapalayam on 13th January 1922
- Gandhiji's visit to Rajapalayam
 - Gandhi Kalai Madram where Gandhiji stayed during his visits in 1927 and 1934
 - Kondaneri kanmai (Backside of Shanthi Theatre) in In October 1927
 - Pethuraja's house – Palayapalayam
 - Ilamthoppu (opposite to PACR Government Hospital on 26-01-1934)
- Khaddhar Vastiralayam office (1925-1947) near Chitra Hospital. Gandhi visited and opened this factory in October 1927
- Rajapalayam sub-treasury office space (political meetings held 1916-1930)
- Congress Ponvizha Maidan (Congress Golden jubilee Ground) 1935-1936-1947
- Jawahar Maidan (Jallianwala Bagh of Rajapalayam) - Flag war in 1932 where many nationalists were severely beaten up in this place between 1932-1942
- Ramarkal (Ramar hilltop) at Sanjeevi Hills, Rajapalayam - Flag hoisted at top of the Ramarkal in 1932 during Nagpur Flag movement in 1932
- Hindu Middle School, Jawahar maidan street - PSK and others founded 'Meenakshi Shakaya
- Vidyalaya during the Home Rule Movement at Rajapalayam (1916-18)
- All the three chavadis of Rajus - Police lathi charge was made on people of Rajapalayam during the freedom movement
- Indian Independence Arch - near Pannaiyar club – 1947
- Govt. Hospital (near Gandhi Statue Roundana) - Many Satyagrahis were beaten up and kept in this Hospital, including IBR
- Periyakadai Bazar and Ambalapuli Bazar, where many foreign cloth shops were boycotted by Rajapalayam volunteers 1930-1933



Legend

Places of Significance

- Burial Urns
- Auditorium
- Chatram
- Chavadi
- Market
- Oorani
- Significance in Freedom Movement
- ◆ Temple
- Prehistoric Rock paintings
- New Ward Boundaries
- Railway Line
- Major City Road
- National Highway
- State Highway
- Reserved Forest
- Water Bodies

Places of Heritage & Cultural Significance in Rajapalayam Municipal Area	Notes	Data Credits Field Survey	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	Prepared By Tapasya Design Studio, Auroville
CRS : WGS 1984			

Map 11.5: Places of Heritage & Cultural Significance in Rajapalayam Municipal Area

11.3

Important Festivals

There are 4 major temple festivals (thiruvizhas) celebrated in Rajapalayam LPA annually by the local community. They are the Mariamman Kovil Pukkuli Thiruvizha, Dhraupathiamman Kovil Pukkuli Thiruvizha, Chithirai Venkudai Thiruvizha and Chithirai Thiruvizha. These festivals bring together and bind the local community and are an important element of the social fabric in the town (Fig. 11.18). Thousands of people gather at the common places near the temples, in Palayapalayam and in several places along the major roads in the town, to witness and participate in these festivals.

Fig 11.18: Temple Festival Celebrations in Rajapalayam



11.4

Natural Heritage

Sanjeevi Malai RF

The Sanjeevi Malai (Sanjeevi Hill), also formally known as Kothankulam Reserved Forest, located in this town is said to be associated with the story of Ramayana. It is said that when Hanuman lifted the Sanjeevi seasonal mountain to heal the arrow wound of the target, a small piece of it fell on the spot and became known as the 'Sanjeevi Hill'. It is now home to a temple. It is usually famous for the small trek that individuals need to take to get to the hilltop. The hilltop offers views of the town and is also home to various flora (**Fig. 11.19**). Recently, rock art paintings of human figurines, possibly belonging to the megalithic period have been found in these hillocks (**Fig.11.20**).

Fig 11.19: **View from Sanjeevi Malai**

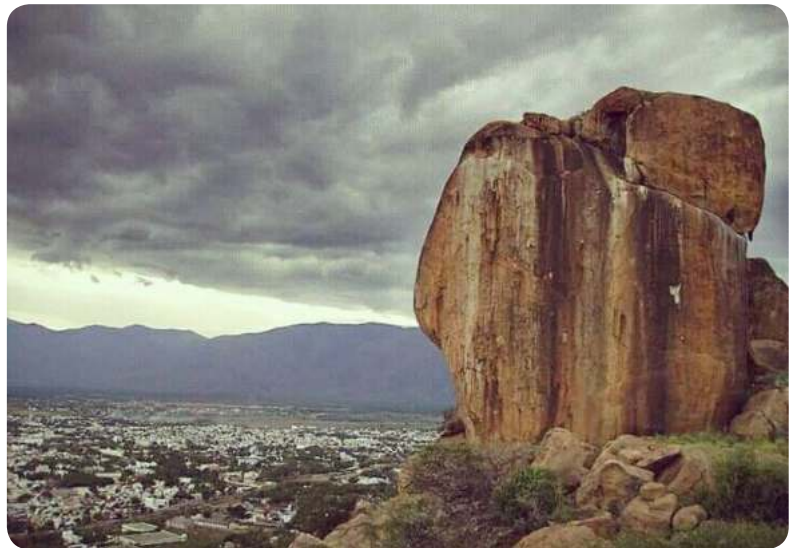


Fig 11.20: **Rock Paintings in Sanjeevi Malai**



Ayyanar Kovil Temple and Waterfalls (Outside Rajapalayam LPA)

Ayyanar Falls is a small cascade of rocks located about 12 km away from the town of Rajapalayam (Fig. 11.21). Situated on the foothills of the Western Ghats, the small waterfall that falls from a height of about fifteen feet falls here next to the Neer Katha Ayyanar Temple. The Neer Katha Ayyanar temple is the main reason for the name of the falls. The temple is situated at the foothills of Western Ghats where two streams named Palaaru and Neeraaru meet. It is more than 500 years old.

Fig 11.21: **Ayyanar Kovil Falls**



Srivilliputhur Tiger Reserve

Srivilliputhur Grizzled Squirrel Sanctuary, a forest area about 8 km west from the town, is a very good option for trekking. There is no public transport/ bus service to reach here. However, the place can be reached by two-wheeler or even bicycle. The forests are found on the eastern slopes of the Western Ghats. Many rare and endemic varieties of flora and fauna are found along the mountain slopes.

The wildlife sanctuary, spread over 480 sq.km. was established in 1989 at Shenbagathoppu in Srivilliputhur taluk. This sanctuary is contiguous with the Periyar Tiger Reserve on the south-western side and the Megamalai Reserved Forest on the north-western side. The altitude varies from 100 to 2,010 m above sea level. The sanctuary is home to the endangered, arboreal grizzled giant squirrel, *Ratufa macroura* (Fig. 11.22).

Fig 11.22: **Grizzled Squirrel**



11.5

Key Findings and Issues

Rajapalayam LPA is blessed with rich cultural, archaeological, historical and natural heritage. These are intangible aspects which makes the area unique. However, there are major issues pertaining to general awareness and upkeep. Some of the issues are:

- Temples are important places of social life for the local citizenry of the LPA. There are 13 major temples within the LPA. Except for the Kothanda Rama Kovil and Mariamman Kovil in the municipal area, other temples lack good infrastructure and amenities like public lighting, toilet facilities, access to drinking water, seating, parking, etc.
- The lack of adequate open spaces and amenities near the temple to organize festivals and gatherings means that during the festival period, roadblocks and traffic congestion are common in all major roads of the town.
- Palayapalayam (the old town area of Rajapalayam) is the one of the places in Rajapalayam where buildings still retain their unique architectural and heritage characters. It is evident from the field survey that buildings in Palayapalayam area are slowly getting replaced by modern buildings. These buildings are unique to the local Raju community and represent an amalgamation of the architecture of their place of origin and the tamil architecture.
- Rajapalayam has a deep connection to the Indian Freedom Struggle and these spaces associated with the freedom movement have a lot to offer in terms of building up the collective identity of the place. These places, however, are not maintained properly and mostly remain unknown to the general public (Fig. 11.23).

Fig 11.23: **Congress Ponvizha Maidan (Congress Golden Jubilee Ground)**



- Uncontrolled Tourism in Eco-sensitive Zones: Ayyanar Kovil is the major recreational spot in the entire LPA. Thus, the Ayyanar Kovil falls and the foothills of the Western Ghats attracts an increasing number of visits from the local population. It is to be noted that the area has been designated as a Tiger Sanctuary as of 2021. Therefore, there is a need to provide proper visitor facilities and amenities as well as increase general awareness to ensure the eco-sensitive zones are protected.



Environment

12

Rajapalayam LPA is blessed with various natural features. It lies at the foothills of the Western Ghats, and has the Eco-Sensitive Zone (ESZ) of Srivilliputhur Megamalai Tiger Reserve (SMTR), within its boundaries. The LPA forms an important part of the Upper Vaippar basin and contains 41 major water bodies. It also has 2 Reserved Forests, one of which has endangered wildlife in it. It is thus an important layer of the LPA.

Tamil Nadu Vision 2023 document released by the GoTN places due importance on environment, by listing ecological preservation as one of the 10 vision themes for the State. Special area programmes aimed at conservation such as the Western Ghats Development Programme (WGDP), that covers eight districts in Tamil Nadu, including 601 sq.km of Rajapalayam as part of Virudhunagar district, are ongoing.

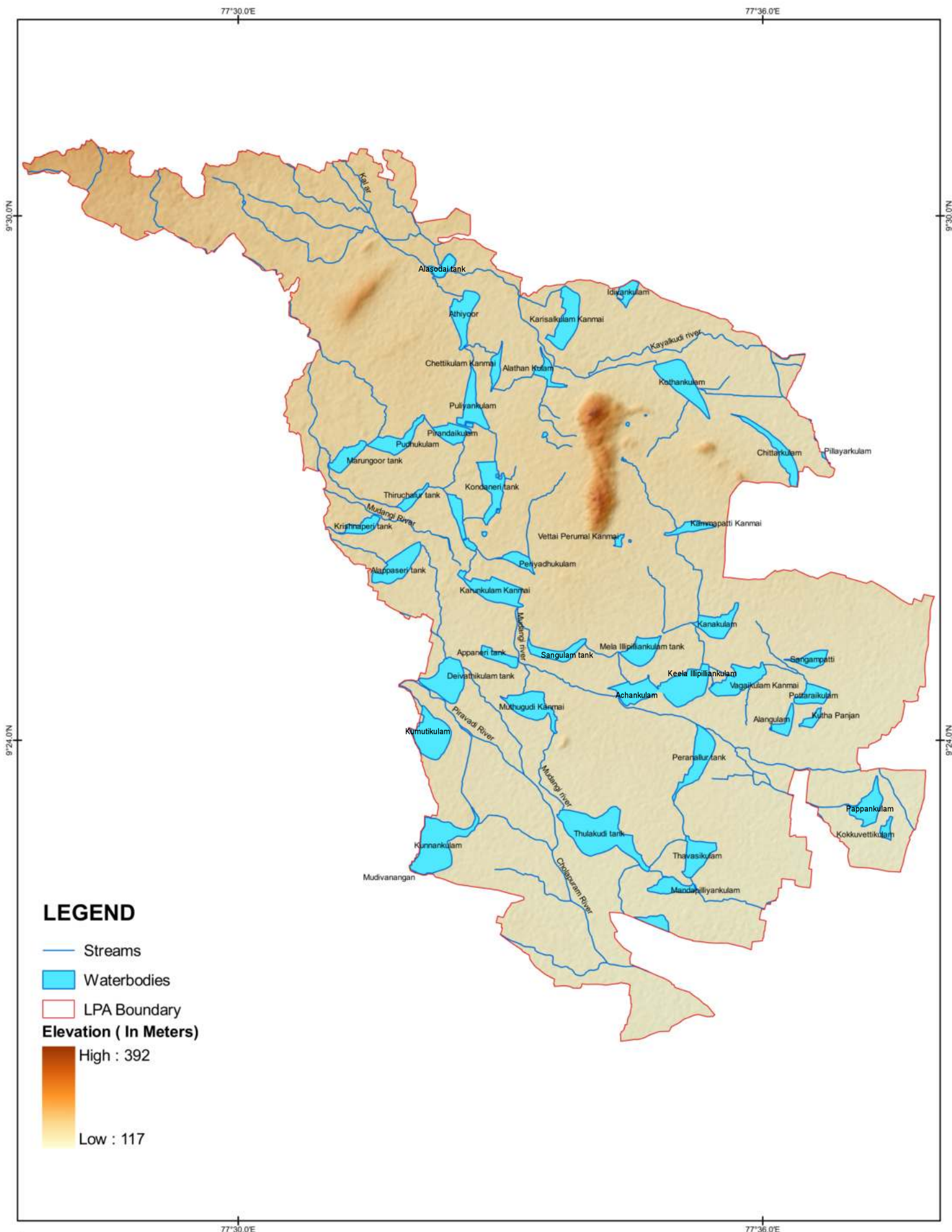
However, the State of Environment (SOE) Report, Tamil Nadu mentions a comparative study of all districts using data from 2011-2012 as baseline, and an Environmental Sustainability Index consisting of 45 indicators from nine thematic areas such as population, land use, agriculture, transport, water, forest, solid waste, energy and output, has identified Virudhunagar as one among 7 least sustainable districts. This section aims to present the basic environmental details of the LPA based on available data.

12.1

Surface Water

12.1.1. Rivers and Streams

The general drainage within the LPA is from the north-west to the south-east (**Map 12.1**). The minimum elevation in the LPA is 120 m above MSL and the maximum elevation of 400 m above MSL, which is the peak of Sanjeevi hills. The entire LPA falls under the Vaippar basin and the drainage pattern is dendritic; the major river in the LPA is Mudangiyaru river which flows from the north-west to the south-east. Mudangiyaru river starts from the Western Ghats hill range, at Ayyanar Kovil and flows south-east and drains in Terkuvenganallur. The Kalar river also originates from the Srivilliputhur RF, flows from north to south and joins other streams in the south and flows as Kayalkudi river. Piravadi river originates from Seithur RF and flows from north-west to south-east passes through Terkuvenganallur. It merges with another stream and flows as Sholapuram river near Sholapuram. In due course the Mudangiyaru and Piravadi rivers merge with Sholapuram river. After merging with Sholapuram river it flows south-east and joins Solaiseri river north of Sendhthattiyapuram. Stream network was derived from the SRTM elevation model and cross verified with the existing database.



<p>Drainage Map of Rajapalayam LPA</p>	<p>Notes :</p>	<p>Data Credits GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 12.1: Drainage Map of Rajapalayam LPA

12.1.2. Current Status – Surface Water Bodies in LPA

The two major challenges faced by water bodies due to urbanisation are pollution and encroachment. Water quality of the bodies within the municipal limits are not considered to be of potable quality. In compliance with an Order issued by the National Green Tribunal (NGT), the Central Pollution Control Board (CPCB) prescribes the following as potential strategies for rejuvenation and restoration of water bodies.

- Recognition Phase – Collection, maintenance and digital mapping of historical information related to water bodies
- Restoration Phase – Designation of water bodies for use of State; Restoration goals; Exploration of steps to be followed for restoration
- Protection Phase – Preparation and execution of action plans to achieve goals
- Improvement Phase – Adoption of additional remediation measures
- Sustenance Phase – Promoting awareness and public participation

Understanding the present status of the issue is a critical first step in the long-term management of water bodies. According to the District Environmental Plan, dated 15th July, 2019 for Virudhunagar district, there is no polluted river stretch in the district. There is little to no available data in this report on water bodies under rejuvenation at present or having been rejuvenated in the last 5 years in the district. In 2019-2020, the Public Works Department (PWD) has reinstated the “Kudimaramathu” scheme to renovate water bodies. The DDMP mentions that a total of 17 works in this scheme has been undertaken in the Upper Vaippar basin Division, Rajapalayam.

There are 42 irrigation tanks in the LPA, they range in size from 6 to 120 ha. The total area covered by the tanks is 1,350 ha. 39 tanks are in current use for agricultural irrigation (**Map 12.2**). Secondary data was collected from the Water Resource Department for the water bodies within Rajapalayam LPA. Primary data was collected by visiting the water bodies to assess the current pollution loads of the tanks and on ground truthing of information gathered from satellite imagery and the tanks were rated on a scale of 1 to 4 (**Table 12.1**):

- Heavily polluted tanks (Score:4)
- Tanks with increased pollution risk (Score:3)
- Tanks with minor pollution risk (Score:2)
- Tanks with good clean water - minimal pollution risk (Score:1)

The tanks were also assessed for the presence of invasive species such as water hyacinth and *Ipomoea carnea*. Additionally, the infestation of *Prosopis juliflora* was quantified from satellite imagery and ground truthed during site visits.

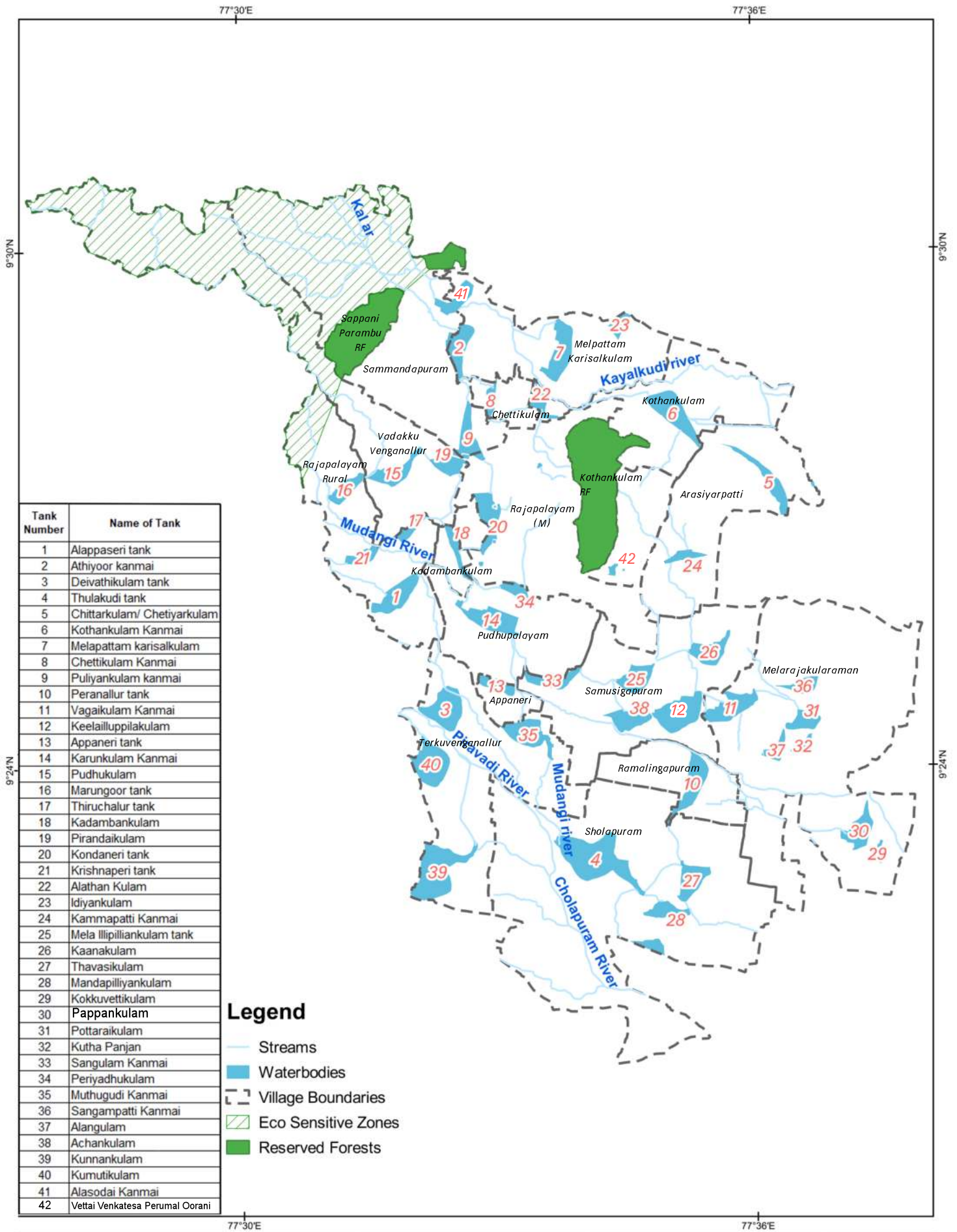
Table 12.1: List of Major Water Bodies in Rajapalayam LPA

Tank No.	Name of Tank	Remarks	Category	Revenue Village	Village	Area (Ha)	Ayacut Area (Ha)	Capacity (MCM)
1	Alappaseri tank	Tank still in use, approximately 10% of spread area infested with <i>Prosopis</i> . <i>Ipomoea carnea</i> also growing in spread area.	3	Rajapalayam	Rajapalayam	35.85	82.82	0.47
2	Athiyoor kanmai	Tank still in use, approx. 30% of spread area infested with <i>Prosopis</i> . Eventual threat from urban development in hinterland.	4	Melpattam Karisalkulam	Melpattam Karisalkulam	36.23	93.8	0.59
3	Deivathikulam tank	Tank still in use, approx. 70% of spread area infested with <i>Prosopis</i> .	3	Terkuvenganallur	Terkuvenganallur	55.32	88.89	0.72
4	Thulakudi tank	Tank still in use, approx. 50% of spread area.	3	Sholapuram	Sholapuram	130.3	125.97	2.03
5	Chittarkulam/ Chetiarkulam	Tank still in use, approx. 50% of spread area infested with <i>Prosopis</i> . Will receive any over flow from UGSS from Kothankulam.	4	Arasiyarpatti	Arasiyarpatti	26.2	59.1	0.03
6	Kothankulam kanmai	Tank still in use, approx. 10% of spread area infested with <i>Prosopis</i> , UGSS will discharge treated water into this tank in future.	2	Kothankulam	Kothankulam	55.58	89.44	0.65
7	Melapattam karisalkulam	Tank still in use, approx. 70% of spread area infested with <i>Prosopis</i> .	4	Melapattam Karisalkulam	Melapattam Karisalkulam	58.53	96.27	0.63
8	Chettikulam kanmai	Tank still in use, approx. 30% of spread area infested with <i>Prosopis</i> .	4	Chettikulam	Chettikulam	14.96	56.84	0.15
9	Puliyankulam kanmai	Tank still in use, heavily infested with water hyacinth, <i>Ipomoea carnea</i> growing near bund. Growing pollution threat from urban development in hinterland.	1	Sammanda puram	Sammandapuram	36.6	56.08	0.32

Tank No.	Name of Tank	Remarks	Category	Revenue Village	Village	Area (Ha)	Ayacut Area (Ha)	Capacity (MCM)
10	Peranallur tank	Tank still in use, approx. 50% of spread area infested with Prosopis.	2	Ramalingapuram	Ramalingapuram	45.33	51.13	0.6
11	Vagaikulam kanmai	Tank still in use, heavily infested with water hyacinth. Growing pollution threat from urban development in hinterland.	1	Melarakulam	Samusigapuram	46.78	42.92	0.64
12	Keelailuppikulam	Tank still in use, approx. 10% of spread area infested with Prosopis.	2	Samusigapuram	Samusigapuram	58.22	41.4	0.88
13	Appaneri tank	Tank still in use, approx. 10% of spread area infested with Prosopis.	3	Appaneri	Appaneri	18.75	41.4	0.25
14	Karunkulam kanmai	Tank still in use, approx. 10% of spread area infested with Prosopis, receives overflow from tanks above that are polluted.	3	Pudhupalayam	Pudhupalayam	61.46	119.8	1.06
15	Pudhukulam	Tank still in use, approximately 10% of spread area infested with Prosopis. Ipomoea carnea growing near bund.	4	Vadaku Venganallur	Rajapalayam	21.6	73.04	0.28
16	Marungoor tank	Tank still in use, approx. 50% of spread area infested with Prosopis.	4	Rajapalayam	Rajapalayam	19.95	42.52	0.25
17	Thiruchalur tank	Tank still in use, approx. 40% of spread area infested with Prosopis.	4	Rajapalayam	Rajapalayam	13.5	DNA	DNA
18	Kadambankulam	Tank still in use, approx. 10% of spread area infested with Prosopis.	2	Vadaku Venganallur	Kadambankulam	13.94	47.84	0.14
19	Pirandaikulam	Tank still in use, heavily infested with water hyacinth, Ipomoea carnea growing near bund. Growing pollution threat from urban development in hinterland.	1	Vadaku Venganallur	Rajapalayam	18.55	40.49	0.18
20	Kondaneri tank	Tank still in use, heavily infested with water hyacinth, Ipomoea carnea growing near bund. Heavy pollution from town behind.	1	Rajapalayam	Rajapalayam	33.64	32.62	0.37
21	Krishnaperi tank	Tank still in use, approx. 20% of spread area infested with Prosopis.	4	Rajapalayam	Rajapalayam	15.04	42.3	0.17
22	Alathan kulam	Tank still in use, approx. 20% of spread area infested with Prosopis. Eventual threat from urban development in hinterland.	4	Chettikulam	Chettikulam	17.4	4.6	0.13

Tank No.	Name of Tank	Remarks	Category	Revenue Village	Village	Area (Ha)	Ayacut Area (Ha)	Capacity (MCM)
23	Idiyankulam	Tank seemingly not in use, does not fill regularly, spread area overgrown with Prosopis.	4	Melpattam Karisalkulam	Idiyankulam	16.1	DNA	DNA
24	Kammappatti kanmai	Tank still in use, approx. 50% of spread area infested with Prosopis.	2	Arasiyarpatti	Kalangaperi	13.6	DNA	DNA
25	Mela Illipilliankulam tank	Tank still in use, approx. 60% of spread area infested with Prosopis, pollution threat from development behind.	2	Samusigapuram	Velyuthapuram	37.00	32.00	0.25
26	Kaanakulam	Tank still in use, approx. 50% of spread area infested with Prosopis.	2	Samusigapuram	Kaanakulam	36.74	34.5	0.29
27	Thavasikulam	Tank still in use, approx. 10% of spread area infested with Prosopis. Growing pollution threat from urban development in hinterland.	2	Sholapuram	Sangaralingapuram	34.2	DNA	DNA
28	Mandapilliyankulam	Tank still in use, approx. 80% of spread area infested with Prosopis. Growing pollution threat from urban development in hinterland.	2	Sholapuram	Sangaralingapuram	23.7	DNA	DNA
29	Kokkuvettikulam	Tank still in use, approx. 50% of spread area infested with Prosopis.	3	Melrajakularaman	Kannithavanpatti	8.2	DNA	1
30	Pappankulam	Tank still in use, approx. 70% of spread area infested with Prosopis.	3	Melrajakularaman	Kannithavanpatti	32.8	DNA	0.99
31	Pottaraikulam	Tank still in use, approx. 50% of spread area infested with Prosopis.	3	Melarakularaman	Melarakularaman	21.3	DNA	0.99
32	Kutha Panjan	Tank still in use, approx. 30% of spread area infested with Prosopis.	3	Melarakularaman	Melarakularaman	7.5	DNA	1.6
33	Sangulam kanmai	Tank still in use, approx. 10% of spread area infested with Prosopis.	3	Samusigapuram	Appaneri	25.5	24.45	0.2
34	Periyadhukulam	Tank still in use, heavily infested with water hyacinth, Ipomoea carnea growing near bund. Heavy pollution from town behind.	1	Pudhupalayam	Pudhupalayam	15.2	DNA	DNA
35	Muthugudi kanmai	Tank still in use, approx. 30% of spread area infested with Prosopis.	2	Terkuvenganallur	Muthugudi	18.4	8.9	0.62
36	Sangampatti kanmai	Tank still in use, approx. 30% of spread area infested with Prosopis.	2	Melarakularaman	Sangampatti	16.13	22.2	0.16

Tank No.	Name of Tank	Remarks	Category	Revenue Village	Village	Area (Ha)	Ayacut Area (Ha)	Ca-pacity (MCM)
37	Alangulam	Tank still in use, approx. 50% of spread area infested with Prosopis.	3	Melaraja kularaman	Melaraja kularaman	16	DNA	DNA
38	Achankulam	Tank still in use, approx. 40% of spread area infested with Prosopis. Ipomoea <i>carnea</i> growing near bund.	3	Samusigapuram	Ramalingapuram	56.45	41.46	0.56
39	Kunnankulam	Tank still in use, approx. 80% of spread area infested with Prosopis.	3	Terkuvenganallur	Terkuvenganallur	82.92	84.84	0.96
40	Kumutikulam	Tank still in use, approx. 80% of spread area infested with Prosopis.	3	Terkuvenganallur	Terkuvenganallur	45.99	66.15	0.59
41	Alasodai kanmai	Tank seemingly not in use, does not fill regularly, spread area 50% overgrown with Prosopis and cultivated in some areas with coconut.	4	Melpattam Karisalkulam	Melpattam Karisalkulam	9.37	6.32	0.23
42	Vettai Perumal temple oorani	Tank not in use. Receives run-off from Sanjeevi Malai. Approx. 50% infested with Prosopis. This tank is under HR&CE.	4	Pudhupalyam	Vettai Venkatesa Perumal Temple	3.42	Nil	DNA



Waterbodies and Streams in Rajapalayam LPA	Notes :	Data Credits Field Survey	 CRS : WGS 1984
		Client DTCP Virudhunagar	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Prepared By Tapasya Design Studio ,Auroville	

Map 12.2: Waterbodies and Streams in Rajapalayam LPA

There are 17 tanks which are majorly polluted and in urgent need of restoration. They are listed in the **Table 12.2** and represented in **Map 12.3**. They are classified under 3 main categories:

1. Already polluted and in need of urgent restoration – 5 nos. (Pulliyangulam Kanmai, Pirandaikulam, Kondaneri Kanmai, Periyadhukulam, Keelalliplangkulam)
2. Tank at immediate risk from increasing urban development in catchment area – 7 nos. (Athiyoor Kanmai, Alathan Kulam, Kothankulam Kanmai, Chittarkulam/Chetiyarkulam, Mela Illipilliankulam, Thavasikulam, Mandapilliyankulam)
3. Tanks at risk from future urban development – 5 nos. (Kammappatti Kanmai, Kaanakulam, Sengulam Kanmai, Sangampatti Kanmai, Vagaikulam)

Table 12.2: **List of Polluted or At-Risk Tanks in the LPA**

Tank Number	Tank Name	Comments
2	Athiyoor Kanmai	Tank at immediate risk from increasing urban development in catchment area
5	Chetiyarkulam/ Chittarkulam	Tank at immediate risk from increasing urban development in catchment area
6	Kothankulam	Tank at immediate risk from increasing urban development in catchment area
9	Puliyakulam Kanmai	Tank already polluted, in need of urgent restoration efforts
12	Keelalliplangkulam	Tank at risk from future urban development
19	Pirandaikulam	Tank already polluted, in need of urgent restoration efforts
20	Kondaneri Kanmai	Tank already polluted, in need of urgent restoration efforts
22	Alathankulam	Tank at immediate risk from increasing urban development in catchment area
24	Kammappatti Kanmai	Tank at risk from future urban development
25	Mela Illipilangkulam	Tank at immediate risk from increasing urban development in catchment area
26	Kaanakulam	Tank at risk from future urban development
27	Thavasikulam	Tank at immediate risk from increasing urban development in catchment area
28	Mandapillayarkulam	Tank at immediate risk from increasing urban development in catchment area
33	Sengulam Kanmai	Tank at risk from future urban development
34	Periyaadhikulam (New Busstand)	Tank already polluted, in need of urgent restoration efforts
36	Sangampatti Kanmai	Tanks at risk from future urban development
11	VagaiKulam	Tank already polluted, in need of urgent restoration efforts
42	Vettai Peruamal temple oorani	Tank already polluted, in need of urgent restoration efforts

(Source: Primary Data Collection)

77°30'E

77°36'E

9°30'N

9°30'N

9°24'N

9°24'N

77°30'E

77°36'E

Tank Number	Name of Tank
1	Alappaseri tank
2	Athiyoor kanmai
3	Deivathikulam tank
4	Thulakudi tank
5	Chittarkulam/ Chetiarkulam
6	Kothankulam Kanmai
7	Melapattam karisakulam
8	Chettikulam Kanmai
9	Puliyankulam kanmai
10	Peranallur tank
11	Vagaikulam Kanmai
12	Keelailuppilakulam
13	Appaneri tank
14	Karunkulam Kanmai
15	Pudhukulam
16	Marungoor tank
17	Thiruchalur tank
18	Kadambankulam
19	Pirandaikulam
20	Kondaneri tank
21	Krishnaperi tank
22	Alathan Kulam
23	Idiyankulam
24	Kammampatti Kanmai
25	Mela Illipiliyankulam tank
26	Kaanakulam
27	Thavasikulam
28	Mandapillyankulam
29	Kokkuvekkulam
30	Pappankulam
31	Pottaraikulam
32	Kutha Panjan
33	Sangulam Kanmai
34	Periyadhukulam
35	Muthugudi Kanmai
36	Sangampatti Kanmai
37	Alangulam
38	Achankulam
39	Kunnankulam
40	Kumutikulam
41	Alasodai Kanmai
42	Vettai Venkatesa Perumal Oorani

Legend

Pollution Status

Already Polluted

Future Urban Development Risk

Immediate Risk

Water Bodies not at risk

Streams

Village Boundaries

Eco Sensitive Zones

Reserved Forests

Railway Line

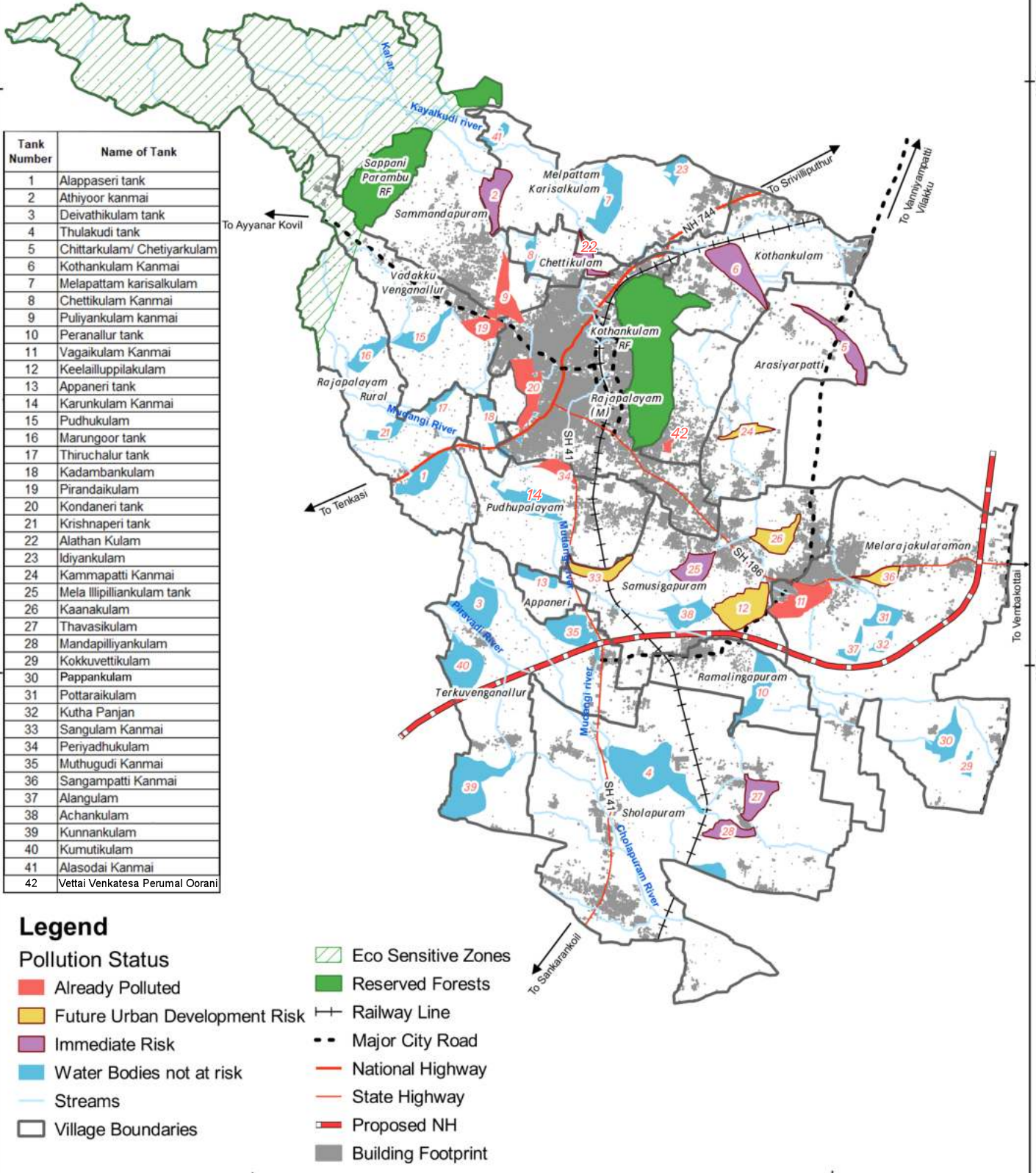
Major City Road

National Highway

State Highway

Proposed NH

Building Footprint



Pollution Risk Classification of Waterbodies in Rajapalayam LPA

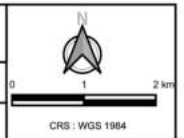
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes :

Data Credits
Field Survey

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville



Map 12.3: Pollution Risk Classification of Water Bodies in the LPA

The tanks shown in red (**Map 12.3**) - Puliyakulam Kanmai, Pirandaikulam, Kondaneri Kanmai, Periyaadhikulam (New Bus stand) and Vagaikulam are already heavily polluted. In the worst cases the water is black and exhibits anaerobic qualities. Reports from local people of skin irritations from over exposure to the water also indicated high levels of pollutants. 4 of these tanks also have rampant infestations of water hyacinth which is concurrent with heavy nutrient loads, additionally *Ipomoea carnea* is invading the spread area of these tanks. Pink and green colour of tanks indicates that they are either at present or in the future at risk of pollution from the increasing urbanization of the LPA.

Agricultural Usage of Tanks and Crop Production

Of the 41 tanks, 39 are still actively used for irrigation of paddy crops. 2 of the tanks are filled late in the season if rains allow – Alasodai kanmai and Idayankuam, and mainly have tree crops planted in the ayacut area. Crop production is variable depending on the seasonal rains and the filling of the tank.

Challenges of Invasive *Prosopis juliflora*

Prosopis juliflora is an exotic fast-growing shrub that is resistant to grazing and rapidly spreads in uncultivated areas. It has value as a fuel wood, but studies have shown that it has the potential to drain water tables, destabilize the natural sealing of water bodies through root penetration of the impermeable silt layers built up over time, and in large monocultural stands has minimal value for biodiversity; although it must be noted that it does provide habitat for birds nesting, some insect populations and hence rapid large scale clearing can have a deleterious effect on local wildlife populations if no alternative tree cover exists. Hence, in best case scenarios the removal of the *Prosopis* should be carried out in a phase-wise manner, and alternative plantations of flood tolerant trees and shrubs should be carried out concurrently to provide habitat alternatives for wildlife.

Prosopis infestation exists in the water bodies of the LPA to varying degrees (**Table 12.3**). Of the 41 tanks in the LPA, 7 of the tanks are heavily infested with *Prosopis juliflora*, and an additional 18 have significant areas of their water spread to areas covered with these shrubs.

Table 12.3: **Extent of *Prosopis* Growth in Water Bodies in LPA**

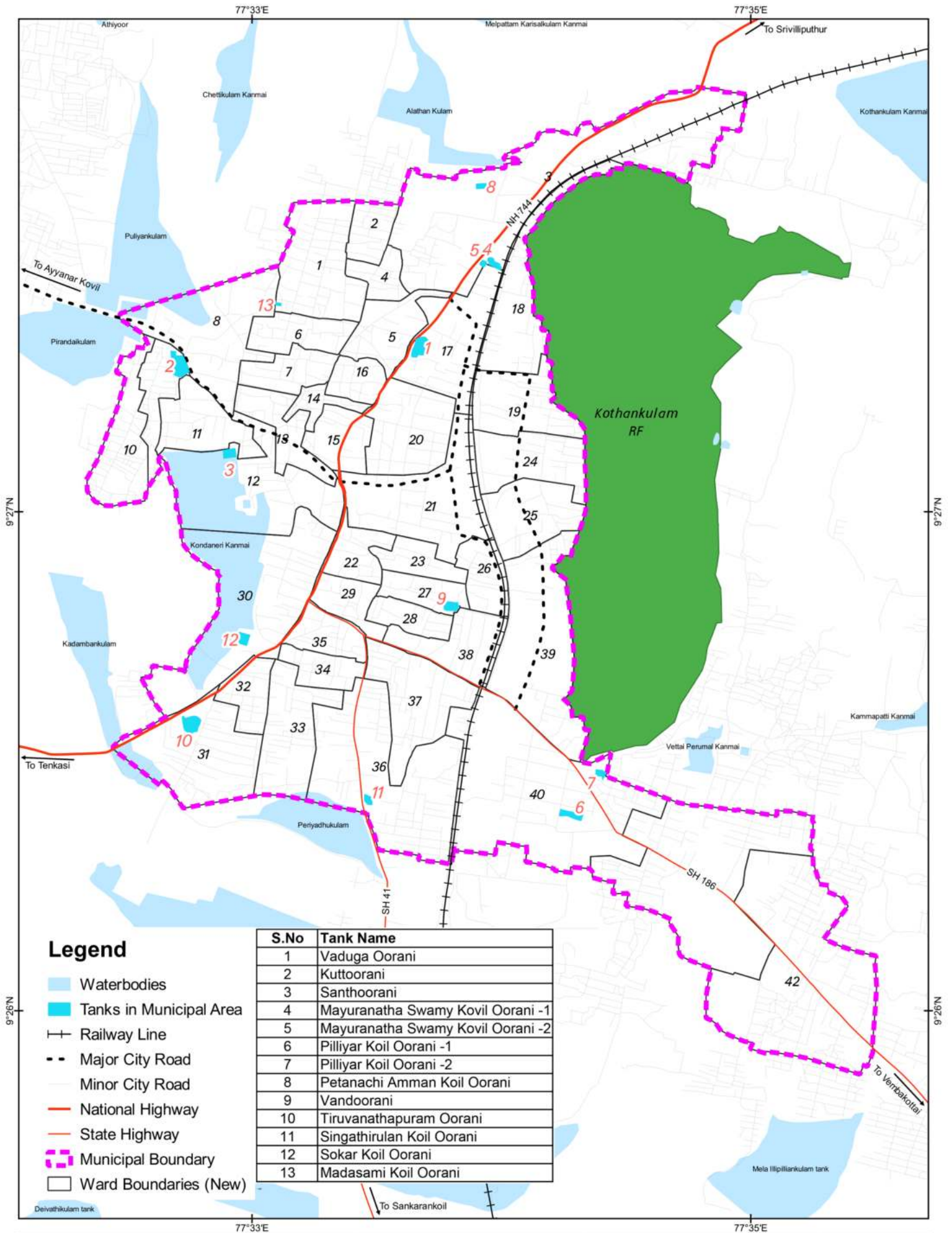
Details	Nos	%
Tanks with greater than 60% of area covered with <i>Prosopis</i>	7	17%
Tanks with 30% - 60% of area covered with <i>Prosopis</i>	18	44%
Tanks with less than 30% of area covered with <i>Prosopis</i>	11	27%
Tanks with less than 10% of area covered with <i>Prosopis</i>	5	12%

12.1.3. Current Status – Surface Water Bodies in Rajapalayam Municipal Area

There are 12 tanks within the Rajapalayam municipal limits (Table 12.4 & Map 12.4). These are either currently heavily polluted or are in the process of becoming polluted both from nutrient overload and also dumping of construction waste and other solid wastes.

Table 12.4: List of Tanks within Rajapalayam Municipal Area

S.No.	Name Of Water Body	Area in Acres	Ownership	New Ward Number
1	Vaduga Oorani	2.65	Revenue Dept.	17
2	Kuttoorani	2.49	Revenue Dept.	9
3	Santhoornai	1.58	PWD	12
4	Mayuranatahar Swamy Kovil Oorani- 1	0.84	HR&CE	3
5	Mayuranatahar Swamy Kovil Oorani-2	1.27	HR&CE	3
6	Pillayar Koil Oorani-1	2.45	Revenue Dept.	40
7	Pillayar Koil Oorani-2	0.254	Revenue Dept.	40
8	Pethanatchiamman Koil Oorani	0.72	HR&CE	3
9	Vandoorani	0.89	Revenue Dept.	27
10	Thiruvanathapuram Oorani	3.02	PWD	31
11	Singathirulan Koil Oorani	0.607	Revenue Dept.	36
12	Sokar Koil Oorani	1.59	Revenue Dept.	30
13	Madasami Koil Oornai	1.61	Revenue Dept.	1



Legend

- Waterbodies
- Tanks in Municipal Area
- Railway Line
- Major City Road
- Minor City Road
- National Highway
- State Highway
- Municipal Boundary
- Ward Boundaries (New)

S.No	Tank Name
1	Vaduga Oorani
2	Kuttoorani
3	Santhoorani
4	Mayuranatha Swamy Kovil Oorani -1
5	Mayuranatha Swamy Kovil Oorani -2
6	Pilliyar Koil Oorani -1
7	Pilliyar Koil Oorani -2
8	Petanachi Amman Koil Oorani
9	Vandoorani
10	Tiruvanathapuram Oorani
11	Singathirulan Koil Oorani
12	Sokar Koil Oorani
13	Madasami Koil Oorani
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Waterbodies in Rajapalayam Municipal Area	Notes	Data Credits Field Survey
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar
		Prepared By Tapasya Design Studio, Auroville

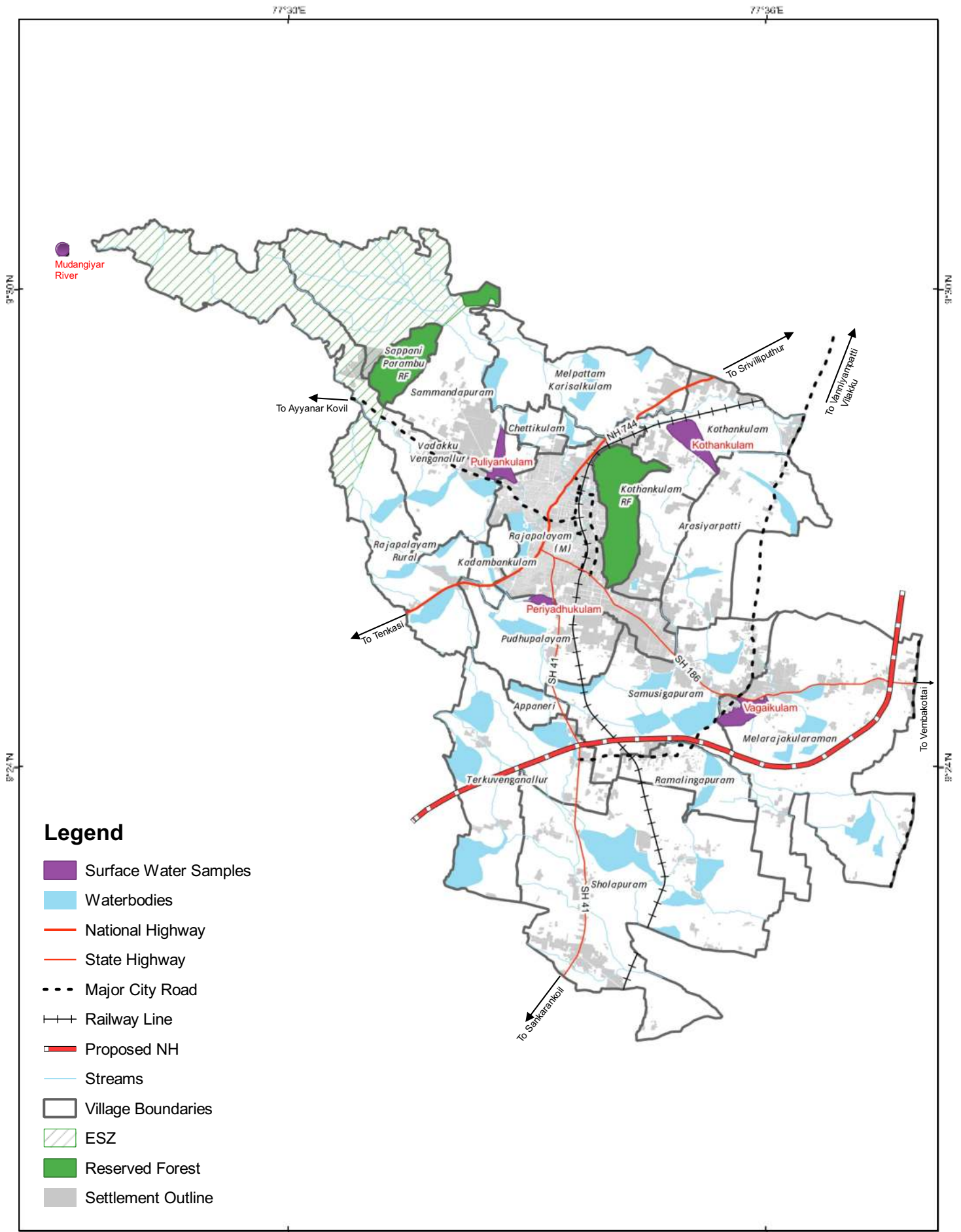
CRS : WGS 1984

Map 12.4: Tanks in Rajapalayam Municipal Area

12.1.4. Primary Data Collection & Analysis – Surface Water

Surface water samples were collected at the following tanks & rivers in the LPA to assess the current impact of sewage and other pollutants in these areas (**Map 12.5**).

- Puliyankulam tank
- Kothankulam tank
- Vagaikulam tank
- Periyaddhikulam tank
- Mudangiyaru river – (Ayyanar Kovil Sunai). Even though it lies outside the LPA, the sample was also collected from here since this is the main drinking water source for Rajapalayam Municipality. Sample collected from the Ayyanar Kovil Sunai indicates that all the water quality parameters are within the permissible limits, as per drinking water standards of the BIS and CPCB.



Legend

- Surface Water Samples
- Waterbodies
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH
- Streams
- Village Boundaries
- ESZ
- Reserved Forest
- Settlement Outline

<p>Surface Water Sample Locations in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits Field Survey, GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 12.5: Surface Water Sample Locations in LPA

12.1.4.1. ANALYSIS OF THE WATER SAMPLE

Physical Property

The colour of the surface water samples, except that of the Periyaddhikulam tank (near the new bus stand) are found to be within the permissible limit. The Periyaddhikulam tank water sample is black in colour, indicating heavy pollution of the water body.

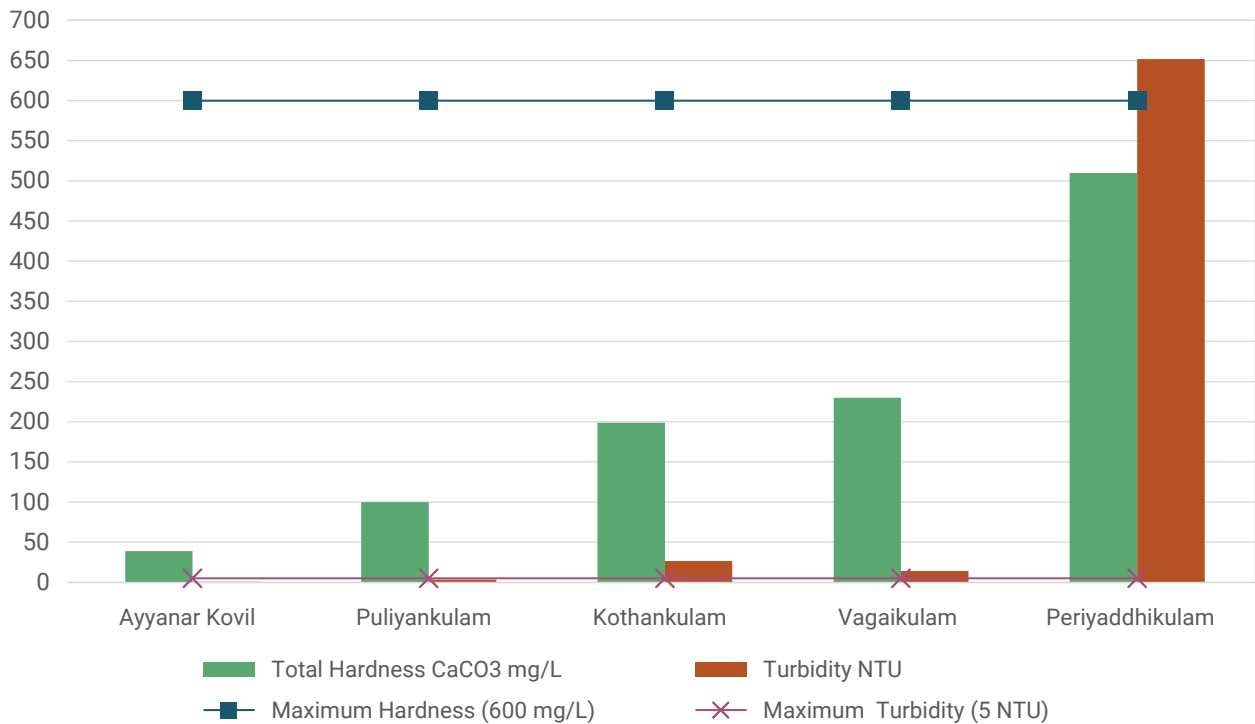
Turbidity

Turbidity is the measure of relative clarity of a liquid. The high value of turbidity is an indicator of water quality and by assessing the other associated parameters like DO, pH, etc., the level of pollution can be explained. Turbidity value of the Periyaddhikulam tank is phenomenally higher (652 NTU), Kothankulam and Vagaikulam were higher than permissible limit with 26.4 and 14.3 NTU respectively (Fig. 12.1); the rest of the sample are within permissible limits specified by BIS for turbidity (1 to 5 NTU).

Total Hardness

Total Hardness is defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate in mg/L. Soap is precipitated chiefly by the presence of calcium and magnesium ions. The effect of increased hardness reflects in the scale formation in pipes, boilers and cooking utensils, and creates adverse effects on domestic use. Total hardness in all the samples is within the BIS limits. Periyaddhikulam records the highest value at 510 mg/L, which is within the permissible limit 600 mg/L (Fig. 12.1).

Fig 12.1: Turbidity and Total Hardness of Surface Water Samples



Dissolved Oxygen

Dissolved oxygen is the ability of the surface and ground water to purify itself through bio-geochemical processes. The solubility of atmospheric oxygen in freshwater ranges from 14.6 ppm at 0°C to 7.0 ppm at 35°C under 1 atm. pressure. However, dissolved oxygen (DO) in water may be affected by the sample temperature, pressure and chemical constituents (Fig. 12.2). Dissolved oxygen (DO) in potable water is a crucial feature since it greatly influences the solubility of metals, which are essential for biological life. DO values in the surface water samples are within the permissible limit specified by BIS, which is 6 to 4 ppm. Periyaddhikulam tank sample recorded a marginally higher value of 6.1 ppm for DO.

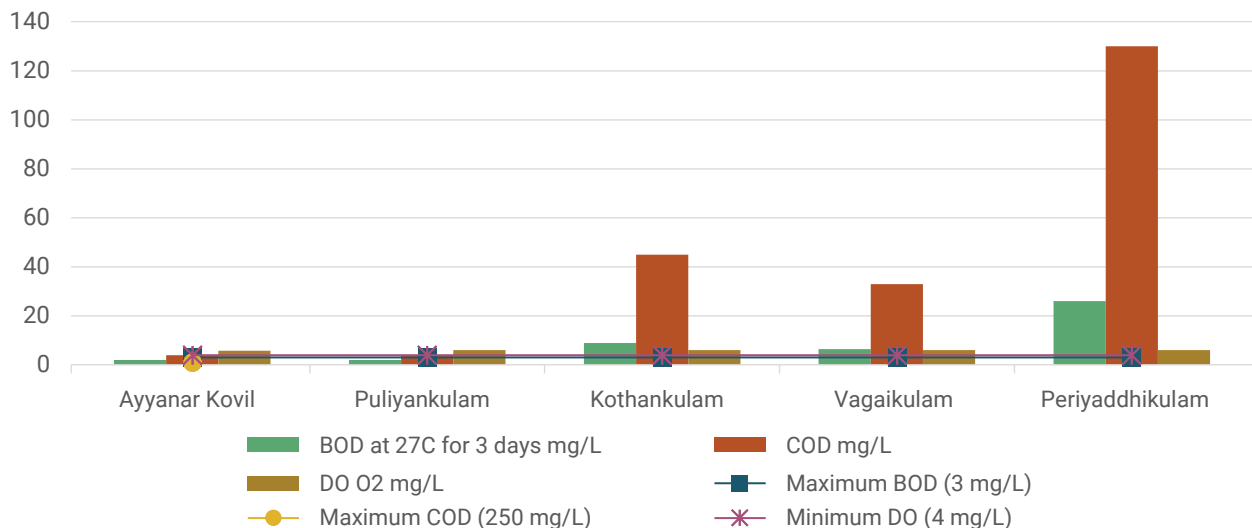
Chemical Oxygen Demand (COD)

The occurrence of inorganic and trace amounts of organic substances in water may be defined by chemical oxygen demand (COD), which is closely related to the organic contaminants in water. All the COD samples in the LPA, including Periyaddhikulam are well within the prescribed limits. Among them, Periyaddhikulam has the highest value of 130 mg/L (Fig. 12.2).

Bio Chemical Oxygen Demand (BOD)

Organic substances like decaying plants, animals and wastes of micro-organisms are the main contributors of biochemical oxygen demand (BOD) in water systems. BOD values in the surface water samples are slightly higher than the BIS limits with 9 and 6.5 mg/L in Kothankulam and Vagaikulam tank. In Ayyanar Kovil and Puliyanakulam the values are within the permissible limit (Fig. 12.2). In Periyaddhikulam, the BOD value is much higher at 26 mg/L. This BOD value can be attributed to the discharge of organic waste and decaying plants and animal excretory wastes into water from the various polluting sources situated nearby, such as domestic and dairy farms. In general, very low DO and high COD values are found mainly in water, which may be due to the mixing of domestic and industrial wastes.

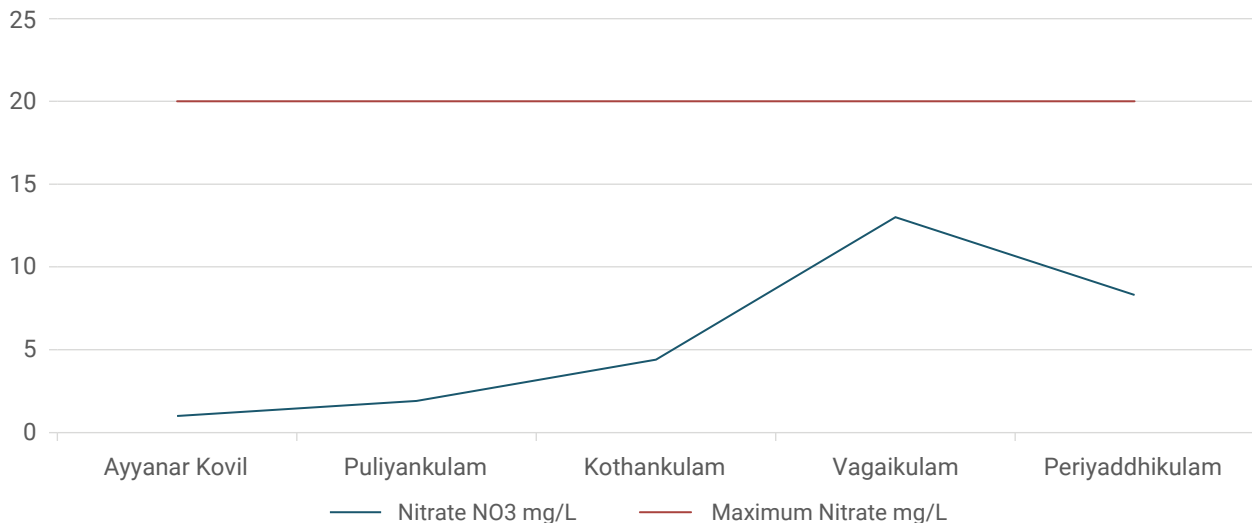
Fig 12.2: BOD, COD and DO values in Surface Water Samples



Nitrate

The BIS acceptable limit for nitrate is 20 mg/L. The surface samples tested show low nitrate values ranging between 1 to 13. Higher values of nitrate are indicators of irrigation patterns in an area, specifically the utilisation of fertilisers and manures, dumping of decayed vegetable and animal feedlots. (Fig. 12.3).

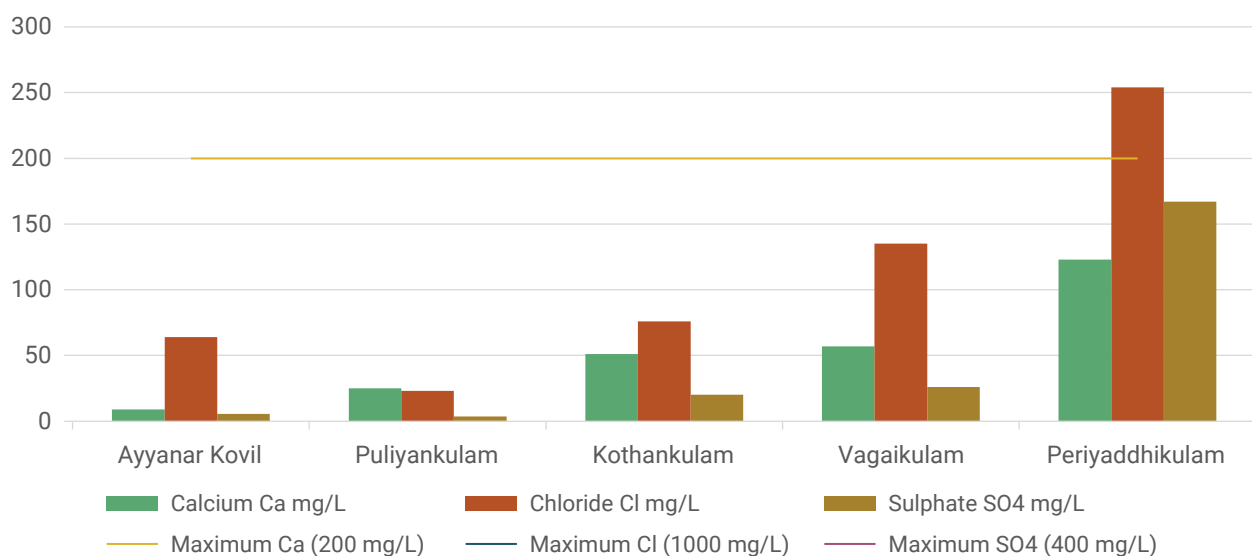
Fig 12.3: Nitrate Values in Surface Water Samples



Calcium

The concentration of calcium in the samples collected varies between 8.9 to 123 mg/l (BIS limit – 75 to 200 mg/L). Calcium may dissolve readily from carbonate rocks and lime stones or can leach from soil. Calcium is an essential nutritional element for human beings and aids in the maintaining the structure of plant cells and soil. The low value of calcium presence in the surface samples may be because of absence of leaching from soils and other sources (Fig. 12.4).

Fig 12.4: Calcium, Chloride & Sulphate Values in Surface Water Samples



Chloride

The chloride values in the surface water samples vary between 23 to 254 mg/L. These are within the permissible BIS limit of 250 mg/L (Fig. 12.4). Periyaddhikulam has a slightly higher value. Although excessive chloride in potable water is not particularly harmful, the criteria set for chloride value is based on its potentially high corrosiveness. Dissolution of salt deposits, discharges of effluents, sewage discharges, irrigation drainage, soil porosity and permeability also play an important role in building up the chloride value. Increase of chlorine level in water is injurious to people suffering from heart and kidney diseases.

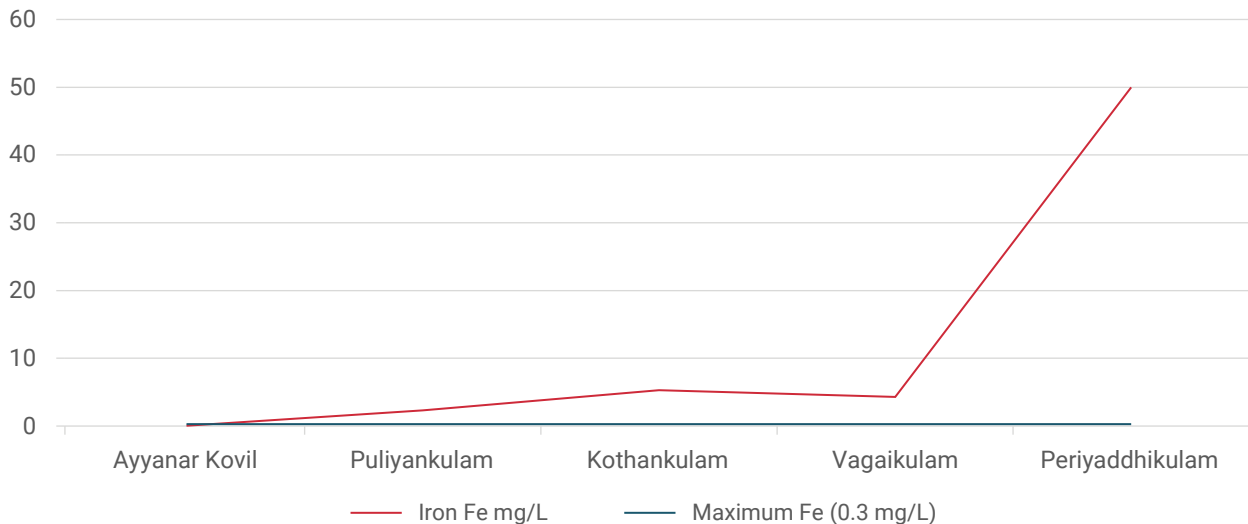
Sulphate

The presence of sulphate in the surface water samples are well within the BIS specified permissible limits of 200 to 400 mg/L. The values in the samples collected range from 3.5 to 167 mg/L (Fig. 12.4).

Iron (Fe)

BIS specified limit for iron is 0.3 mg/L. In the surface water samples of the LPA, iron ranges from 0.05 mg/L (Ayyanar Kovil) to 50 mg/L (Periyaddhikulam). All samples tested, except the Ayyanar Kovil sample, have values higher than the prescribed standards. Excess iron causes discoloration, turbidity, deposits and iron bearing water have an astringent metallic or bitter taste. It also facilitates growth of iron bacteria which causes blocking of pipes, meters, etc (Fig. 12.5).

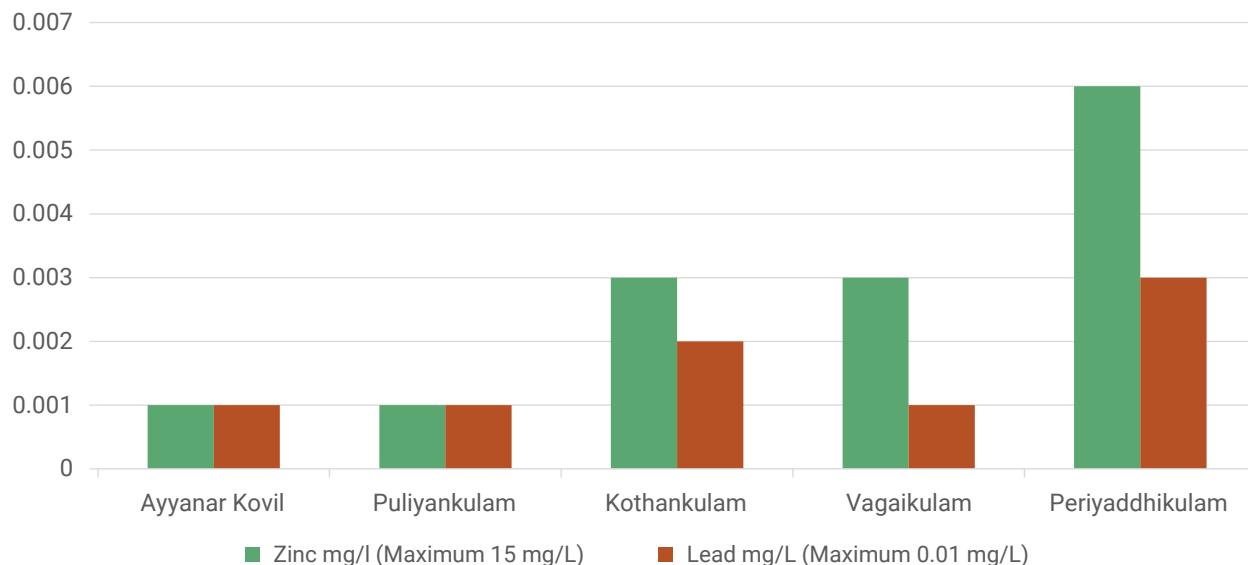
Fig 12.5: Iron (Fe) Values in Surface Water Samples



Zinc and Lead

The presence of heavy metals in the surface water samples are well within the permissible limits specified by the BIS. In Periyaddhikulam tank, zinc value is slightly higher at 0.006 mg/L, in comparison to the other surface water samples (Fig. 12.6).

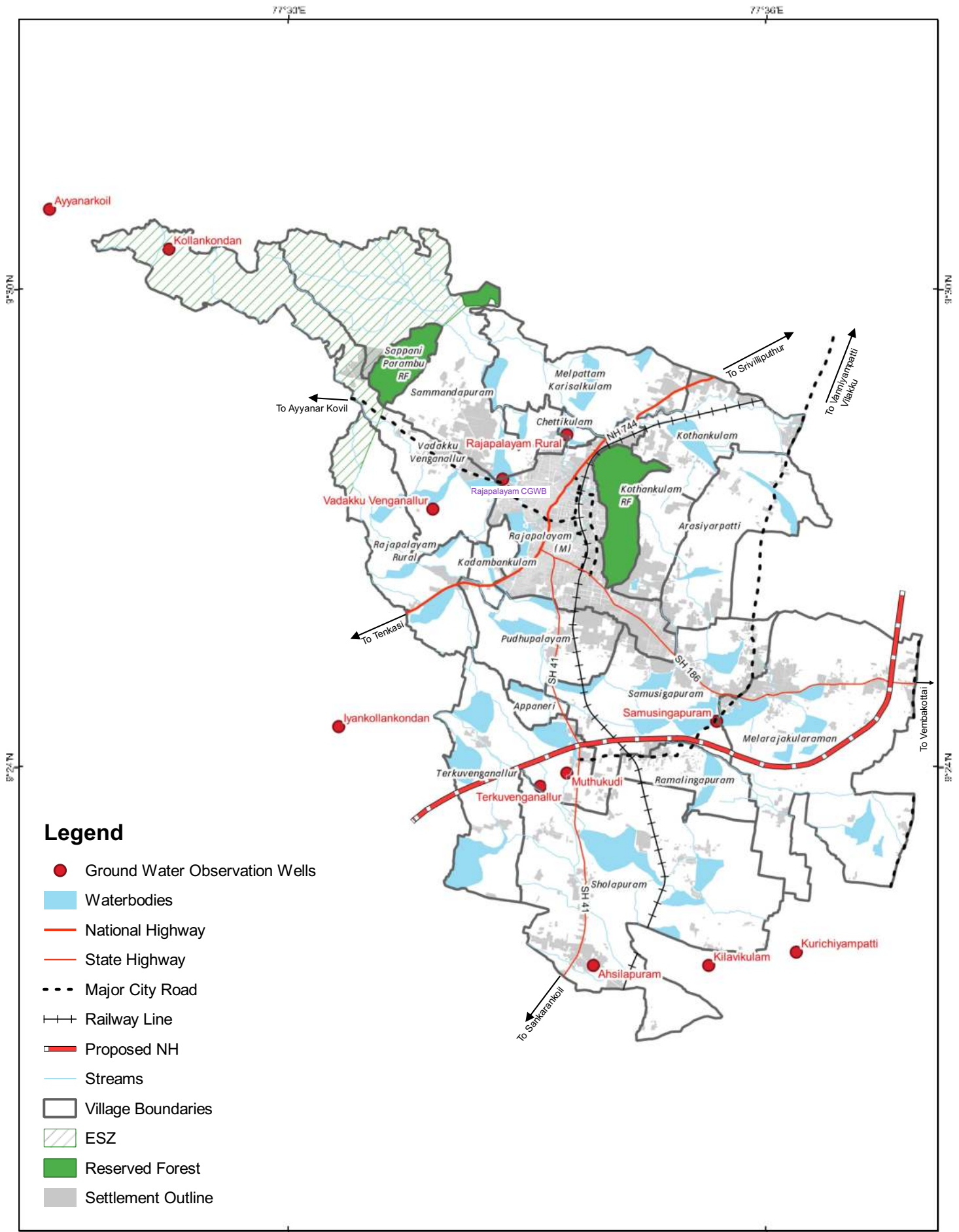
Fig 12.6: Zinc and Lead Values in Surface Water Samples



12.2 Ground Water

12.2.1. Secondary Data Analysis – Water Quality

Water quality data for the study area was purchased from WRO/RDC for the last 30 years and was compared with water quality observed by the Central Ground Water Board (CGWB) values. Tamil Nadu State Government has 11 observation wells in the study area and CGWB has 1 monitoring well within Rajapalayam LPA (**Map 12.6**) The ground water quality data were assessed and analysed to study the ground water quality issues within the study area. It is observed from the water quality data analysis that the majority of the elements are within the limits prescribed by the Bureau of Indian Standards (BIS) for domestic use. The BIS specifies the acceptable or desirable limits and the permissible limits in the absence of alternate source.



Legend

- Ground Water Observation Wells
- Waterbodies
- National Highway
- State Highway
- - - Major City Road
- ⊢⊢⊢ Railway Line
- ▬ Proposed NH
- Streams
- ▭ Village Boundaries
- ▨ ESZ
- Reserved Forest
- Settlement Outline

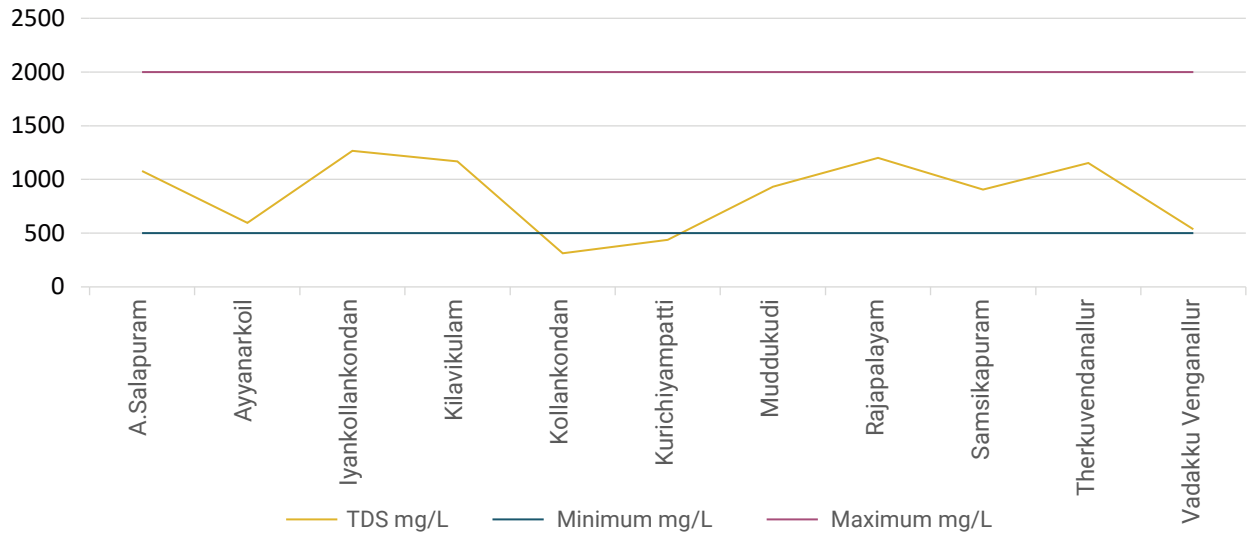
Ground Water Observation Wells in Rajapalayam LPA	Notes	Data Credits Field Survey, GeTS Consultants	
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar	 <small>CRS : WGS 1984</small>
Prepared By Tapasya Design Studio, Auroville			

Map 12.6: Location of Observation Wells in LPA

Total Dissolved Solids (TDS)

In most of the villages, the Total Dissolved Solids values collected over a period of 30 years (Fig. 12.7) were found beyond the acceptable limit specified by the BIS standards (500 to 2,000 mg/L), but within the permissible limits. Iyankollankondan (1,267.71 mg/L) has the highest TDS, followed by Rajapalayam (1,200.63 mg/L) and Kilavikulam (1,169.67 mg/L).

Fig 12.7: TDS Average for 30 Years

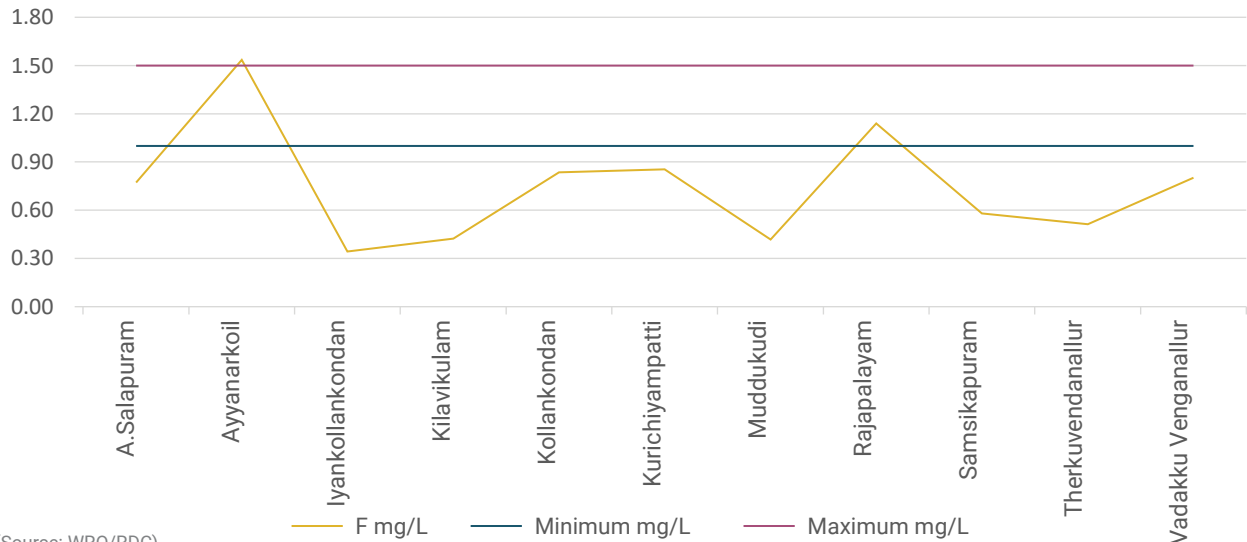


(Source: WRO/RDC)

Fluoride

The BIS specified acceptable limit of Fluoride is 1.0 mg/L and permissible limit is 1.5 mg/L. In the study area the highest average value is recorded at Ayyanar Koil (1.54 mg/L) which is beyond the permissible value. This is followed by Rajapalayam (1.14 mg/L), but the records here while higher than the acceptable limit are within the permissible limit. In Ayyanar Kovil, as per AGC/WRO data the maximum recorded value for fluoride is 3 mg/L in the year 2007, and the minimum recorded value is 0.16 mg/L in the year 2004 (Fig. 12. 8).

Fig 12.8: Fluoride Average for 30 Years

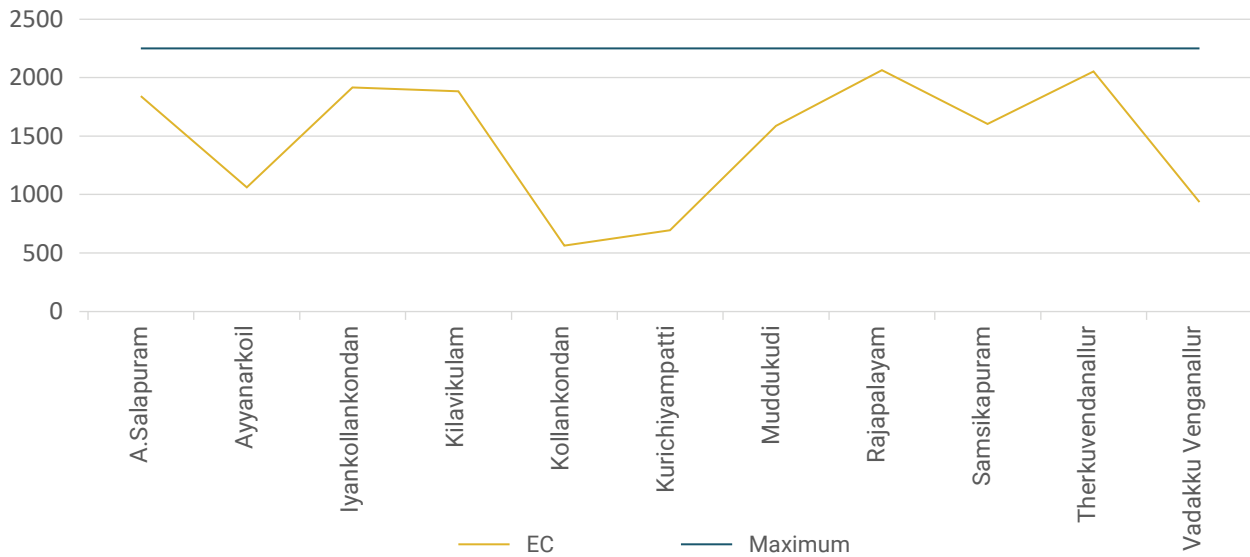


(Source: WRO/RDC)

Electrical Conductivity (EC)

Electrical Conductivity values as per BIS standards, if between 750 to 2,250 $\mu\text{S}/\text{cm}$ at 25°C, is inferred as moderately fresh water. If the EC values falls between 2,250 – >3,000 $\mu\text{S}/\text{cm}$ at 25°C, then it is a sign of higher concentration of mineralization. In the study area, all the villages fall within the permissible limit of 2,250 $\mu\text{S}/\text{cm}$ (Fig. 12.9).

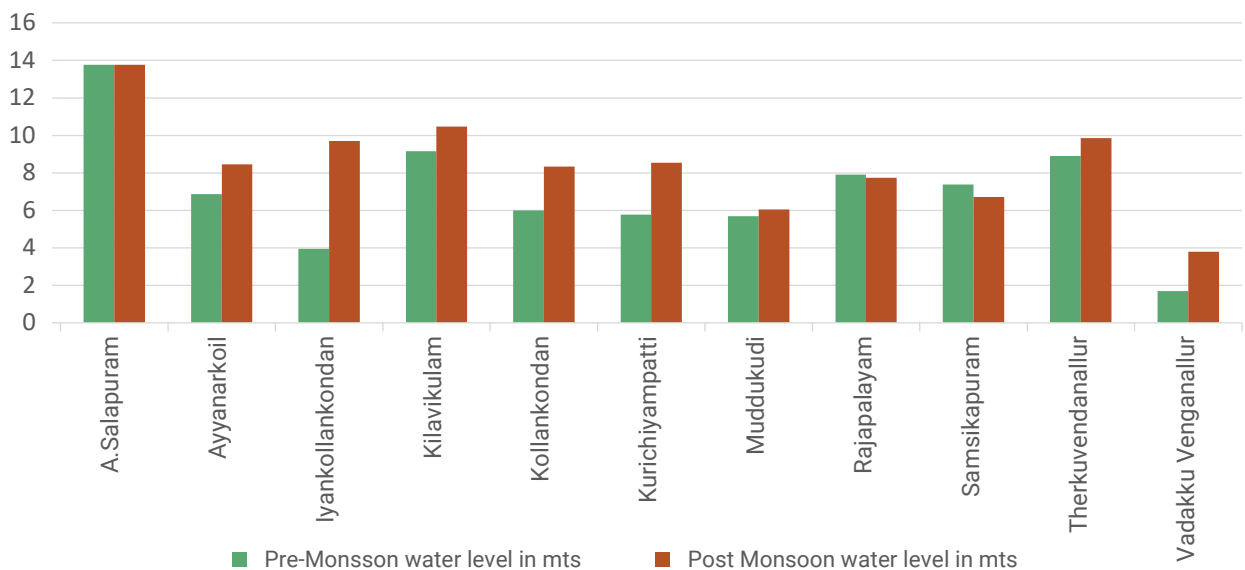
Fig 12.9: Electrical Conductivity $\mu\text{S}/\text{cm}$ at 25°C



12.2.2.Secondary Data Analysis – Water Table

Water levels are studied and recorded for every month by TWAD/ SECR Board (Map 12.6); CGWB maintains water levels records for every four months in a year from their monitoring wells and piezometers.

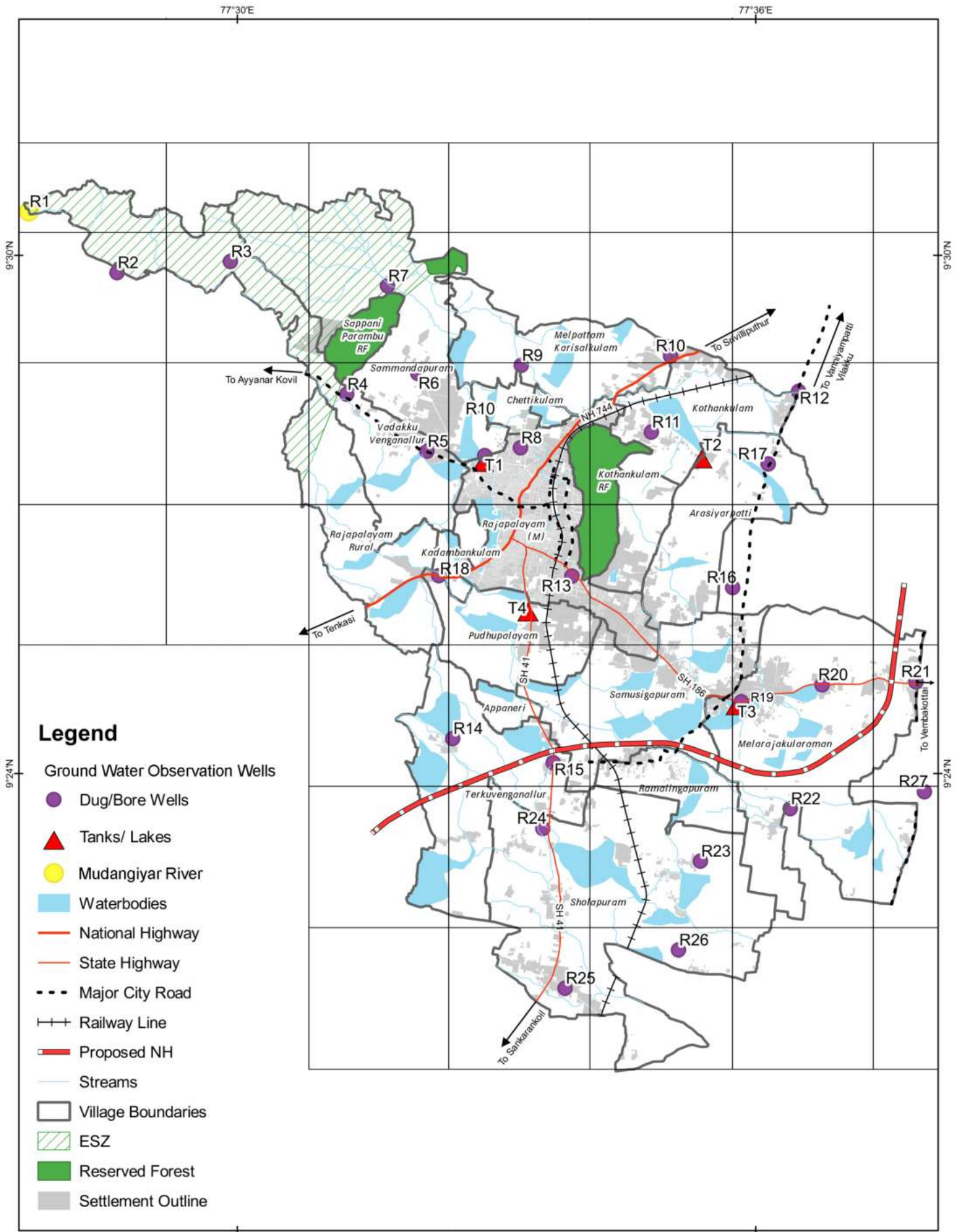
Fig 12.10 : Water Level Average for Post and Pre-monsoon in the Last 30 Years



It is observed from the last 30 years average water level in the study area (**Fig. 12.10**) that water level is higher during the post-monsoon period rather than pre-monsoon. Water level is much higher than the average in Ahsilapuram village with an average of 13.77 m, whereas Vadakku Venganallur has the minimum water level of 1.70 m during pre-monsoon. During post-monsoon period, Ahsilapuram recorded maximum water level of 13.76 m followed by Kilavikulam at 10.48 m and Vadakku Venganallur at 3.80 m.

12.2.3. Primary Data Collection & Analysis

Ground water samples were taken in 27 locations (**Map 12.7**). Samples were collected from dug wells and borewells. The depth of the water table and water level were measured during the survey, along with GPS tags of the locations of the sample. In the Rajapalayam LPA of about 150 sq.km, the study area was overlaid with a 3x3 km grid (31 grids including buffer), and for each grid a water sample was collected (**Map 12.7**). The general observation from analysed values along with spatial consideration, indicates that the southern part of the LPA is impacted by pollution. The values of various parameters are higher than the BIS prescribed limits indicating the presence of pollutants through various sources.



Legend

- Ground Water Observation Wells
- Dug/Bore Wells
- ▲ Tanks/ Lakes
- Mudangiyar River
- Waterbodies
- National Highway
- State Highway
- - - Major City Road
- ++ Railway Line
- ▬ Proposed NH
- Streams
- ▭ Village Boundaries
- ▨ ESZ
- Reserved Forest
- Settlement Outline

<p>Ground Water Sample Locations in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits Field Survey, GeTS Consultants</p>	 <p>CRS : WGS 1984</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	

Map 12.7: Ground Water Sample Locations in the LPA

TDS in Ground Water Samples

The total dissolved solids in water samples are attributed to the presence of sodium, potassium, calcium, magnesium, manganese, carbonates, bicarbonates, chlorides, phosphate, organic matter, and other particles. **Map 12.8**, representing the spatial distribution of Total Dissolved Solids (TDS) mg/l for the study area, shows higher concentration of TDS (BIS standard 500 to 2000 mg/L) beyond the permissible limit in Sholapuram, Ramalingapuram and Melarajakularaman villages within the LPA.

EC in Ground Water Samples

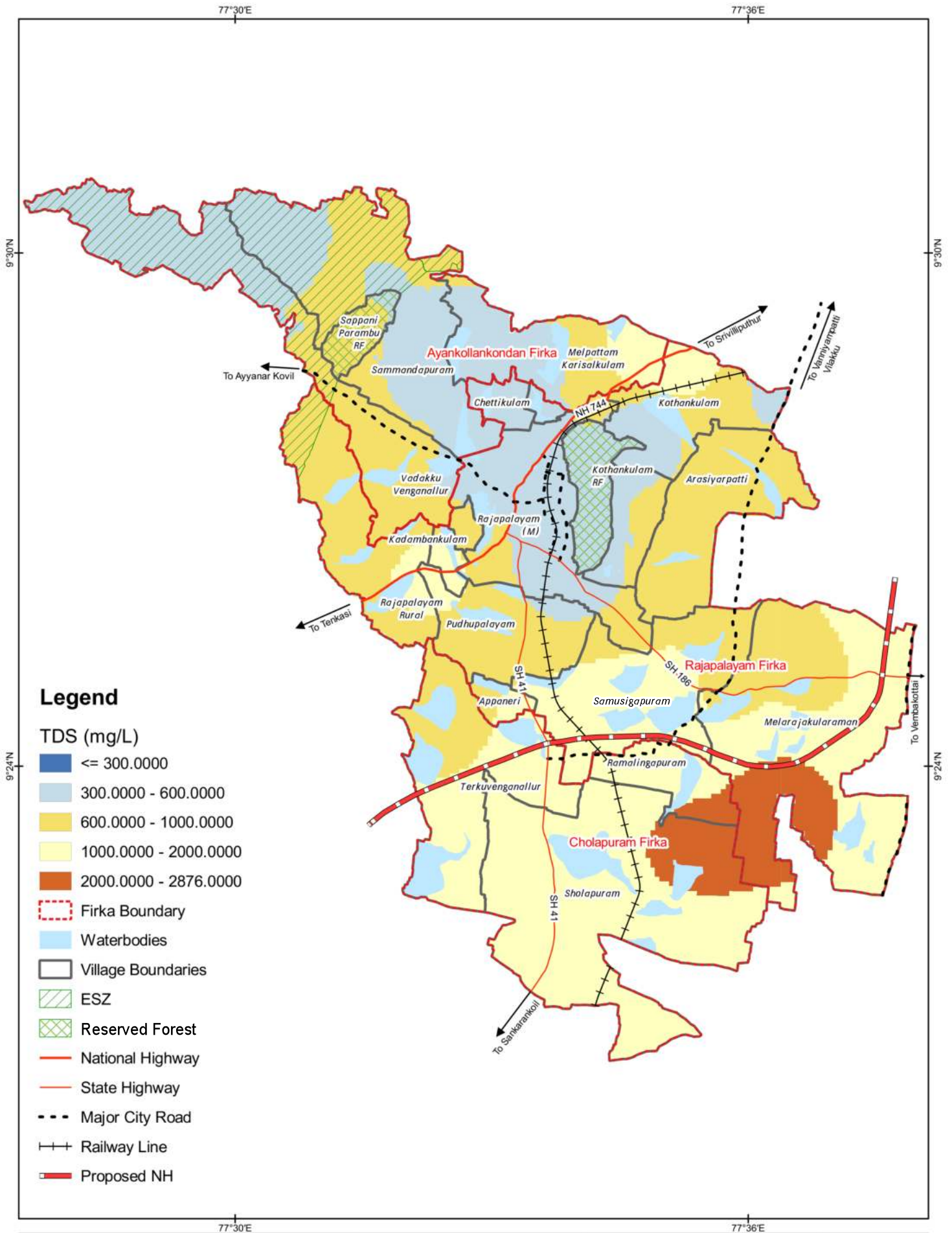
Electrical conductance is a good indication of total dissolved solids, which is a measure of salinity and affects the taste of the potable water. Factors like ionic mobility and ionic valences also influence conductivity. The Electrical conductivity map of the LPA (**Map 12.9**) shows higher values than the permissible limit specified by the BIS ($< 2250 \mu\text{S}/\text{cm}$) in the southern part of the LPA, consisting of Sholapuram, Ramalingapuram and Melarajakularaman revenue villages.

Nitrate in Ground Water samples

The spatial representation of nitrate concentration in the LPA (**Map 12.10**) establishes the presence of higher values than the permissible limit (BIS standard $< 45 \text{ mg}/\text{L}$) in the southern part of the LPA.

Fluoride in Ground Water samples

The presence of higher concentrations of fluoride and nitrate in the water sample indicates the presence of contamination with geogenic origin. The spatial representation of fluoride concentration in the LPA (**Map 12.11**) indicates that the values are within the permissible limit (BIS standard 1.0 to 1.5 mg/L); high values are found in some areas in the south-western part of the LPA.



Legend

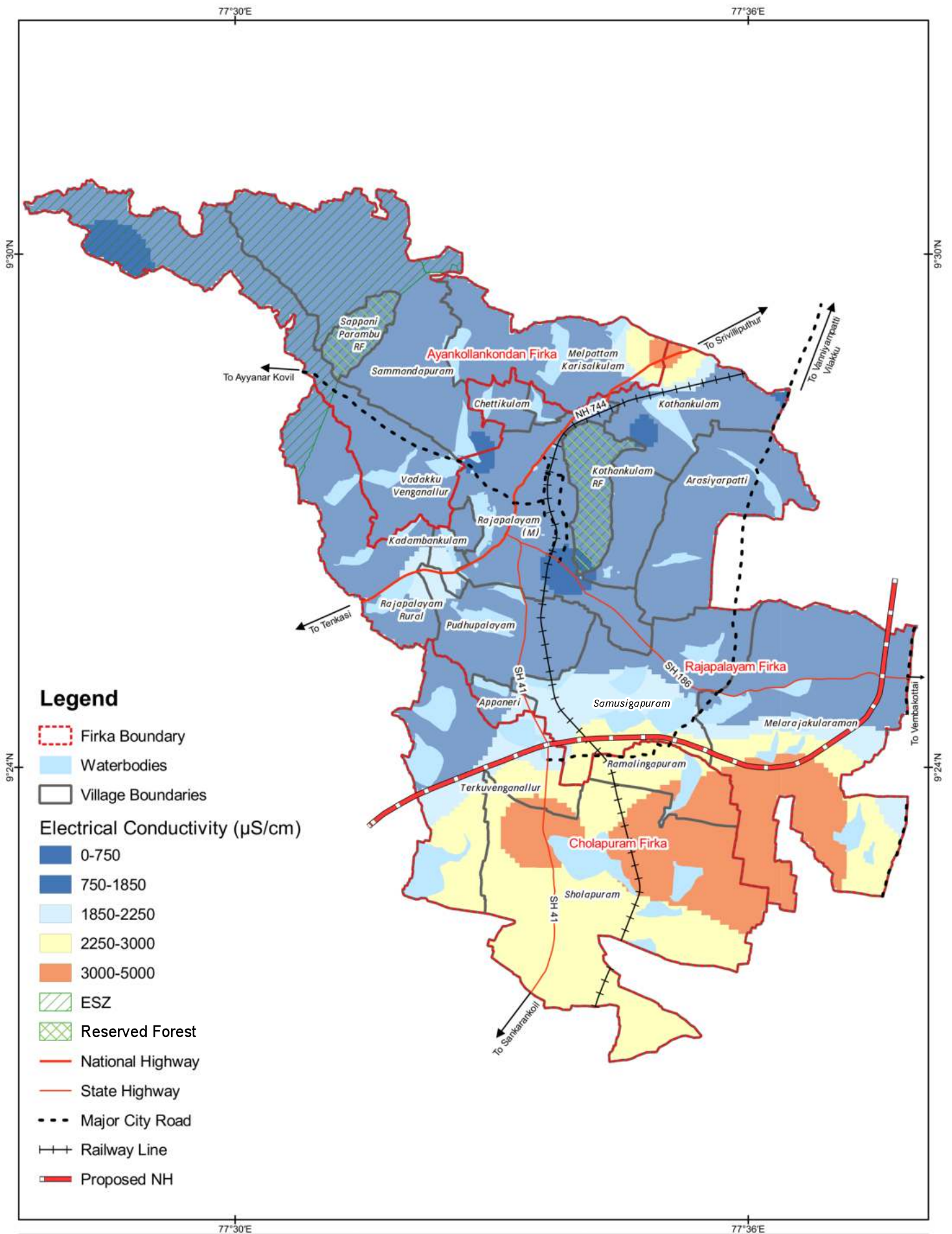
TDS (mg/L)

- ≤ 300.0000
- 300.0000 - 600.0000
- 600.0000 - 1000.0000
- 1000.0000 - 2000.0000
- 2000.0000 - 2876.0000
- Firka Boundary
- Waterbodies
- Village Boundaries
- ESZ
- Reserved Forest
- National Highway
- State Highway
- Major City Road
- ++ Railway Line
- Proposed NH

<p>TDS Levels in Ground Water in Rajapalayam LPA</p>	<p>Notes</p> <p>BIS Standards for TDS = 500-2000 mg/L</p>	<p>Data Credits</p> <p>GeTS Consultants</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<p>Client</p> <p>DTCP Virudhunagar</p>	<p>Prepared By</p> <p>Tapasya Design Studio, Auroville</p>

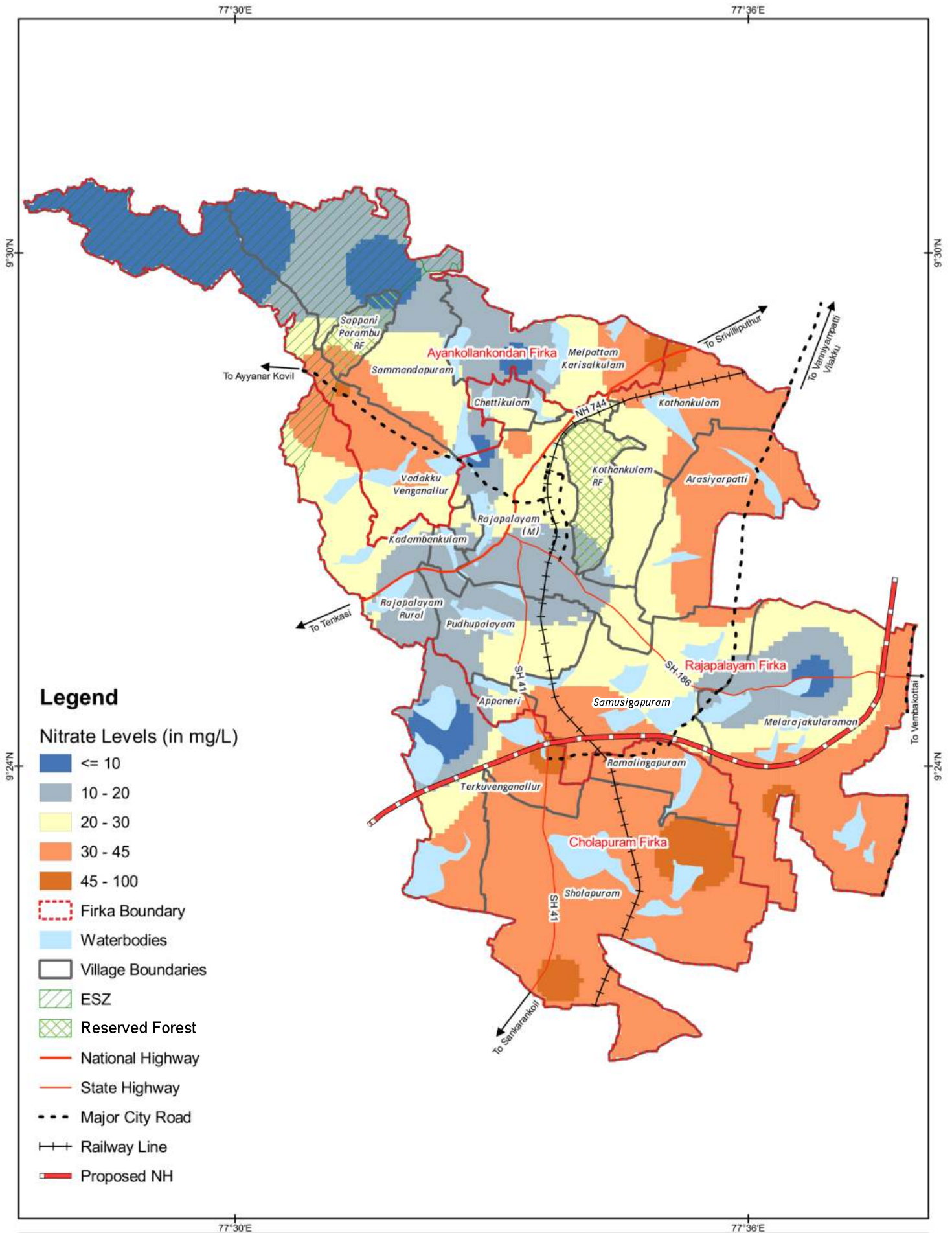
CRS : WGS 1984

Map 12.8: TDS Map of the LPA



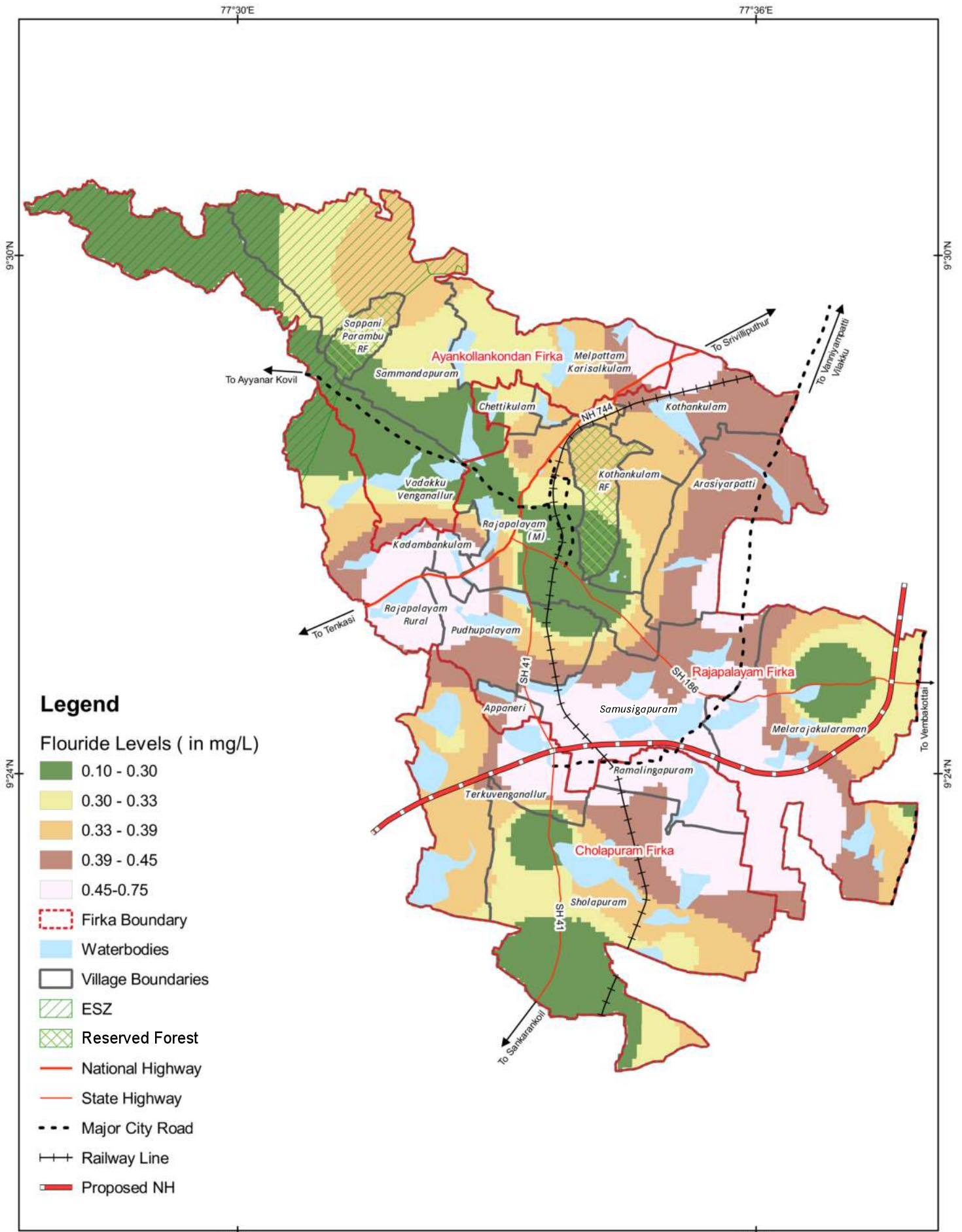
<p>Electrical Conductivity in Ground Water in Rajapalayam LPA</p>	<p>Notes</p> <p>BIS Standards for EC = 2500 $\mu\text{S}/\text{cm}$</p>	<p>Data Credits</p> <p>GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client</p> <p>DTCP Virudhunagar</p> <p>Prepared By</p> <p>Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 12.9: Electrical Conductivity Map of the LPA



<p>Nitrate Levels in Ground Water in Rajapalayam LPA</p>	<p>Notes</p> <p>BIS Standards for NO₃ = 45 mg/L</p>	<p>Data Credits</p> <p>GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client</p> <p>DTCP Virudhunagar</p> <p>Prepared By</p> <p>Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 12.10: Nitrate Concentration Map of the LPA



<p>Flouride Levels in Ground Water in Rajapalayam LPA</p>	<p>Notes</p> <p>BIS Standards for Flouride = 1.0-1.5 mg/L</p>	<p>Data Credits</p> <p>GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client</p> <p>DTCP Virudhunagar</p> <p>Prepared By</p> <p>Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

Map 12.11: Fluoride Concentration Map of the LPA

12.3

Current Ground Water Resource Estimation

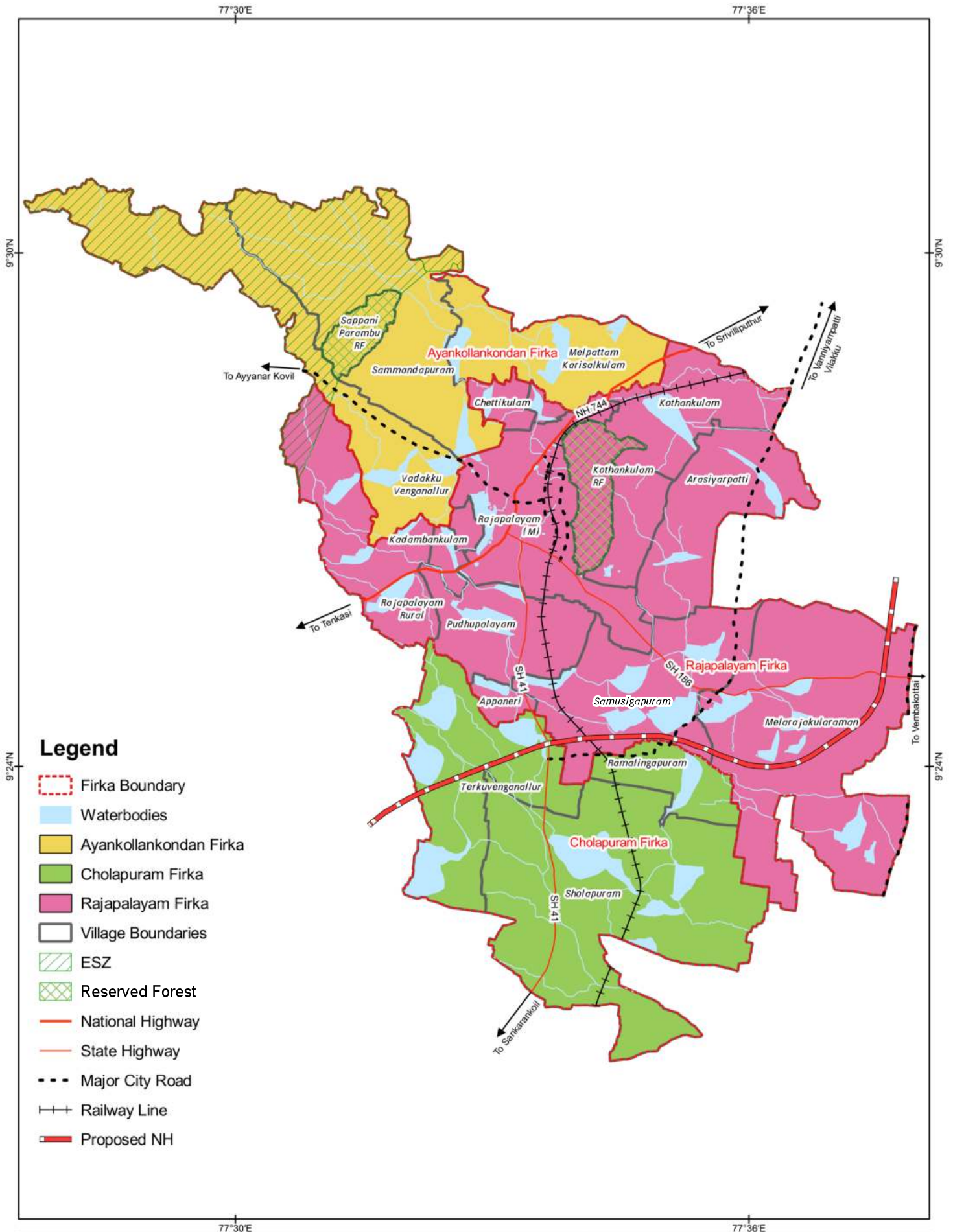
The LPA consists of three firkas namely, Cholapuram, Iyankollankondan and Rajapalayam (**Map 12.12**). It is estimated based on the CGWB data and data collected from the field that the annual replenishable groundwater resource is around 5,688.84 ham and deducting the natural discharge of 568.90 ham the during monsoon season (**Table 12.5**) the net groundwater availability is 5,119.94 ham. Based on the stage of ground water development, the firkas have been categorised as safe (<70%), semi-critical (70-90%), critical (90-100%) and over-exploited (100<) in any area, as per the GEC norms.

Table 12.5: Ground Water Resource Estimation

S.No.	Firka	Net Groundwater Availability (ham)	Irrigation Draft (ham)	Domestic and Industry Draft (ham)	Total Draft (ham)	Stage of Groundwater Development (%)
1	Cholapuram	1,273.73	1,904.40	37.13	1,941.53	152.43
2	Iyankollankondan	1,870.07	1,153.80	188.32	1,342.12	71.77
3	Rajapalayam	1,976.14	1,368.90	276.37	1,645.27	83.26
Total		5,119.94	4,427.10	501.83	4,928.92	96.27

It is observed that villages falling under Cholapuram firka are over drafting from the existing available water resources and hence it falls under over exploited zone based on the Groundwater resource estimation (GEC 2015) norms.

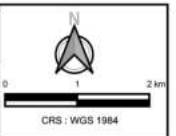
The Dynamic Groundwater Resources Assessment of India assessed the ground water resources periodically based on the firkas. Among the 3 firkas in the LPA viz, Iyankollankondan, Rajapalayam and Cholapuram (**Map 12.13**), Rajapalayam was categorised as “over-exploited” in the year 2011, “semi-critical” in the year 2013 and once again as “over-exploited” in the year 2017. Iyankollankondan Firka was categorised as “semi-critical” in 2013 and 2017. Cholapuram firka was categorised as “over-exploited” both in 2013 to 2017 (**Fig. 12.11**). In the current assessment the Cholapuram firka, in the LPA, has 152% overdraft above the net groundwater available and is classified under the “over-exploited category”. Rajapalayam firka has improved from “over-exploited” to “semi-critical”. Iyankollankondan also falls marginally under the “semi-critical” category, based on the stage of groundwater development being listed at 71%.



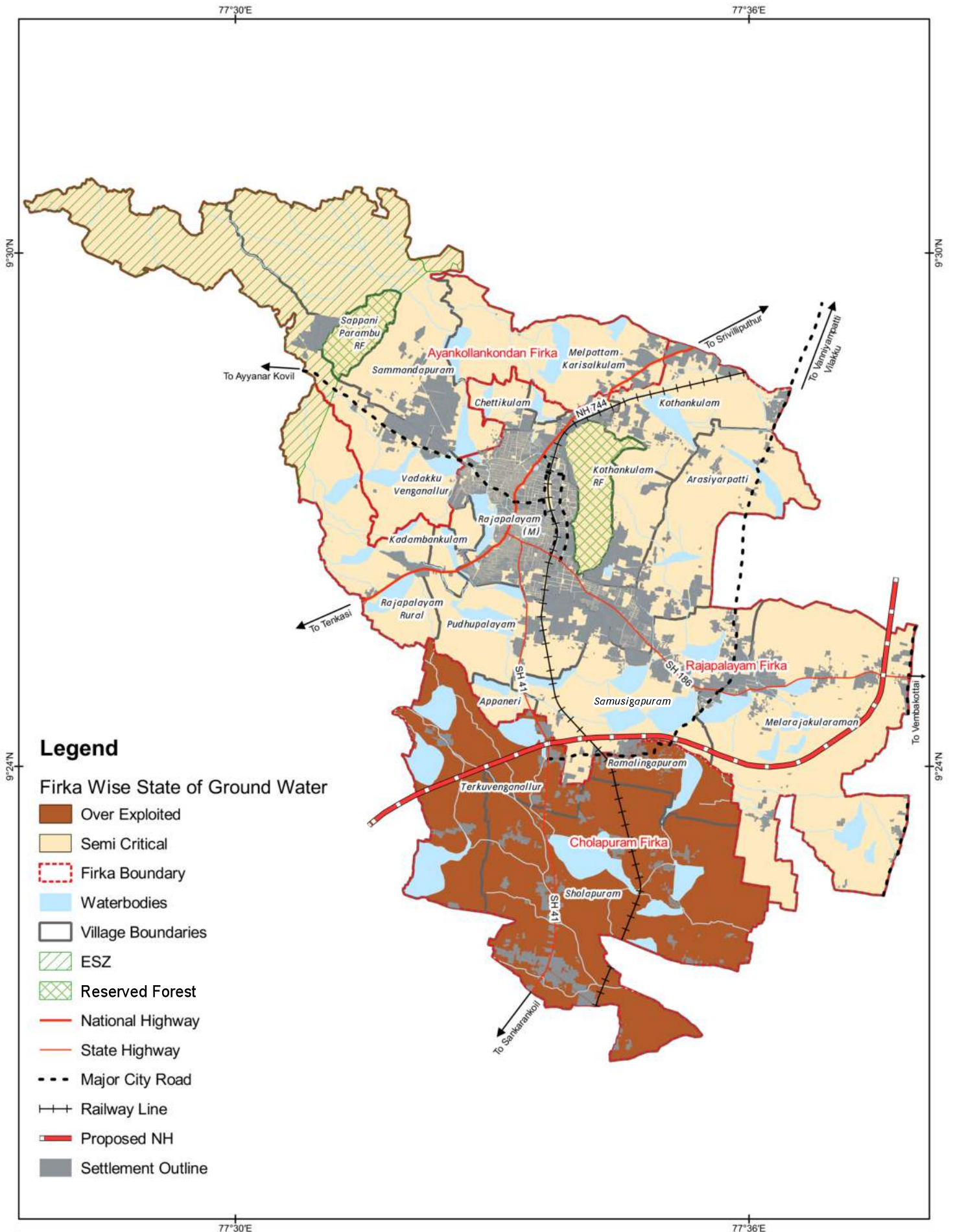
Legend

- Firka Boundary
- Waterbodies
- Ayankollankondan Firka
- Cholapuram Firka
- Rajapalayam Firka
- Village Boundaries
- ESZ
- Reserved Forest
- National Highway
- State Highway
- Major City Road
- Railway Line
- Proposed NH

<p>Firkas in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits GeTS Consultants</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>



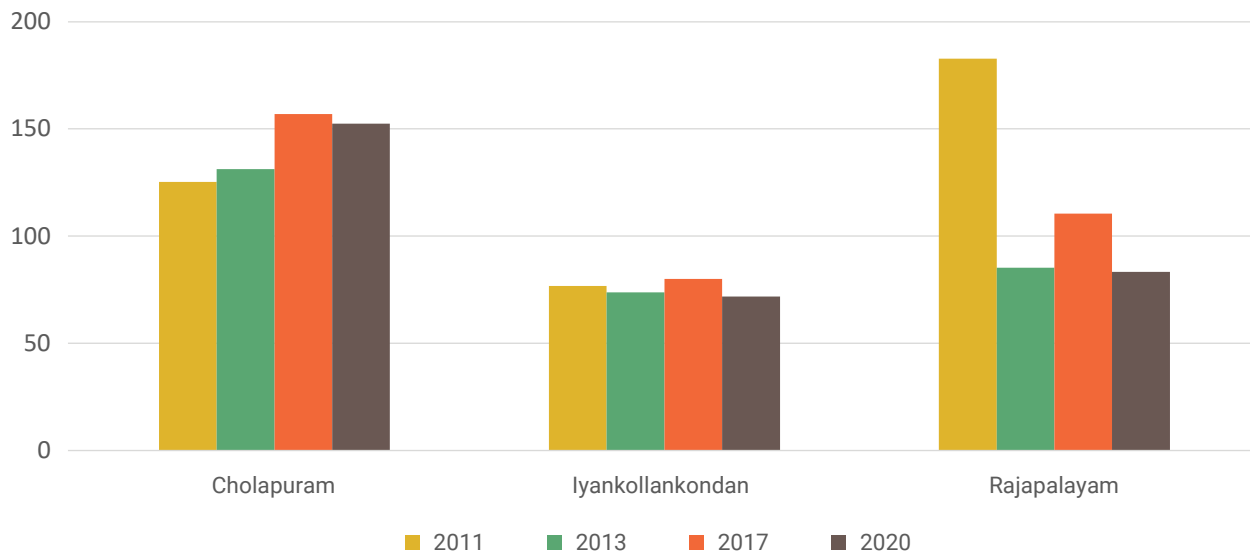
Map 12.12: **Firka Map of the LPA**



<p>Spatial Representation of Stage of Ground Water Development in Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits GeTS Consultants</p>	
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>		<p>Client DTCP Virudhunagar</p> <p>Prepared By Tapasya Design Studio, Auroville</p>	<p>CRS : WGS 1984</p>

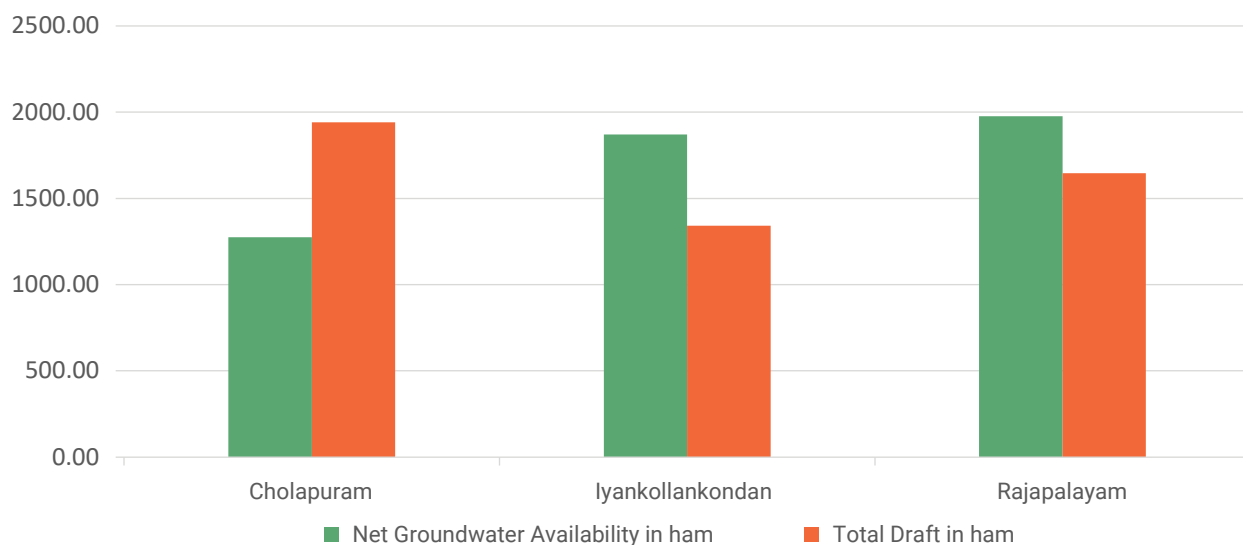
Map 12.13: Spatial Representation of Stage of Groundwater Development Category as per GEC Norms

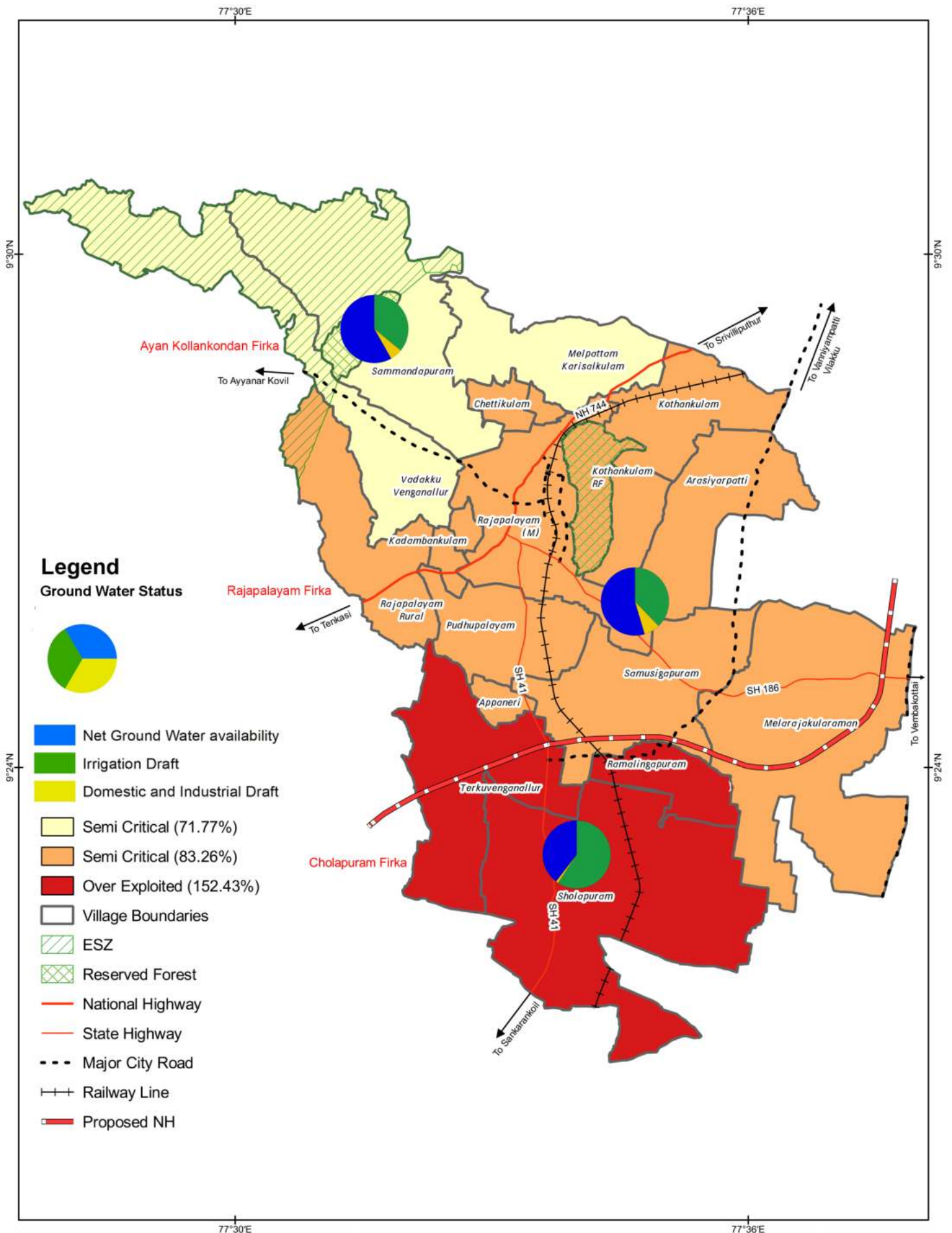
Fig 12.11: Periodical Changes in the Stage of GW Development in Rajapalayam LPA



Based on the ground water resource estimation the highest stage of ground water development is occurring in Cholapuram firka with 152% (Fig. 12.12). The net ground water availability is 1,273.73 ham and the total draft is 1,941.53 ham, which indicates that there is an overdraft of 667.8 ham, over and above the net groundwater availability (Map 12.14). Rajapalayam firka and Iyankollankodan firka fall under the semi-critical category. In considering the entire LPA, the stage of ground water development is at 96% and hence comes under critical category.

Fig 12.12: Firka-wise Stage of Groundwater Development in Rajapalayam LPA

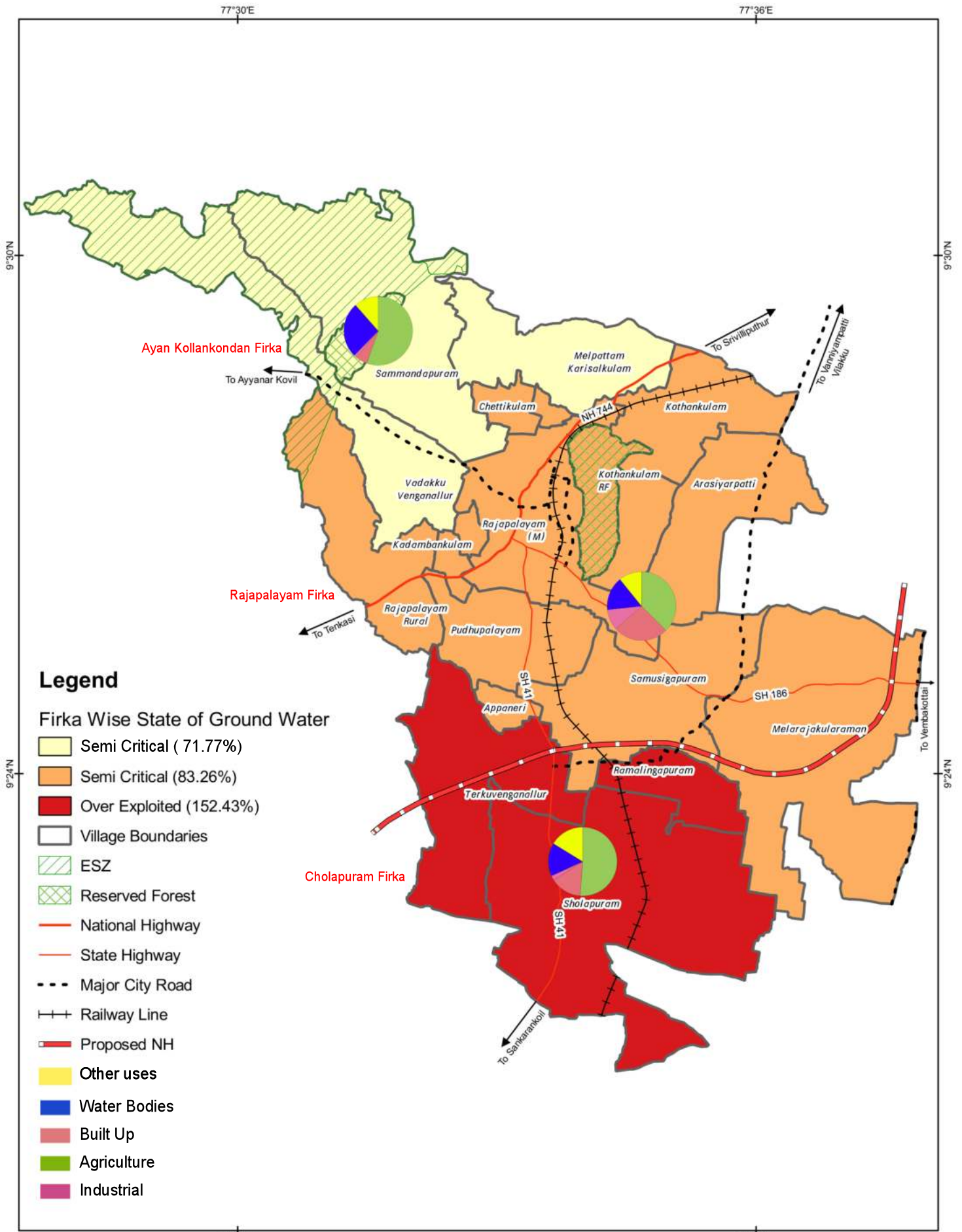




Spatial Representation of Current Groundwater Status in Firkas and Stage of Ground Water Development	Notes	Data Credits Primary Survey, GeTS Consultants	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 12.14: Spatial Representation of Current Groundwater Status in Firkas and Stage of Ground Water Development

The estimated net total ground water resource is 5,119.94 ham and the ground water draft for irrigation is 4,427.10 ham, which is almost 86% of the net available ground water (**Table 12.5**). In particular, Cholapuram firka drafts almost 150% over the net available ground water in its available resource. The domestic and industrial draft in Cholapuram firka is 37.13 ham, which indicates that 98% of the ground water is used only for agricultural purpose. The entire LPA falls under Critical category (90 to 100%) based on the stage of ground water development, which is 96%. Agricultural activities in the villages of Iyankollankondam are the highest at 67% but the availability of water resource is also higher in this area. However, while in Cholapuram the percentage of agriculture is less, the availability of water resource is also minimal (**Map 12.15**). A detailed study is recommended on the irrigation pattern and usage of water resources in the villages of Cholapuram firka.



Spatial Representation of Major Land Use in Firka	Notes	Data Credits Primary Survey, GeTS Consultants	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 12.15: Spatial Representation of Major Land Use in Firkas

12.4

Disaster Management

A climate risk assessment that was conducted as part of the TNUFIP for the project areas classifies Rajapalayam under the Medium overall risk category, based on its risk for heat, rainfall, drought, earthquake, sea level rise, flooding and cyclones (Table 12.6).

Table 12.6: Climate/ Disaster Risk Levels for Rajapalayam

S.No.	Climate Risk	Risk Level	Remarks
1	Change in Temperature (Increase)	Medium	-
2	Change in Precipitation (Decrease)	Medium to High	-
3	Drought	Medium to High	Can lead to other hazards like heat waves and forest fires.
4	Cyclones (Storm)	Low	No incidence of Rajapalayam being affected by Cyclones.
5	Earthquake	Low	Rajapalayam falls under the Low Damage Risk Zone or Seismic Zone II. IS code assigns a zone factor of 0.10 for Zone 2.
6	Sea Level Rise	Low	
7	Flooding risk (from extreme rainfall events)	Low	

12.4.1. HAM Radio Communication during Disaster

Rajapalayam International Radio Communicators Club (RIRCOM Club) was inaugurated on 21st January 1993 by Superintendent of Police, Virudhunagar District. Amateur Radio (HAM RADIO) is a popular scientific hobby in which an individual operates his or her own station. HAM denotes Hertz Armstrong and Marconi or also Help All Mankind. The RIRCOM Club has a membership of around 80 and has 10 active members. It is the only one of its kind in Virudhunagar district and the biggest in the southern districts of Tamil Nadu.

Government of India, Ministry of Telecommunication & IT's WPC Wing issued Amateur wireless station license and callsign as VU2IRD to the club. When all regular communications facilities fail, Ham Radio is the only alternative communication service and recognized worldwide. HAMS are used as a second line of wireless communication during disaster and other natural calamities. RIRCOM has provided service in managing crowd and also during flood relief efforts at Pilavakkal dam in Virudhunagar district. There is a repeater tower setup on top of Sanjeevi Malai by the district administration in the 1990's, but presently this repeater requires maintenance. The repeater can effectively provide communication covering a radius of 200 km.

12.5

Biodiversity

The LPA consists of distinct ecological zones, with the most important areas being the Eco-Sensitive Zone on the western side adjoining the Srivilliputhur Wildlife Sanctuary, and Sanjeevi Malai RF abruptly bordering the densely developed urban area on the east. Both of these areas will be very important to protect during the future development of the town as they provide habitat for a wide number of species. Additionally, the presence of a large number of water bodies within the area provides habitat opportunities for a wide number of water birds.

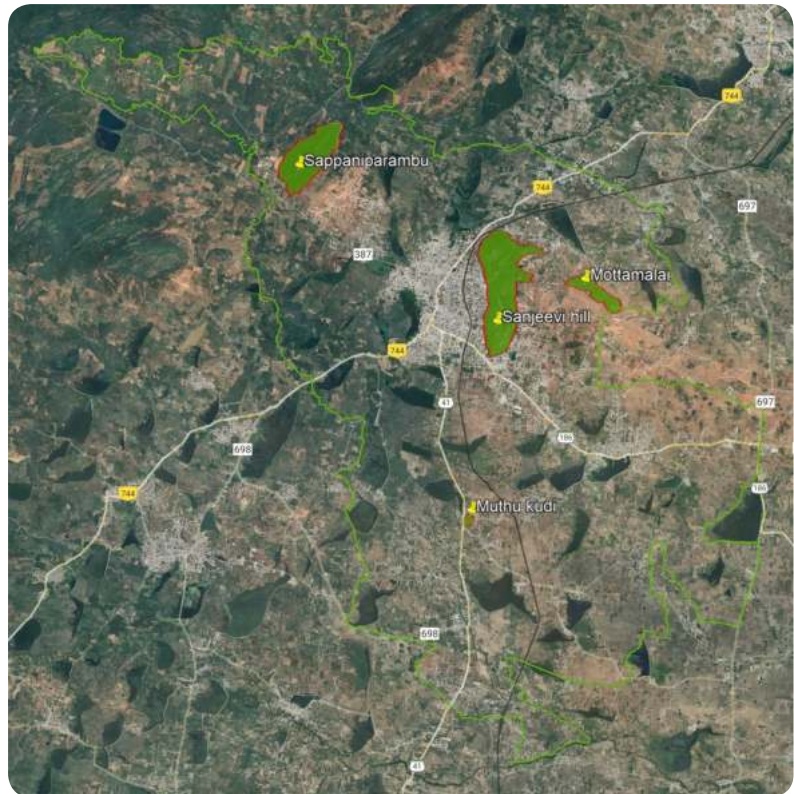
Currently the eco-sensitive zone mainly consists of mango and coconut orchards, and as such allows for the presence of forest animals such as the bear, leopard and deer, and to move through relatively freely as their needs require. This is apparent from these animals' presence in Sappani Parambu RF on the eastern side of the eco-sensitive zone. It is important that in any future development plans that the atmosphere of the eco-sensitive zone is maintained to ensure that animals have the ability to migrate as freely as they do at the present time.

Sanjeevi Malai, although at present in a state of degradation, still has the potential to regenerate and function as both an amenity space and green lung for the growing town, an important carbon sink with respect to the challenges of climate change, and also a haven for important biodiversity both with respect to flora and fauna.

12.5.1. Forests

Within the LPA there are 4 areas of natural vegetation (**Fig. 12.13**), of which two are Reserved Forests – Sappani Parambu (1.57 sq.km) and Sanjeevi Malai (Kothankulam RF, 2.79 sq.km). The other two are panchayat forests – Sundakka Perumal Malai/ Vada Malai and Muthukudi/ Snail Malai. Sappani Parambu has a decent population of spotted deer and has reported sightings of leopards. The eastern slopes of the Western Ghats lie at about 10-12 km west of Rajapalayam municipal area; Sanjeevi Malai is located in close proximity to the municipal limits.

Fig 12.13: Google Earth Map showing Areas of Natural Vegetation in LPA



12.5.1.1. SANJEEVI MALAI (KOTHANKULAM RF)

Sanjeevi Malai, also known as Kothankulam RF, is a unique forest adjacent to the municipal zone of the LPA. It covers 278 ha and has a maximum altitude of 380 m, rising from 168 m at ground level. The hill holds a special place in the hearts and memories of the residents of Rajapalayam. The naming of the hill stretches to the time of the Ramayana, where legend holds it that the hill is a fallen fragment of the mountain Hanuman was carrying from the Himalayas to Sri Lanka, with the herbs that would save Rama's and Lakshmana's lives.

It has enormous potential in the future development of the town with respect to biodiversity, carbon sequestration, as well as educational, amenity and recreational uses. Its proximity to the Western Ghats, means that it is still has the potential to be home to a wide range of birds and butterflies, even if it is unlikely that the larger animal population will manage to return given the ever-increasing urban expansion.

During the botanical surveys 197 species were identified (**Table 12.7**), of which 46 were tree species (**Table 12.8**). Unfortunately, 80% of these tree species are rare or occasional meaning that less than 10 individuals were spotted, and in some cases, there was only one representative of the species. On the flip side of this, 9 species were either common or abundant, in other words dominating the tree cover of the areas. Some of these

are obviously planted such as the *Tectona grandis* (Teak) or *Acacia planifrons*, which dominate the western slopes of the hill. The only large tree specimens on the hill are from the genus of *Ficus* which are found in outcropping rocks, and which have no commercial use for timber or fuel wood. The other trees are all of small stature and indicative of secondary growth forest. There is little doubt that the original forest type of the hill is long since lost, firstly for timber logging many centuries before and later for fuel wood. There are also large areas that have been colonised by lemongrass and consequently the hill is vulnerable to seasonal fire events, which will further degrade the forest over time unless controlled.

Table 12.7: **Plant List of Sanjeevi Malai RF**

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
1	<i>Abrus precatorius</i>	Climber	Fabaceae	Rare	Nonspecific
2	<i>Abutilon indicum</i>	Herb	Malvaceae	Common	Nonspecific
3	<i>Acacia chundra</i>	Tree	Fabaceae	Rare	Slope
4	<i>Acacia horrida</i>	Tree	Fabaceae	Common	All over
5	<i>Acacia leucophloea</i>	Tree	Fabaceae	Rare	Nonspecific
6	<i>Acacia mellifera</i>	Tree	Fabaceae	Occasional	Flat land - planted
7	<i>Acacia nilotica</i>	Tree	Fabaceae	Occasional	Slope
8	<i>Acacia planifrons</i>	Tree	Fabaceae	Common	Slope - planted
9	<i>Acalypha fruticosa</i>	Shrub	Euphorbiaceae	Abundant	Foot hill
10	<i>Actiniopteris radiata</i>	Fern	Pteridaceae	Rare	Understory
11	<i>Aerva javanica</i>	Herb	Amaranthaceae	Locally abundant	Nonspecific
12	<i>Aerva lanata</i>	Herb	Amaranthaceae	Locally abundant	Nonspecific
13	<i>Aganosma cymosa</i>	Climber	Apocynaceae	Rare	Slope/top
14	<i>Ageratum conyzoides</i>	Herb	Asteraceae	Common	Flat land
15	<i>Albizia amara</i>	Tree	Fabaceae	Abundant	Flat land
16	<i>Albizia lebbeck</i>	Tree	Fabaceae	Rare	Nonspecific
17	<i>Amorphophallus sylvaticus</i>	Shrub	Araceae	Rare	Understory
18	<i>Anisochilus carnosus</i>	Herb	Lamiaceae	Rare	Top hill
19	<i>Anisomeles indica</i>	Shrub	Lamiaceae	Occasional	Flat land
20	<i>Anisomeles malabarica</i>	Shrub	Lamiaceae	Locally abundant	Flat land
21	<i>Asparagus racemosus</i>	Climber	Asparagaceae	Occasional	Nonspecific
22	<i>Asystasia gangetica</i>	Herb	Acanthaceae	Locally abundant	Flat land
23	<i>Atalantia monophylla</i>	Tree	Rutaceae	Occasional	Flat land
24	<i>Azadirachta indica</i>	Tree	Meliaceae	Rare	Nonspecific
25	<i>Barleria buxifolia</i>	Shrub	Acanthaceae	Common	Slope
26	<i>Barleria longiflora</i>	Shrub	Acanthaceae	Occasional	Nonspecific
27	<i>Barleria prionitis</i>	Shrub	Acanthaceae	Rare	Nonspecific
28	<i>Basilicum polystachyon</i>	Herb	Lamiaceae	Occasional	Foot hill
29	<i>Bauhinia racemosa</i>	Tree	Fabaceae	Occasional	Top hill
30	<i>Benkara malabarica</i>	Shrub	Rubiaceae	Locally abundant	Slope
31	<i>Blainvillea acmella</i>	Herb	Asteraceae	Locally abundant	Flat land

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
32	<i>Blepharis maderaspatensis</i>	Herb	Acanthaceae	Locally abundant	Flat land
33	<i>Boerhavia diffusa</i>	Herb	Nyctaginaceae	Occasional	Nonspecific
34	<i>Bulbostylis barbata</i>	Grass	Cyperaceae	Rare	Top hill
35	<i>Butea monosperma</i>	Tree	Fabaceae	Rare	Water bund
36	<i>Canthium coromandelicum</i>	Shrub	Rubiaceae	Rare	Slope
37	<i>Capparis brevispina</i>	Shrub	Capparaceae	Occasional	Understory
38	<i>Capparis decidua</i>	Shrub	Capparaceae	Abundant	Slope
39	<i>Capparis divaricata</i>	Shrub	Capparaceae	Rare	Nonspecific
40	<i>Capparis zeylanica</i>	Straggler	Capparaceae	Rare	Nonspecific
41	<i>Caralluma adscendens</i>	Herb	Apocynaceae	Occasional	Flat land
42	<i>Carissa carandas</i>	Shrub	Apocynaceae	Rare	Slope
43	<i>Carissa hirsuta</i>	Shrub	Apocynaceae	Abundant	Slope
44	<i>Cassia fistula</i>	Tree	Fabaceae	Rare	Nonspecific
45	<i>Cassia occidentalis</i>	Shrub	Fabaceae	Occasional	Foot hill
46	<i>Cassia absus</i>	Herb	Fabaceae	Locally abundant	Nonspecific
47	<i>Catunaregam spinarum</i>	Shrub	Rubiaceae	Occasional	Nonspecific
48	<i>Cayratia trifoliata</i>	Climber	Vitaceae	Rare	Nonspecific
49	<i>Celtis philippensis</i>	Tree	Cannabaceae	Rare	Top hill
50	<i>Ceropegia juncea</i>	Herb	Apocynaceae	Rare	Understory
51	<i>Cheilanthes mysorensis?</i>	Fern	Aspleniaceae	Occasional	Understory
52	<i>Chionanthus zeylanicus</i>	Tree	Oleaceae	Rare	Top hill
53	<i>Chloroxylon swietenia</i>	Tree	Rutaceae	Rare	Top hill
54	<i>Chromolaena odorata</i>	Shrub	Asteraceae	Locally abundant	Flat land
55	<i>Cissampelos pareira</i>	Climber	Menispermaceae	Occasional	Flat land
56	<i>Cissus quadrangularis</i>	Climber	Vitaceae	Common	Nonspecific
57	<i>Cissus vitigenia</i>	Climber	Vitaceae	Locally abundant	Nonspecific
58	<i>Cleome rutidosperma</i>	Herb	Cleomaceae	Occasional	Flat land
59	<i>Coccinia grandis</i>	Climber	Cucurbitaceae	Common	Nonspecific
60	<i>Combretum albdum</i>	Straggler	Combretaceae	Rare	Nonspecific
61	<i>Commelina benghalensis</i>	Herb	Commelinaceae	Locally abundant	Nonspecific
62	<i>Commelina diffusa</i>	Herb	Commelinaceae	Occasional	Nonspecific
63	<i>Commiphora berryi</i>	Tree	Burseraceae	Abundant	Flat land
64	<i>Corallocarpus epigaeus</i>	Climber	Cucurbitaceae	Rare	Nonspecific
65	<i>Cordia monoica</i>	Tree	Boraginaceae	Rare	Top hill
66	<i>Crotalaria evolvuloides</i>	Herb	Fabaceae	Common	Nonspecific
67	<i>Crotalaria nana</i>	Herb	Fabaceae	Common	Nonspecific
68	<i>Croton bonplandianus</i>	Herb	Euphorbiaceae	Locally abundant	Foot hill
69	<i>Cymbopogon citratus</i>	Grass	Poaceae	Abundant	Slope
70	<i>Cynotis tuberosa</i>	Herb	Commelinaceae	Occasional	Flat land
71	<i>Dalbergia coromandeliana</i>	Tree	Fabaceae	Common	Slope
72	<i>Datura metel</i>	Shrub	Solanaceae	Occasional	Foot hill
73	<i>Dioscorea oppositifolia</i>	Climber	Dioscoraceae	Rare	Nonspecific
74	<i>Diospyros montana</i>	Tree	Ebenaceae	Occasional	Top hill

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
75	<i>Dodonaea viscosa</i>	Shrub	Sapindaceae	Rare	Top hill
76	<i>Dolichandrone atrovirens</i>	Tree	Bignoniaceae	Rare	Foot hill
77	<i>Dopatrium sp.</i>	Herb	Plantaginaceae	Locally abundant	Moist places
78	<i>Drypetes sepiaria</i>	Tree	Putranjivaceae	Rare	Top hill
79	<i>Ehretia pubescens</i>	Tree	Boraginaceae	Occasional	Nonspecific
80	<i>Eichhornia crassipes</i>	Herb	Pontederiaceae	Common	Water body
81	<i>Elytraria acaulis</i>	Herb	Acanthaceae	Locally abundant	Foot hill
82	<i>Eragrostiella bifaria</i>	Grass	Poaceae	Abundant	Foot hill/Flat land
83	<i>Eragrostis tanella</i>	Grass	Poaceae	Abundant	Flat land
84	<i>Eriocaulon quinqlare</i>	Herb	Eriocaulaceae	Locally abundant	Moist places
85	<i>Euphorbia antiquorum</i>	Shrub	Euphorbiaceae	Abundant	Between rock
86	<i>Euphorbia hirta</i>	Herb	Euphorbiaceae	Occasional	Nonspecific
87	<i>Evolvulus alsinoides</i>	Herb	Convolvulaceae	Common	Nonspecific
88	<i>Ficus arnottiana</i>	Tree	Moraceae	Rare	On rock
89	<i>Ficus benghalensis</i>	Tree	Moraceae	Rare	On rock
90	<i>Ficus mollis</i>	Tree	Moraceae	Occasional	On rock
91	<i>Ficus virens?</i>	Tree	Moraceae	Rare	Top hill
92	<i>Flueggea leucopyrus</i>	Shrub	Phyllanthaceae	Occasional	Nonspecific
93	<i>Galactea tenuiflora</i>	Herb	Fabaceae	Locally abundant	Nonspecific
94	<i>Gardenia resinifera</i>	Tree	Rubiaceae	Rare	Nonspecific
95	<i>Gloriosa superba</i>	Climber	Colchicaceae	Occasional	Flat land
96	<i>Gmelina asiatica</i>	Shrub	Lamiaceae	Occasional	Slope
97	<i>Grewia carpinifolia?</i>	Straggler	Malvaceae	Common	Nonspecific
98	<i>Grewia flavescens</i>	Straggler	Malvaceae	Common	Nonspecific
99	<i>Grewia villosa</i>	Shrub	Malvaceae	Occasional	Nonspecific
100	<i>Gyrocarpus americanus</i>	Tree	Hernandiaceae	Common	Top hill
101	<i>Haldina cordifolia</i>	Tree	Rubiaceae	Rare	Top hill
102	<i>Hemidesmus indicus</i>	Herb	Apocynaceae	Rare	Nonspecific
103	<i>Hibiscus micranthus</i>	Shrub	Malvaceae	Abundant	Flat land
104	<i>Holoptelea integrifolia</i>	Tree	Ulmaceae	Occasional	Nonspecific
105	<i>Hugonia mystax</i>	Straggler	Linaceae	Common	Nonspecific
106	<i>Hybanthus enneaspermus</i>	Herb	Violaceae	Occasional	Nonspecific
107	<i>Ichnocarpus frutescens</i>	Climber	Apocynaceae	Occasional	Nonspecific
108	<i>Indigofera aspalathoides</i>	Herb	Fabaceae	Occasional	Top hill
109	<i>Indigofera tinctoria</i>	Herb	Fabaceae	Occasional	Foot hill
110	<i>Indigofera trita</i>	Herb	Fabaceae	Common	Flat land
111	<i>Ipomoea pes-tigridis</i>	Climber	Convolvulaceae	Occasional	Nonspecific
112	<i>Ipomoea sepiaria</i>	Climber	Convolvulaceae	Rare	Nonspecific
113	<i>Jasminum auriculatum</i>	Climber	Oleaceae	Occasional	Understory
114	<i>Jatropha curcas</i>	Shrub	Euphorbiaceae	Occasional	Flat land
115	<i>Jatropha glandulifera</i>	Shrub	Euphorbiaceae	Occasional	Flat land
116	<i>Jatropha villosa</i>	Shrub	Euphorbiaceae	Occasional	Flat land
117	<i>Justicia gendarussa</i>	Herb	Acanthaceae	Common	Nonspecific

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
118	<i>Justicia procumbens</i>	Herb	Acanthaceae	Common	All over
119	<i>Justicia simplex</i>	Herb	Acanthaceae	Common	All over
120	<i>Justicia tranquebariensis</i>	Herb	Acanthaceae	Common	Foot hill
121	<i>Lantana indica</i>	Shrub	Lamiaceae	Occasional	Flat land
122	<i>Lawsonia inermis</i>	Shrub	Lythraceae	Rare	Water bund
123	<i>Lepidagathis scariosa</i>	Herb	Acanthaceae	Locally abundant	Foot hill
124	<i>Lepisanthes tetraphylla</i>	Tree	Sapindaceae	Rare	Top hill
125	<i>Leucaena leucocephala</i>	Tree	Fabaceae	Occasional	Foot hill
126	<i>Limonia acidissima</i>	Tree	Rutaceae	Rare	Water bund
127	<i>Maerua apetala</i>	Tree	Capparaceae	Rare	Understory
128	<i>Maerua oblongifolia</i>	Climber	Capparaceae	Rare	Nonspecific
129	<i>Melhania incana</i>	Herb	Malvaceae	Common	Nonspecific
130	<i>Merremia tridentata</i>	Herb	Convolvulaceae	Locally abundant	Nonspecific
131	<i>Microstachys chamaelea</i>	Herb	Euphorbiaceae	Occasional	Top hill
132	<i>Mollugo nudicaulis</i>	Herb	Molluginaceae	Occasional	Nonspecific
133	<i>Morinda coreia</i>	Tree	Rubiaceae	Rare	Nonspecific
134	<i>Moringa concanensis</i>	Tree	Moringaceae	Rare	Top hill/Slope
135	<i>Ochna gamblei</i>	Shrub	Ochnaceae	Occasional	Between rock
136	<i>Ocimum americanum</i>	Herb	Lamiaceae	Common	Nonspecific
137	<i>Ocimum basilicum</i>	Herb	Lamiaceae	Common	Nonspecific
138	<i>Ocimum filamentosum</i>	Herb	Lamiaceae	Occasional	Foot hill
139	<i>Ocimum gratissimum</i>	Herb	Lamiaceae	Common	Foot hill
140	<i>Opuntia dilleni</i>	Shrub	Cactaceae	Rare	Flat land
141	<i>Oxalis corniculata</i>	Herb	Oxalidaceae	Occasional	Moist places
142	<i>Pancratium zeylanicum</i>	Herb	Amaryllidaceae	Occasional	Flat land
143	<i>Pavonia odorata</i>	Herb	Malvaceae	Common	Foot hill
144	<i>Pavonia zeylanica</i>	Shrub	Malvaceae	Common	All over
145	<i>Pergularia daemia</i>	Shrub	Apocynaceae	Occasional	Nonspecific
146	<i>Phoenix pusilla</i>	Shrub	Arecaceae	Rare	Nonspecific
147	<i>Phoenix sylvestris</i>	Shrub	Arecaceae	Common	Flat land
148	<i>Phyllanthus maderaspatensis</i>	Herb	Phyllanthaceae	Occasional	Foot hill
149	<i>Physalis minima</i>	Herb	Solanaceae	Occasional	Nonspecific
150	<i>Plectranthus amboinicus</i>	Shrub	Lamiaceae	Locally abundant	Foot hill
151	<i>Plectranthus sp.</i>	Herb	Lamiaceae	Locally abundant	Foot hill
152	<i>Pleiospermium alatum</i>	Tree	Rutaceae	Occasional	Lower elevation
153	<i>Polycarpaea corymbosa</i>	Herb	Caryophyllaceae	Occasional	Top hill
154	<i>Portulaca sp</i>	Herb	Portulacaceae	Occasional	Top hill
155	<i>Pouzolzia zeylanica</i>	Shrub	Urticaceae	Occasional	Top hill
156	<i>Premna sp.</i>	Tree	Lamiaceae	Occasional	Flat land
157	<i>Prosopis juliflora</i>	Tree	Fabaceae	Locally abundant	Foot hill
158	<i>Psilanthus wightianus</i>	Shrub	Rubiaceae	Occasional	Understory
159	<i>Pupalia lappacea</i>	Shrub	Amaranthaceae	Locally abundant	Foot hill
160	<i>Reissantia indica</i>	Shrub	Celastraceae	Common	Nonspecific

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
161	<i>Rhynchosia aurea</i>	Herb	Fabaceae	Common	Foot hill
162	<i>Rhynchosia suaveolens</i>	Climber	Fabaceae	Common	Nonspecific
163	<i>Rivea hypograteriformis</i>	Straggler	Convolvulaceae	Occasional	Nonspecific
164	<i>Ruellia prostrata</i>	Herb	Acanthaceae	Occasional	Nonspecific
165	<i>Ruellia tuberosa</i>	Herb	Acanthaceae	Occasional	Foot hill
166	<i>Sansevieria cylindrica</i>	Herb	Asparagaceae	Locally abundant	Slope/top
167	<i>Sansevieria roxburghiana</i>	Herb	Asparagaceae	Rare	Understory
168	<i>Sapindus emarginata</i>	Tree	Sapindaceae	Rare	Top hill
169	<i>Schoenoplectus articulata</i>	Grass	Cyperaceae	Common	Water body
170	<i>Scilla indica</i>	Herb	Asparagaceae	Locally abundant	Top hill
171	<i>Senna auriculata</i>	Shrub	Fabaceae	Occasional	Between rock
172	<i>Solanum pubescens</i>	Shrub	Solanaceae	Abundant	Nonspecific
173	<i>Spermacoce articularis</i>	Herb	Rubiaceae	Occasional	Nonspecific
174	<i>Striga gesnerioides</i>	Herb	Orobanchaceae	Rare	Nonspecific
175	<i>Strobilanthes cordifolia</i>	Shrub	Acanthaceae	Locally abundant	Top hill
176	<i>Strychnos minor</i>	Climber	Loganiaceae	Rare	Nonspecific
177	<i>Symphorema involucreatum</i>	Climber	Lamiaceae	Rare	Nonspecific
178	<i>Tecomella undulata</i>	Tree	Bignoniaceae	Locally abundant	Foot hill
179	<i>Tectona grandis</i>	Tree	Lamiaceae	Common	Slope - planted
180	<i>Tephrosia purpurea</i>	Herb	Fabaceae	Common	Nonspecific
181	<i>Tephrosia villosa</i>	Herb	Fabaceae	Common	Top hill
182	<i>Tinospora cordifolia</i>	Climber	Menispermaceae	Occasional	Nonspecific
183	<i>Tridax procumbens</i>	Herb	Asteraceae	Occasional	Foot hill
184	<i>Triumfetta rhomboidea</i>	Herb	Malvaceae	Common	Nonspecific
185	<i>Urena lobata subsp. sinuata</i>	Herb	Malvaceae	Common	Nonspecific
186	<i>Vernonia cinerea</i>	Herb	Asteraceae	Abundant	All over
187	<i>Vicoa indica</i>	Herb	Asteraceae	Abundant	All over
188	<i>Vigna trilobata</i>	Climber	Fabaceae	Rare	Foot hill
189	<i>Viscum orientale</i>	Shrub	Santalaceae	Rare	Parasite
190	<i>Vitex negundo</i>	Shrub	Lamiaceae	Occasional	Foot hill
191	<i>Waltheria indica</i>	Herb	Malvaceae	Abundant	Foot hill
192	<i>Wattakaka volubilis</i>	Straggler	Apocynaceae	Rare	Nonspecific
193	<i>Wrightia tinctoria</i>	Tree	Apocynaceae	Rare	Lower elevation
194	<i>Ziziphus mauritiana</i>	Tree	Rhamnaceae	Occasional	Nonspecific
195	<i>Ziziphus oenophloea</i>	Straggler	Rhamnaceae	Occasional	Nonspecific
196	<i>Ziziphus xylopyrus</i>	Tree	Rhamnaceae	Occasional	Slope
197	<i>Zornia gibbosa</i>	Herb	Fabaceae	Common	Flat land

Table 12.8: Flora Details of Sanjeevi Malai RF

Breakup of Species	Numbers of species	Number of Rare or Occasional Species	Number of Common or Abundant Species	% rare or Occasional Species
Tree	46	37	9	80%
Shrubs	45	29	16	64%
Climbers & Stragglers	29	22	7	76%
Herbs, Grasses, Ferns	77	31	46	40%
Total Number of Species	197	119	78	60%

The remaining species consists of 45 shrubs, 29 climbers or stragglers, 75 herbs and grasses, and 2 ferns. For the woody species of shrubs and climbers, more than two thirds of them are rare or occasional. Of the more common species, there is a predominance of thorny species which indicates a high grazing pressure.

The most significant species of tree found is *Maerua apetala*, considered endemic to the southern part of Tamil Nadu. Another 15 species are considered to be species of special interest as their presence in extremely small numbers (sometimes only one individual in an inaccessible location of the hill) gives a clear indication as to the original vegetation of the area, which is very different from the degraded vegetation type that is now prevailing due to the constant interference of the present day and extractive practices of the past.

Some of these species are characteristic members of the Tropical Dry Evergreen Forest (TDEF), such as *Atalantia monophylla*, *Chionanthus zeylanica*, *Drypetes sepiaria* and *Lepisanthes tetraphylla*. Others are interesting timber species, such as *Chloroxylon swietenia* – satinwood and *Haldina cordifolia* – yellow teak.

Aside from these pockets of Evergreen species and remnant species, the rest of the forest areas are dominated by deciduous species of trees such as *Acacia horrida*, *Albizia amara*, *Commiphora berryi*, *Dalbergia coromandeliana* and *Wrightia tinctoria*. Sometimes these areas are in a closed canopy, intertwined with creepers and stragglers such as *Hugonia mystax*, *Carrisa hirsuta* and *Grewia* species. At other times the areas have been significantly penetrated by the presence of non-native species, either planted, such as *Acacia planifrons*, or seeding exotic nuisance species – *Prosopis juliflora*.

Thus, the general state of the natural forest areas on the hill is that of degradation, with the predominance of species associated with disturbance and recolonization. The canopy in many places is open, and the ground vegetation is dominated by *Cymbopogon citratus* – lemongrass, which is highly susceptible to fire due to the high oil content of the grass leaves.

Storm Water Channels

Surface water run-off from Sanjeevi Malai flows down the hill and through the urban areas (**Fig. 12.14**). On the western side, the run-off ends in Kondaneri Kanmai and other small water bodies. On the eastern side, the water channels flow past Vettai Venkatesa Perumal Temple and also towards Kammappatti Kanmai; in the north these water channels flow into the Kothankulam Kanmai.

Fig 12.14: Google Earth Image of Watershed Divisions on Sanjeevi Malai (green line) and Water Courses (blue line)



Vegetation Zones of Sanjeevi Malai

The vegetation analysis of Sanjeevi Malai shows (**Fig. 12.15 & Tables 12.9**):

- 27% of the area is dense forest
- 49% of the area has some tree cover
- 15% is currently covered with lemongrass
- 9% is sheet rock and not suitable for plantation

Fig 12.15: Vegetation Zones of Sanjeevi Malai

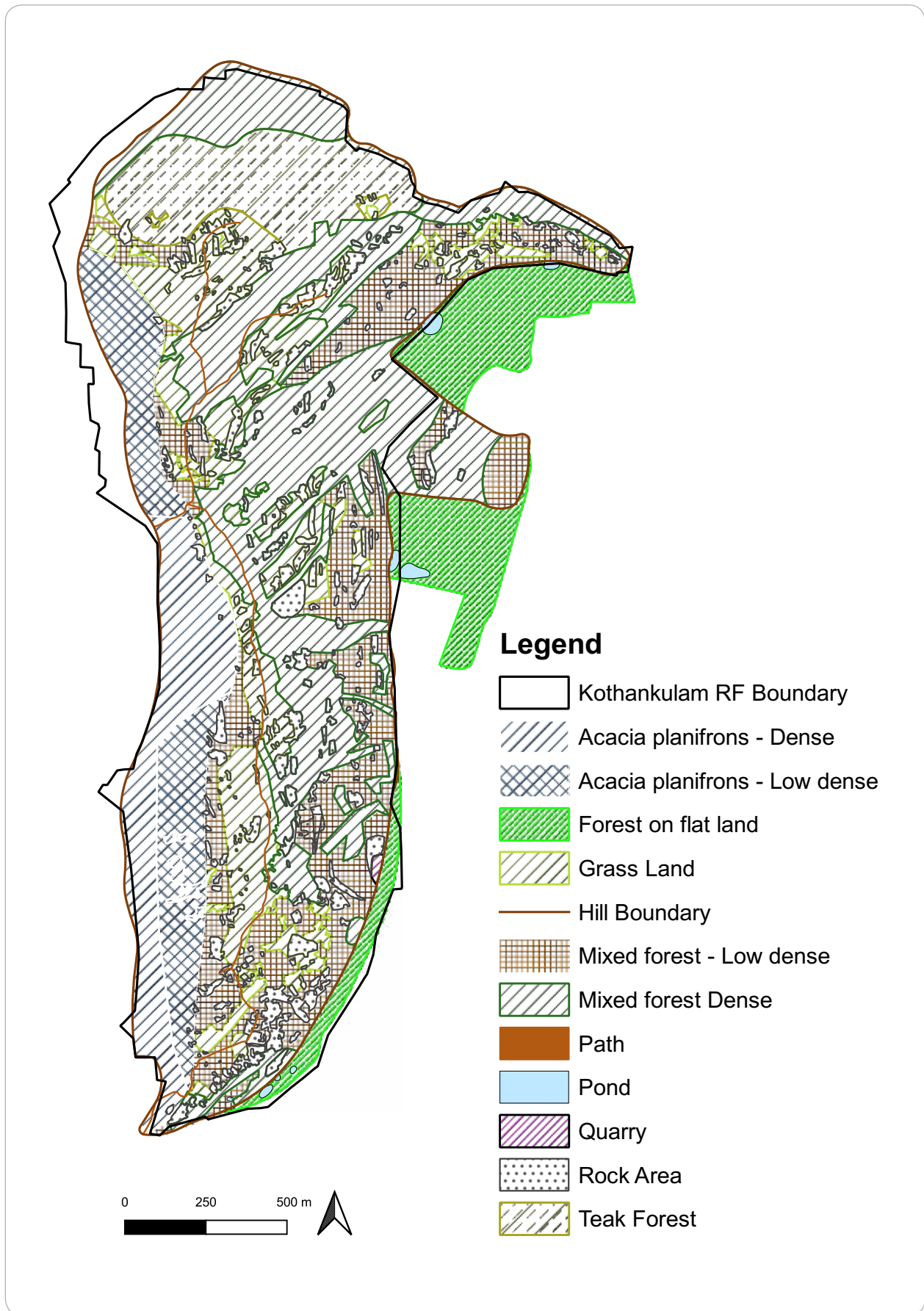


Table 12.9: **Vegetation Zonation of Sanjeevi Malai RF**

Zones (sq.m)	Teak Plantation (sq.m)	Acacia planifrons Plantation (sq.m)	Natural Areas (sq.m)	Sub-Total Area (sq.m)	Total Area	% to Total
Mixed Forest – Dense			7,60,485	7,60,485		
Mixed Forest – Low Dense			6,03,350	6,03,350		
Teak Forest	2,48,138			2,48,138		
Acacia <i>planifrons</i> – Dense		2,39,929		2,39,929		
Acacia <i>planifrons</i> – Low Dense		2,57,229		2,57,229		
Total Tree Covered Areas					21,09,131	
Grass Area	4,950	10,716	4,14,957	4,30,623		
Rocks Area	1,806	3,526	2,51,185	2,56,517		
Quarry			2,435	2,435		
Pond			11,298	11,298		
Forest on Flat Land			3,02,755	3,02,755		
Private Land			44,943	44,943		
Total					31,57,702	
Total area of tree cover					21,09,131	67%
Total area of native forest					13,63,835	43%
Total area of non – native plantation					7,45,296	24%
Total area of Invasive grasses					4,30,623	14%
Total area degraded					11,75,919	37%

12.5.1.2. SAPPANI PARAMBU

Sappani Parambu is also a reserved forest and covers 157 hectares. It has a lower elevation than Sanjeevi Malai – 250 m rising up from 180 m at ground level, and its species composition is discernibly different. During the botanical surveys 75 species were identified (**Table 12.10**).

Table 12.10: Plant List of Sappani Parambu RF

S.No.	Binomial Name	Habit	Family	Status/ Frequent	Biological Info
1	<i>Acacia horrida</i>	Tree	Fabaceae	Common	Slope
2	<i>Acacia juliflora</i>	Tree	Fabaceae	Common	Foot hill
3	<i>Acacia mellifera</i>	Tree	Fabaceae	Rare	Slope
4	<i>Acacia planifrons</i>	Tree	Fabaceae	Occasional	Nonspecific
5	<i>Acalypha fruticosa</i>	Shrub	Euphorbiaceae	Occasional	Foot hill
6	<i>Actiniopteris radiata</i>	Fern	Pteridaceae	Occasional	Understory
7	<i>Ageratum conyzoides</i>	Herb	Asteraceae	Locally abundant	Foot hill
8	<i>Ageratum houstonianum</i>	Herb	Asteraceae	Common	Foot hill
9	<i>Albizia amara</i>	Tree	Fabaceae	Abundant	Seen everywhere
10	<i>Albizia lathami</i>	Tree	Fabaceae	Rare	Foot hill
11	<i>Azadirachta indica</i>	Tree	Meliaceae	Rare	Foot hill
12	<i>Barleria longiflora</i>	Shrub	Acanthaceae	Occasional	Foot hill
13	<i>Basella sp.</i>	Climber	Basellaceae	Occasional	Understory
14	<i>Bauhinia racemosa</i>	Tree	Fabaceae	Rare	Nonspecific
15	<i>Benkara malabarica</i>	Shrub	Rubiaceae	Rare	Foot hill
16	<i>Blepharis maderaspatensis</i>	Herb	Acanthaceae	Common	Nonspecific
17	<i>Butea monosperma</i>	Tree	Fabaceae	Rare	Flat land
18	<i>Cadaba trifoliata</i>	Shrub	Capparaceae	Occasional	Flat land
19	<i>Capparis brevispina</i>	Shrub	Capparaceae	Occasional	Flat land
20	<i>Capparis decidua</i>	Shrub	Capparaceae	Occasional	Flat land
21	<i>Capparis divaricata</i>	Shrub	Capparaceae	Occasional	Flat land
22	<i>Catunaregam spinosa</i>	Shrub	Rubiaceae	Occasional	Slope
23	<i>Chloroxylon swietenia</i>	Tree	Rutaceae	Occasional	Slope
24	<i>Chromolaena odorata</i>	Shrub	Asteraceae	Occasional	Food hill
25	<i>Cissus quadrangularis</i>	Climber	Vitaceae	Occasional	Flat land on trees
26	<i>Commiphora berryi</i>	Tree	Burseraceae	Occasional	Slope
27	<i>Cymbopogon citratus</i>	Grass	Rutaceae	Locally abundant	Seen at Open areas
28	<i>Dalbergia coromandeliana</i>	Tree	Fabaceae	Locally abundant	Foot hill/slope
29	<i>Delonix elata</i>	Tree	Fabaceae	Rare	Foot hill
30	<i>Dichrostachys cinerea</i>	Tree	Fabaceae	Occasional	Slope
31	<i>Digera muricata</i>	Herb	Amaranthaceae	Common	Foot hill
32	<i>Diospyros montana</i>	Tree	Ebenaceae	Rare	Flat land/Slope
33	<i>Dodonaea viscosa</i>	Shrub	Sapindaceae	Occasional	Nonspecific
34	<i>Drypetes sepiaria</i>	Tree	Euphorbiaceae	Rare	Top hill
35	<i>Ehretia laevis</i>	Tree	Boraginaceae	Rare	Flat land
36	<i>Ehretia pubescens</i>	Tree	Boraginaceae	Rare	Flat land
37	<i>Elytraria acaulis</i>	Herb	Acanthaceae	Locally abundant	Foot hill/Flat land
38	<i>Eragrostiella bifaria</i>	Grass	Poaceae	Locally abundant	Nonspecific

S.No.	Binomial Name	Habit	Family	Status/ Frequent	Biological Info
39	<i>Euphorbia antiquorum</i>	Tree	Euphorbiaceae	Occasional	Flat land
40	<i>Evolvulus alsinoides</i>	Herb	Convolvulaceae	Common	Nonspecific
41	<i>Ficus mollis</i>	Tree	Moraceae	Rare	Top hill
42	<i>Flueggea leucopyrus</i>	Shrub	Euphorbiaceae	Locally abundant	Foot hill
43	<i>Grewia flavescens</i>	Shrub	Malvaceae	Locally abundant	Foot hill/Flat land
44	<i>Grewia villosa</i>	Tree	Malvaceae	Occasional	Foot hill
45	<i>Gyrocarpus americana</i>	Tree	Hernandiaceae	Occasional	Flat land on top areas
46	<i>Holoptelea integrifolia</i>	Tree	Ulmaceae	Occasional	Flat land on top areas
47	<i>Indigofera aspalathoides</i>	Herb	Fabaceae	Common	Nonspecific
48	<i>Indigofera linnae</i>	Herb	Fabaceae	Common	Nonspecific
49	<i>Ipomoea sepiaria</i>	Climber	Convolvulaceae	Occasional	Nonspecific
50	<i>Jasminum auriculatum</i>	Climber	Oleaceae	Common	Nonspecific
51	<i>Justicia procumbens</i>	Herb	Acanthaceae	Common	All over
52	<i>Lantana camara</i>	Shrub	Verbenaceae	Occasional	Slope
53	<i>Lepidagathis scariosa</i>	Herb	Acanthaceae	Abundant	All over
54	<i>Leucas aspera</i>	Herb	Lamiaceae	Common	Foot hill
55	<i>Limonia acidissima</i>	Tree	Rutaceae	Planted	Cultivated
56	<i>Maerua apetala</i>	Tree	Capparaceae	Common	Seen everywhere
57	<i>Ochna gamblei</i>	Shrub	Ochnaceae	Occasional	Slope
58	<i>Ocimum americanum</i>	Herb	Lamiaceae	Common	Nonspecific
59	<i>Opuntia dillenii</i>	Shrub	Cactaceae	Rare	Rocky areas
60	<i>Pavonia odorata</i>	Herb	Malvaceae	Common	All over
61	<i>Psilanthus wightianus</i>	Shrub	Rubiaceae	Occasional	Foot hill
62	<i>Reissantia indica</i>	Shrub	Celastraceae	Occasional	Slope
63	<i>Sansevieria cylindrica</i>	Shrub	Asparagaceae	Rare	Understory
64	<i>Sapindus emarginatus</i>	Tree	Sapindaceae	Rare	Flat land
65	<i>Senna auriculata</i>	Shrub	Fabaceae	Abundant	All over
66	<i>Sida cordifolia</i>	Shrub	Malvaceae	Locally abundant	Nonspecific
67	<i>Solanum pubescens</i>	Shrub	Solanaceae	Abundant	Foot hill/Flat land
68	<i>Strobilanthes cordifolia</i>	Shrub	Acanthaceae	Occasional	Top hill
69	<i>Strychnos minor</i>	Climber	Loganiaceae	Occasional	Flat land/Top hill
70	<i>Symphorema involucreatum</i>	Climber	Verbenaceae	Occasional	Nonspecific
71	<i>Tephrosia purpurea</i>	Herb	Fabaceae	Common	Nonspecific
72	<i>Vicoa indica</i>	Herb	Asteraceae	Common	All over
73	<i>Waltheria indica</i>	Herb	Malvaceae	Common	All over
74	<i>Wrightia tinctoria</i>	Tree	Apocynaceae	Rare	Flat land
75	<i>Ziziphus xylopyrus</i>	Tree	Rhamnaceae	Occasional	Flat land/Slope

There is a lower concentration of lemongrass on Sappani Parambu, however it is present in some of the open areas. The presence of wildlife is increased due to the forest department's creation of drinking holes within the forest. The botanical species count is relatively low and again the high percentage of rare or occasional species is indicative of a secondary growth forest (Table 12.11). There are only 5 species of tree and 5 species of shrubs that are common or abundant. They are also of small stature, indicating relatively recent establishment (within the last 30 or 40 years). The soil is also extremely poor, indicating that soil erosion has happened during previous periods of deforestation. There are much fewer evergreen remnant species here.

Table 12.11: Flora Details of Sappani Parambu RF

Breakup of Species	Numbers of Species	Number of Rare or Occasional Species	Number of Common or Abundant Species	% Rare or Occasional Species
Tree	28	23	5	82%
Shrubs	22	17	5	77%
Climbers & Stragglers	6	5	1	83%
Herbs, Grasses, Ferns	19	1	18	5%
Total Number of Species	75	46	29	61%

12.5.1.3. SUNDAKKA PERUMAL MALAI/ VADA MALAI

Sundakka Perumal Malai/ Vada Malai is not a reserved forest and is subject to a much higher level of degradation and disturbance than either Sanjeevi Malai or Sappani Parambu. It covers 52 hectares and rises to an altitude of 230 m from a ground level of 170 m. Botanical survey of this panchayat forest has identified 118 total species here (Table 12.12).

Table 12.12: Plant List of Sundakka Perumal Malai/ Vada Malai

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
1	<i>Abrus precatorius</i>	Climber	Fabaceae	Rare	Nonspecific
2	<i>Abutilon indicum</i>	Shrub	Malvaceae	Common	Foot hill
3	<i>Acacia horrida</i>	Tree	Fabaceae	Common	Slope
4	<i>Acacia leucophloea</i>	Tree	Fabaceae	Rare	Slope/Top hill
5	<i>Acacia mellifera</i>	Tree	Fabaceae	Rare	Slope
6	<i>Acacia planifrons</i>	Tree	Fabaceae	Occasional	Slope
7	<i>Acalypha fruticosa</i>	Shrub	Euphorbiaceae	Abundant	Foot hill
8	<i>Achyranthes aspera</i>	Herb	Amaranthaceae	Common	Foot hill
9	<i>Actiniopteris radiata</i>	Fern	Pteridaceae	Occasional	Understory
10	<i>Aerva lanata</i>	Herb	Amaranthaceae	Locally abundant	Nonspecific
11	<i>Ageratum conyzoides</i>	Herb	Asteraceae	Locally abundant	Foot hill
12	<i>Albizia amara</i>	Tree	Fabaceae	Abundant	Slope
13	<i>Albizia lebbek</i>	Tree	Fabaceae	Rare	Nonspecific
14	<i>Allmania nodiflora</i>	Herb	Amaranthaceae	Rare	Nonspecific

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
15	<i>Andrographis echiooides</i>	Herb	Acanthaceae	Abundant	Nonspecific
16	<i>Anisochilus carnosus</i>	Herb	Lamiaceae	Rare	Top hill
17	<i>Anisomeles malabarica</i>	Shrub	Lamiaceae	Locally abundant	Flat land
18	<i>Apluda mutica</i>	Grass	Poaceae	Locally abundant	Flat land
19	<i>Aristida hystrix</i>	Grass	Poaceae	Locally abundant	Foot hill
20	<i>Asystasia gangetica</i>	Herb	Acanthaceae	Locally abundant	Flat land
21	<i>Atalantia monophylla</i>	Tree	Rutaceae	Occasional	Flat land
22	<i>Azadirachta indica</i>	Tree	Meliaceae	Rare	Nonspecific
23	<i>Barleria buxifolia</i>	Shrub	Acanthaceae	Common	Slope/Foot hill
24	<i>Blainvillea acmella</i>	Herb	Asteraceae	Locally abundant	Flat land
25	<i>Blepharis maderaspatensis</i>	Herb	Acanthaceae	Common	Nonspecific
26	<i>Borreria articularis</i>	Herb	Rubiaceae	Common	Nonspecific
27	<i>Borreria hispida</i>	Herb	Rubiaceae	Common	Nonspecific
28	<i>Calotropis gigantea</i>	Shrub	Apocynaceae	Occasional	Foot hill
29	<i>Canthium coromandelicum</i>	Shrub	Rubiaceae	Rare	Slope
30	<i>Capparis decidua</i>	Shrub	Capparaceae	Occasional	Flat land
31	<i>Capparis divaricata</i>	Shrub	Capparaceae	Occasional	Flat land
32	<i>Caralluma adscendens</i>	Herb	Apocynaceae	Occasional	Foot hill/Understory
33	<i>Carissa carandas</i>	Shrub	Apocynaceae	Rare	Slope
34	<i>Cassia absus</i>	Herb	Fabaceae	Locally abundant	Nonspecific
35	<i>Cassia fistula</i>	Tree	Fabaceae	Rare	Open area
36	<i>Catunaregam spinarum</i>	Shrub	Rubiaceae	Occasional	Foot hill
37	<i>Celosia argentea</i>	Shrub	Amaranthaceae	Occasional	Foot hill
38	<i>Cissus quadrangularis</i>	Climber	Vitaceae	Common	Nonspecific
39	<i>Cleome viscosa</i>	Herb	Capparaceae	Locally abundant	Foot hill
40	<i>Coccinia grandis</i>	Climber	Cucurbitaceae	Common	Nonspecific
41	<i>Commelina benghalensis</i>	Herb	Commelinaceae	Locally abundant	Nonspecific
42	<i>Commelina diffusa</i>	Herb	Commelinaceae	Occasional	Nonspecific
43	<i>Commiphora berryi</i>	Tree	Burseraceae	Occasional	Slope
44	<i>Crotalaria evolvuloides</i>	Herb	Fabaceae	Common	Nonspecific
45	<i>Ctenolepis garcinii</i>	Climber	Cucurbitaceae	Occasional	On trees
46	<i>Cymbopogon citratus</i>	Grass	Poaceae	Abundant	Slope
47	<i>Cynodan dactylon</i>	Grass	Poaceae	Locally abundant	Foot hill
48	<i>Cynotis tuberosa</i>	Herb	Commelinaceae	Occasional	Flat land
49	<i>Dactyloctenium aegyptium</i>	Grass	Poaceae	Locally abundant	Flat land
50	<i>Dalbergia coromandeliana</i>	Tree	Fabaceae	Locally abundant	Foot hill/slope
51	<i>Diospyros montana</i>	Tree	Ebenaceae	Rare	Flat land/Slope
52	<i>Ehretia laevis</i>	Tree	Boraginaceae	Rare	Flat land
53	<i>Ehretia pubescens</i>	Tree	Boraginaceae	Rare	Flat land
54	<i>Elytraria acaulis</i>	Herb	Acanthaceae	Locally abundant	Foot hill
55	<i>Euphorbia antiquorum</i>	Tree	Euphorbiaceae	Occasional	Flat land

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
56	<i>Euphorbia hirta</i>	Herb	Euphorbiaceae	Occasional	Nonspecific
57	<i>Evolvulus alsinoides</i>	Herb	Convolvulaceae	Common	Nonspecific
58	<i>Evolvulus nummularius</i>	Herb	Convolvulaceae	Occasional	Nonspecific
59	<i>Ficus mollis</i>	Tree	Moraceae	Rare	Top hill
60	<i>Flueggea leucopyrus</i>	Shrub	Phyllanthaceae	Occasional	Nonspecific
61	<i>Gomphrena celosioides</i>	Herb	Amaranthaceae	Occasional	Nonspecific
62	<i>Gomphrena globosa</i>	Shrub	Amaranthaceae	Occasional	Foot hill
63	<i>Grewia flavescens</i>	Shrub	Malvaceae	Locally abundant	Foot hill/Flat land
64	<i>Haldina cordifolia</i>	Tree	Rubiaceae	Rare	Top hill
65	<i>Heteropogon contortus</i>	Grass	Poaceae	Locally abundant	Nonspecific
66	<i>Hibiscus micranthus</i>	Shrub	Malvaceae	Abundant	Flat land
67	<i>Holoptelia integrifolia</i>	Tree	Ulmaceae	Occasional	Nonspecific
68	<i>Hugonia mystax</i>	Straggler	Linaceae	Common	Nonspecific
69	<i>Hybanthus enneospermis</i>	Herb	Violaceae	Occasional	Nonspecific
70	<i>Hyptis suaveolens</i>	Herb	Lamiaceae	Common	Foot hill
71	<i>Indigofera aspalathoides</i>	Herb	Fabaceae	Occasional	Top hill
72	<i>Indigofera linnaei</i>	Herb	Fabaceae	Common	Nonspecific
73	<i>Jasminum auriculatum</i>	Climber	Oleaceae	Common	Nonspecific
74	<i>Jatropha gossypifolia</i>	Shrub	Euphorbiaceae	Occasional	Flat land
75	<i>Jatropha villosa</i>	Shrub	Euphorbiaceae	Occasional	Flat land
76	<i>Justicia procumbens</i>	Herb	Acanthaceae	Common	All over
77	<i>Justicia tranquebariensis</i>	Herb	Acanthaceae	Common	Foot hill
78	<i>Lepidagathis scariosa</i>	Herb	Acanthaceae	Locally abundant	Foot hill
79	<i>Maerua apetala</i>	Tree	Capparaceae	Common	Seen everywhere
80	<i>Merremia tridentata</i>	Herb	Convolvulaceae	Locally abundant	Nonspecific
81	<i>Moringa concanensis</i>	Tree	Moringaceae	Rare	Top hill/Slope
82	<i>Ocimum americanum</i>	Herb	Lamiaceae	Common	Nonspecific
83	<i>Ocimum gratissimum</i>	Herb	Lamiaceae	Common	Foot hill
84	<i>Oldenlandia corymbosa</i>	Herb	Rubiaceae	Common	Nonspecific
85	<i>Oldenlandia umbellata</i>	Herb	Rubiaceae	Common	Nonspecific
86	<i>Opuntia dillenii</i>	Shrub	Cactaceae	Rare	Flat land
87	<i>Pavonia odorata</i>	Shrub	Malvaceae	Common	Foot hill
88	<i>Pavonia zeylonica</i>	Shrub	Malvaceae	Common	All over
89	<i>Pergularia daemia</i>	Climber	Apocynaceae	Occasional	Nonspecific
90	<i>Perotis indica</i>	Grass	Poaceae	Common	Nonspecific
91	<i>Phyllanthus maderaspatensis</i>	Herb	Euphorbiaceae	Occasional	Foot hill
92	<i>Physalis minima</i>	Herb	Solanaceae	Occasional	Nonspecific
93	<i>Plectranthus amboinicus</i>	Shrub	Lamiaceae	Locally abundant	Foot hill
94	<i>Portulaca sp.</i>	Herb	Portulacaceae	Common	Nonspecific
95	<i>Premna sp.</i>	Tree	Lamiaceae	Occasional	Flat land
96	<i>Prosopis juliflora</i>	Tree	Fabaceae	Locally abundant	Foot hill
97	<i>Pupalia lappacea</i>	Herb	Amaranthaceae	Locally abundant	Foot hill

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
98	<i>Reissantia indica</i>	Shrub	Celastraceae	Occasional	Slope
99	<i>Rhynchosia suaveolens</i>	Climber	Fabaceae	Common	Nonspecific
100	<i>Rivea hypocrateriformis</i>	Climber	Convolvulaceae	Occasional	Nonspecific
101	<i>Sansevieria cylindrica</i>	Herb	Asparagaceae	Locally abundant	Slope/top
102	<i>Sarcostemma intermedium</i>	Climber	Apocynaceae	Occasional	On trees
103	<i>Scilla indica</i>	Herb	Asparagaceae	Locally abundant	Top hill
104	<i>Senna auriculata</i>	Shrub	Fabaceae	Occasional	Between rock
105	<i>Sida cordifolia</i>	Shrub	Malvaceae	Locally abundant	Nonspecific
106	<i>Sida rhombifolia</i>	Shrub	Malvaceae	Common	Nonspecific
107	<i>Solanum pubescens</i>	Shrub	Solanaceae	Abundant	Nonspecific
108	<i>Tephrosia purpurea</i>	Herb	Fabaceae	Common	Nonspecific
109	<i>Trichodesma indicum</i>	Herb	Boraginaceae	Occasional	Nonspecific
110	<i>Tridax procumbens</i>	Herb	Asteraceae	Occasional	Foot hill
111	<i>Vernonia cinerea</i>	Shrub	Asteraceae	Abundant	Seen everywhere
112	<i>Vicoa indica</i>	Herb	Asteraceae	Abundant	Seen everywhere
113	<i>Waltheria indica</i>	Herb	Malvaceae	Abundant	Foot hill
114	<i>Wattakaka volubilis</i>	Climber	Apocynaceae	Rare	On trees
115	<i>Wrightia tinctoria</i>	Tree	Apocynaceae	Rare	Lower elevation
116	<i>Ziziphus mauritiana</i>	Tree	Rhamnaceae	Occasional	Nonspecific
117	<i>Ziziphus xylopyrus</i>	Tree	Rhamnaceae	Occasional	Slope
118	<i>Zornia gibbosa</i>	Herb	Fabaceae	Common	Flat land

There are very few mature trees here (**Table 12.13**), and the area is constantly grazed by goats and cattle. It has a number of herb species that are not present in either Sanjeevi Malai or Sappani Parambu, but at this stage in its degradation there is very little that contributes to the biodiversity of the area. The open canopy allows large areas to be covered with lemongrass.

Table 12.13: Flora Details of Sundakka Perumal Malai/ Vada Malai

Breakup of Species	Numbers of Species	Number of Rare or Occasional Species	Number of Common or Abundant Species	% rare or Occasional Species
Tree	25	20	5	80%
Shrubs	27	14	13	52%
Climbers & Stragglers	11	6	5	55%
Herbs, Grasses, Ferns	55	15	40	27%
Total Number of Species	118	55	63	47%

12.5.1.4. MUTHUKUDI

Muthukudi is a small hillock, covering only 5 hectares, and consequently has fewer species than the other sites. During botanical survey, 86 plant species were identified in Muthukudi (Tables 12.14 & 12.15). However, it has a number of interesting species present such as *Haldina cordifolia* and *Ehretia laevis*. There is no canopy cover, which in this case has led to a high density of lemongrass and is a fire risk.

Table 12.14: Plant List of Muthukudi

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
1	<i>Abutilon indicum</i>	Shrub	Malvaceae	Common	Nonspecific
2	<i>Acanthospermum hispidum</i>	Herb	Acanthaceae	Locally abundant	Flat land
3	<i>Achyranthes aspera</i>	Herb	Amaranthaceae	Common	Foot hill
4	<i>Aerva lanata</i>	Herb	Amaranthaceae	Locally abundant	Nonspecific
5	<i>Albizia lebbek</i>	Tree	Fabaceae	Rare	Nonspecific
6	<i>Allmania nodiflora</i>	Herb	Amaranthaceae	Rare	Nonspecific
7	<i>Alysicarpus monilifer</i>	Herb	Fabaceae	Common	Nonspecific
8	<i>Anisomeles malabarica</i>	Shrub	Lamiaceae	Locally abundant	Flat land
9	<i>Apluda mutica</i>	Grass	Poaceae	Locally abundant	Flat land
10	<i>Azadirachta indica</i>	Tree	Meliaceae	Rare	Nonspecific
11	<i>Barleria buxifolia</i>	Shrub	Acanthaceae	Common	Slope
12	<i>Boerhavia diffusa</i>	Herb	Nyctaginaceae	Occasional	Nonspecific
13	<i>Borreria articularis</i>	Herb	Rubiaceae	Common	Nonspecific
14	<i>Borreria hispida</i>	Herb	Rubiaceae	Common	Nonspecific
15	<i>Bulbostylis barbata</i>	Grass	Cyperaceae	Rare	Top hill
16	<i>Calotropis gigantea</i>	Shrub	Apocynaceae	Occasional	Foot hill
17	<i>Canthium coromandelicum</i>	Shrub	Rubiaceae	Rare	Slope
18	<i>Capparis decidua</i>	Shrub	Capparaceae	Abundant	Slope
19	<i>Cassia absus</i>	Herb	Fabaceae	Locally abundant	Nonspecific
20	<i>Catunaregam spinosa</i>	Shrub	Rubiaceae	Occasional	Nonspecific
21	<i>Chukrasia tabularis</i>	Tree	Meliaceae	Rare	Top hill
22	<i>Cissus quadrangularis</i>	Climber	Vitaceae	Common	Nonspecific
23	<i>Cleome viscosa</i>	Herb	Capparaceae	Locally abundant	Foot hill
24	<i>Coccinia grandis</i>	Climber	Cucurbitaceae	Common	Nonspecific
25	<i>Commelina benghalensis</i>	Herb	Commelinaceae	Locally abundant	Nonspecific
26	<i>Crotalaria evolvuloides</i>	Herb	Fabaceae	Common	Nonspecific
27	<i>Croton bonplandianus</i>	Herb	Euphorbiaceae	Locally abundant	Foot hill
28	<i>Ctenolepis garcinii</i>	Climber	Cucurbitaceae	Occasional	On trees
29	<i>Cymbopogon citratus</i>	Grass	Poaceae	Abundant	Slope
30	<i>Dalbergia coromandeliana</i>	Tree	Fabaceae	Common	Slope
31	<i>Delonix regia</i>	Tree	Fabaceae	Rare	Foot hill
32	<i>Dolichandrone atrovirens</i>	Tree	Bignoniaceae	Rare	Foot hill
33	<i>Ehretia laevis</i>	Tree	Boraginaceae	Occasional	Slope

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
34	<i>Eragrostiella bifaria</i>	Grass	Poaceae	Abundant	Foot hill/Flat land
35	<i>Euphorbia antiquorum</i>	Tree	Euphorbiaceae.	Abundant	Between rock
36	<i>Euphorbia hirta</i>	Herb	Euphorbiaceae	Occasional	Nonspecific
37	<i>Evolvulus alsinoides</i>	Herb	Convolvulaceae	Common	Nonspecific
38	<i>Evolvulus nummularius</i>	Herb	Convolvulaceae	Occasional	Nonspecific
39	<i>Ficus benghalensis</i>	Tree	Moraceae	Rare	On rock
40	<i>Ficus mollis</i>	Tree	Moraceae	Occasional	On rock
41	<i>Flueggea leucopyrus</i>	Shrub	Phyllanthaceae	Occasional	Nonspecific
42	<i>Galactia tenuiflora</i>	Herb	Fabaceae	Locally abundant	Nonspecific
43	<i>Haldina cordifolia</i>	Tree	Rubiaceae	Rare	Flat land
44	<i>Hemidesmus indicus var. pubescens</i>	Climber	Apocynaceae	Rare	On trees
45	<i>Heteropogon contortus</i>	Grass	Poaceae	Locally abundant	Nonspecific
46	<i>Hybanthus enneospermis</i>	Herb	Violaceae	Occasional	Nonspecific
47	<i>Ichnocarpus frutescens</i>	Climber	Apocynaceae	Occasional	Top hill
48	<i>Indigofera aspalathoides</i>	Herb	Fabaceae	Occasional	Top hill
49	<i>Indigofera linnaei</i>	Herb	Fabaceae	Common	Nonspecific
50	<i>Lawsonia inermis</i>	Shrub	Lythraceae	Rare	Water bund
51	<i>Leucaena leucocephala</i>	Tree	Fabaceae	Occasional	Foot hill
52	<i>Leucas aspera</i>	Herb	Lamiaceae	Common	Foot hill
53	<i>Mollugo nudicaulis</i>	Herb	Molluginaceae	Occasional	Nonspecific
54	<i>Morinda tinctoria</i>	Tree	Rubiaceae	Rare	Nonspecific
55	<i>Mukia maderaspatana</i>	Climber	Cucurbitaceae	Occasional	On trees
56	<i>Ocimum americanum</i>	Herb	Lamiaceae	Common	Nonspecific
57	<i>Ocimum basilicum</i>	Herb	Lamiaceae	Common	Foot hill
58	<i>Oldenlandia umbellata</i>	Herb	Rubiaceae	Common	Nonspecific
59	<i>Passiflora foetida</i>	Climber	Passifloraceae	Common	On trees
60	<i>Pavonia zeylonica</i>	Shrub	Malvaceae	Common	All over
61	<i>Pedaliium murex L.</i>	Herb	Pedaliaceae	Occasional	Foot hill
62	<i>Pergularia daemia</i>	Climber	Apocynaceae	Occasional	Nonspecific
63	<i>Phyllanthus maderaspatensis</i>	Herb	Euphorbiaceae	Occasional	Foot hill
64	<i>Physalis minima</i>	Herb	Solanaceae	Occasional	Nonspecific
65	<i>Pithecellobium dulce</i>	Tree	Fabaceae	Rare	Slope
66	<i>Prosopis juliflora</i>	Tree	Fabaceae	Locally abundant	Foot hill
67	<i>Scilla indica</i>	Herb	Asparagaceae	Locally abundant	Top hill
68	<i>Senna auriculata</i>	Shrub	Fabaceae	Occasional	Between rock
69	<i>Sida acuta</i>	Shrub	Malvaceae	Locally abundant	Foot hill
70	<i>Sida cordata</i>	Shrub	Malvaceae	Locally abundant	Foot hill
71	<i>Solanum nigrum</i>	Herb	Solanaceae	Occasional	Nonspecific
72	<i>Tephrosia maxima</i>	Shrub	Fabaceae	Common	Nonspecific
73	<i>Tephrosia purpurea</i>	Shrub	Fabaceae	Common	Nonspecific
74	<i>Tephrosia villosa</i>	Shrub	Fabaceae	Occasional	Foot hill
75	<i>Tithonia diversifolia</i>	Shrub	Asteraceae	Occasional	Foot hill

S.No.	Binomial Name	Habit	Family	Status/Frequent	Ecological Info
76	<i>Tribulus terrestris</i>	Herb	Zygophyllaceae	Occasional	Foot hill
77	<i>Trichodesma indicum</i>	Herb	Boraginaceae	Occasional	Nonspecific
78	<i>Tridax procumbens</i>	Herb	Asteraceae	Occasional	Foot hill
79	<i>Vernonia cinerea</i>	Shrub	Asteraceae	Abundant	All over
80	<i>Vicoa indica</i>	Herb	Asteraceae	Abundant	All over
81	<i>Vigna trilobata</i>	Climber	Fabaceae	Rare	Foot hill
82	<i>Waltheria indica</i>	Shrub	Malvaceae	Abundant	Foot hill
83	<i>Wattakaka volubilis</i>	Climber	Apocynaceae	Rare	Nonspecific
84	<i>Xanthium strumarium</i>	Shrub	Asteraceae	Occasional	Foot hill
85	<i>Ziziphus mauritiana</i>	Tree	Rhamnaceae	Occasional	Nonspecific
86	<i>Ziziphus xylopyrus</i>	Tree	Rhamnaceae	Occasional	Slope

Table 12.15: Flora Details of Muthukudi

Breakup of Species	Numbers of species	Number of Rare or Occasional species	Number of Common or Abundant species	% Rare or Occasional species
Tree	17	14	3	82%
Shrubs	20	9	11	45%
Climbers & Stragglers	10	7	3	70%
Herbs, Grasses, Ferns	39	15	24	38%
Total Number of Species	86	45	41	52%

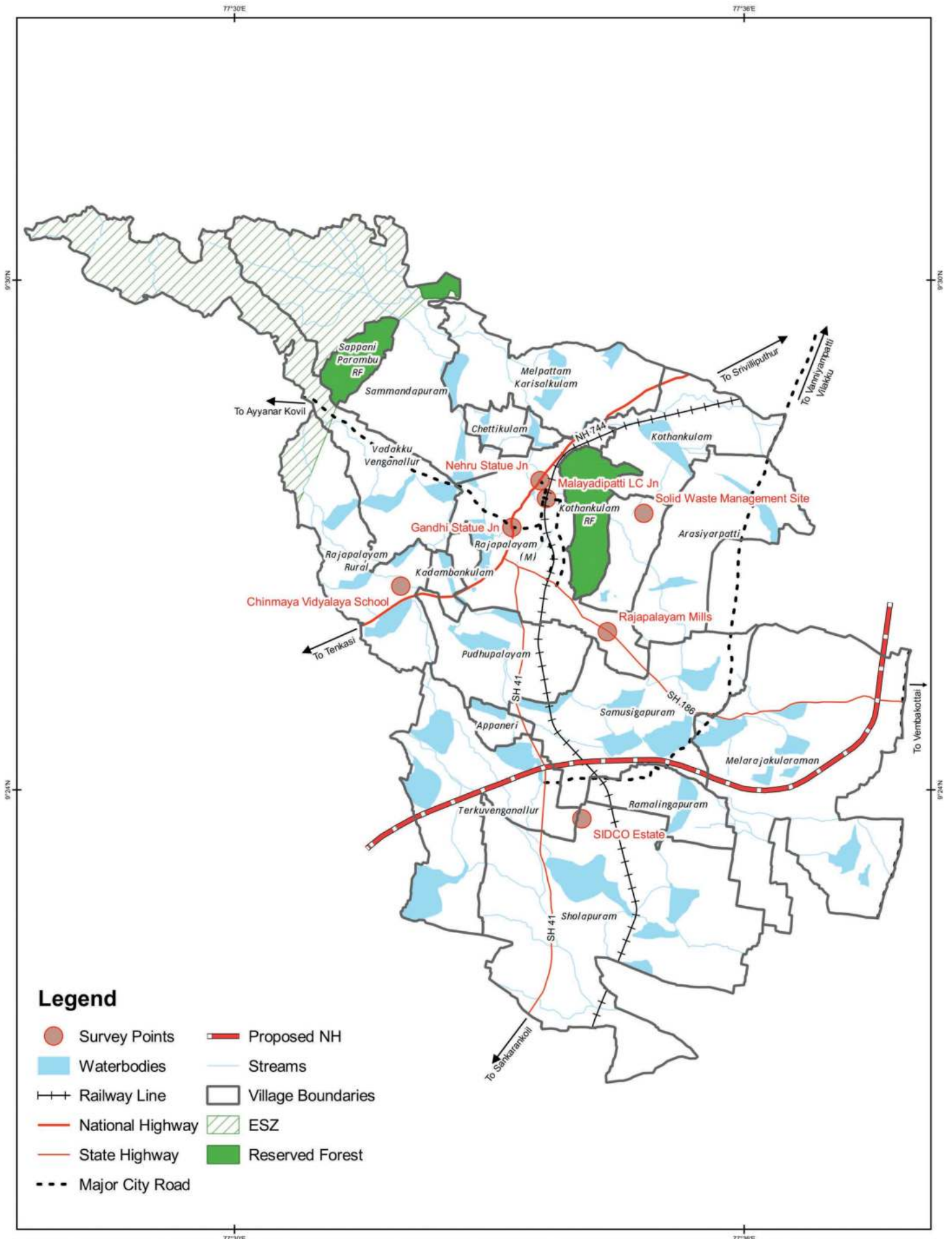
12.6 Pollution

12.6.1. Air Pollution

According to the Initial Environmental Examination draft report prepared by TWAD on behalf of Rajapalayam Municipality, an examination of air pollutants at three locations within the town in 2016-17, indicate that oxides of sulphur and nitrogen concentrations were in the range of 8.8-10.9 $\mu\text{g}/\text{m}^3$ 20.2-24 $\mu\text{g}/\text{m}^3$ respectively, well below the accepted standards. The average particulate matter (PM10) concentrations ranging between 66-71.5 $\mu\text{g}/\text{m}^3$, were higher than the standard concentration of 60 $\mu\text{g}/\text{m}^3$. Green House Gas (GHG) emission for Rajapalayam as listed in the Data Portal for Cities, was 37,153 Ton Co2e. The per capita GHG emission stood at 0.285 Ton Co2e, considering a total population of 1.3 lakhs. It is important to study in detail the GHG emission data for the region of Rajapalayam to make it a sustainable community in the future.

Current Status

Secondary data was collected from the Pollution Control Board. Primary data was gathered from the LPA from 7 different locations. Locations 1-3 were from traffic congestion areas. Location 4 was from the municipal dump yard. Location 5 from the industrial estate. Location 6 from a school in a rural setting – to act as a control and Location 7 was from one of the town's industries (**Map 12.16**).



Legend

- Survey Points
- Waterbodies
- Streams
- Railway Line
- Village Boundaries
- National Highway
- State Highway
- Major City Road
- ESZ
- Reserved Forest

Air Pollution Assessment for Rajapalayam LPA	Notes	Data Credits Field Survey, Auroville Botanical Gardens Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		 CRS : WGS 1984

Map 12.16: Sample Locations for Air Quality Assessment

All of the parameters came back as below the maximum limits. The only tests that were close to the maximums were for both of the particulate matter categories, and these were highest for the 3 traffic hotspots and the municipal dump yard (**Table 12.16**). Thus, we can conclude that at the present time there are no concerns with regard to air pollution in the town.

Table 12.16: **Air Pollution Status in Rajapalayam**

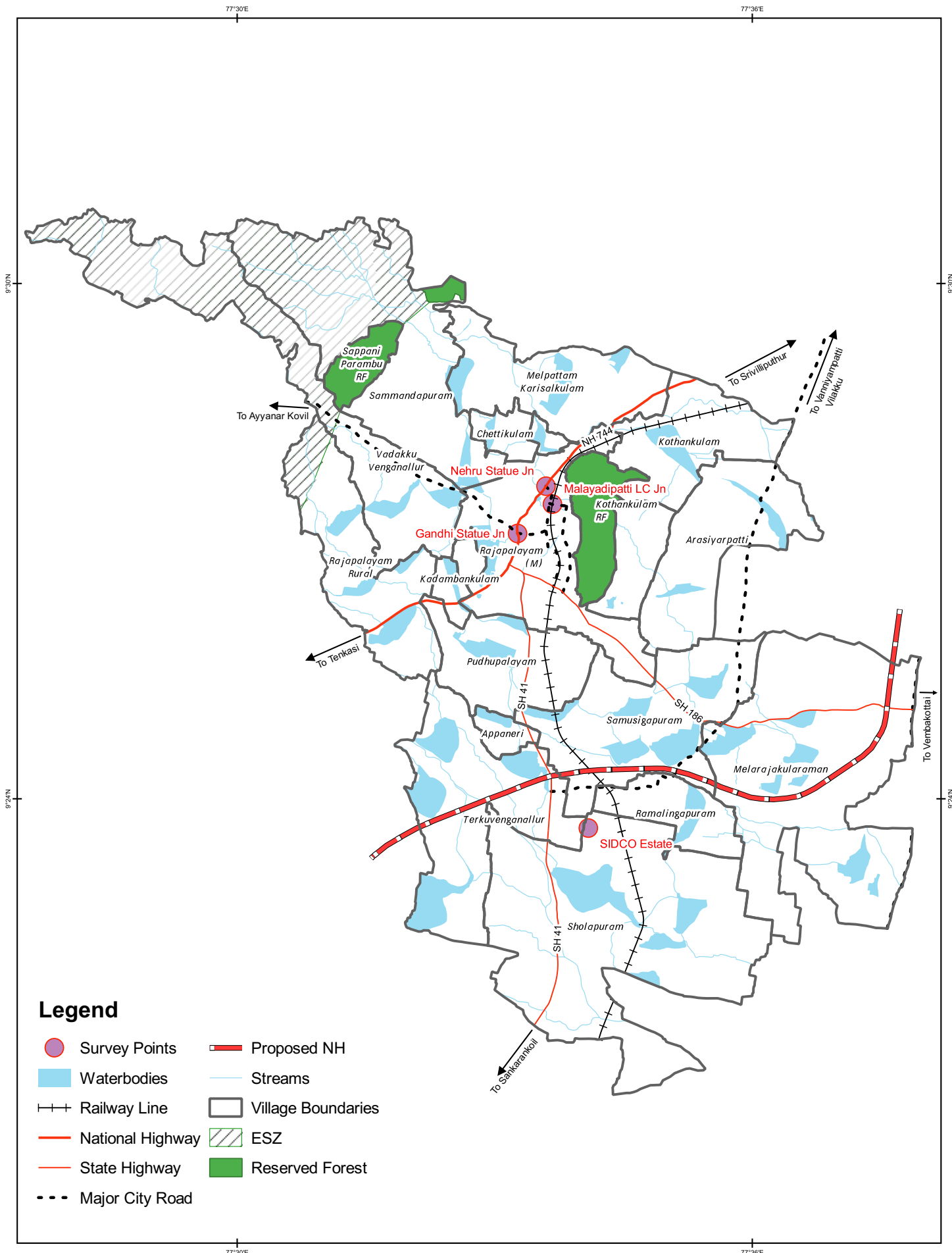
Name of the test	Units	Max	1	2	3	4	5	6	7	Comment
Ammonia	ug/m ³	100	<5	<5	<5	26.7	<5	16.9	8.8	Majority of Sites at less than Threshold Value. One site at 25% Max Limit
Arsenic	ug/m ³	6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	All sites less than threshold value
Benzene	ug/m ³	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	All sites less than threshold value
Benzo(a)Pyrene	ug/m ³	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	All sites less than threshold value
Carbon Monoxide	ug/m ³	2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	All sites less than threshold value
Lead	ug/m ³	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	All sites less than threshold value
Nickel	ug/m ³	20	<1	<1	<1	<1	<1	<1	<1	All sites less than threshold value
Oxidants	ug/m ³	100	<10	<10	<10	<10	<10	<10	<10	All sites less than threshold value
Oxides of Nitrogen	ug/m ³	40	21.7	14	17	20.1	17	15	24.2	All sites less than threshold value
PM 10	ug/m ³	60	54.5	58	56.5	58.7	42.2	43.2	46.7	All sites less than threshold value
PM 2.5	ug/m ³	40	30.7	32.2	31.5	30.2	19.5	28.2	23.5	All sites less than threshold value
Sulphur Dioxide	ug/m ³	50	13.1	12.9	16.3	15.2	15.5	10.1	13.7	Most Sites at 75% of max limit
Average Air Quality Index	-		55	58	57	59	42	46	47	

Max	Max Annual Average Limits of NAAQs
1	Gandhi Statue Junction
2	Nehru Statue Junction
3	Railway Crossing
4	Solid Waste Management Site
5	SIDCO Industrial Estate
6	Chinmaya Vidyalaya School
7	Rajapalayam Mills Near Gate

12.6.2. Noise Pollution

Current Status

Secondary data was collected from the Pollution Control Board. Primary data was gathered in the LPA from 4 different locations (**Map 12.17**). Locations 1-3 were from traffic congestion areas. Location 4 was from the industrial estate. The noise pollution level for all of the traffic hotspots was above the maximum permitted levels (**Table 12.17**). Note that the decibel scale (**Fig. 12.16**) is logarithmic and consequently if the value is 10 points higher than the permitted level, it is 10 times louder than it should be. At all of the traffic junctions we have noise limits that are 10 to 20 times louder than should be allowed in a commercial zone. Consequently, remedial measures are required to return to ambient noise levels suitable for the long-term health of the residents.



Legend

- Survey Points
- Waterbodies
- Streams
- Railway Line
- Village Boundaries
- National Highway
- State Highway
- Major City Road
- ESZ
- Reserved Forest
- Proposed NH

<p>Noise Pollution Assessment for Rajapalayam LPA</p>	<p>Notes</p>	<p>Data Credits Field Survey, Auroville Botanical Gardens</p>
<p>AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area</p>	<p>Client DTCP Virudhunagar</p>	<p>Prepared By Tapasya Design Studio, Auroville</p>



Map 12.17: Sample Locations for Noise Quality Assessment

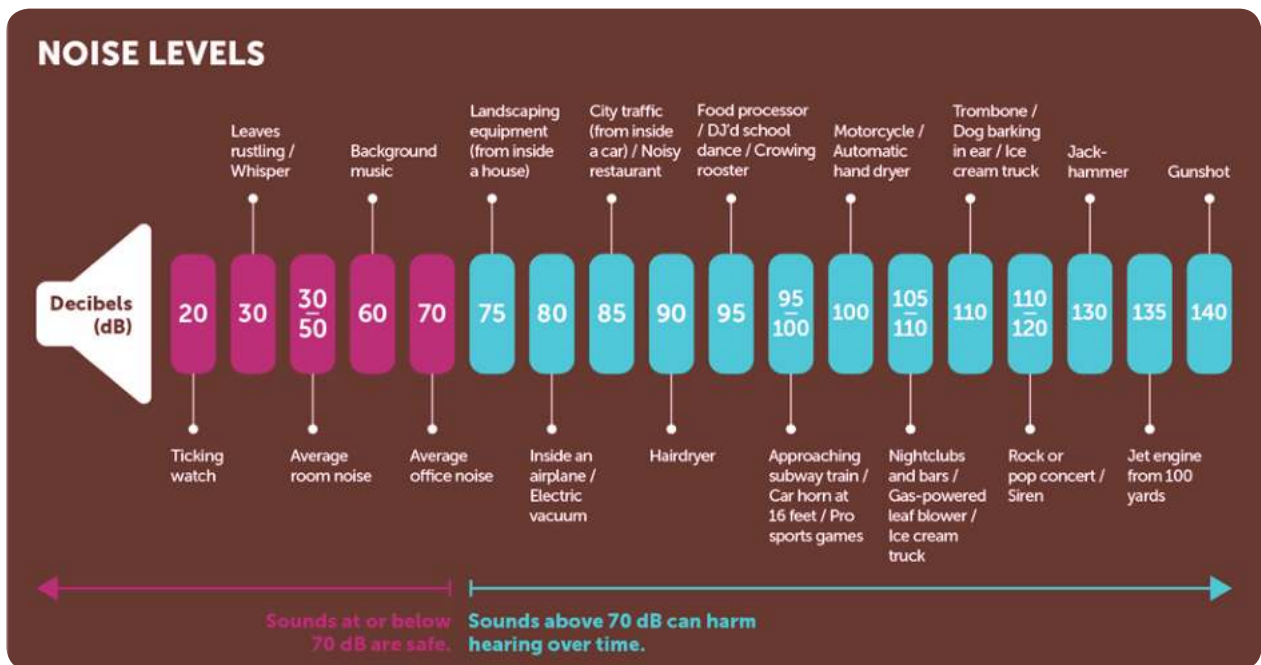
Table 12.17: Noise Pollution Status in the Rajapalayam

Monitoring Time	Nehru Statue Junction			Gandhi Statue Junction			Railway Crossing			SIDCO Industrial Estate		
	MIN	MAX	LEQUI	MIN	MAX	LEQUI	MIN	MAX	LEQUI	MIN	MAX	LEQUI
10 AM - 11 AM	67.3	75	72	76.5	85.6	82.6	64.4	77.9	74.9	49.9	57.6	54.6
11 AM - 12 PM	63.2	100	84.6	72.5	79.4	76.4	61.7	76	73	62.4	74.5	71.5
12 PM - 1 PM	63.4	78.3	75.3	79.3	96.4	84.5	56.1	69.7	66.7	53.6	63.8	60.8
1 PM - 2 PM	64.9	78.7	75.7	69.2	83.5	80.5	66.4	104.8	82.6	46.9	62	59
2 PM - 3 PM	72.3	106.3	85.3	70.5	104.3	87.4	67.8	94.3	84.1	45.3	57.8	54.8
3 PM - 4 PM	64.8	95.7	83.3	68.2	105	83.6	59.4	102.2	83.8	46.6	55.2	52.2
4 PM - 5 PM	69.1	78.1	75.1	63.2	98	83.6	59.4	74.1	71.1	56.1	72.8	69.8
5PM - 6 PM				78.5	99.5	85.5	62.3	95.6	82	55.7	68	65

DAY TIME LIMIT	Db(A) Leq
SILENCE ZONE	50
RESIDENTIAL	55
COMMERCIAL	65
INDUSTRIAL	75

	Above acceptable Threshold
	Within acceptable Threshold

Fig 12.16: Decibel Scale for Noise Levels



12.7

Key Issues

12.7.1. Issues Related to Biodiversity

The biodiversity found in and around Rajapalayam is one of the unique features of the LPA. The proximity to the Western Ghats and the large number of irrigation tanks makes this area resplendent with many types of animal life – those of the forest and also of the skies. Great efforts have to be made in the local community to create awareness and protect the habitats on the western side of the planning area, and it is imperative that these areas continue to receive the support required against constant developmental pressures as the collective loss would be substantial. Aside from the eco-sensitive areas near the Western Ghats, there are other areas in the LPA that have degraded ecosystems.

12.7.2. Risk of Degradation of Sanjeevi Malai (Kothankulam RF)

Sanjeevi Malai, also known as Kothankulam RF, lies adjacent to Rajapalayam town. Some of the challenges specific to this RF are:

Forest Fires

The canopy in many places in Sanjeevi Malai is open, and there are large areas that have been colonized by *Cymbopogon citrate* - lemongrass, which has significant consequences for the ecosystem as it then becomes highly susceptible to fire due to the high oil content of the grass leaves. This can become a negative loop as an increase in the frequency of fire also leads to further degradation of the remaining canopy cover and a greater presence of the lemon grass. At present the hill is vulnerable to seasonal fire events, which will further degrade the forest over time if left uncontrolled. The start of the fire season comes at some point in February, as the lemon grass dries out. The threat remains until the middle of the summer monsoon when fresh grass growth becomes predominant. Restoration of the forest on the hill with native species will decrease fire risk and increase water absorption capacity – reducing also storm water flow. These forest fires become a great danger especially on the western side, where there are a high density of settlements and slums.

Dwindling Population of Certain Species

As the forest areas become degraded the populations of the more sensitive species of flora dwindle. This has been clearly demonstrated with the vegetation survey on Sanjeevi Malai, where the majority of the tree species are found in very small numbers, and in some cases, they are reduced to a remnant population of one or two. This fact coupled with the intense pressures noted above, such as fire and grazing means that these species will become locally extinct in the near future. Again, with respect to Sanjeevi Malai, the evidence points to the fact that there was originally a predominantly evergreen forest on the top of the

hills, and this evergreen canopy would have created its own microclimate, which would be much less harsh than the current situation where the tops of the hill are covered in lemongrass.

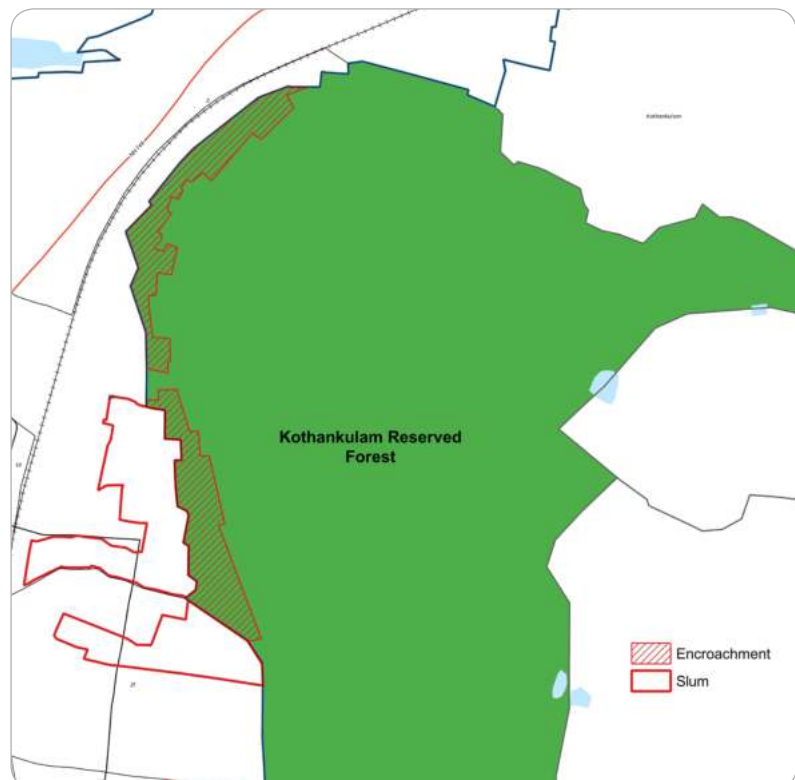
Grazing in Sanjeevi Malai (Kothankulam RF)

Grazing of domestic animals is a major issue. There are approximately 700 goats grazing on the hill, as well as domestic cattle. Consequently, the understory or underlying layer of vegetation of the forest is highly impacted where the animals can penetrate. This is preventing the natural regeneration of trees and shrubs, and gradually the forest is becoming more impoverished. Uncontrolled grazing is observed in Sanjeevi Malai (Kothankulam RF) leading to degradation of forest land cover. As per Forest Act 1927, grazing activity is prohibited in Reserved Forests.

Encroachment

Encroachment due to urban expansion is a threat to the Sanjeevi Malai, with settlements and slums slowly expanding onto the foothills of the hill, which is designated Reserved Forest (Fig. 12.17). Due to the proximity of such unregulated slums, the threat of forest fire has the potential to spread into the urban areas, with potential loss of life and damage to property. The occurrence of forest fires in this range is also a threat to human settlements. It is important to recognize this division in land ownership in the future, when considering potential schemes to rehabilitate the hill. Additionally, the future of the slum areas also needs to be factored in.

Fig 12.17: Encroachment of Human Settlements on Sanjeevi Malai (Kothankulam RF)



Storm Water Drain

Channelling of the storm water that comes off the hill, and down through the developed areas is a major challenge (**Fig. 12.14**).

This is to an extent dealt with in the west, with storm drains, but without a similar system to the east problems will develop.

This is exacerbated by the fact that on the eastern slopes of the hills there are large areas with sheet rock, which have very little absorption capacity. Additionally on the eastern side, the original waterways are becoming raised roads, which are already causing problems during heavy rain events as there is no easy passage for the excess water to move between the lakes once they are full.

12.7.3. Risk of Degradation of Sappani Parambu RF

Sappani Parambu RF lies within the Eco-Sensitive Zone in the LPA. Some of the challenges specific to this RF are:

Encroachment

Encroachment and continued urban expansion are a threat to both Sanjeevi Malai and also Sappani Parambu. As human habitation pushes right up against the borders of the forest, a number of inherent activities come to plague the forest areas. There is dumping of solid waste in the forests, open defecation, penning of domestic animals, and certain activities such as drinking, gambling and prostitution. All of these activities impact the wildlife as the animals will shy away from the areas where humans are active. This is especially pertinent with respect to Sappani Parambu where there is currently a presence in the forest of large mammals such as deer and bear, as well as important reptiles such as the Indian python. If the development to the forest limits is inevitable and unstoppable, then the only way to deal with it is through education and public awareness programs.

Community Engagement

The absence of mechanisms for community involvement in managing the areas, is perhaps the most important issue to address so that in the long term the local members of the community can channel their energies towards the protection and restoration of the environment in the Rajapalayam area. The town has many local experts, and there is interest across the generations, with a number of extremely talented and knowledgeable youngsters present. They have been guided and taught by others in the town that are more senior to them and that have extensive knowledge of species and ecology. It is these people who have the knowledge and passion required for the protection of the biodiversity in the area; it is important that they are empowered to work with the various government departments who are responsible for the natural areas of the planning area. It is only when collaboration is in place that useful and innovative work can occur.

Human-Animal Conflict

Human/Animal conflicts are inevitable in this kind of area. When local farmers are losing their crops to the animals, resentment builds up. In the Rajapalayam area, only losses to elephants are recompensed, whilst that from wild boar is not. This leads to farmers resorting to poisoning and traps to try and deter the boar, which has detrimental impacts on all types of wildlife. Recognition of the farmer's plight and a widening of the compensation scheme would help to diffuse the situation.

Poaching of Wild Animals

Poaching of wild animals is a continual problem; the forest department has limited resources to deal with this and is often ineffective.

12.7.4. Threat to Eco-Sensitive Zones

The Ministry of Environment, Forests and Climate Change issued a notification on 09.07.2018, declaring an area between 0-6.2 km from the boundary of the Srivilliputhur Grizzled Squirrel Wildlife Sanctuary as Eco-Sensitive Zone. This wildlife sanctuary was later upgraded into Srivilliputhur Megamalai Tiger Reserve (SMTR). The eco-sensitive zone to the west of the planning area is currently intact to an extent to perform the envisaged role that such an area should provide. However, pig farming in that areas has been polluting water bodies that, for centuries have served the wildlife of the area, and the clearing of scrub lands in the foothills for intensive agricultural developments is reducing the possibilities for the eco-sensitive zone to serve its function as a buffer for the sanctuary. It is important the regulations in place are adhered to and that community involvement in the protection of the area is encouraged.

12.7.5. Issues Related to Eco-Tourism in SMTR

Presently the ecotourism programme of SMTR has several issues and problems which may pose hindrance in achieving the objectives of ecotourism:

- Absence of mechanisms for active involvement of local community in ecotourism activities: Although the local populace benefit from the tourism activities carried out in and around SMTR, there is currently no institutional mechanism to actively involve the local community in the ecotourism activities. Eco-Tourism Development Committees (ETDC) which were created in few places like Suruli falls, Ayyanar temple, etc. needs to be upscaled to serve the entire reserve.
- Absence of alternative ecotourism activity: The only component of ecotourism inside SMTR is that related to pilgrimage tourism. There is a need to shift focus to alternative tourism activities such as nature trails, trekking, boating, cycling, bullock cart tourism, nature conservancies, etc.

- Presence of high impact tourism activities (pilgrimage activities) in the core areas has high adverse impact to the environment. Also there exists no compensatory provisions such as environment cess to mitigate these impacts such as pollution and habitat degradation. Such impacts reduce the values of ecotourism in the reserve in terms of visitor experience and human footprints.
- Absence of functioning interpretation programme: One of the primary goals of ecotourism is to provide near natural experience and gratification to the visitors through an active education and interpretation programme. Presently there is no functioning Interpretation Centre in SMTR.
- Absence of marketing strategy optimize the potential of the region as a tourist attraction.
- Absence of research on tourism activities and tourists: It is imperative to understand the consumers i.e., tourists. There is a dearth of scientific knowledge on the purpose, expectations, satisfaction level and results of visit to SMTR. There has been no mechanism to collect these data through surveys and studies in the reserve.
- Dearth of Human Resource: Presently, the frontline protection staff are given the additional responsibility of managing tourism activities. Absence of dedicated staff for ecotourism activities is one of the main reasons for non-realization of tourism potential of SMTR. There are no institutional provisions to involve the local community as human resource such as nature guides for managing tourism activity.

12.7.6. Risk of Invasive Plant Species

Within the LPA there are over 50+ non-native or exotic species, some of these have the potential to be an invasive threat, either in agricultural lands, on waste lands, within the forest areas or in water bodies. Of these species, 11 are currently a nuisance within the LPA. Within the Reserved Forest, the majority of the trees are all of small stature and indicative of a secondary growth forest. Thus, the general state of the natural forest areas in the LPA is that of degradation, with the predominance of species associated with disturbance and recolonization. The tanks were also found to have the presence of invasive species such as water hyacinth and *Ipomoea carnea*.

12.7.7. Pollution in Surface Water Bodies

Pollution of water bodies due to effluent inflow from urban developments

Over the past 60 years Kondaneri Kanmai, the lake on the western side of Rajapalayam has slowly been polluted by the increasing nutrient loads that are entering the lake through the storm water drains that run through the town. At present Kondaneri Kanmai and the channel that connects to Periyadhikulam are stinking and black in colour – a seemingly irreversible situation, without

a major collaboration between a number of departments and the local residents. The contamination in the surface water bodies is evident from the analyzed water samples surrounding Rajapalayam municipal area. Periyadhikulam (near new bus stand), Puliyanikulam, Kondaneri Kanmai and Vagaikulam were highly contaminated with high turbidity, mineralization, and odour indicating the water is not potable. However, with the rapid pace of urban expansion to the east of Sanjeevi Malai, there are an increasing number of tanks that will be rapidly polluted in the next few years unless solutions are developed to control the inflow of polluted water from households.

For Kondaneri Kanmai, there is hope as the Underground Sewage System (UGSS) that is currently being constructed offers the possibility that much of the grey water currently being dumped into the open storm water channels will be redirected to the treatment plant; this will drastically reduce the nutrient load entering the lake. This is a timely intervention that will give a restoration project for the lake a great chance of success. However, for all the other lakes that have urban development expanding in their upper catchments the future may well be bleak, unless an innovative approach can be found to deal with these localized developments that have the potential to greatly damage these valuable water resources, both with respect to agricultural resources, as well as ground water recharge points.

Solid Waste dumping in the lakes

In many of the lakes within the LPA the dumping of solid waste is a major challenge. There are two main categories of waste being dumped:

- Non-organic household waste that has no resale value and is consequently non-recyclable. In many of the surrounding villages, there is no garbage collection, and so inevitably this waste ends up being dumped in peripheral locations, often in the flood areas of the lakes. Additionally, some municipal waste ends up in the tanks, as the collectors find it easier to dump the waste in these locations, rather than taking it to the official segregation yards (**Fig. 2.18**). Invasive water hyacinth and unregulated dumping of solid waste leads to degradation of tanks in the vicinity of the urban areas.
- Construction rubble is also dumped in the tanks, which in the long-term will led to encroachment into these areas – reducing the water holding capacity of the tanks. The reduction in capacity of the tanks is detrimental for agricultural irrigation, for ground water recharge and also for flood management in high rainfall years. The construction waste is dumped within the water channels creates potential flooding problems during heavy rain events – which are predicted to increase as a result of climate change.

Fig 12.18: **Waste Dumping in Water Bodies**



Encroachment of water channels

In many areas, encroachment of the water channel by plantations and the creation of ad hoc bridges to allow access to farmlands has reduced the efficiency of the water flow into and between tanks. There is also localized flooding due to the blockages, as well as erosion of patta lands, when the waters are redirected.

Other Risks

Surface runoff in newly developing urban areas, with particular reference to the east of Sanjeevi Malai. Roads have been formed in the water channels. Once these roads are made permanent with macadam or concrete the water flow becomes greatly impaired, with the subsequent flooding of residences in the areas becoming a major problem.

Climate change will also impact the surface water lakes, as there is an increase in intensity of rainfall events. This could actually be a boon for the area, if the lakes and channels are in good condition, as they will be highly suited to containing the additional water.

12.7.8. Issues Related to Quality of Ground Water

Based on the field survey The following issues are observed in the quality of underground water in the LPA:

- The electrical conductivity map of the LPA shows higher values than the permissible limit of BIS standards ($< 2,250 \mu\text{S}/\text{cm}$) in the southern part of the LPA, consisting of Sholapuram, Ramalingapuram and Melarajakularaman revenue villages.
- The nitrate concentration of the LPA proves the presence of higher values than the permissible limit (BIS standard $< 45 \text{ mg}/\text{L}$) in few spots in Terkuvenganallur and Sholapuram. In general, the water in the southern part of LPA shows nitrate concentration breaching the permissible level of around $45 \text{ mg}/\text{L}$.
- The fluoride content in the water samples, while within permissible limits in general, high concentrations are found in the southern part of the LPA.
- Total dissolved solids (TDS) mg/l for the study area shows higher concentration of TDS (BIS standard 500 to $2,000 \text{ mg}/\text{L}$), beyond the permissible limit in Sholapuram, Ramalingapuram and Melrajakularaman revenue villages within the LPA.
- General observation from analyzed values, with spatial representation indicates that the underground water in the southern part of the LPA has been impacted by pollution.
- The Dynamic Groundwater Resources Assessment of India assessed the ground water resources periodically based on firkas. Among 3 Firkas in the LPA, Rajapalayam firka was categorized as “over-exploited” in the year 2011, as “semi-critical” in the year 2013 and once again as “over-exploited” in the year 2017. Iyankollankondan firka was categorized in “semi-critical” in 2013 and 2017. Sholapuram firka is categorized as “over-exploited” both in the years 2013 and 2017.
- Sholapuram firka, based on the Dynamic Groundwater Resources Assessment, is found to be over drafting water resource as much as 152% above the net groundwater available and is classified as “over-exploited” category in the LPA. Iyankollankondan also falls marginally under “semi-critical” category, with stage of ground water development being listed at 71%. In case of Rajapalayam firka, the stage of ground water development has moved from “over-exploited” to “semi-critical” in due course of time. Micro-level studies pertaining Sholapuram firka should be undertaken to avoid further deterioration.
- Due to the absence of underground drainage, the sewage and industrial waste are diverted to the nearest open water bodies which contaminates the surface water body, which in turn contaminates the sub-surface or groundwater. It is evident from the analyzed results, that the surface water bodies connected with sewage were turbid. The tank near new bus stand has high COD, traces

of heavy metals including zinc, lead and the color of water is black, with higher turbidity than rest of the water samples in the LPA.

12.7.9. Recharge Capacity

It can be observed from recharge map (**Map 12.18**) of the LPA, that the recharge capacity of the southern parts of LPA, especially in Sholapuram, Melarajakularaman, Arasiyarpatti and the southern parts of Sammandapuram, is classified as moderate to poor.

Artificial recharge zone map is generated in GIS with the geology, geomorphology, land use/ land cover, drainage and surface water body maps. In addition to that water level and weathered zone thickness maps prepared using samples from wells and ground water monitoring wells were used. Weightage was assigned for each thematic layer and its classes. High priorities with higher weightage are given to geomorphology and geology layers as it plays a vital role in ground water recharge. All the layers were integrated, based on their weightages, spatially in GIS environment using overlay index model. The results are classified into three categories/zone as Poor, Moderate, Good.

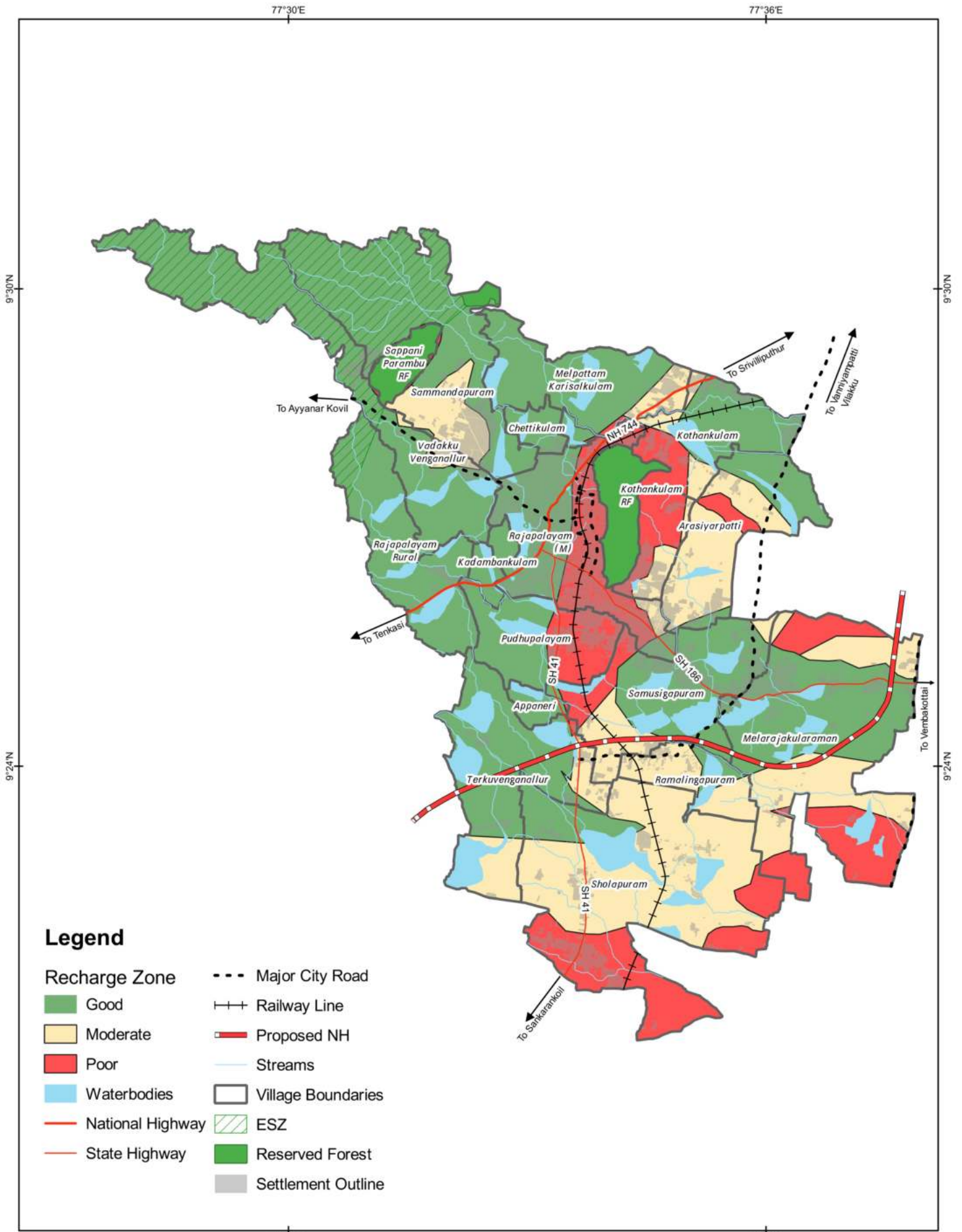
12.7.10. Noise Pollution

Based on the data collected from the Pollution Control Board and field study in different locations of Rajapalayam, the noise pollution level for all the traffic hotspots is noted to be above the maximum permitted levels. At all of the traffic junctions, we have noise limits that are 10 to 20 times louder than should be allowed in a commercial zone.

12.7.11. Drought Vulnerability

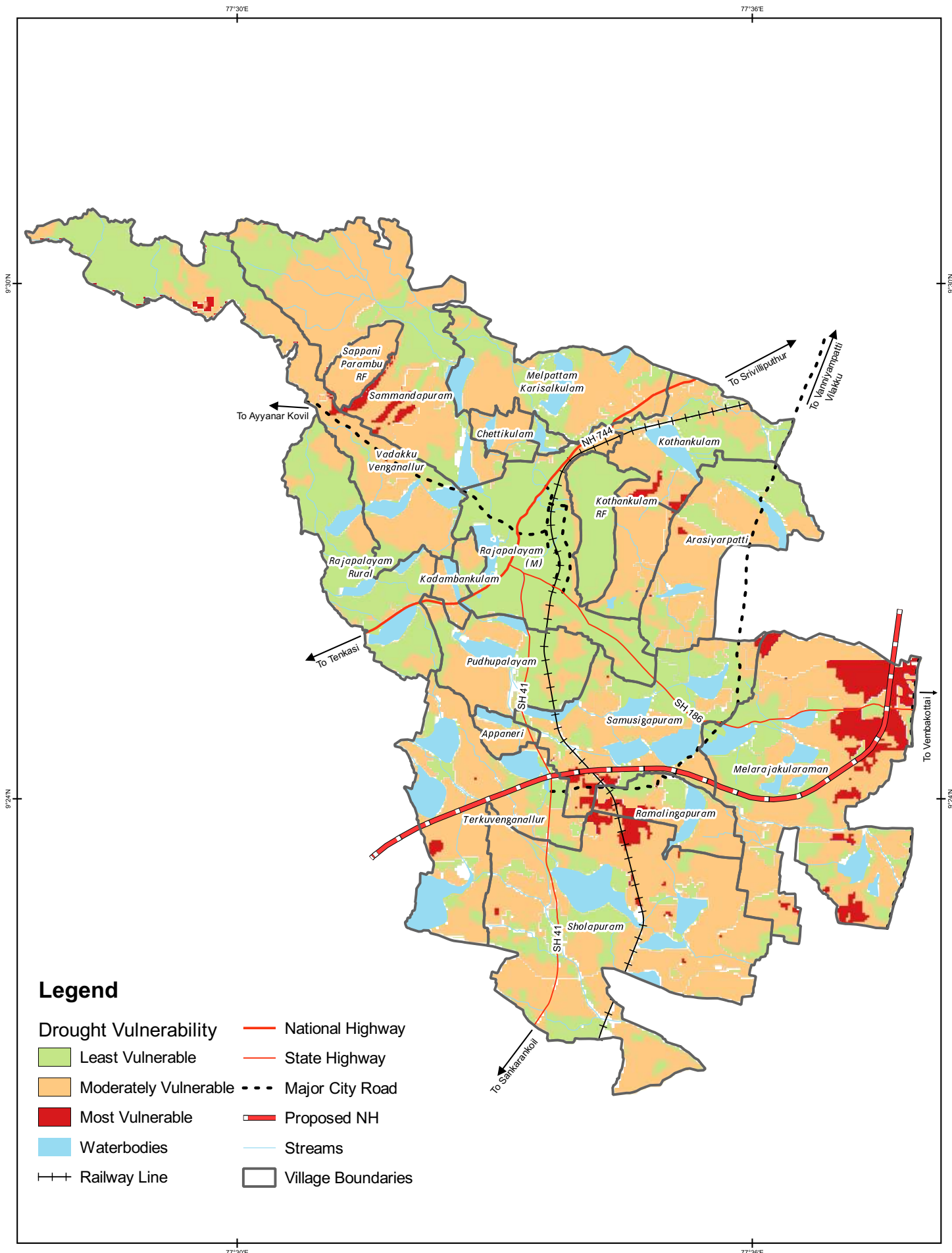
Rajapalayam LPA was one of the places heavily affected by the drought in 2016. Although the socio-economic impact might be minimal, such instances of drought coupled with the relatively lower agricultural workforce participation of 16.07% (of total workforce) will have a heavy impact on environmental balance and food security issues. Climate change projections for the district of Virudhunagar, prepared by the Government of Tamil Nadu in collaboration with Anna University projects an increase in temperature of up to 2°C by 2050; this will also have an impact on drought vulnerability.

To understand the vulnerability of the LPA to drought, multiple parameters of Rajapalayam LPA were taken into consideration and assessed to create a drought vulnerability map (**Map 12.19**). As shown in the map, the most vulnerable areas are found in parts of Melarajakularaman, Chathrapatti, Ramalingapuram and Sholapuram. The least affected areas include parts of Rajapalayam Rural, Pudhupalayam and ESZ of Vadakku Venganallur.



Ground Water Recharge Zones in Rajapalayam LPA	Notes	Data Credits Field Survey, GeTS Consultants	  CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 12.18: Ground Water Recharge Zones in Rajapalayam LPA



Drought Vulnerability Assessment for Rajapalayam LPA

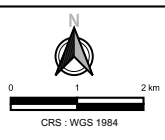
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area

Notes
The Drought Vulnerability is performed using Weighted Multivariate Index Analysis in GIS

Data Credits
Field Survey, SRTM DEM, Landsat 8, Datasets from GSI, TNAU, IGC

Client
DTCP Virudhunagar

Prepared By
Tapasya Design Studio, Auroville



Map 12.19: Drought Vulnerability Map of Rajapalayam LPA



Administration & Governance

13

13.1 Administrative Setup

Rajapalayam is located in the district of Virudhunagar. Virudhunagar district has 3 revenue divisions, namely, Aruppukottai, Sivakasi and Sattur. These 3 revenue divisions are further sub-divided into 10 taluks, namely, Virudhunagar, Aruppukottai, Kariapatti, Tiruchuli, Sivakasi, Srivilliputhur, Wataraiippu, Sattur, Vembakottai and Rajapalayam (**Table 13.1**). All these revenue taluks have been established as individual blocks.

Table 13.1: **Administrative Setup of Rajapalayam in Virudhunagar District**

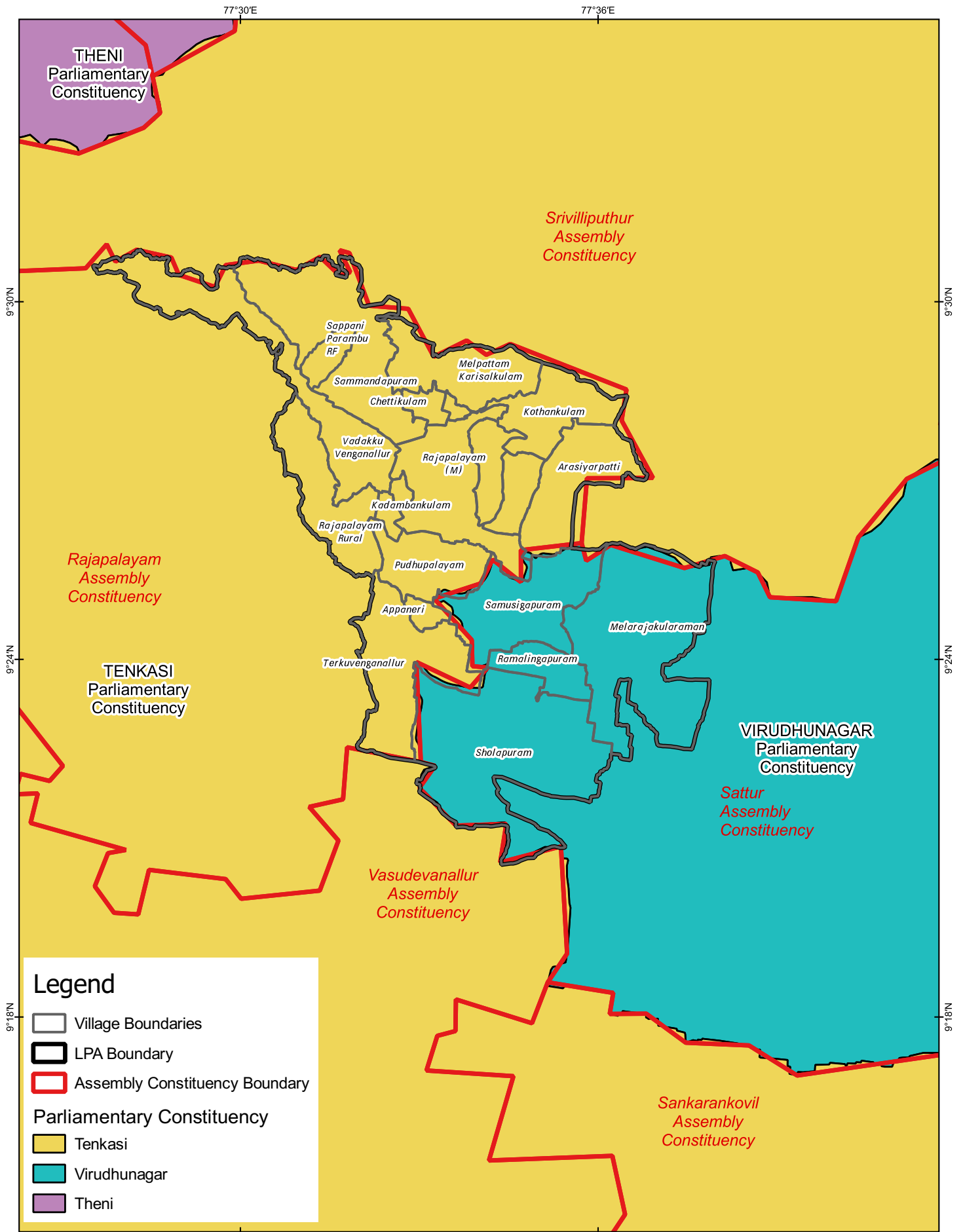
Revenue Division	Taluk	Block	Municipality
Aruppukottai	Virudhunagar	Virudhunagar	Virudhunagar
	Aruppukottai	Aruppukottai	
	Kariapatti	Kariapatti	Aruppukottai
	Tiruchuli	Tiruchuli Narikkudi	
Sivakasi	Sivakasi	Sivakasi	Sivakasi
	Srivilliputhur	Srivilliputhur	Thiruthangal
	Wataraiippu	Wataraiippu	Srivilliputhur
Sattur	Sattur	Sattur	Sattur
	Vembakottai	Vembakottai	
	Rajapalayam	Rajapalayam	Rajapalayam

(Source: District Profile Handbook – 2021, Virudhunagar District)

In the case of Rajapalayam, the block and the taluk do not consist of all the same villages. For instance, the village of Arasiyarpatti, within Rajapalayam Taluk falls under Srivilliputhur Block.

13.2 Electoral Constituencies

Rajapalayam Local Planning Area falls within two Parliamentary and two State Assembly constituencies. As represented in **Map 13.1**, the LPA falls under the Parliamentary constituencies of Tenkasi and Virudhunagar. Similarly, the LPA also falls under the State Assembly constituencies of Rajapalayam and Sattur. The village-wise list is specified in **Table 13.2**.



Electoral Constituencies for Rajapalayam LPA	Notes :	Data Credits Digitised according to Election Commission of India Map	 CRS : WGS 1984
AMRUT Based Master Plan Preparation for Rajapalayam Local Planning Area		Client DTCP Virudhunagar Prepared By Tapasya Design Studio, Auroville	

Map 13.1: Electoral Constituencies of Rajapalayam LPA

Table 13.2: **Electoral Constituencies of Rajapalayam LPA**

S.No.	Kothankulam (RF)	Parliamentary Constituency	Assembly Constituency
1	Sammandapuram	TENKSASI	RAJAPALAYAM
2	Melpattam Karisalkulam		
3	Vadaku Venganallur		
4	Rajapalayam Rural		
5	Kadambankulam		
6	Appaneri		
7	Terkuvenganallur		
8	Pudhupalayam		
9	Chettikulam		
10	Kothankulam		
11	Arasiyarpatti		
12	Sappani Parambu RF		
13	Kothankulam RF		
14	Rajapalayam Municipality		
15	Samusigapuram	VIRUDHUNAGAR	SATTUR
16	Ramalingapuram		
17	Melarajakularaman		
18	Sholapuram		

13.3 Revenue Administration

Rajapalayam Local Planning Area falls under Rajapalayam Revenue Taluk, which is present in the Sattur revenue division of the Virudhunagar district. Out of the 32 revenue villages listed under Rajapalayam Revenue Taluk, 15 revenue villages fall inside the local planning area. These villages are as listed in **Table 13.3**.

Table 13.3: **Revenue Villages of Rajapalayam LPA**

S.No.	Revenue Village
1	Appaneri
2	Arasiyarpatti
3	Kadambankulam
4	Kothankulam
5	Melarajakularaman
6	Pudhupalayam
7	Sholapuram
8	Ramalingapuram
9	Terkuvenganallur
10	Melpattam Karisalkulam
11	Sammandapuram
12	Vadaku Venganallur
13	Rajapalayam (Rural)
14	Chettikulam
15	Samusigapuram

13.4 Local Body Administration

In the district of Virudhunagar, there are a total of 11 Blocks or Panchayat Unions, alongside 7 Municipalities, among which Rajapalayam Municipality is also one. The Panchayat unions are made up of 9 Panchayat towns and 450 Village Panchayats. Out of those 450 Village Panchayats, Rajapalayam Block consists of 36 Panchayats. But it must be noted that the boundaries for revenue villages and panchayats don't coincide with each other. So, the Local Planning Area does not only consist of the villages in Rajapalayam Block but also Srivilliputhur Block. The list of the panchayats that either partially or as a whole fall in the LPA include those listed in **Table 13.4**.

Table 13.4: **Village Panchayats Within the LPA**

S.No.	Village Panchayat	Block
1	Sholapuram	Rajapalayam Block
2	Kilavikulam	
3	Melarajakularaman	
4	Chathrapatti	
5	Terkuvenganallur	
6	Melpattam Karisalkulam	
7	Nallamanaikkanpatti	
8	Krishnapuram	Srivilliputhur Block
9	Inam Chettikulam	
10	Kothankulam	
11	Kalangaperi	

(Source: Rajapalayam and Srivilliputhur Block Handbooks (2019-2020))

13.5 E-Governance

TNeGA has setup the Online Community Service Centres (CSCs) also known as E-Sevai Kendras. E Sevai Kendras are setup with internet connectivity and provide digital access to the citizens for major departments; there are a total of 91 services ranging all the way from bill payments to admissions, granting certificates, etc. The complete list of all the services can be accessed from <https://tnega.tn.gov.in/projects/e-sevai>. There are 14 CSCs in Rajapalayam LPA (**Table 13.5**).

Table 13.5: **Details of Community Service Centers (CSC) in Rajapalayam LPA**

S.No.	Taluk	Revenue Village/ Municipality	Municipality/ Village Panchayat	Service Centre Agency	Community Service Centres (CSC)
1	Rajapalayam	Rajapalayam Municipality	Rajapalayam Municipality	PACS	Singarajakottai - PACS
2	Rajapalayam	Rajapalayam Municipality	Rajapalayam Municipality	PACS	Sammandapuram - PACS
3	Rajapalayam	Melarajakularaman	Zamin Nathampatti	PACS	Zamin Nathampatti - PACS
4	Rajapalayam	Terkuvenganallur	South Venganallur	PACS	Muthugudi - PACS
5	Rajapalayam	Sholapuram	Sholapuram	PACS	Sholapuram - PACS
6	Rajapalayam	Municipality	Rajapalayam Municipality	PACS	Rajapalayam CMs - PACS
7	Rajapalayam	Municipality	Rajapalayam Municipality	PACS	MDA HSG 109, Rajapalayam Taluk Co-op housing society PACS
8	Rajapalayam	Terkuvenganallur		VPRC	Rajapalayam Block Office
9	Rajapalayam	Municipality	Rajapalayam Municipality	TACTV	TACTV Arasu e – sevai maiyam, Rajapalayam Taluk Office
10	Rajapalayam	Municipality	Rajapalayam Municipality	TACTV	TACTV Arasu e – savai maiyam, Rajapalayam Taluk Office
11	Rajapalayam	Municipality	Rajapalayam Municipality	VLE	RR Nagar - VLE
12	Rajapalayam	Municipality	Melarajakularaman	VLE	Jagadeswari - VLE
13	Rajapalayam	Samusigapuram	Samusigapuram	VLE	Ramesh Guruswamy - VLE
14	Rajapalayam	Municipality	Rajapalayam Municipality	TACTV	Srikrishna Computer Centre

(Source: Tamil Nadu E-Governance Agency & IT Department, Virudhunagar District)

13.6 Sources of Revenue and Tax Collection

Rajapalayam is an important textile town, where a large number of spinning mills, ginning mills, power looms and surgical cotton units are located. According to the data received from the Department of Commercial Taxes, **Table 13.6** lists the details of Goods and Services Tax collected in Rajapalayam Block over the past 5 years (GST Was introduced in 2017).

Table 13.6: **Goods and Services Tax Collected in Rajapalayam Block**

	SGST	IGST	CGST	Total
2017-18	5,06,65,119	51,13,36,820	4,19,88,075	14,37,87,014
2018-19	84,537,370	78,821,557	7,11,75,151	23,45,34,078
2019-20	89,893,949	73,382,863	70,991,236	23,82,68,048
2020-21	86,796,214	64,880,675	70,028,214	22,17,05,103
2021-22	69,782,584	49,311,897	5,587,627	17,49,82,090
Total	38,16,75,236	32,15,30,794	31,00,70,303	1,01,32,76,333

(Source: Commercial Taxes Department)

13.7

Line Departments

The State Government's line departments continue to play a crucial role in basic service delivery, especially within the LPA region. The following are the important government bodies and departments, which provide day to day governance and administration:

- **Municipality:** Rajapalayam Municipality's origin dates to pre-independence to the year 1885. It was setup by the British government. It was then declared as a Panchayat Board in the year 1930 itself. It has then progressed to become a Grade III Municipality in the year 1941, Grade II Municipality in the year 1955, Grade I Municipality in the year 1975 and proceeded to become a Selection Grade Municipality in 1989. Then after 19 years, in the year 2008, it was then constituted as a Special Grade Municipality.

Rajapalayam Municipality is headed by the Municipal Commissioner and functions under the Regional Director of Municipal Administration, Tirunelveli. Roles and responsibility of the Rajapalayam Municipality includes execution and maintenance of administration works relating to public health, water supply, roads (local & collector road), drainages, sewerage connection and streetlights within the municipal limits.

- **Local Planning Authority (LPA):** LPA functions as a separate office within the regions of DTCP Virudhunagar. The LPA is headed by a Chairman, who oversees Chief Executive Officer and two or more local authorities. The functions of the Local Planning Authority is to regulate the physical development of Rajapalayam LPA according to the land uses envisaged in the Master Plan and Detailed Development Plan. Local Planning Authorities formulate new schemes based on the Master Plans.

- **Directorate of Town and Country Planning (DTCP):** The Deputy Director, DTCP, Virudhunagar prepares and monitors the Master Plan and Town Planning Schemes for the LPA area. Implementation of the development plans are carried out by the Town Planning Officer (TPO) of Rajapalayam Municipality for the town, and Block Development Officer (BDO) for the rural areas in the LPA.

- **Revenue Department:** Rajapalayam Taluk falls under Sivakasi Revenue Division. The division is headed by a Revenue Divisional Officer (RDO) in the capacity of Sub-Collector. The Taluk is headed by the Tahsildar. The responsibilities of a Tahsildar include maintaining all the land the revenue record of the entire Rajapalayam Taluk.

- **Rajapalayam Block:** Rajapalayam Block is one of the 11 administrative blocks in Virudhunagar District. The Block Development Officer is the head of the Rajapalayam Block. BDO is the official in charge of the Rajapalayam Block and also functions as the secretary of the Block Panchayat or Panchayat Samiti.

• **District Industries Centre (DIC):** District Industries Centre, Virudhunagar comes under the Department of Industries and Commerce, headed by the General Manager. The primary objective of the DIC is to generate employment by way of promoting Micro, Small and Medium Enterprises (MSMEs), Cottage and Handicrafts Industries. The DIC data lists a total of 3,330 small and micro industries in and around the LPA area. Nearly 25,000 skilled and unskilled employees are working in the MSME sector.

• **Small Industries Development Corporations (SIDCO):** Rajapalayam Industrial Estate (Or SIDCO Rajapalayam) located near Mudukkudi (Sholapuram revenue village) functions under the Branch Manager, SIDCO Branch Office, Virudhunagar; its responsibility is to forge sustainable partnership with MSME's to enhance their competitiveness. Industries present in this estate are PVC pipes, herbal medicine industry, cotton & textile industries, HDPE poly bags manufacturing industry, welding and electrical fixtures industries.

• **Department of Agriculture:** The Assistant Director, Department of Agriculture, Virudhunagar is responsible for the agriculture crop production and implementation of schemes for the welfare of farmers in Rajapalayam LPA. The Assistant Director reports to the Director, Agriculture and Farmers Welfare Department.

• **Market Committee:** Marketing of agricultural products is supported through various infrastructure and services provided by the Department of Agriculture. Rajapalayam is one of 278 Regulated Markets in the State functioning under the Virudhunagar/ Ramanathapuram Market Committee (Agri mark). Regulated Markets act as a common forum for farmers and traders to interact on an equal footing for marketing of agricultural produce.

• **Department of Horticulture:** The Deputy Director, Department of Horticulture and Plantation crop, Virudhunagar is responsible for implementation of various farmer centric schemes and give technical guidance to the farmers for adapting Horticulture in Rajapalayam LPA.

• **Water Supply & Sewerage:** The Executive Engineer, Tamil Nadu Water Supply and Drainage Board (TWAD), Tirunelveli Division is responsible for construction of water and sewerage infrastructure. The Rajapalayam Municipality and the Rural Development and Panchayat Raj Department, on the other hand, are in-charge of providing and delivering services inside the town and its vicinity areas, respectively. The Executive Engineer of Rajapalayam TWAD division, coordinates with the Municipal Engineer and Block Development Officer (BDO) of Rajapalayam Block for the implementation of the water supply and drainage services.

• **Water Resource Department (WRD):** The Executive Engineer of Upper Vaippar Basin Division, Tirunelveli District oversees the Upper Vaippar Basin Sub-Division, Rajapalayam. The LPA area falls under the Vaippar River basin division of PWD. The Public Works Department – Water Resources Organization (PWD-WRO) is responsible for rejuvenating water bodies and delivering water from the sources for irrigation and drinking purposes.

• **Electricity and Street Lights:** The delivery of power services to the LPA region is under the purview of the Tamil Nadu Electricity Board (TNEB). The Executive Engineer, Rajapalayam Division functions under the direction of Superintending Engineer of TANGEDCO Virudhunagar Circle. The Assistant Executive Engineers in Rajapalayam, Seithur & Alangulam are under the Executive Engineer, Rajapalayam. They are responsible to carry out service distribution and infrastructure projects such as streetlights.

• **National Highways:** The Project Director, National Highways Authority of India, Madurai – PIU oversees the Divisional Engineer (NHAI) at Virudhunagar is in charge of maintaining the NH-744 passing through the Rajapalayam LPA and execution of proposed NH-744.

• **State Highways:** Assistant Divisional Engineer (SH) of Rajapalayam sub-division functioning under the SH Virudhunagar division is responsible for construction of new SH in Rajapalayam LPA and maintenance of the existing SH-41 & SH-186 in the LPA.

• **Other Roads:** The Rajapalayam Municipality and Panchayat Unions carry out the construction and maintenance of Municipality roads and rural roads, respectively. The District Rural Development Agency (DRDA) Project Director oversees the construction of roads in the district, while the Transport management is handled by the Regional Transport Offices (RTO) and the Tamil Nadu State Transport Corporation (TNSTC).

• **Public Housing & Slum Upgradation:** The Tamil Nadu Housing Board is in charge of providing and delivering housing services, while the Tamil Nadu Urban Habitat Development Board (TNUHDB) is accountable for formulating development initiatives for the notified slum and squatter settlements in the area. The Executive Engineers at Madurai division of TNHB are responsible for construction of public housing and the Executive Engineer at Tirunelveli Division of TNUHDB is responsible for construction of housing for slums. Infrastructure development is subsidized partially by HUDCO loans and GoTN & Gol funds.

• **Environment & Forest:** The Conservator of Forest and Field Director, Madurai oversees the Deputy Director, Srivilliputhur–Megamalai Tiger Reserve (SMTR). The responsibility is to manage and conserve the Srivilliputhur–Megamalai Tiger Reserve and Eco-Sensitive Zone in Rajapalayam LPA. Under the purview of the Deputy Director, SMTR, the following officials function:

- Wildlife Warden, Rajapalayam
- Forest Range Officer, Rajapalayam: Responsible for protecting and managing Sanjeevi Malai Reserve Forest (Kothankulam RF)

• **Police Department:** The Deputy Superintendent of Police (DSP), Rajapalayam Sub-Division, Virudhunagar District reports to the Superintendent of Police, Virudhunagar. The DSP, Rajapalayam heads the following 5 police stations in the Rajapalayam area, serving a combined radius of 11.36 sq.km.:

- Rajapalayam South Police station
- Rajapalayam North Police Station
- Rajapalayam All women Police Station
- Rajapalayam Town Traffic Police Station
- Rajapalayam NH Traffic Police Station

• **Fire Safety Department:** The Fire Brigade Officer heads the Fire Station located at Madasamy Kovil Street Road, Palayapalayam, and functions under the District Fire and Rescue Officer, Virudhunagar. The department is responsible for provision of fire and rescue services for entire Rajapalayam Block.

• **Tamil Nadu Pollution Control Board:** TNPCB District Office is headed by the District Environmental Engineer(a/c), TNPCB, Virudhunagar and is responsible for giving environmental clearance for establishment of industries in Rajapalayam (Red, Orange, Green category industry), inspects existing industrial units, air quality monitoring and control and abatement of water pollution.

• **Education:** The District Educational Officer, School Education Department, Srivilliputhur Division, Virudhunagar District governs the Rajapalayam Block headed by the Block Educational Officer, Rajapalayam. The responsibility of Block Educational Officer is to oversee the functioning of the following schools in LPA and other parts of the Block:

- Department of Elementary Education - 101 schools
- Department of School Education - 21 schools
- Directorate of Matriculation Education - 8 Schools

Apart from the above there are other Board of Education in LPA:

- Department of Adi Dravidar & Tribal Welfare – 1 school
- Central Board of Secondary Education - 4 Schools

Three Polytechnic colleges present in LPA are registered under the Directorate of Technical Education, Chennai, headed by the Commissioner.

- **Healthcare:** Joint Director of Medical and Rural Health Services (Tuberculosis), Virudhunagar governs the public healthcare facilities present in Rajapalayam LPA.

- **Hindu Religious & Charitable Endowments Department (HR&CE):** Assistant Commissioner, Virudhunagar administrates the temples present in LPA. Rajapalayam has 14 important temples. Some of these temples are maintained by the Executive Officer, for example: EO, Mayuranatha Swamy Kovil.

