

# NAGAPATTINAM LPA

GIS BASED MASTER PLAN  
2041



VOLUME 1/2



Nagapattinam Local Planning Authority  
Directorate of Town and Country Planning  
Government of Tamil Nadu

GIS Based Master Plan  
**Nagapattinam with Velankanni – 2041**

Master Plan

**Directorate of Town and Country Planning**  
SEPTEMBER - 2024

## NAGAPATTINAM LOCAL PLANNING AREA

Name of the Local Planning Authority : Nagapattinam Local Planning Authority

Reference :

Nagapattinam Local Planning Authority : Roc.No. 634/2016/Tha.ma-2

Director of Town and Country Planning : Roc.No.1265/2022/TCP-12

Chennai

Approved : G.O.(Ms)No. 142 Housing and Urban  
Development dt:09.02.1990

Nagapattinam Local Planning Authority :

Resolution for Consent

Member Secretary of :  
Nagapattinam Local Planning Authority/  
Deputy Director of  
Town and Country Planning,  
Nagapattinam District.

Assistant Director(Master Plan) of Town and  
Country Planning, Chennai

Joint Director of Town and Country Planning,  
Chennai

Director of Town and Country Planning,  
Government of Tamil Nadu

Principle Secretary to Government,  
Housing and Urban Development Department  
Government of Tamil Nadu

## PROFORMA

NAME OF THE OFFICE : DISTRICT TOWN AND COUNTRY PLANNING OFFICE,  
NAGAPATTINAM DISTRICT.

NAME OF CLPA : Nagapattinam 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 Under : G.O (Ms)No: 2062 dt.20.09.1973  
Section 10(1)(c)
3. The G.O.details which confirmation : G.O (Ms)No: 680 dt.16.03.1974  
Was ordered under Section 10(4)
4. The G.O.details of Notification : G.O (Ms)No: 10 H&UD dt.18.01.2017  
Under Section 10(1)(c)
5. The G.O.details which confirmation : G.O (Ms)No: 10 H&UD dt.19.01.2018  
Was ordered under Section 10(4)

### III.CONSTITUTION

6. The G.O.details in which : G.O (Ms)No: 650 dt.08.04.1975  
Nagapattinam  
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 :  
Nagapattinam&Velankanni 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. PERPUBLICATION 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 :  
Ciruculation in the Nagapattinam&  
Velankanni Local Planning

Deputy Director,  
District Town and Country Planning,  
Nagapattinam District.

**Nagapattinam & Velankanni 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 Nagapattinam & Velankanni 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.

Member Secretary  
Nagapattinam & Velankanni  
Local Planning Authority

# TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	BACKGROUND OF THE STUDY	1
1.2	OBJECTIVE	1
1.3	PROFILE OF NAGAPATTINAM LOCAL PLANNING AREA	1
1.3.1	Historical Development of Nagapattinam .....	3
1.3.2	Regional Context.....	3
1.3.3	Evolution of the Growth of Nagapattinam .....	5
1.3.4	Geographical Location .....	6
1.3.5	Physical Characteristics.....	7
1.4	SUMMARY	9
<b>2.</b>	<b>DEMOGRAPHY .....</b>	<b>13</b>
2.1	DEMOGRAPHIC PROFILE	13
2.1.1	Trend of population and growth rate over 100 years.....	13
2.1.2	Trend of population growth in Nagapattinam LPA.....	14
2.1.3	SC & ST Population.....	16
2.1.4	Fishermen Population .....	18
2.1.5	Population density .....	18
2.1.6	Sex Ratio.....	20
2.1.7	Literacy.....	21
2.1.8	Household Size.....	22
2.1.9	Workforce Participation Rate .....	23
2.2	POPULATION PROJECTION	24
2.2.1	Population Projection methods .....	24
2.2.2	Population projection using various methods.....	25
2.3	SUMMARY	31
<b>3.</b>	<b>ECONOMY .....</b>	<b>34</b>
3.1	ECONOMIC PROFILE	34
3.1.1	Workforce Participation rate .....	34
3.1.2	Fishing .....	37
3.1.3	Industries .....	39
3.1.4	Trade and Commerce.....	40
3.1.5	Agriculture.....	41
3.2	EMPLOYMENT PROJECTION	41
3.3	SUMMARY	42
<b>4.</b>	<b>HOUSING .....</b>	<b>45</b>
4.1	EXISTING SITUATION ANALYSIS	45

4.1.1	Growth in Households .....	45
4.1.2	Housing Typology.....	46
4.1.3	Housing Ownership.....	48
4.1.4	Housing Occupancy.....	48
4.1.5	Urban Slums .....	49
4.1.6	Houseless population.....	51
4.1.7	Existing housing shortage .....	51
4.2	HOUSING PROJECTION .....	51
4.3	SUMMARY .....	54
<b>5.</b>	<b>PHYSICAL INFRASTRUCTURE .....</b>	<b>55</b>
5.1	EXISTING PHYSICAL INFRASTRUCTURE FACILITIES .....	55
5.1.1	Water Supply.....	55
5.1.2	Sewerage and Sanitation .....	58
5.1.3	Solid Waste management .....	61
5.1.4	Storm water drainage .....	63
5.1.5	Electricity.....	64
5.2	PROJECTED REQUIREMENT .....	64
5.2.1	Water Supply.....	64
5.2.2	Sewage .....	65
5.2.3	Solid Waste Management.....	66
5.2.4	Electricity.....	66
5.3	SUMMARY .....	67
<b>6.</b>	<b>SOCIAL INFRASTRUCTURE .....</b>	<b>69</b>
6.1	EXISTING SOCIAL INFRASTRUCTURE FACILITIES .....	69
6.1.1	Educational facilities .....	69
6.1.2	Healthcare facilities.....	75
6.1.3	Recreational Spaces .....	76
6.1.4	Miscellaneous facilities .....	77
6.2	PROJECTED REQUIREMENT .....	81
6.2.1	Education .....	82
6.2.2	Health.....	82
6.2.3	Recreation & Open Space .....	83
6.3	SUMMARY .....	84
<b>7.</b>	<b>TRAFFIC &amp; TRANSPORTATION.....</b>	<b>87</b>
7.1	EXISTING TRAFFIC &TRANSPORTATION SCENARIO AND FACILITIES .....	87
7.1.1	Road Network .....	87
7.1.2	Railway Connectivity .....	88
7.1.3	Port.....	89
7.1.4	Traffic analysis.....	89



7.2	GRID OF ROADS	98
7.2.1	Grid of Roads Network Plan.....	99
7.2.2	ROAD DEVELOPMENT PROPOSALS.....	100
	<b>ROAD LINKING NH-32 AND AKKARAIPPETTAI POIGAINALLUR ROAD.....</b>	<b>100</b>
	<b>ROAD CONNECTING NH-32 WITH KARUVELANKADAI ROAD.....</b>	<b>100</b>
7.3	SUMMARY	101
<b>8.</b>	<b>ENVIRONMENT .....</b>	<b>104</b>
8.1	CLIMATE AND RAINFALL	104
8.2	ENVIRONMENTAL ASSETS	104
8.2.1	Green Cover .....	104
8.2.2	Agriculture.....	105
8.2.3	Water Bodies.....	105
8.3	TOPOGRAPHY & CONTOURS	105
8.4	ENVIRONMENTAL DEGRADATION	106
8.4.1	Air Pollution .....	106
8.4.2	Noise Pollution.....	106
8.5	COASTAL REGULATION ZONE	107
8.5.1	Distribution of Coastal Regulation Zone in Nagapattinam LPA .....	107
8.6	HAZARDS AFFECTING NAGAPATTINAM	107
8.6.1	GAJA Cyclone-2018 .....	107
8.6.2	Tsunami-2004.....	108
8.7	VULNERABLE AREAS	109
8.8	SUMMARY	110
<b>9.</b>	<b>TOURISM .....</b>	<b>114</b>
9.1	PLACES OF INTEREST AND TOURIST POPULATION	114
9.1.1	Nagapattinam Municipality .....	115
9.1.2	Velankanni.....	116
9.1.3	Sikkal .....	117
9.2	PROJECTED TOURIST POPULATION AND INFRASTRUCTURE REQUIREMENT	119
9.2.1	Projected tourist population.....	119
9.2.2	Infrastructure requirement.....	120
9.3	SUMMARY	121
<b>10.</b>	<b>EXISTING LAND USE.....</b>	<b>123</b>
10.1	EVALUATION OF NAGAPATTINAM MASTER PLAN 2001	123
10.2	EXISTING LAND USE	124
10.2.1	Residential.....	124
10.2.2	Commercial .....	125
10.2.3	Industrial .....	125

10.2.4	Institutional.....	126
10.2.5	Recreation.....	126
10.2.6	Transportation.....	127
10.2.7	Water Bodies.....	128
10.2.8	Agriculture use.....	128
10.2.9	Vacant land.....	128
10.3	URDPFI GUIDELINES STANDARDS FOR LAND USE STRUCTURE	129
10.4	SUMMARY	129
<b>11.</b>	<b>ISSUES &amp; POTENTIALS.....</b>	<b>134</b>
11.1	ISSUES IN NAGAPATTINAM LPA	134
11.2	POTENTIALS OF NAGAPATTINAM LPA	140
11.3	SUMMARY	143
<b>12.</b>	<b>LAND SUITABILITY ANALYSIS.....</b>	<b>144</b>
12.1	PARAMETERS CONSIDERED FOR SUITABILITY	144
12.1.1	Existing land use.....	144
12.1.2	Coastal Regulation Zone.....	144
12.1.3	Elevation.....	144
12.1.4	Distance to Roads.....	145
12.1.5	Distance from Water Body.....	145
12.2	WEIGHTAGE INDEX FOR SUITABILITY	145
12.3	SUMMARY	146
<b>13.</b>	<b>PLANNING PROPOSALS AND IMPLEMENTATION.....</b>	<b>148</b>
13.1	LAND USE PLANNING STRATEGIES	148
13.2	CONCEPT PLAN	149
13.3	PROJECT PROPOSALS	152
13.4	PROPOSED LAND USE 2041	167
13.5	COASTAL REGULATION ZONE (CRZ) NOTIFICATION IN THE NAGAPATTINAM MASTER PLAN	170
13.6	BLUE GREEN INFRASTRUCTURE IN NAGAPATTINAM LOCAL PLANNING AREA	172
13.7	URBAN FORESTRY	173
13.8	PROPOSED PARKS	173
13.9	PROPOSED PLAYGROUND	174
13.10	SUMMARY	175

<b>14.</b>	<b>ZONING REGULATIONS</b>	<b>176</b>
14.1	RESIDENTIAL USE ZONE	176
14.2	COMMERCIAL USE ZONE	178
14.3	INDUSTRIAL USE ZONE	179
14.4	INSTITUTIONAL USE ZONE	179
14.5	AGRICULTURAL USE ZONE	180
14.6	OPEN SPACE AND RECREATIONAL USE ZONE	181
14.7	NON URBAN USE ZONE	181

**15. LAND USE SCHEDULE**

**16. ANNEXURE**

- 1. List of OSR in Nagapattinam LPA**
- 2. Housing and Urban Development [UD4(2)] Department G.O.(Ms).No.10 dated 18.01.2017**
- 3. Housing and Urban Development [UD4(2)] Department G.O.(Ms).No.10 dated 19.01.2018**

## LIST OF TABLES

Table 1.1: Profile of Nagapattinam Town .....	2
Table 1.2: Profile of Nagapattinam LPA .....	2
Table 1.3: Class I towns within a distance 100 Kms from Nagapattinam with their distance .....	3
Table 1.4: Average Rainfall in Nagapattinam .....	7
Table 2.1: Growth Rate of Nagapattinam Municipality from 1901 - 2011 .....	14
Table 2.2: Trend of Population and its Growth rate in Urban & Rural Area of Nagapattinam LPA (1971-2011) .....	15
Table 2.3: Village/Town wise SC/ST population for 1991, 2001 & 2011.....	16
Table 2.4: Village/Town Wise Proportion of SC & ST in Nagapattinam LPA .....	17
Table 2.5: Fishermen Population in Nagapattinam LPA for the Year 2010.....	18
Table 2.6: Village/Town wise Population Density for Nagapattinam LPA from 2001-2011 .....	19
Table 2.7: Village/Town wise Sex Ratio of Nagapattinam LPA (2011) .....	21
Table 2.8: Literacy Rate of Nagapattinam LPA from 2001 to 2011.....	22
Table 2.9: Household & Household Size in Nagapattinam LPA 2011.....	22
Table 2.10: Village/Town wise Participation Rate of Nagapattinam LPA .....	24
Table 2.11: Classification of Nagapattinam LPA based on local bodies.....	25
Table 2.12: Population projection using Arithmetic Progression Method .....	26
Table 2.13: Population projection using Incremental Increase Method .....	26
Table 2.14: Population projection using Geometrical Increase Method.....	27
Table 2.15: Population projection using Exponential Growth method .....	27
Table 2.16: Population projection using Graphical method .....	28
Table 2.17: Projected Population of Nagapattinam LPA-2041 .....	30
Table 3.1: Workforce Participation Rate of Nagapattinam LPA 2001 & 2011 .....	35
Table 3.2: Sectoral Composition of Workers in Nagapattinam LPA during 2001 & 2011.....	35
Table 3.3: Population Involved in Various Fishing Activities (2010) .....	37
Table 3.4: Male & Female Workforce in Nagapattinam LPA (1991 – 2011) .....	41
Table 3.5: Employment Projection for Nagapattinam LPA .....	42
Table 4.1: No. of Households in Nagapattinam LPA-2001 and 2011 .....	45
Table 4.2: Household growth rate in urban area of the LPA and Nagapattinam district .....	46
Table 4.3: Housing Condition-Nagapattinam LPA-2011.....	47
Table 4.4: Housing Tenure-Nagapattinam LPA-2011 .....	48

Table 4.5: Housing Occupancy-Nagapattinam LPA-2011.....	49
Table 4.6: Urban Slum population and share of Slum households-Nagapattinam LPA 2001 & 2011 .....	50
Table 4.7: Houses proposed under PMAY (Urban) in Nagapattinam LPA.....	50
Table 4.8: Share of Houseless Population in Nagapattinam Urban area-2011.....	51
Table 4.9: Existing Housing Shortage 2021 .....	51
Table 4.10: Quantity of Houses required in 2041 .....	53
Table 4.11: Projected Residential area requirement in Nagapattinam LPA .....	53
Table 5.1: Source of Water Supply in Nagapattinam LPA .....	55
Table 5.2: Existing gap in water supply-Nagapattinam LPA.....	57
Table 5.3: Household Sanitary facilities 2011-Nagapattinam LPA.....	59
Table 5.4: Status of Existing Sewerage Network and STPs in Nagapattinam LPA.....	61
Table 5.5: Existing gap in Sewage treatment in Nagapattinam LPA .....	61
Table 5.6: Existing Solid Waste Generation-Nagapattinam LPA .....	62
Table 5.7: Projected requirement for water supply in 2041.....	65
Table 5.8: Projected requirement for Sewage Treatment facilities in 2041 .....	65
Table 5.9: Projected requirement for Solid waste generation and disposal facilities in 2041 .....	66
Table 5.10: Substation requirement for 2041-Nagapattinam LPA .....	67
Table 6.1: No. of Schools Available in Nagapattinam LPA .....	69
Table 6.2: Tamil Nadu School Education Norms for Schools .....	70
Table 6.3: List of Colleges in Nagapattinam LPA .....	71
Table 6.4: Healthcare Facilities in Nagapattinam LPA.....	76
Table 6.5: Recreational Facilities in Nagapattinam LPA.....	76
Table 6.6: Existing Burial Grounds in Nagapattinam LPA.....	77
Table 6.7: Gap Analysis for Projected Population - 2041.....	82
Table 6.8: Gap Analysis for Health Facilities .....	82
Table 6.9: Gap Analysis for Organized Open Space .....	83
Table 7.1: Train Arrival and Departure.....	89
Table 7.2: Traffic Volume at Intersections .....	92
Table 7.3: Moving Vehicle Method Data Collection.....	94
Table 7.4: Summary of on-street parking .....	95
Table 7.5: Peak parking Ratio .....	97
Table 7.6: Proposed New Collector Roads for Nagapattinam LPA.....	100
Table 8.1: Air Quality Index of Nagapattinam LPA.....	106
Table 8.2: CRZ classification of Nagapattinam LPA .....	107

Table 8.3: GAJA Cyclone relief Centres in Nagapattinam District .....	108
Table 8.4: Extent of inundation during Tsunami 2004.....	108
Table 8.5: Damages due to Tsunami 2004 in Nagapattinam district .....	109
Table 8.6: Vulnerable Area in Nagapattinam LPA.....	110
Table 9.1: Tourist Destination in Nagapattinam LPA .....	117
Table 9.2: Year-wise tourist footfall of Velankanni and Nagore .....	118
Table 9.3: Tourist Population Projection for Nagapattinam LPA .....	120
Table 9.4: Projected Tourist Infrastructure Requirement.....	121
Table 10.1: Evaluation of proposed land use 2001 and Existing land use 2021– Nagapattinam Municipality .....	124
Table 10.2: Existing land use in Nagapattinam LPA .....	129
Table 10.3: Land use standards as per URDPFI guidelines.....	129
Table 11.1: Village/Town wise Growth Trend of the LPA .....	135
Table 11.2: Slum Population in Nagapattinam Municipality and Velankanni .....	136
Table 11.3: PMAY (Urban) Beneficiaries in Nagapattinam and Cuddalore.....	137
Table 11.4: Projected requirement for Sewage Treatment facilities.....	137
Table 11.5: Projected requirement for Solid Waste disposal system.....	138
Table 11.6: Damages caused by Tsunami 2004 in Nagapattinam district .....	138
Table 11.7: Relief centres in Nagapattinam district during GAJA Cyclone, 2018 .....	139
Table 11.8: Peak parking Ratio.....	139
Table 11.9: Year-wise tourist footfall of Velankanni and Nagore .....	141
Table 12.1: Weightage Index for land suitability analysis.....	145
Table 12.2: Categorization of parameters .....	146
Table 13.1: Taluk wise agricultural productivity in Nagapattinam District.....	153
Table 13.2: Taluk wise contribution in fisheries sector .....	154
Table 13.3: Cyclone shelters in Nagapattinam LPA.....	161
Table 13.4: On-Street Parking details in Nagapattinam Municipality.....	163
Table 13.5: Project Proposals for Nagapattinam LPA-2041.....	165
Table 13.6: Proposed land use area split up for Nagapattinam LPA.....	168
Table 13.7: Comparison of Existing and proposed land use share in Nagapattinam LPA .....	170
Table 13.8: Proposed Parks & Playground – Institutional .....	174

## LIST OF FIGURES

Figure 1.1: Regional Connectivity of Nagapattinam LPA .....	4
Figure 1.2: Chronological Growth of Nagapattinam.....	5
Figure 1.3: Administrative Setup of The LPA .....	6
Figure 1.4: Mean Temperature & Precipitation In Nagapattinam .....	8
Figure 2.1: Population Growth of Nagapattinam Town From 1901-2011.....	13
Figure 2.2: Comparative Population Growth Rate 1981-1991.....	14
Figure 2.3: Population Growth Trend (1971-2011) In Nagapattinam LPA .....	15
Figure 2.4: Share of Sc Population In Nagapattinam LPA .....	17
Figure 2.5: Comparative Population Density-2011.....	19
Figure 2.6: Comparison of Sex Ratio (2001 & 2011).....	20
Figure 2.7: Comparative Literacy Rate-2011 .....	21
Figure 2.8: Workforce Participation Rate -2011.....	23
Figure 2.9: Graphical Method for Nagapattinam Municipality-2041.....	28
Figure 2.10: Graphical Method for Velankanni Town Panchayat-2041.....	28
Figure 2.11: Graphical Method for Vicinity Area-2041 .....	29
Figure 2.12: Graphical Method for Nagapattinam LPA-2041.....	29
Figure 2.13: Projected Population,2041-Nagapattinam LPA.....	30
Figure 3.1: Comparison of Occupational Structure-2011 .....	34
Figure 3.2: Trend of Occupational Structure In Nagapattinam LPA (2001 & 2011).....	36
Figure 3.3: Occupational Growth Trend (In %) In 2041 of Nagapattinam LPA .....	36
Figure 4.1: Housing Condition In Nagapattinam LPA-2011 .....	46
Figure 4.2: Share of Slum Population In Nagapattinam LPA-2011 .....	49
Figure 5.1: Mode of Water Supply In Nagapattinam Municipality.....	56
Figure 5.2: Mode of Water Supply In Velankanni Town Panchayat.....	56
Figure 5.3: Mode of Water Supply In Villages In Nagapattinam LPA .....	56
Figure 5.4: Water Storage Facilities In Nagapattinam LPA .....	57
Figure 5.5: Type of Latrine Facility Within The Premises-Nagapattinam LPA.....	60

Figure 5.6: Composition of Municipal Solid Waste In Nagapattinam Municipality .....	62
Figure 6.1: Area Covered By Existing Primary Schools .....	72
Figure 6.2: Area Covered By Existing Middle Schools .....	73
Figure 6.3: Area Covered By Existing High Schools.....	74
Figure 6.4: Area Covered By Existing Higher Secondary Schools.....	75
Figure 6.5: Location of Parks In Nagapattinam LPA.....	78
Figure 6.6: Location of Anganwadi In Nagapattinam LPA.....	79
Figure 6.7: Locations of Burial Grounds In Nagapattinam LPA .....	80
Figure 6.8: Other Social Infrastructure Facilities In Nagapattinam LPA.....	81
Figure 7.1: Surveyed Junctions In Nagapattinam LPA.....	91
Figure 7.2: Running/Journey Speed In Different Stretches .....	93
Figure 7.3: Average Journey Speed On The Surveyed Road Stretch.....	94
Figure 7.4: Parking Survey Locations In Nagapattinam LPA .....	96
Figure 7.5: Average Composition of Vehicles Parked.....	97
Figure 7.6: On-Street Parking.....	98
Figure 7.7: Conceptual Road Network Pattern.....	99
Figure 9.1: Places of Interest In Nagapattinam LPA .....	114
Figure 9.2: Tourist Growth Trend In Velankanni& Nagore .....	119
Figure 9.3: Tourist Population Projection for Nagapattinam LPA .....	120
Figure 11.1: Population Growth Trend In Nagapattinam LPA.....	134
Figure 11.2: Occupational Growth Trend In Nagapattinam .....	136
Figure 11.3: Pilgrimage Sites In Nagapattinam LPA.....	141
Figure 13.1: Concept Plan for Nagapattinam LPA.....	151
Figure 13.2: Conceptual Design of Beach Front Development (for Reference Only) .....	158
Figure 13.3: Conceptual Design of River Front Development (for Reference Only).....	159
Figure 13.4: Conceptual Design for Eco-Tourism.....	160
Figure 13.5: Conceptual Design for Central Park .....	160



## LIST OF MAPS

Map 1.1: Location map of Nagapattinam LPA	10
Map 1.2: Evolution map of Nagapattinam LPA	11
Map 1.3: Major Road network in Nagapattinam LPA	12
Map 2.1: Population growth rate in Nagapattinam LPA	32
Map 2.2: Population density in Nagapattinam LPA	33
Map 3.1: Work force participation rate in LPA	44
Map 5.1: Physical Infrastructure in Nagapattinam LPA	68
Map 6.1: Education facilities in Nagapattinam LPA	85
Map 6.2: Health facilities in Nagapattinam LPA	86
Map 7.1: Existing Road network in Nagapattinam LPA	102
Map 7.2: Grid of Roads for Nagapattinam LPA	103
Map 8.1: Environmental Assets of Nagapattinam LPA	111
Map 8.2: Coastal Regulation Zone 2011-Nagapattinam LPA	112
Map 8.3: No Development Zone as per CRZ 2011	113
Map 9.1: Tourist Attraction Spots within LPA	122
Map 10.1: Existing land use 2021-Nagapattinam LPA	132
Map 10.2: Existing land use 2021-Nagapattinam Municipality	133
Map 12.1: Land Suitability analysis	147
Map 13.1: Proposed land use 2041-Nagapattinam LPA	176
Map 13.2: Proposed land use 2041-Nagapattinam Municipality	177

## LIST OF ABBREVIATIONS

AICTE	- All India Council for Technical Education
AMRUT	- Atal Mission for Rejuvenation and Urban Transformation
CBD	- Central Business District
CLPA	- Combined Local Planning Area
CPCD	- Central Pollution Control Board
CPCL	- Chennai Petroleum Corporation Limited
CPHEEO	- Central Public Health and Environmental Engineering Organization
CRZ	- Coastal Regulation Zone
CWSS	- Combined Water Supply Scheme
CZMP	- Coastal Zone Management Plan
DEM	- Digital Elevation Model
DEWATS	- Decentralized Waste Water Treatment Systems
DTCP	- Directorate of Town and Country Planning
ECS	- Equivalent Car Space
ESA	- Ecologically Sensitive Area
FAR	- Floor Area Ration
FSI	- Floor Space Index
FY	- Fiscal Year
GDP	- Gross Domestic Product
GIS	- Geographic Information System
HTL	- High Tide Line
ISWM	- Integrated Solid Waste Management
ITI	- Industrial Training Institute
JLG	- Joint Liability Group
JNNURM	- Jawaharlal Nehru National Urban Renewal Mission
LOS	- Level of Service
LPA	- Local Planning Area
LPCD	- Liters Per Capita per Day
LST	- Land Surface Temperature
M	- Municipality
MLD	- Million Liters per Day
MOEF	- Ministry of Environment and forest
MP	- Master planning

MSW	- Municipal Solid Waste
NBC	- National Building Code
NDVI	- Normalized Difference Vegetation Index
NDZ	- No Development Zone
NEERI	- National Environmental Engineering Research Institute
NH	- National Highway
NSSO	- National Sample Survey office
OHT	- Over Head Tank
PCU	- Passenger Car Unit
PMAY	- Pradhan Mantri Awas Yojana
PVC	- Polyvinyl Chloride
RADPFI	- Rural Area Development Plan formulation and Implementation
RCC	- Reinforced Cement Concrete
RO	- Reverse Osmosis
RTE	- Right to Education
SC	- Scheduled Caste
SH	- State Highway
SIDCO	- Small Industrial Development Corporation
SIPCOT	- State Industries Promotion Corporation of Tamil Nadu Ltd.
SOI	- Survey of India
ST	- Scheduled Tribes
STP	- Sewage Treatment Plant
TANSIDCO	- Tamil Nadu Small Industries Development Corporation Limited
TNCDBR	- Tamil Nadu Combined Development Building Rules
TNJFU	- Tamil Nadu Dr.J. Jayalalitha Fisheries University
TNMB	- Tamil Nadu Maritime Board
TNUIFSL	- Tamil Nadu Urban Infrastructure Financial Services Limited
TP	- Town Panchayat
TPD	- Tonnes Per Day
TTDC	- Tamil Nadu Tourism Development Corporation Limited
TWAD	- Tamil Nadu Water Supply and Drainage Board
ULD	- Urban Local Body
URDPFI	- Urban and Regional Development Plans formulation and Implementation
WHO	- World Health Organization

## **1. INTRODUCTION**

### **1.1 BACKGROUND OF THE STUDY**

The GIS-based Master Plan is prepared under AMRUT (Atal Mission for Rejuvenation and Urban Transformation) program. AMRUT aims to transform cities into efficient living spaces. The mission targets transforming 500 cities and towns in India into efficient urban living spaces, with a special focus on water supply, sewerage, storm water drains, green spaces and parks. The mission mandates a set of 11 reforms which have to be implemented by all the states and 500 mission cities within 4 years. One such reform under 'Urban Planning and City Development Plans' is the preparation and implementation of master plan using GIS within 48 months. The GIS is a system that creates, manages, and analyse all types of spatial & geographical data. Its significant feature is to integrate the spatial and attribute data. It has revolutionized the process of map-making and plan preparation. The system is capable of storing, updating, retrieving, analysing and displaying. It's cost-effective, accurate and accomplishes the plan preparation with speed.

In the above context, the government of Tamil Nadu has awarded the preparation of GIS-based Master Plan (MP) for Nagapattinam Local Planning Area to the Department of Planning, School of Architecture and Planning, Anna University. The Master Plan for Nagapattinam is prepared for 20 years, considering the various demand for the projected population. This report covers aspects such as collection and review of sector-wise data on the existing situation. And also study the demand, supply and identify the gap in the service delivered, assess the environmental conditions, study the traffic situations, land use pattern and identify existing problems, potentials and proposing land parcels for various activities.

### **1.2 OBJECTIVE**

The vision of Nagapattinam Master Plan preparation is to improve the socio-economic standard of living of the people and enhance the quality of life by the generation of employment opportunities, social facilities, basic amenities, transport infrastructure and services and others.

### **1.3 PROFILE OF NAGAPATTINAM LOCAL PLANNING AREA**

The Nagapattinam Local Planning Area (CLPA) was originally declared under section 10 (4) of the Town and Country Planning Act, 1971 in the G.O.Ms.No.2062 RD&LA dated 20-9-1973. The Governor of Tamil Nadu has included additional areas in the CLPA as per G.O. Ms. No. 10 of Housing and Urban development department No. II (2)/HOU/163/2018 dated 19th January 2018. The revised LPA comprises of Nagapattinam Municipality, Velankanni Town Panchayat, and 11 revenue Villages. The area of the LPA is 80.08 sq. km with a population of 1,64,824 in 2011. The

Municipal area, which forms the core of the LPA accounts for 18.61% of the LPA area. However, the population of the core area accounts for 45% of the total population of LPA. The mismatch between the population and the area will be a big challenge for the balanced development of the LPA.

Nagapattinam and Nagore were incorporated as a single Municipality in 1866 and promoted to a second-grade Municipality in 1986. It was upgraded to selection grade Municipality in the year 1998. The Nagapattinam Municipality consists of 36 wards and covers an area of about 14.35 sq./km. The profile of Nagapattinam Town & Nagapattinam LPA is described in Table 1.1 & 1.2.

**Table 1.1: Profile of Nagapattinam Town**

1.	Name of the Town	Nagapattinam
2.	Civic Status	Municipality (1866)
		Second Grade Municipality (1986)
		Selection Grade Municipality (1998)
3.	Population (2011)	1,02,905
4.	Population Growth Rate (2001 -11)	10.47 %
5.	Area	14.35 sq.km
6.	Density	7,171 persons/ sq.km
7.	Name of the Tehsil	Nagapattinam
8.	Name of the District	Nagapattinam
9.	State	Tamil Nadu

(Source: Nagapattinam Municipality)

**Table 1.2: Profile of Nagapattinam LPA**

1.	Name of the LPA	Nagapattinam with Velankanni
2.	<b>Constitution of the LPA</b>	
	Date of Notification	10.04.1974
	Extent of the LPA	14.35 sq.km
	Constituents of the LPA	Nagapattinam Town
3.	<b>Inclusion of Additional Area in the LPA</b>	
	Date of Notification for inclusion of	19.01.2018
	Extent of the LPA including additional	80.08 sq.km
	Constituents of the LPA	Nagapattinam Municipality, Velankanni
4.	Total area of the LPA	80.08 sq.km
5.	Population contained in the LPA	1,64,824

(Source: DTCP)

### 1.3.1 Historical Development of Nagapattinam

Nagapattinam is the district headquarters of Nagapattinam District, Tamil Nadu. The name Nagapattinam was derived from Nagar + Pattinam. In the ancient period, the people from Nagar Nadu (Sri Lanka) were settled at this site initially and the same is developed as port town during Chola Period. Therefore, this town has been named as Nagapattinam. During 9<sup>th</sup> to 12<sup>th</sup> Century, Nagapattinam was ruled by Cholas and was used as a flourishing Commercial base and a launching pad for east bound naval expeditions. The neighbouring port, Kaveripoompattinam (modern-day Poompuhar), was the capital of the Chola Kingdom. At that point of time, palace for Kings, ministers and army officer's residence, places for trade and commerce export and import establishment were located at Nagapattinam. Whereas, Nagore was the residential place for the common people. During 4<sup>th</sup> and 5<sup>th</sup> century this town has gained momentum for developmental activities. The trade to this town from China was flourishing, various section of people in and around Nagapattinam were started to settle in groups of their own societies. From 6<sup>th</sup> to 11<sup>th</sup> century the Chola and Pallava Kingdom has created many religious institutions in this town and the Buddhism had also been spread during this period. While sea trade was flourishing during the 12<sup>th</sup> century the elephant, horses and clothes had been imported from different parts of the world through this port town. At a later stage, this town has come under the control of Holland and Dutch people. In 1781, it was conquered by the British East India Company from Dutch and served as the capital of Tanjore District from 1799 to 1845 CE under Madras Presidency. After independence in 1947, this town has become the part of India as well as State of Tamil Nadu. In 1991, Nagapattinam District was formed by bifurcating the Thanjavur District and Nagapattinam became the District Headquarters of the newly formed Nagapattinam District.

### 1.3.2 Regional Context

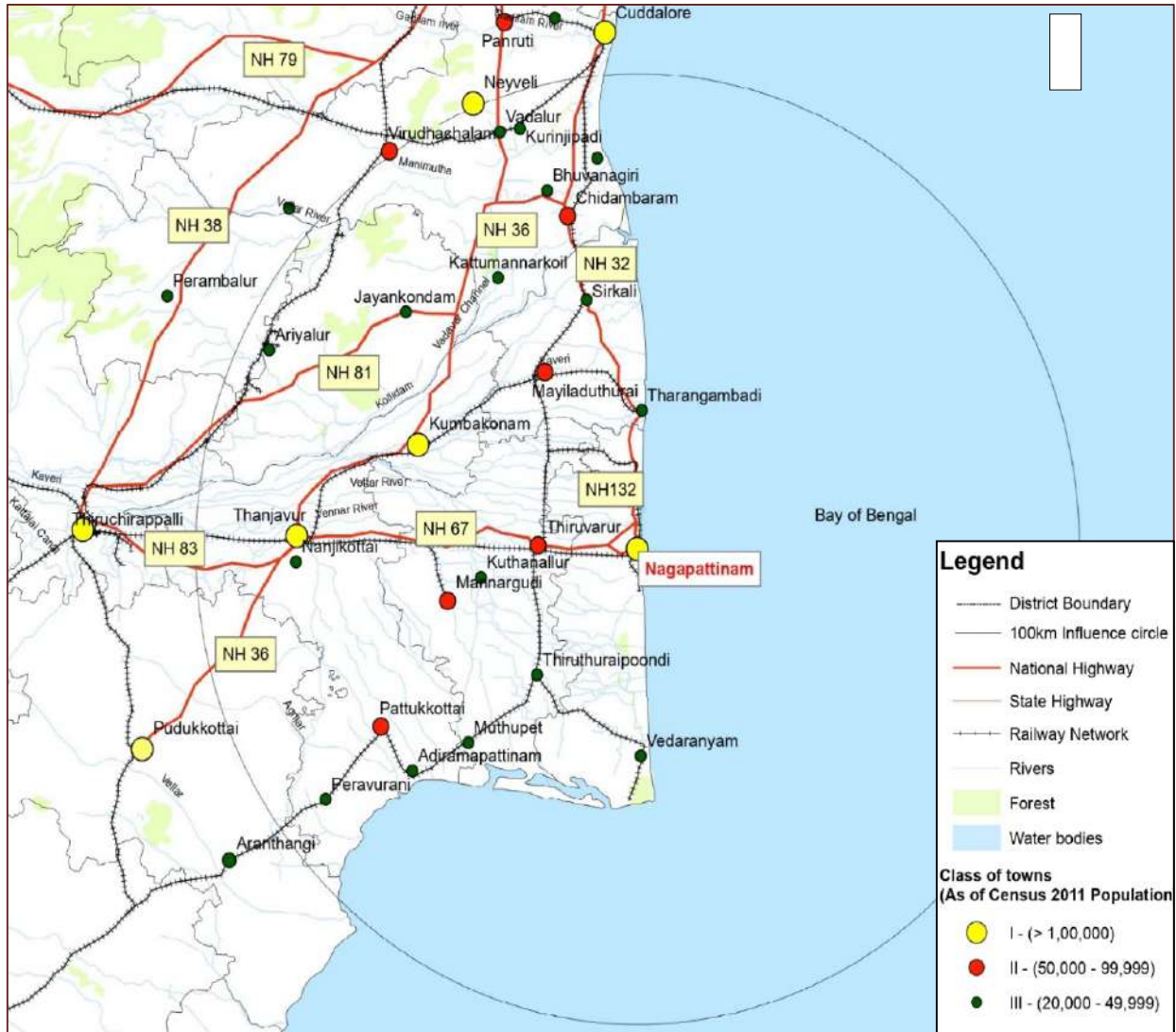
Nagapattinam is a coastal town and it lies at sea level. A location map showing the Nagapattinam Planning Area is depicted in the Map 1.1. Nagapattinam is bound by the bay of the Bengal in the east, Vellaiyar river in the South, Thiruvarur district in the west, Thanjavur in the North West and Karaikal & Puducherry in the North. Nagapattinam Municipality is located at 84 km from Thanjavur, 14 km from Karaikal, 40 km from Mayiladuthurai, 40 km from Kumbakonam, 25 km from Thiruvarur, and 350 km from Chennai, the state capital of Tamil Nadu.

**Table 1.3: Class I towns within a distance 100 Kms from Nagapattinam with their distance**

Class I towns within distance from Nagapattinam		
Tiruchirappalli (147.2 Km)	Neyveli (124.2 Km)	Cuddalore (131.2 Km)
Pudukkottai (160 Km)	Kumbakonam (69.9 Km)	Thanjavur (92.3 Km)

Table 1.3 shows the nearby Class I towns with distance from Nagapattinam town. Nagapattinam has a vast hinterland serving as a potential market and service area. Large urban

settlements such as Tiruchirappalli, Neyveli, Cuddalore, Pudukkottai, Kumbakonam, and Thanjavur are more than 70 km away from Nagapattinam. Therefore, the town has a massive hinterland for a distance of 70 km around it, for which it can act as a growth center establishing forward and backward linkages and, in the process, promoting its development besides contributing to the regional development. Figure 1.1 depicts the pattern of distribution of urban settlements in the region.



**Figure 1.1: Regional Connectivity of Nagapattinam LPA**

### 1.3.3 Evolution of the Growth of Nagapattinam

The growth pattern of Nagapattinam is linear and it is taking place mainly along the transport corridors. The driving force for growth is primarily, the location of important tourist places. The major developments are seen along NH 45A and NH 83. In 1984, settlements were found only near the port in Nagapattinam town and surrounding the pilgrimage places like Sikkal, Nagore, and Velankanni (Figure 1.2). During 1984, the residential area was spread over 1.77 sq.km in Nagapattinam, Nagore and Velankanni. Over the years, growth happens in such a way that the area between Nagapattinam and Nagore along the national highway is developing. In addition to that, the route connecting Nagapattinam to Sikkal is also developing. The growth of the town in the north and the south is restricted by the Vettar and Kaduvaiyar rivers respectively. Currently, the old town in Nagapattinam has become the Central Business District (CBD) which has a higher density than the rest of the areas. The peripheral regions of Nagapattinam are predominantly agricultural areas without any major developments. The evolution of growth in Nagapattinam town from the year 1984 to 2017 is shown in the Map 1.2.

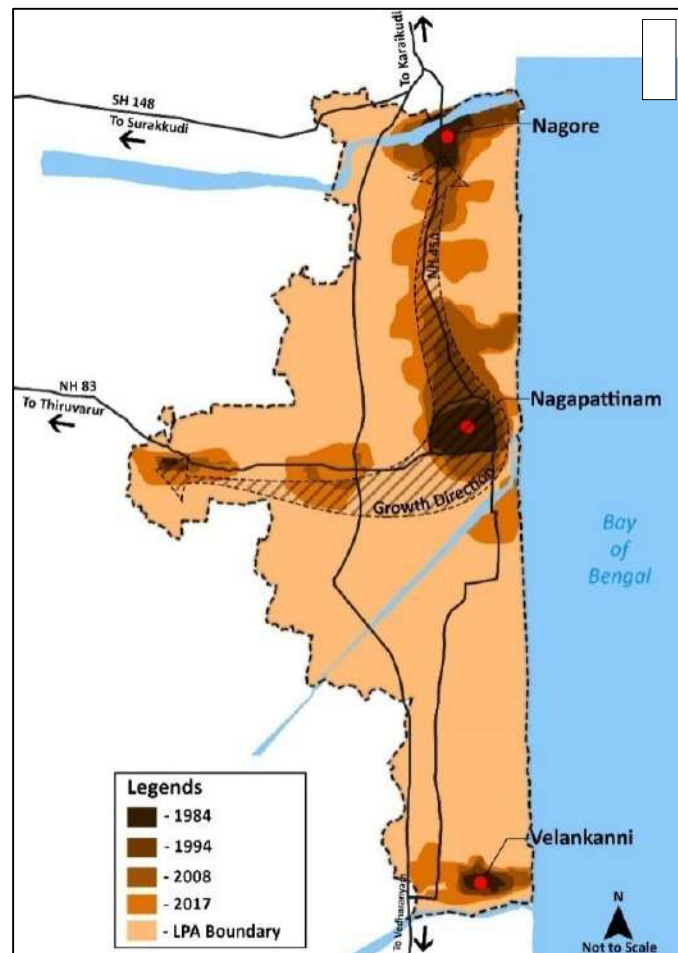


Figure 1.2: Chronological growth of Nagapattinam



### 1.3.4 Geographical Location

Nagapattinam is located on the shores of the Bay of Bengal between the 10.49°N latitude and 79.84°E longitude. The Local Planning Area is bounded by the Bay of Bengal on the east side, Karaikal on the north side with the Vettar river flowing along this boundary, Vellaiyar river on the South, which runs along the south of Velankanni Town Panchayat and west side covered by Villages namely Sirangudi Puliur, Ponveli, Orathur, Vadavoor, Themangalam, Kadambanoor, and Vadakudi. The total geographical area of the planning area is 80.08 Sq.km. with the coastal stretch of 16.7 km within the LPA. (Map 1.1)

A map showing the Nagapattinam Municipality and the surrounding Villages within the planning area is shown in Figure 1.3.

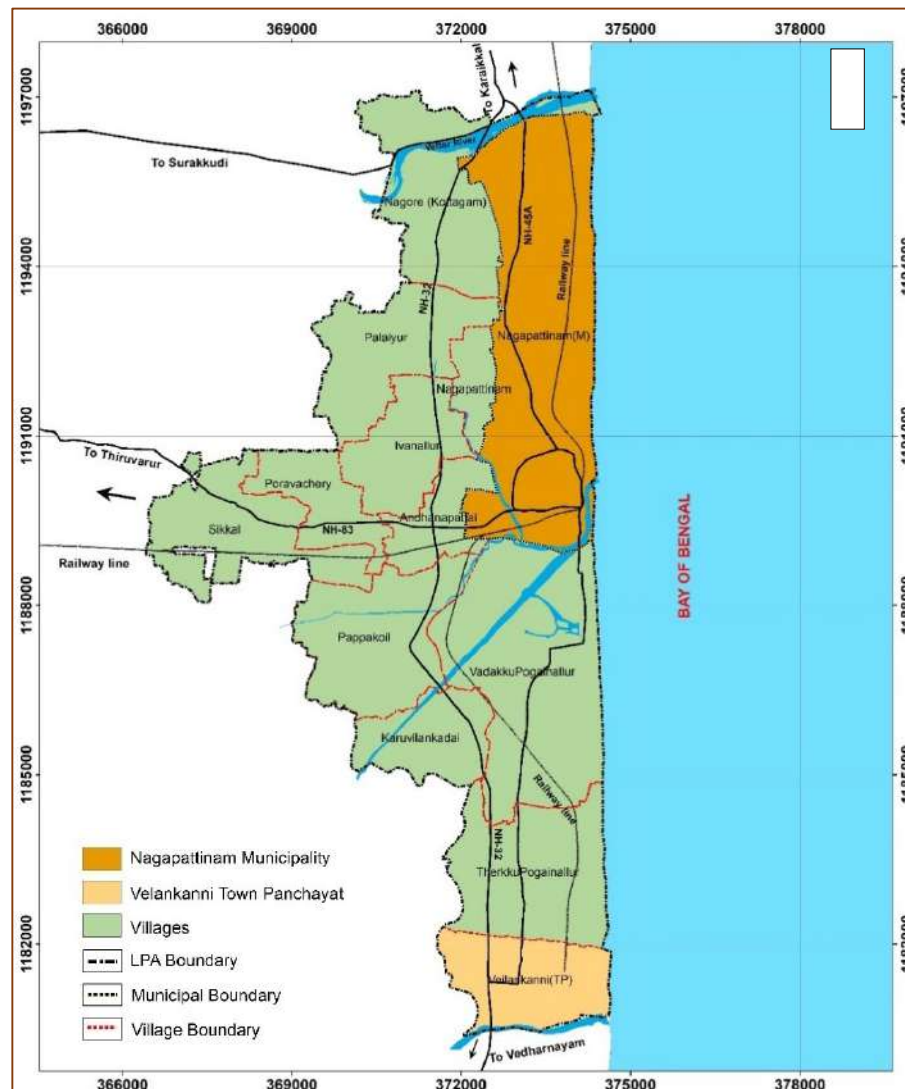


Figure 1.3: Administrative setup of the LPA

### 1.3.5 Physical Characteristics

#### ***Topography and Soil***

The terrain of Nagapattinam is generally plain with a gradual slope of 1.2 degrees. The topographical slope is towards the east and the southeast. It has an average elevation of 6 m above mean sea level. Nagapattinam has alluvial and black soli and consists of sandy clay, silt, and sand. The soil along the sea coast is slightly saline due to the influence of the seawater and consequently, their fertility is low to medium only.

The LPA is situated in the deltaic region of Cauvery River. The three tributaries of river Cauvery transverse through the Nagapattinam LPA. The Vettar River runs on the north, the Vellaiyar river runs on the south and the Kaduvaiyar river runs on the middle of the LPA.

#### ***Climate and Rainfall***

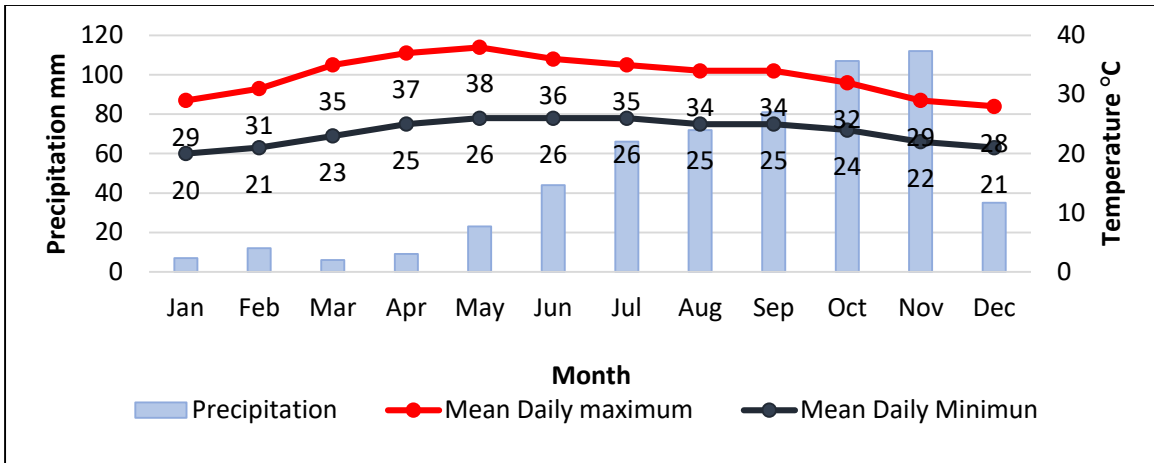
Nagapattinam has a tropical savanna climate with the summer season from April to July and December to January marks the winter season. The maximum temperature ranges from 35°C to 38°C during the summer season and during the winter season, the temperature ranges from 20°C to 25°C (Figure 1.4). The place experiences high humidity throughout the year and it reaches 70% from August to May because of its proximity to the sea.

Rain during summer season is sparse and the south-west monsoon, sets in June and continues till September. north-east monsoon sets in October and continues till January. The rainfall during the south-west monsoon period is much lower than that of the north-east monsoon. The north-east monsoon contributes 60% of the total annual rainfall. The average rainfall in Nagapattinam is 1392 mm per annum. Table 1.4 give details about the year wise rainfall received in Nagapattinam.

**Table 1.4: Average Rainfall in Nagapattinam**

Actual rainfall in mm						NormalRainfall in mm
2013	2014	2015	2016	2017	2018	
1029.6	1415.0	1747.6	661.4	1629	1079.8	1392.6

(Source: TWAD)



(Source: Meteoblue.com)

**Figure 1.4: Mean Temperature & Precipitation in Nagapattinam**

### **Transport Network**

The Nagapattinam LPA is well connected to nearby places like Thanjavur, Kumbakonam, Cuddalore, Mayiladuthurai, Karaikal and also to major cities like Chennai, Trichy, Madurai, etc. Regional connectivity for spatial representation of major and minor towns within a distance of 100 Kms from Nagapattinam is shown in Figure 1.1.

### **Road Connectivity**

Nagapattinam is connected by two National highways and State highways as listed below,

- NH 32 – connects to Villupuram
- NH 83 – connects to Tiruchirappalli
- SH 67 – connects Nagore to Nachiyar Koil
- SH 148 – connects Nagore to Vettar

### **Rail Connectivity**

Nagapattinam has one main railway station namely, Nagapattinam junction which connects Thiruvarur Junction in the west, Nagore in the north, and Velankanni in the south. There are passenger trains from Nagapattinam junction to Tiruchirappalli, Thanjavur, Mayiladuthurai, Karaikal, Mannargudi, and Thiruthuraipoondi. A daily express train for Chennai Egmore and Ernakulam Junction is also functioning. There are two tri-weekly trains from Mannargudi to Tirupati (Pamani Express) and Velankanni to Vasco da Gama (Goa) (Vasco Velankanni Express) that passes via Nagapattinam Junction. The existing transportation network in Nagapattinam LPA is shown in Map No. 1.3.

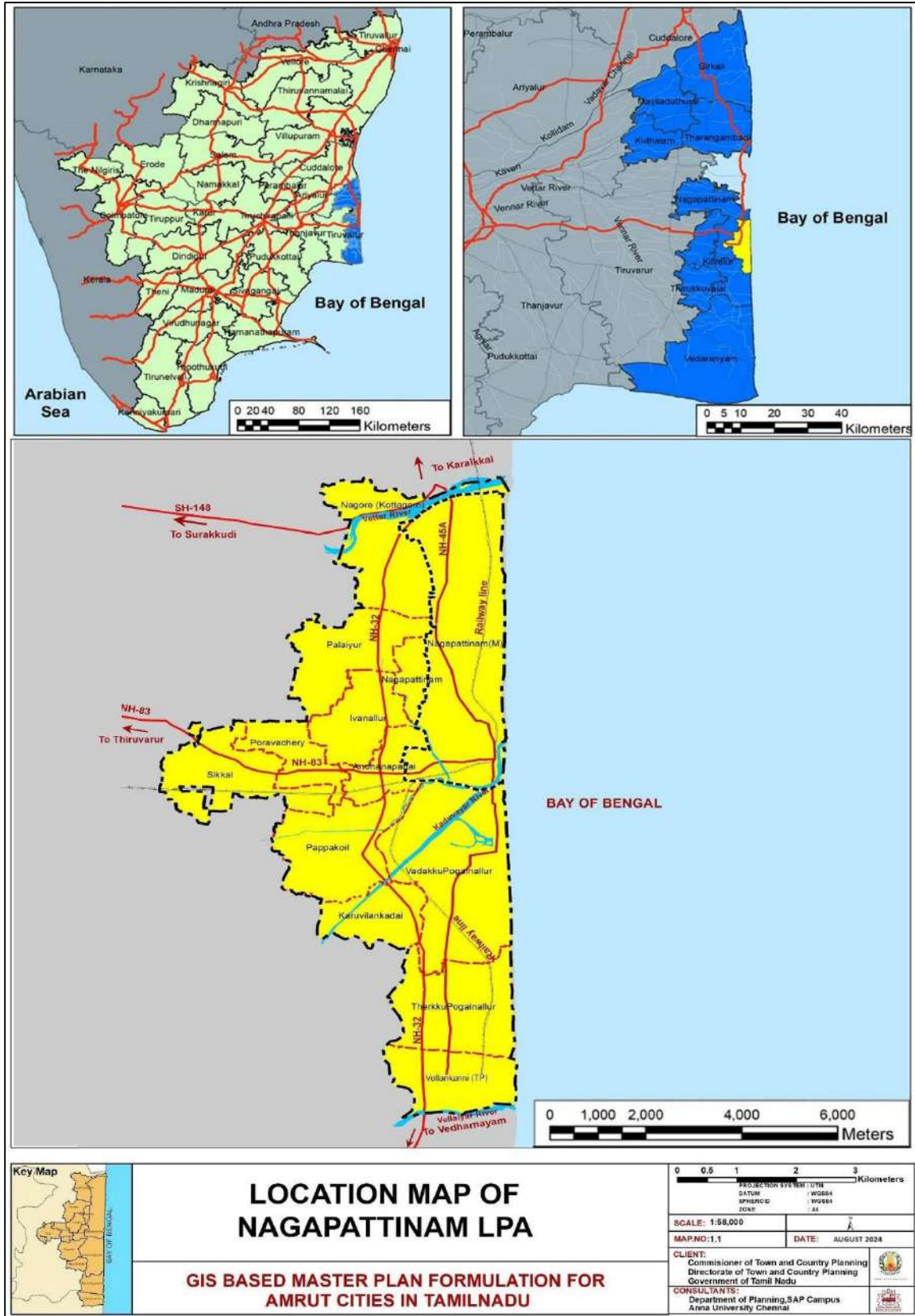
### ***Air connectivity***

There is no direct flight connectivity for Nagapattinam. The nearest airport is located at a distance of 145 km in Tiruchirappalli.

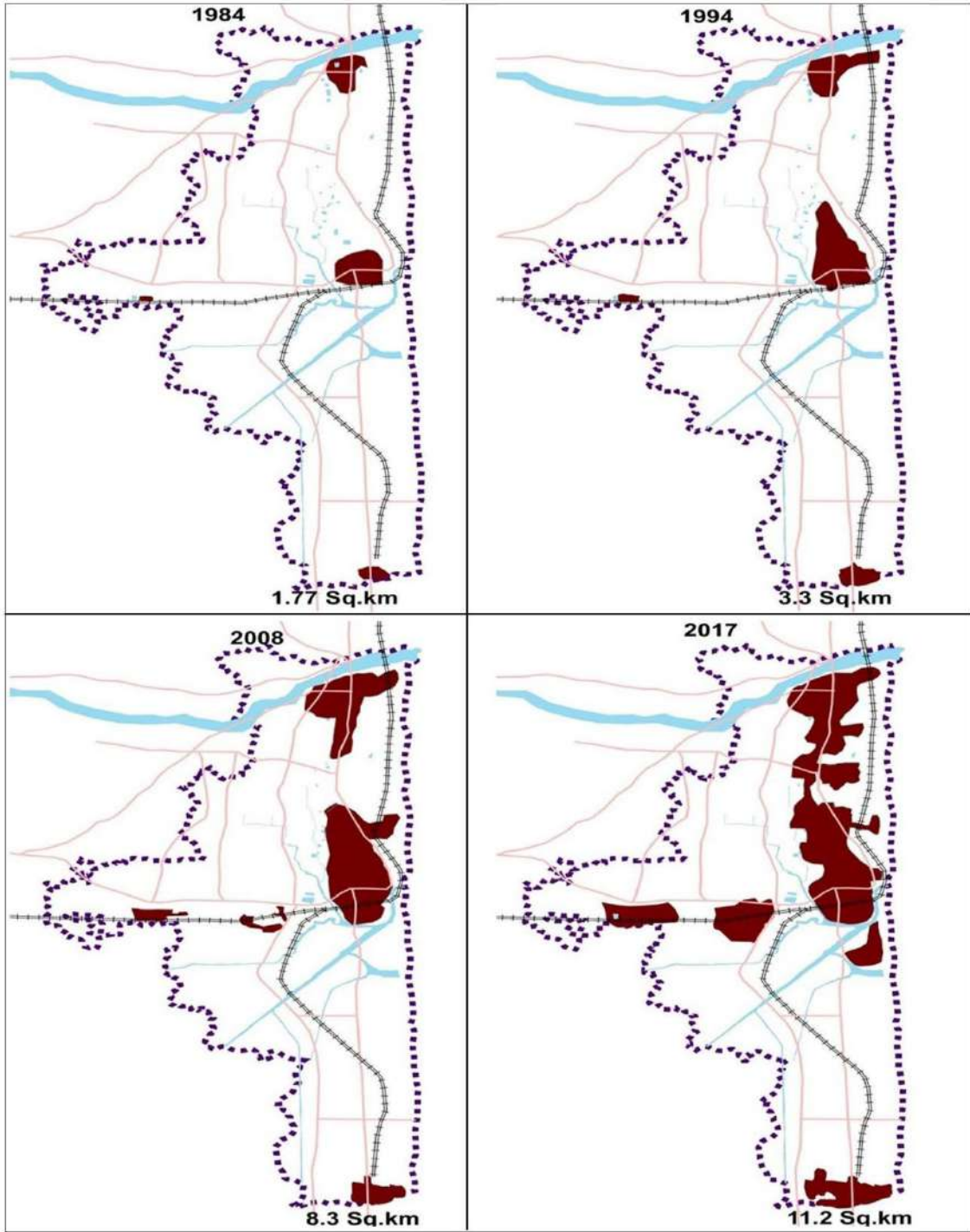
### **1.4 SUMMARY**

Nagapattinam master plan aims at improving the socio-economic standard of living of the people and enhancing the quality of life by the generation of employment opportunities, social facilities, basic amenities, transport infrastructure and services and others. Nagapattinam LPA is extended to 80.08 Sq.km with Nagapattinam Municipality, Velankanni Town Panchayat and 11 revenue Villages. Nagapattinam District was formed by bifurcating the Thanjavur District in 1991 and Nagapattinam became the District Headquarters of the newly formed Nagapattinam district.

Nagapattinam is bound by the bay of the Bengal in the east, River Uppanar in the South, Thiruvarur district in the west, Thanjavur in the North West and Karaikal & Puducherry in the North. The growth pattern in Nagapattinam is linear and it is taking place mainly along the transport corridors. The driving force for the growth is primarily Tourism and fishing. Nagapattinam LPA is located in the Cauvery River basin. The LPA is well connected with National and State highways (NH-32, NH-83, SH-67, SH-148). This master plan will focus on developing Nagapattinam with a robust economy by utilizing its tourism, agriculture, and fishing potentials.

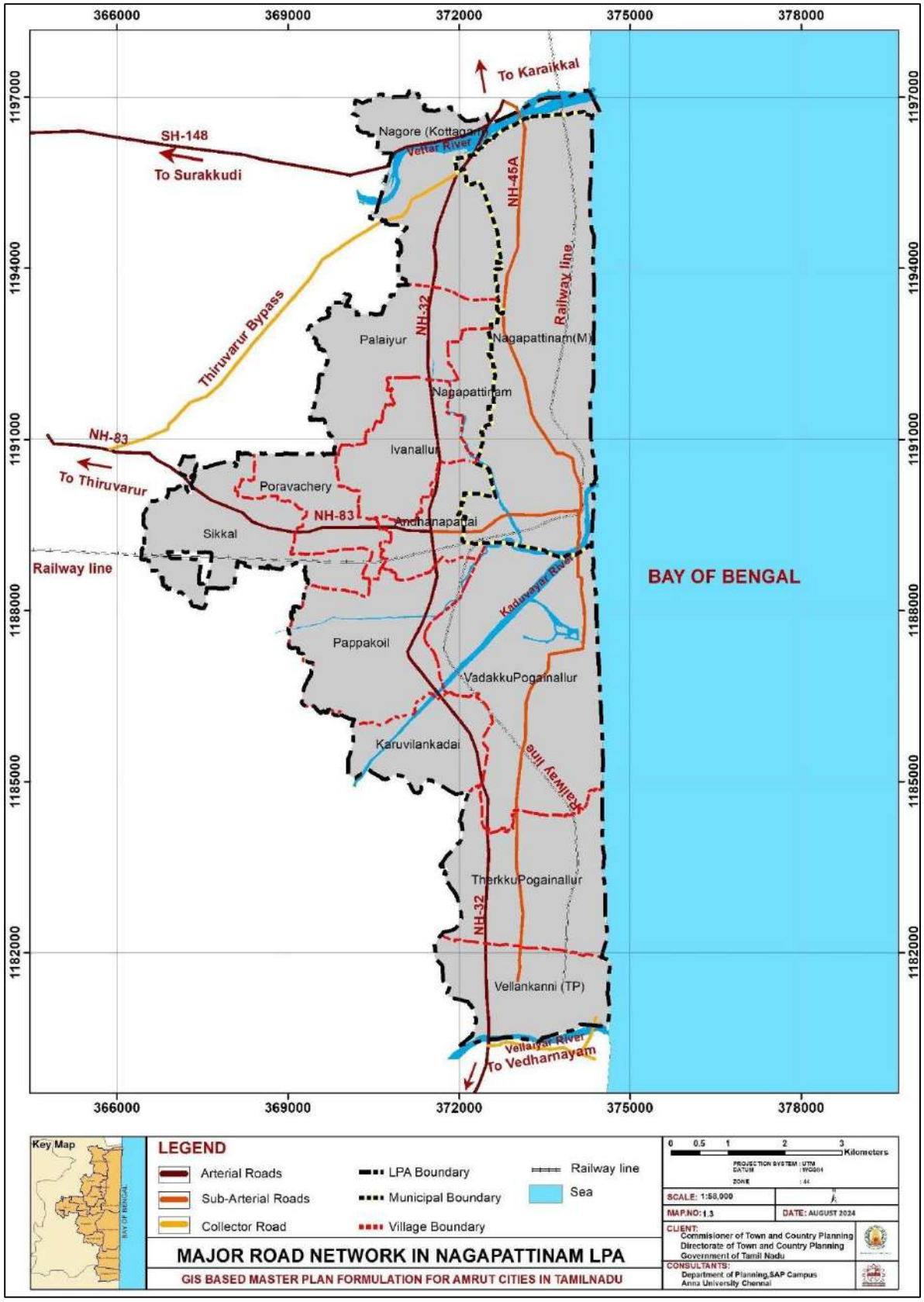


Map 1.1: Location map of Nagapattinam LPA



<p>Key Map BAY OF BENGAL</p>	<h2>EVOLUTION MAP OF NAGAPATTINAM LPA</h2>		
	<h3>GIS BASED MASTER PLAN FORMULATION FOR AMRUT CITIES IN TAMILNADU</h3>		<p>PROJECTION SYSTEM : UTM          DATUM : WGS84          SPHEROID : WGS84          ZONE : 48</p> <p>SCALE: 1:50,000</p> <p>MAP NO: 1.2      DATE: AUGUST 2024</p> <p>CLIENT:          Commissioner of Town and Country Planning          Directorate of Town and Country Planning          Government of Tamil Nadu</p> <p>CONSULTANTS:          Department of Planning, SAP Campus          Anna University Chennai</p>

Map 1.2: Evolution map of Nagapattinam LPA



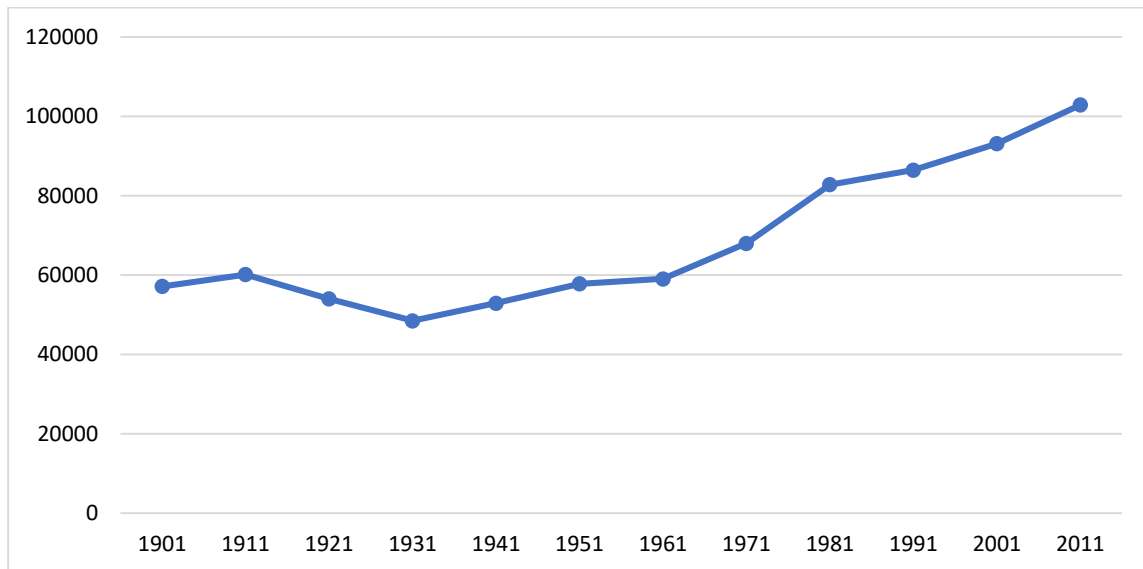
Map 1.3: Major Road network in Nagapattinam LPA

## 2. DEMOGRAPHY

### 2.1 DEMOGRAPHIC PROFILE

#### 2.1.1 Trend of population and growth rate over 100 years

The demographic study provides comprehensive and detail information about the trend of population growth, composition and distribution. It also highlights the demands of the increasing population in terms of housing, economy, infrastructure, and other services. The statistics and projections resulting from this study form the basis for the planning process.



**Figure 2.1: Population growth of Nagapattinam town from 1901-2011**

The population of Nagapattinam LPA for the year 2011 is 1,64,824 of which male and female were 81,292 (49.32%) and 83,532 (50.67%) respectively. Nagapattinam LPA population constitutes 10.19% of the total Nagapattinam district population. Nagapattinam town had a moderate population of 57,190 in 1901 and it has experienced a natural growth since then. According to the 2011 census, the population of Nagapattinam town is 1,02,905. Table 2.1 reveals that there was a negative decadal growth rate during the year 1911 - 21 and 1921-1931. The maximum decadal growth rate was witnessed during 1971-1981. The population of the town has doubled from 57,190 to 1,02,905 during the 100-year period of 1901 to 2011 (Figure 2.1 & Table 2.1). Table 2.1 presents the growth rate of Nagapattinam Municipality from the year 1901 to 2011.

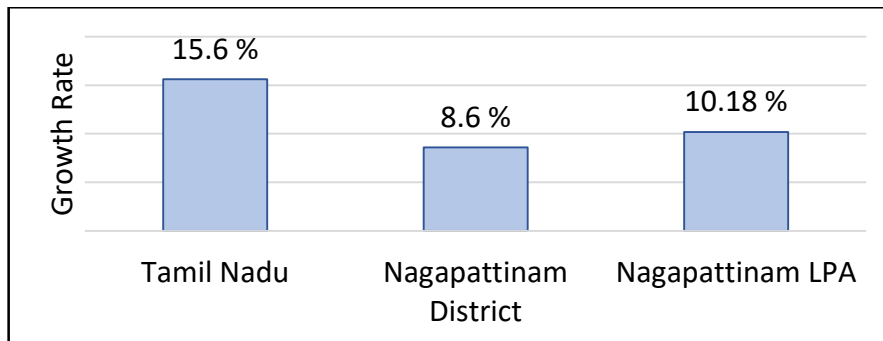


**Table 2.1: Growth Rate of Nagapattinam Municipality from 1901 - 2011**

S. No.	Year	Population	Inter - Decennial Growth Rate (in %)
1	1901	57,190	-
2	1911	60,168	5.21
3	1921	54,016	-10.22
4	1931	48,527	-10.16
5	1941	52,936	9.09
6	1951	57,834	9.25
7	1961	59,063	2.13
8	1971	68,026	15.18
9	1981	82,828	21.76
10	1991	86,489	4.42
11	2001	93,148	7.70
12	2011	1,02,905	10.47

(Source – Census of India)

### 2.1.2 Trend of population growth in Nagapattinam LPA



**Figure 2.2: Comparative population growth rate 1981-1991**

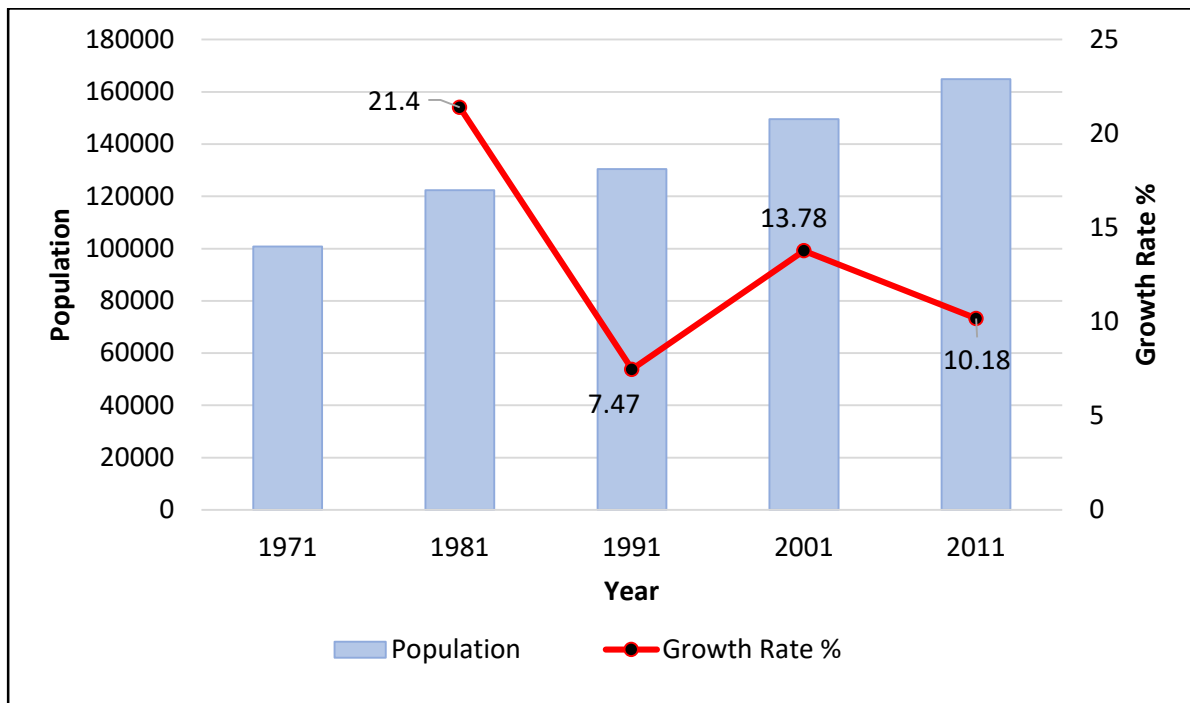
Nagapattinam LPA has a growth rate of 10.18 % during 2001-11 (Figure 2.2), which is higher than that of the district (8.6 %) and lower than that of the state (15.6 %). It is evident from the Table 2.1, that the decadal growth rate was high during the year 1981 which is mainly due to the expansion of the town limits. There is an abrupt fall in the growth rate of the total population after 1981. The major cause for the decline in growth rate during 1981 and 1991 is due to general migration in search of better employment to other districts. However, there is an increase in the growth rate in Nagapattinam LPA from the year 2001 to 2011. The table below shows the trend of population growth in the Nagapattinam LPA from the year 1971-2011.

**Table 2.2: Trend of Population and its Growth rate in Urban & Rural Area of Nagapattinam LPA (1971-2011)**

S. No	Year	Urban		Rural		Total Population	Growth Rate % of LPA
		Population	Growth Rate %	Population	Growth Rate %		
1	1971	71751	-	29001	-	100752	-
2	1981	88335	23.11	33991	17.20	122326	21.40
3	1991	92644	4.87	37778	11.14	130422	7.47
4	2001	103299	11.50	46292	22.53	149591	13.78
5	2011	114013	10.37	50811	9.76	164824	10.18

(Source:Census of India)

Out of the total population of Nagapattinam LPA, 69.17% reside in urban areas and 30.82% in rural areas. Figure 2.3 reveals that the population growth rate of Nagapattinam LPA is generally declining, which is mainly due to lack of employment opportunities within the town. Population distribution in Nagapattinam LPA is shown in the Map No 2.1.



**Figure 2.3: Population growth trend (1971-2011) in Nagapattinam LPA**

### 2.1.3 SC & ST Population

The Table below shows the distribution of SC and ST population in the core and periphery of the LPA.

**Table 2.3: Village/Town wise SC/ST population for 1991, 2001 & 2011**

S. No.	Description	Name of Villages/Town	SC Population			ST Population		
			1991	2001	2011	1991	2001	2011
1	Urban	Nagapattinam (M)	6492	7475	8917	586	700	641
2		Velankanni (TP)	636	1212	1913	41	0	23
3	Rural	Nagore	703	889	998	0	0	0
4		Palaiyur	610	630	607	0	0	0
5		Ivanalur	1197	1442	2709	0	4	226
6		Anthapettai	291	1333	951	11	10	3
7		VadakuPoigainallur	131	1149	1014	0	0	0
8		TherkkuPoigainallur	48	34	85	0	0	0
9		Poravacheri	900	1047	1161	0	0	4
10		Sikkal	1490	1647	1965	36	16	3
11		Papakoil	1502	1919	2314	0	33	12
12		Karuvelankadai	594	748	832	0	0	0
13		Nagapattinam Village	0	0	26	0	0	0
<b>Total</b>			<b>14594</b>	<b>19525</b>	<b>23492</b>	<b>674</b>	<b>763</b>	<b>912</b>

(Source – Census of India)

From Table 2.3, it can be inferred that the total population of SC & ST in Nagapattinam LPA has shown a gradual increase for the past few decades. The SC & ST population constituted 14.25% and 0.55% of the total Nagapattinam LPA population in the year 2011. The Nagapattinam Municipality has the highest SC & ST population followed by Ivanalur village during the year 2011. There is a significant increase in the population of ST in Ivanalur village during the last decade. It is observed that there is a decline in SC population in Villages like Palaiyur, Anthapettai, and VadakuPoigainallur from the year 2001 to 2011. The table 2.3 shows the village/town wise population of Nagapattinam LPA from the year 1991 to 2011.

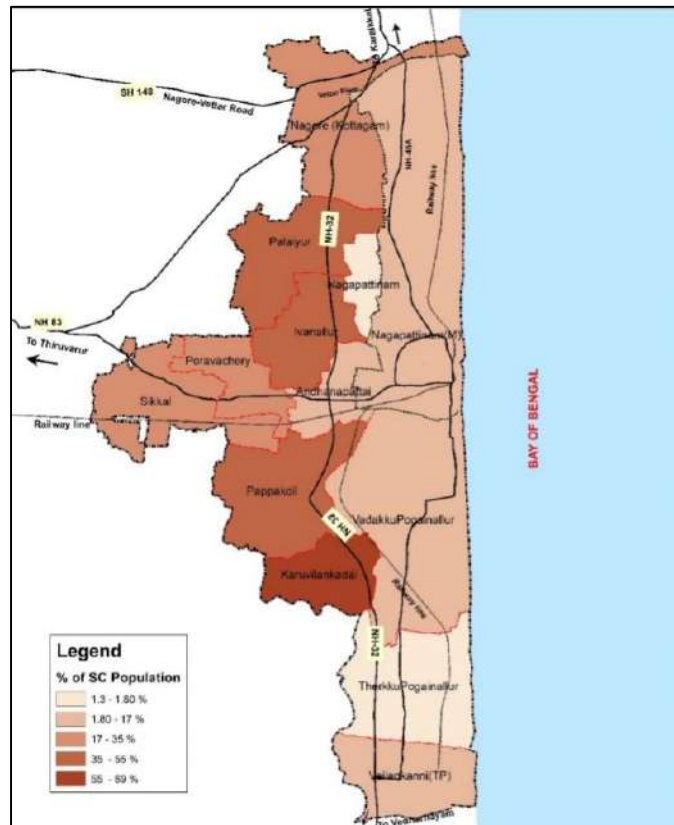
Table 2.4 reveals the village/town wise proportion of SC & ST population in Nagapattinam LPA. Karuvelankadai village has 69.28 % of its population under the SC category and has the maximum SC population in the LPA. Similarly, Villages like Palaiyur, Ivanalur, and Papakoil have a larger proportion of the SC population in Nagapattinam LPA.

Figure 2.4 shows the concentration of SC population in Nagapattinam LPA. The Villages of the LPA where the proportion of the disadvantaged population are higher, special socio-economic initiatives to improve the standard of living and the quality of life can be suggested.

**Table 2.4: Village/Town Wise Proportion of SC & ST in Nagapattinam LPA**

S. No.	Name of Villages/Towns	Population	% of SC	% of ST
1	Nagapattinam (M)	102905	8.67	0.6
2	Velankanni (TP)	11108	17.22	0.2
3	Nagore (Kottagam) (Muttam & Thethi)	3564	28.00	0.0
4	Palaiyur	1291	47.02	0.0
5	Ivanalur (Sellur)	4921	55.05	4.6
6	Anthanapettai (Manjakollai)	7349	12.94	0.0
7	VadakuPoigainallur (Akkarapettai)	10826	9.37	0.0
8	TherkkuPoigainallur	4731	1.80	0.0
9	Poravacheri	4422	26.26	0.1
10	Sikkal	5652	34.77	0.1
11	Papakoil	4915	47.08	0.2
12	Karuvelankadai	1201	69.28	0.0
13	Nagapattinam Village	1939	1.34	0.0
<b>Total</b>		<b>164824</b>	<b>14.25</b>	<b>0.55</b>

(Source – Census of India)



**Figure 2.4: Share of SC population in Nagapattinam LPA**

#### 2.1.4 Fishermen Population

According to marine fisheries census 2010, the total fishermen population in Nagapattinam district was 84,369. It is noticed from the Table 2.5 that the fishermen population of Nagapattinam LPA during the year 2010 was 20,953 and it accounts for 12.71% of the total LPA population, 24.83% of the district's fishermen population and 2.60% of the state fishermen population. Nagore village witnessed the highest fishermen population in Nagapattinam LPA. The sex ratio of the fishermen population is 932 which is less when compared with the overall sex ratio of Nagapattinam LPA. The table below presents the details of village wise fishermen population of Nagapattinam LPA for the year 2010. Fishing is one of the important sectors in the LPA. Therefore, the master plan will explore the avenues to enhance the opportunities to modernize and diversify the industry.

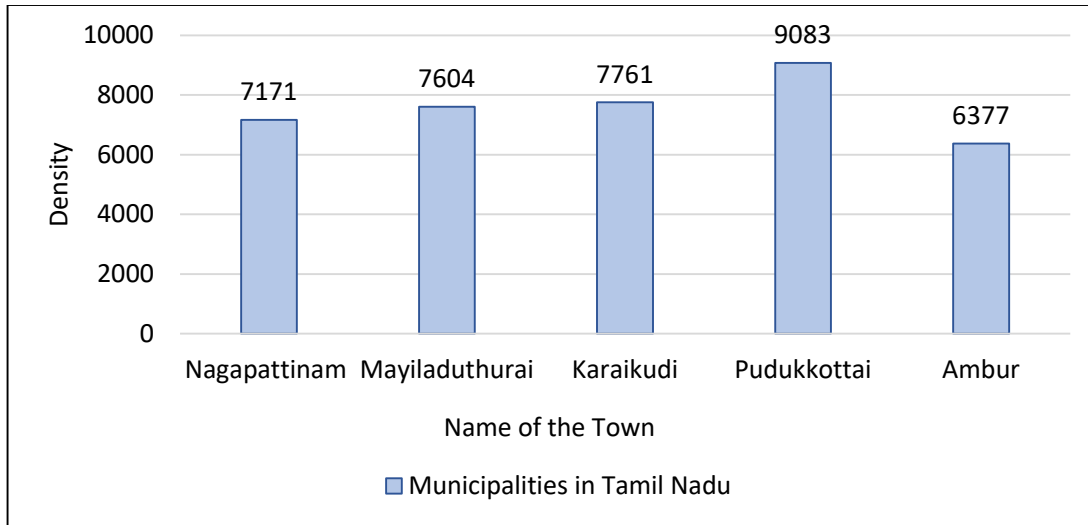
**Table 2.5: Fishermen Population in Nagapattinam LPA for the Year 2010**

S. No.	Name of the Villages	Fishermen families	Total Fishermen population	Male	Female	Sex Ratio
1	Akkarapettai	1,101	4,695	2,360	2,335	992
2	Ariyanattu Street	987	4,149	2,212	1,937	876
3	Kallar	251	954	487	467	959
4	Keechankuppam	720	2,735	1,449	1,286	888
5	Nagore Pattinacherry	1,133	4,734	2,406	2,328	968
6	Nambiyar Nagar	450	1,814	947	867	916
7	Samandhanpettai	426	1,872	983	889	904
<b>Total</b>		<b>5,068</b>	<b>20,953</b>	<b>10,844</b>	<b>10,109</b>	<b>932</b>

(Source – Marine Fisheries Census 2010)

#### 2.1.5 Population density

Population density is defined as the number of persons per Sq.km. Nagapattinam LPA spreads over an area of about 80.08 Sq.km. The total population density of the LPA has increased from 1868 persons per Sq. km in 2001 to 2058 persons per Sq.km in 2011. Figure 2.5 shows the comparison of the population density of Nagapattinam Municipality with other similar municipalities in Tamil Nadu. In Nagapattinam LPA, Nagapattinam Municipality has the highest population density of about 7171 persons per Sq. Km, followed by Velankanni Town Panchayat. This is mainly associated with the availability of better employment opportunities in urban areas.



**Figure 2.5: Comparative population density-2011**

Table 2.6 shows that there is a significant rise in the population density of Villages like Ivanalur, Nagore and Anthanapettai. This is mainly due to the resettlement of people affected by Tsunami to these Villages. A decline in population density is noticed in VadakkuPoigainallur which is associated with a decrease in the population due to the impact of the Tsunami. A larger concentration of agricultural land & general migration may be other reasons for the decrease in population density. The table below gives the Village/Town wise population density of Nagapattinam LPA. Distribution of population density in Nagapattinam LPA is shown in the Map 2.2.

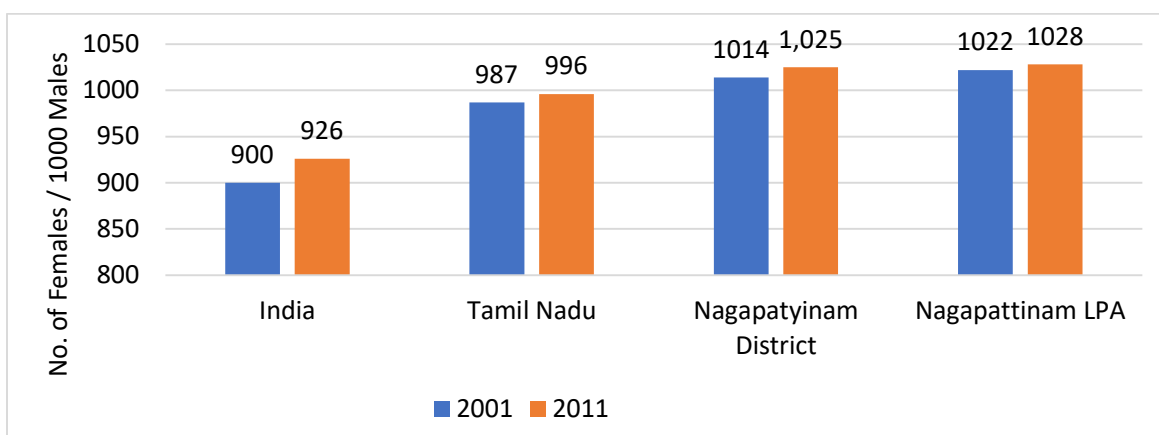
**Table 2.6: Village/Town wise Population Density for Nagapattinam LPA from 2001-2011**

S. No	Description	Name of Villages/Town	Area Sq. Km	Population		Population Density (Persons per Sq.km)		Changes in density (in %)
				2001	2011	2001	2011	
1	Urban	Nagapattinam (M)	14.35	93148	102905	6491	7171	10.47
2		Velankanni (TP)	5.50	10151	11108	1846	2020	9.43
3	Rural	Nagore	6.00	2269	3564	378	594	57.07
4		Palaiyur	5.00	1296	1291	259	258	-0.39
5		Ivanalur (Sellur)	5.19	2225	4921	429	948	121.17
6		Anthanapettai (Manjakollai)	8.14	6454	7349	793	903	13.87
7		VadakkuPoigainallur (Akkarapettai)	11.50	15566	10826	1354	941	-30.45

S. No	Description	Name of the Villages/Town	Area Sq.km	Population		Population density (Persons per Sq.km)		Changes in density (in %)
				2001	2011	2001	2011	
8	Rural	TherkkuPoigainallur	5.00	4368	4731	874	946	8.31
9		Poravacheri	5.00	4115	4422	823	884	7.46
10		Sikkal	6.00	5164	5652	861	942	9.45
11		Papakoil	3.00	3623	4915	1208	1638	35.66
12		Karuvelankadai	4.00	1212	1201	303	300	-0.91
13		Nagapattinam Village	1.39	0	1939	0	1395	
<b>Total</b>			<b>80.07</b>	<b>149591</b>	<b>164824</b>	<b>1868</b>	<b>2058</b>	<b>10.18</b>

(Source: Census of India)

### 2.1.6 Sex Ratio



**Figure 2.6: Comparison of Sex ratio (2001 & 2011)**

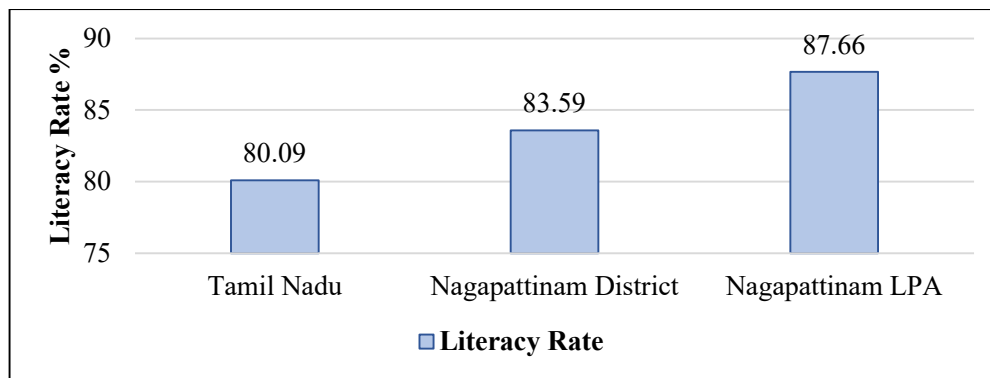
Sex ratio is denoted by the number of females per 1000 males. As per census 2011, the sex ratio of Nagapattinam LPA is 1028 females per 1000 males which is almost similar to that of the district (1025) and higher than the state (996) (Figure 2.6). It is also noticed from Table 2.7, the Velankanni Town Panchayat witnessed the highest sex ratio of 1085 in 2011 followed by TherkkuPoigainallur village. Overall, the sex ratio in Nagapattinam LPA shows an increasing trend. This may be attributed to two reasons; first, the women in Nagapattinam LPA receive proper education and health care, so their survival chances are good as those of men. Secondly, the town has a matriarchal society in which the women hold the power to pull strings and doesn't allow discrimination between a daughter and son. It may also be associated due to out-migration of men in search of employment opportunities. Table 2.7 presents the Village/Town wise sex ratio of Nagapattinam LPA for the year 2011.

**Table 2.7: Village/Town wise Sex Ratio of Nagapattinam LPA (2011)**

S. No	Name of Villages/Town	2011		
		Male	Female	Sex Ratio
1	Nagapattinam (M)	50793	52112	1026
2	Velankanni (TP)	5327	5781	1085
3	Nagore	1792	1772	989
4	Palaiyur	637	654	1027
5	Ivanalur	2461	2460	1000
6	Anthanapettai	3592	3757	1046
7	VadakuPoigainallur	5418	5408	998
8	TherkkuPoigainallur	2298	2433	1059
9	Poravacheri	2258	2164	958
10	Sikkal	2770	2882	1040
11	Papakoil	2406	2509	1043
12	Karuvelankadai	589	612	1039
13	Nagapattinam Village	951	988	1039
	<b>Total</b>	<b>81,292</b>	<b>83,532</b>	<b>1028</b>

(Source:Census of India)

### 2.1.7 Literacy



**Figure 2.7: Comparative literacy rate-2011**

The literacy rate for Nagapattinam District is 83.59% and Tamil Nadu State is 80.09%. As per census 2011, the literacy rate in Nagapattinam LPA is 87.66% which is higher than that of the State and District literacy rate (Figure 2.7). Table 2.8 shows that the literacy rate in most of the Villages in the LPA has increased during the year 2001 to 2011. The higher literacy rate in Nagapattinam LPA is attributed to the nearness of Villages to Nagapattinam Municipality and Velankanni Town Panchayat which have better educational facilities. Table 2.8 shows the literacy rate of Nagapattinam LPA.



**Table 2.8: Literacy Rate of Nagapattinam LPA from 2001 to 2011**

S. No.	Name of Villages/Town	Literate		Literacy Rate %		Changes in literacy
		2001	2011	2001	2011	
1	Nagapattinam (M)	68310	81031	83.78	89.02	5.25
2	Velankanni (TP)	6916	8401	78.02	84.99	6.96
3	Nagore (Kottagam) (Muttam&Thethi)	1519	2604	75.50	83.92	8.42
4	Palaiyur	942	1022	83.00	88.64	5.64
5	Ivanalur (Sellur)	1396	3468	72.59	80.39	7.79
6	Anthanapettai (Manjakollai)	4904	5879	86.05	90.20	4.15
7	VadakuPoigainallur (Akkarapettai)	10040	8056	75.48	85.00	9.52
8	TherkkuPoigainallur	3195	3633	82.18	85.22	3.05
9	Poravacheri	3012	3520	83.16	89.11	5.96
10	Sikkal	3778	4504	83.60	89.38	5.78
11	Papakoil	2267	3469	75.42	80.79	5.37
12	Karuvelankadai	793	847	74.25	79.38	5.13
13	Nagapattinam Village	0	1323	0.00	80.13	80.13
<b>Total</b>		<b>107072</b>	<b>127757</b>	<b>82.00</b>	<b>87.66</b>	<b>5.66</b>

(Source: Census of India)

### 2.1.8 Household Size

As per Census 2011, the average household size of Nagapattinam LPA was 4.1. There is no much difference between urban and rural household size. It implies that the core city doesn't have much potential to attract migrants from the surrounding rural areas. Table 2.9 reveals that more than 30 % of the Villages in the planning area have less than 4 persons per household. Anthanapettai Villages has maximum household size of 4.52 in Nagapattinam LPA. The details of total household & household size of Nagapattinam LPA are given in the below table.

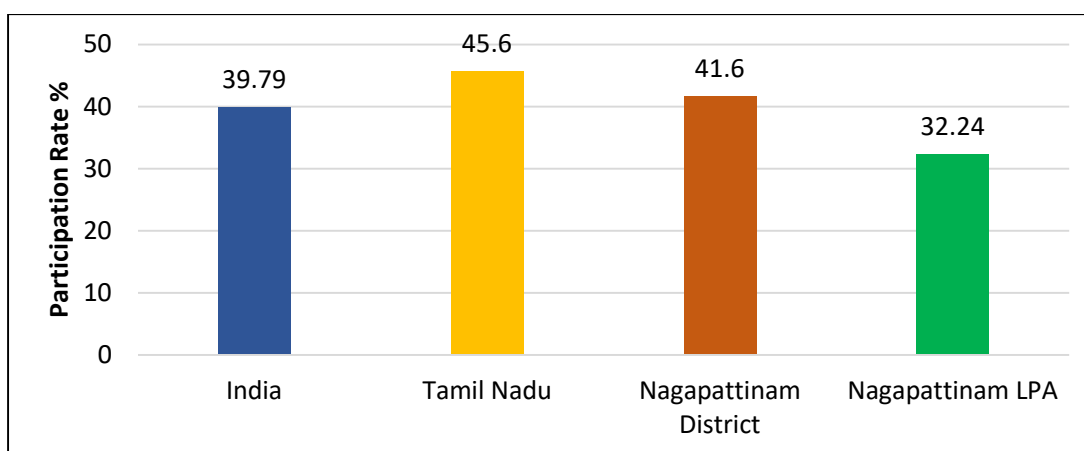
**Table 2.9: Household & Household Size in Nagapattinam LPA 2011**

S. No.	Name of Villages/Town	Population 2011	No. of households	Household Size
1	Nagapattinam (M)	102905	24518	4.19
2	Velankanni (TP)	11108	2753	4.03
3	Nagore	3564	852	4.18
4	Palaiyur	1291	346	3.73
5	Ivanalur	4921	1295	3.80
6	Anthanapettai	7349	1625	4.52
7	VadakuPoigainallur	10826	2503	4.32
8	TherkkuPoigainallur	4731	1171	4.04

S No.	Name of Villages/Town	Population 2011	No. of households	Household Size
9	Poravacheri	4422	1029	4.29
10	Sikkal	5652	1451	3.89
11	Papakoil	4915	1177	4.17
12	Karuvelankadai	1201	345	3.48
13	Nagapattinam Village	1939	507	3.82
<b>Total</b>		<b>164824</b>	<b>39572</b>	<b>4.16</b>

(Source: Census of India)

### 2.1.9 Workforce Participation Rate



**Figure 2.8: Workforce Participation Rate -2011**

The workforce participation rate of India was 39.79% and Tamil Nadu was 45.6% in 2011. The participation rate of Nagapattinam LPA is low when compared with the State and Nation's workforce rate (Figure 2.8). It is evident from Table 2.10 that the proportion of total workers to the population of Nagapattinam LPA was 32.24% in 2001 and 34.29% in 2011. The figure had increased by 2.05% which is a reflection of the growing economic opportunities in the area. The urban participation rate (32.8 %) is lower than that of the rural participation rate (37.6 %) in the planning area. The higher participation rates of workers in Villages may be attributed to the Rural Employment Guarantee program and also the seasonal employment in the agricultural sector. However, the rate had decreased in Villages like Nagore, Palaiyur, Ivanalur, and Anthanapettai. The table below gives the Village/Town wise workers participation rate of Nagapattinam LPA for the years 2001 & 2011. (Refer Map 3.1)

**Table 2.10: Village/Town wise Participation Rate of Nagapattinam LPA**

S.No.	Name of Villages/Town	Population		Total Workers		% of workers	
		2001	2011	2001	2011	2001	2011
1	Nagapattinam (M)	93148	102905	27952	33532	30.01	32.59
2	Velankanni (TP)	10151	11108	3431	3885	33.80	34.97
3	Nagore (Kottagam) (Muttam & Thethi)	2269	3564	995	1253	43.85	35.16
4	Palaiyur	1296	1291	731	596	56.40	46.17
5	Ivanalur (Sellur)	2225	4921	961	1986	43.19	40.36
6	Anthanapettai (Manjakollai)	6454	7349	2119	2287	32.83	31.12
7	VadakuPoigainallur (Akkarapettai)	15566	10826	4944	3801	31.76	35.11
8	TherkkuPoigainallur	4368	4731	1632	1758	37.36	37.16
9	Poravacheri	4115	4422	1430	1604	34.75	36.27
10	Sikkal	5164	5652	1971	2316	38.17	40.98
11	Papakoil	3623	4915	1534	2167	42.34	44.09
12	Karuvelankadai	1212	1201	539	540	44.47	44.96
13	Nagapattinam	0	1939	0	806	0	41.57
<b>Total</b>		<b>149591</b>	<b>164824</b>	<b>48239</b>	<b>56531</b>	<b>32.24</b>	<b>34.29</b>

(Source: Census of India)

## 2.2 POPULATION PROJECTION

Population Projection is an extrapolation of historical data into the future. It is used to understand the future growth of a city using the past available data and provides a basic standard for the estimation of land and infrastructure requirements. Population projection helps to determine the demand for services among different segments of the population.

### 2.2.1 Population Projection methods

Population projection has various methods such as the Arithmetical Progression method, Exponential method, Incremental Increase method, Decreasing Growth Rate method, Geometrical Increase method, and Graphical method. Different methods are used depending on the need and nature of the area for which projection is made. In the context of Nagapattinam LPA, for projecting the population up to 2041, the following methods have been adopted,

- Arithmetical Progression method
- Incremental Increase method

- Geometrical Increase method
- Exponential Growth method
- Graphical method

for projecting future population, Nagapattinam LPA has been classified into three types based on the nature of Urban and Rural local bodies. They are as follows,

- Nagapattinam (Municipality)
- Velankanni (Town Panchayat)
- Vicinity Area (Villages)

Classification of Municipality, Town Panchayat and Vicinity area comprises of the following towns and Villages as shown in Table below.

**Table 2.11: Classification of Nagapattinam LPA based on local bodies**

Type of local body	Name of the town/village
Municipality	Nagapattinam
Town Panchayat	Velankanni
Vicinity area	Nagore (Kottagam) (Muttam&Thethi)
	Palaiyur
	Ivanalur (Sellur)
	Anthanapettai (Manjakollai)
	VadakkuPoigainallur (Akkarapettai)
	TherkkuPoigainallur
	Poravacheri
	Sikkal
	Papakoil
	Karuvelankadai
	Nagapattinam Village

### 2.2.2 Population projection using various methods

The population projection made for the Nagapattinam Municipality, Velankanni Vicinity area and Nagapattinam LPA using various methods are given in the tables below.

#### ***Arithmetic Progression Method***

This method is based on the assumption that the population increases at a constant rate. In this method, the average increase in population per decade is calculated from the past census reports. This increase is added to the present population to find out the population of the next decade.

$dP/dt = C$  i.e., rate of change of population with respect to time is constant.

Population after nth decade will be  $P_n = P + n.C$

Where,  $P_n$  is the population after n decade and P is present population.

**Table 2.12: Population projection using Arithmetic Progression Method**

Description	2011 Census Population	Projected Population			
		2011	2021	2031	2041
Nagapattinam(M)	102905	101522	109896	118270	126644
Velankanni (TP)	11108	12293	14435	16577	18719
Vicinity area	50811	52056	57820	63584	69348
Nagapattinam LPA	164824	165871	182151	198431	214711

***Incremental Increase method***

This method is a modification of the arithmetical increase method and it is suitable for an average size town under the normal condition where the growth rate is found to be in increasing order. While adopting this method the increase in increment is considered for calculating future population.

Population after  $n^{\text{th}}$  decade is  $P_n = P + n.X + \{n(n+1)/2\}. Y$

Where,  $P_n$  = Population after nth decade

X = Average increase and Y = Incremental increase

**Table 2.13. Population projection using Incremental Increase Method**

Description	2011Census Population	Projected Population			
		2011	2021	2031	2041
Nagapattinam(M)	102905	98449	103750	109051	114352
Velankanni (TP)	11108	17634	25117	32600	40083
Vicinity area	50811	53818	61344	68870	76396
Nagapattinam LPA	164824	16990	190211	210521	230831

***Geometrical Increase method***

In this method, the increase in population from decade to decade is assumed to remain constant. The geometric mean increase is used to find out the future increment in population. Since this method gives higher values and hence should be applied for a new industrial town at the beginning of development for only a few decades.

$$P_n = P (1 + IG/100)^n$$

Where,  $P_n$  = Population at the end of nth decade

IG = geometric mean (%)

P = Present population

n = No. of decades

**Table 2.14. Population projection using Geometrical Increase Method**

Description	2011 Census Population	Projected Population			
		2011	2021	2031	2041
Nagapattinam(M)	102905	102893	121870	154775	210765
Velankanni (TP)	11108	14045	26886	71209	188601
Vicinity area	50811	56429	148413	208000	312572
Nagapattinam LPA	164824	173367	297169	433984	711938

**Exponential Growth method**

Instead of assuming that the population is growing by a constant amount, the exponential model assumes that the population is growing at a constant rate. This may be appropriate for expanding communities unaffected by any constraints.

$$P(t+n) = P(t) \times e^{rn}$$

where r is the constant annual growth rate

$$r = \log_e(P(t+n) / P(t)) / n$$

**Table 2.15. Population projection using Exponential Growth method**

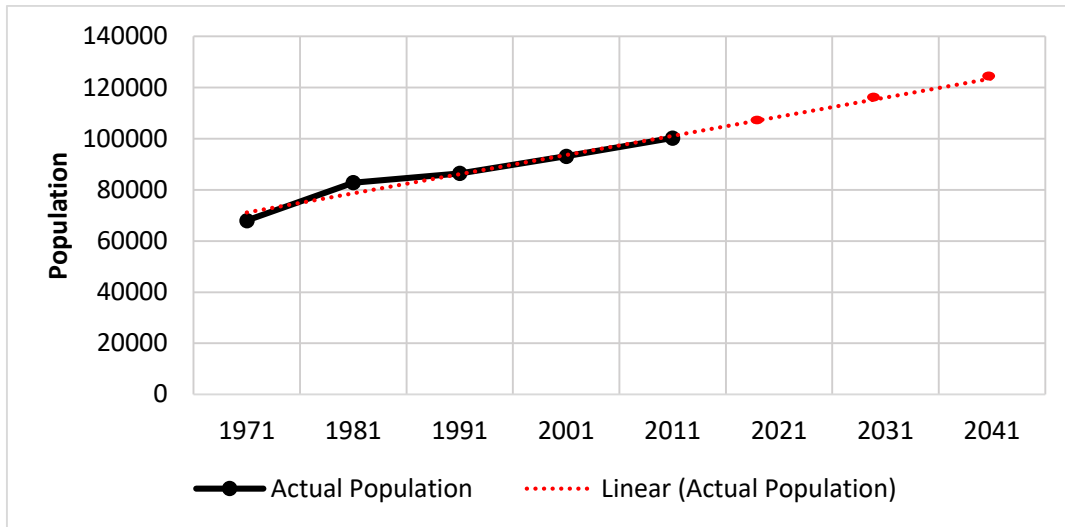
Description	2011Census Population	Projected Population			
		2011	2021	2031	2041
Nagapattinam(M)	102905	103436	110891	119218	12835
Velankanni (TP)	11108	14179	19805	27663	38639
Vicinity area	50811	54100	63226	73891	86355
Nagapattinam LPA	164824	171795	193922	220772	25334

**Graphical Method**

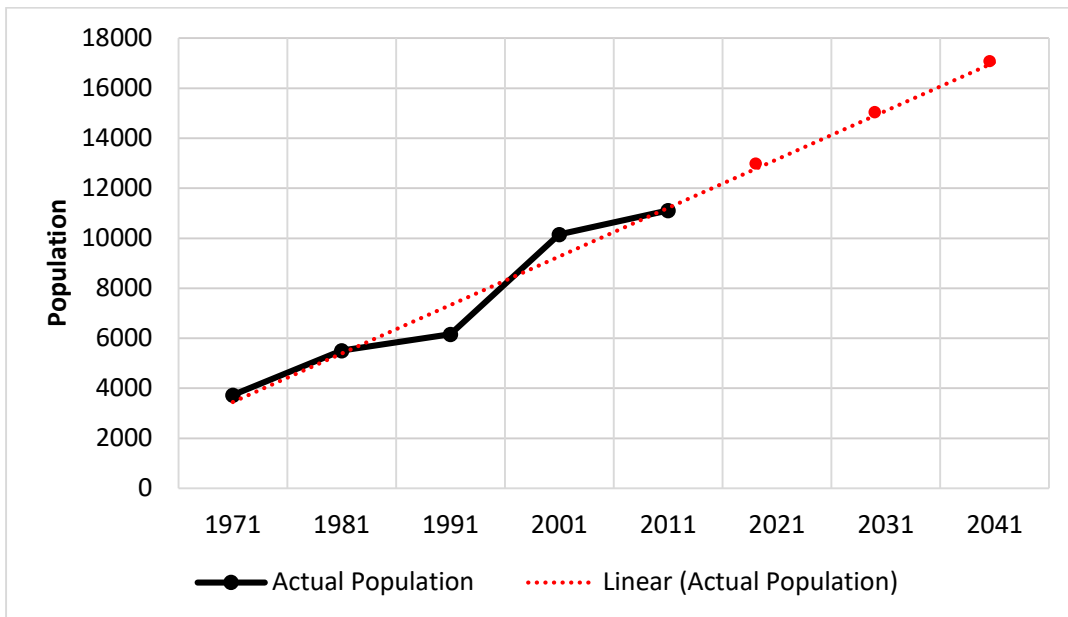
In this method, the populations of last few decades are correctly plotted to a suitable scale on graph. The population curve is smoothly extended for getting future population.

**Table 2.16: Population projection using Graphical method**

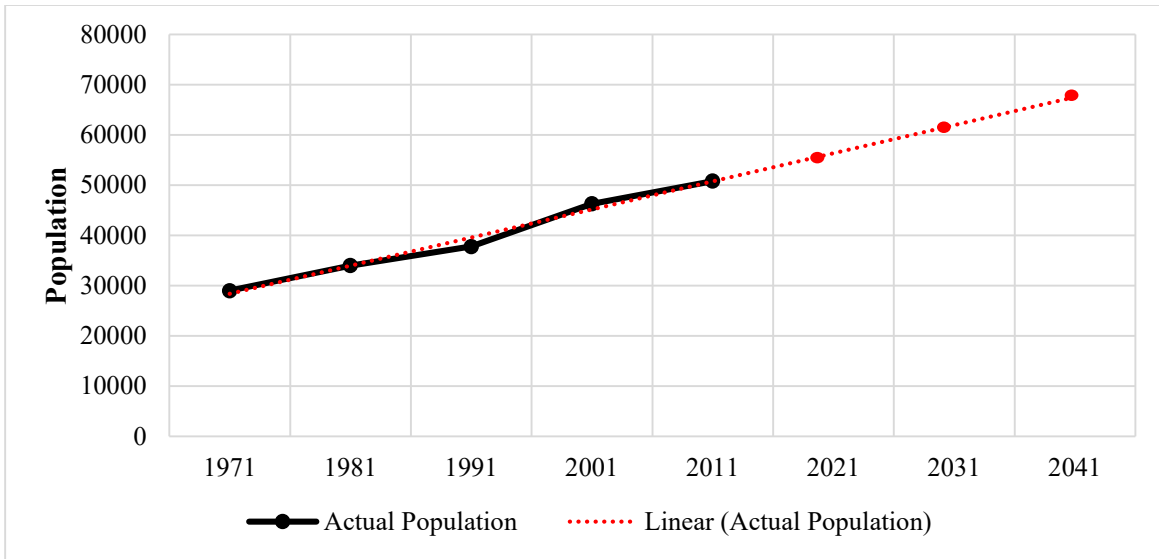
Description	2011 Census Population	Projected Population			
		2011	2021	2031	2041
Nagapattinam(M)	102905	101490	108580	116220	123980
Velankanni (TP)	11108	11210	13186	15195	17095
Vicinity area	50811	50580	56268	61190	67820
Nagapattinam LPA	164824	163350	178820	191765	208052



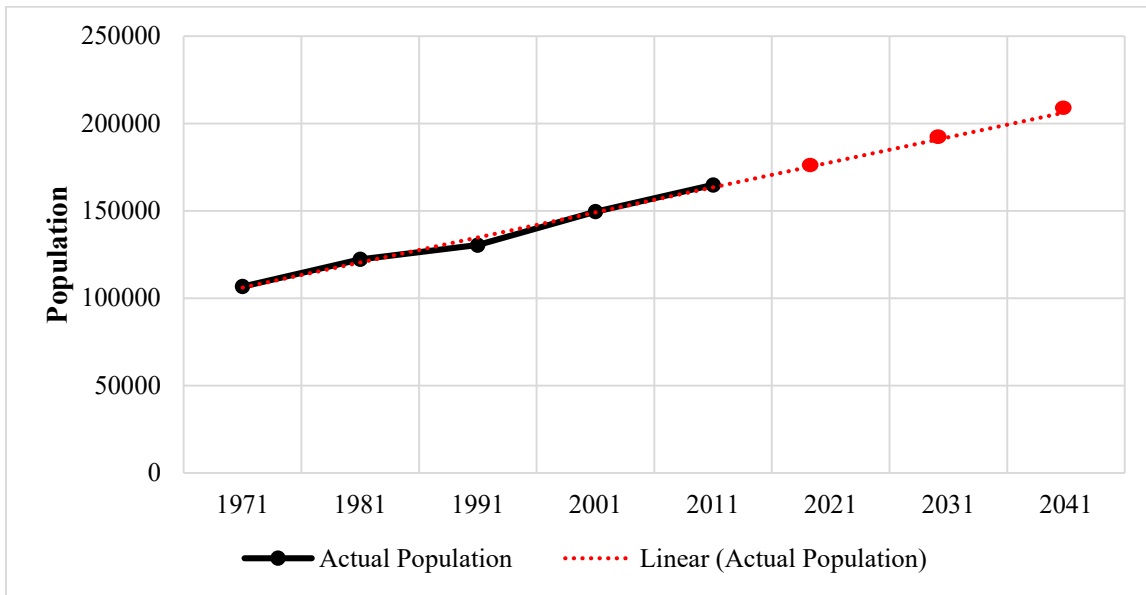
**Figure 2.9: Graphical method for Nagapattinam Municipality-2041**



**Figure 2.10 Graphical method for Velankanni Town Panchayat-2041**



**Figure 2.11 Graphical method for Vicinity area-2041**



**Figure 2.12 Graphical method for Nagapattinam LPA-2041**

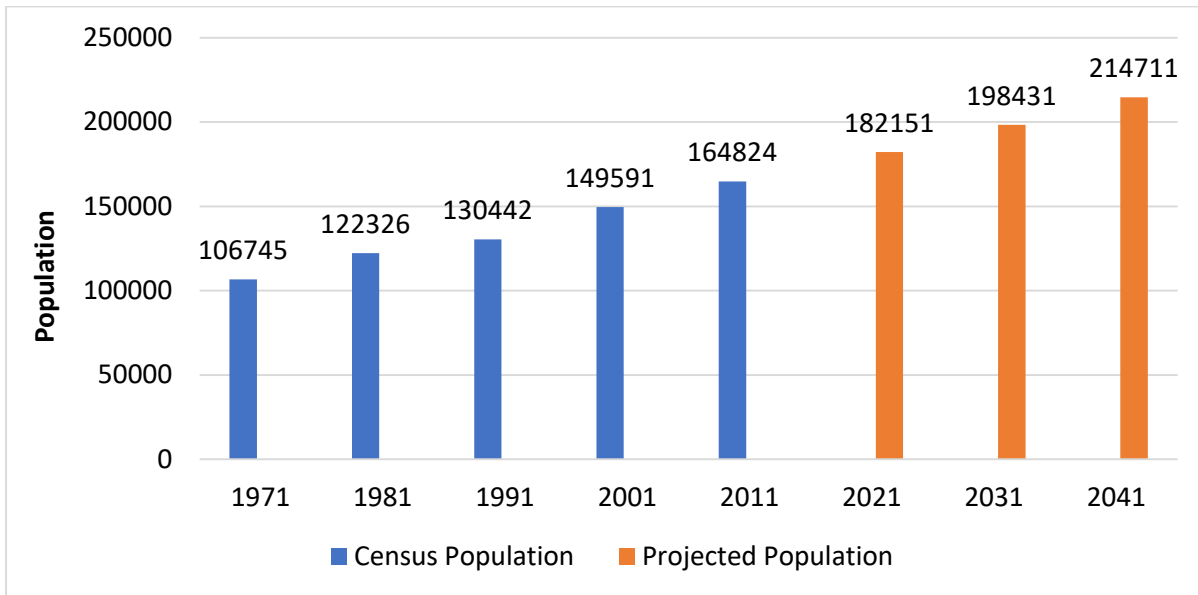
In the context of Nagapattinam, population increases at a constant rate so the Arithmetic progression method seems to be very appropriate to arrive at population projections. As per the Census 2011, the population of Nagapattinam LPA is 1, 64,284 and as per the Projection by arithmetic increase method 2011 population is 1, 65,871. It is evident Census data coincides with the Population projected by the arithmetic progression method. Therefore, the population arrived by arithmetic progression method will be taken as Projected population.



**Table 2.17: Projected Population of Nagapattinam LPA-2041**

Year	Nagapattinam(M)	Velankanni (TP)	Vicinity area	Nagapattinam LPA
<b>Census Population</b>				
1971	68026	3725	29001	100752
1981	82828	5507	33991	122326
1991	86489	6155	37778	130422
2001	93148	10151	46292	149591
2011	102905	11108	50811	164824
<b>Projected Population</b>				
2021	109896	14435	57820	182151
2031	118270	16577	63584	198431
2041	126644	18719	69348	214711

The Projected population of Nagapattinam LPA in 2021, 2031 and 2041 will be 182151,198431 and 214711 respectively. This Projected Population will require additional infrastructure, services and facilities to cater to the needs of the future population and to facilitate a high quality of life within the city. So, based on this projected population, the projected requirement for facilities such as Housing, Infrastructure and employment are analysed. (Table 2.17 & Figure 2.13).

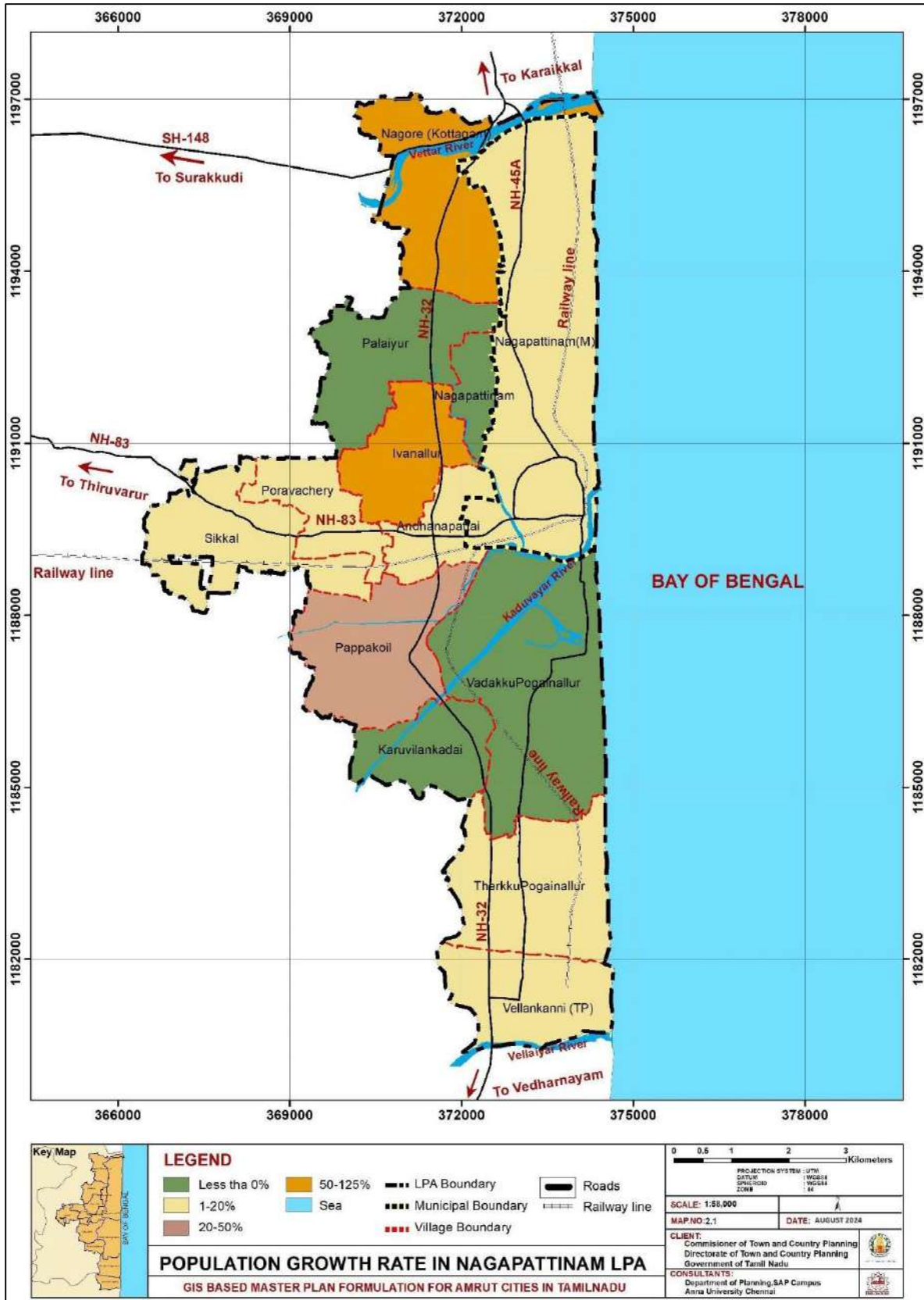


**Figure 2.13: Projected Population,2041-Nagapattinam LPA**

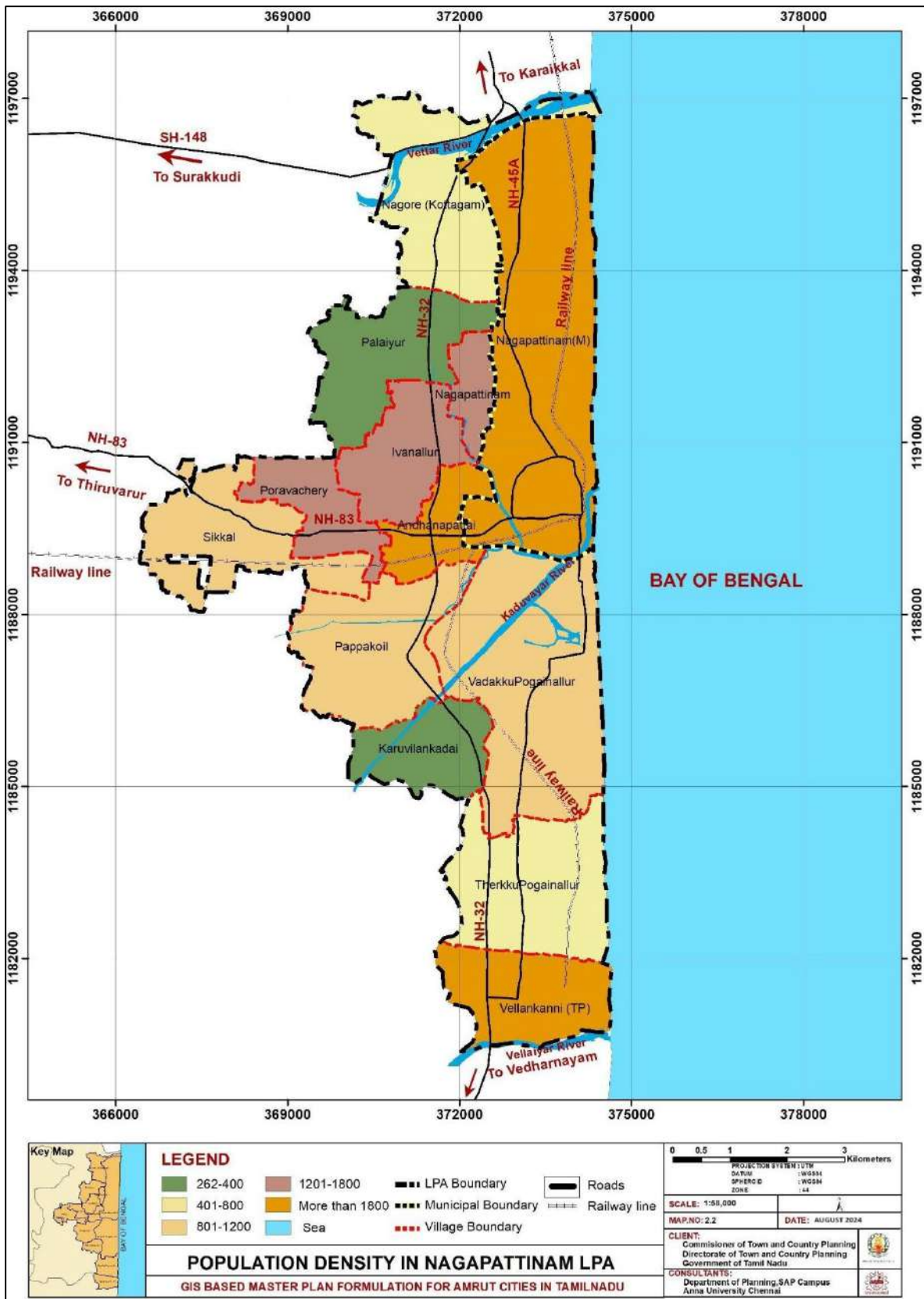
### 2.3 SUMMARY

Nagapattinam LPA contains a Population of 1,64,824 as per Census 2011 which constitute 10.19% of the total Nagapattinam District's population. The population of the town has doubled from 57,190 to 1,02,905 during the 100 years of 1901 to 2011. There is an abrupt fall in the growth rate of the total population after 1981. The major cause for the decline in growth rate during this period was due to general migration in search of better employment to other districts. The urban population (69.17 %) constitutes a major part of the Planning area. The Villages of the LPA, where the proportion of the disadvantaged population are higher, calls for special socio-economic initiatives to improve the standard of living and the quality of life. Fishermen Population accounts for 12.71% of the total LPA population. Nagapattinam Municipality has the highest population density in the LPA with a density of about 7171 persons per Sq.km. The Workforce participation rate of Nagapattinam LPA is lower than the country, state and district.

In the context of Nagapattinam, Population increases at a constant rate so the Arithmetic progression method seems to be very appropriate to arrive at population projections. The projected population of Nagapattinam LPA in 2041 was found to be 214711. Whereas for Municipality, Velankanni and Villages outside the municipal area the population in 2041 will be 126644, 18719 and 69348 respectively. So based on population projected, the projected requirement for facilities such as housing, infrastructure and employment are analysed. Effective planning strategy to promote stability, employment opportunities, and provision of other facilities will enhance the quality of life in Nagapattinam LPA for the future population.



Map 2.1: Population growth rate in Nagapattinam LPA



Map 2.2: Population density in Nagapattinam LPA

### 3. ECONOMY

#### 3.1 ECONOMIC PROFILE

Being a coastal town with a coastal stretch of about 17 km, fishing is considered an important economic activity. Many Villages in Nagapattinam practice marine fishing and a large number of ice factories are located here for the preservation of fish. The fishing industry encountered a major breakdown after the tsunami that destructed the coastal areas on 26 December 2004. So, there is a need to develop this industry to boost the local economic growth. Tourism is also an important economic driver with the presence of various historic and religious places in and around Nagapattinam LPA. The most important pilgrimage centres are Nagore Dargah, Singaravelar temple, and Velankanni church. Though the town is deprived of any major industries, it is flourishing with many household industries like candle making, handicrafts, etc. Chennai Petroleum Corporation Limited is a major refinery located outside the planning area on the northern side and it is considered a major contributor to the economy of the town.

With the larger concentration of cultivable lands, agriculture remains an important source of occupation for Villages. Besides, a large number of farmers are also engaged in aquaculture which contributes to the economy of the town. Being the headquarters of the Nagapattinam district, the town serves as a main administrative place that provides various tertiary services. In view of these facts, the town is considered to have great potential for seaborne trading, fishing, tourism, and agricultural activities.

##### 3.1.1 Workforce Participation rate

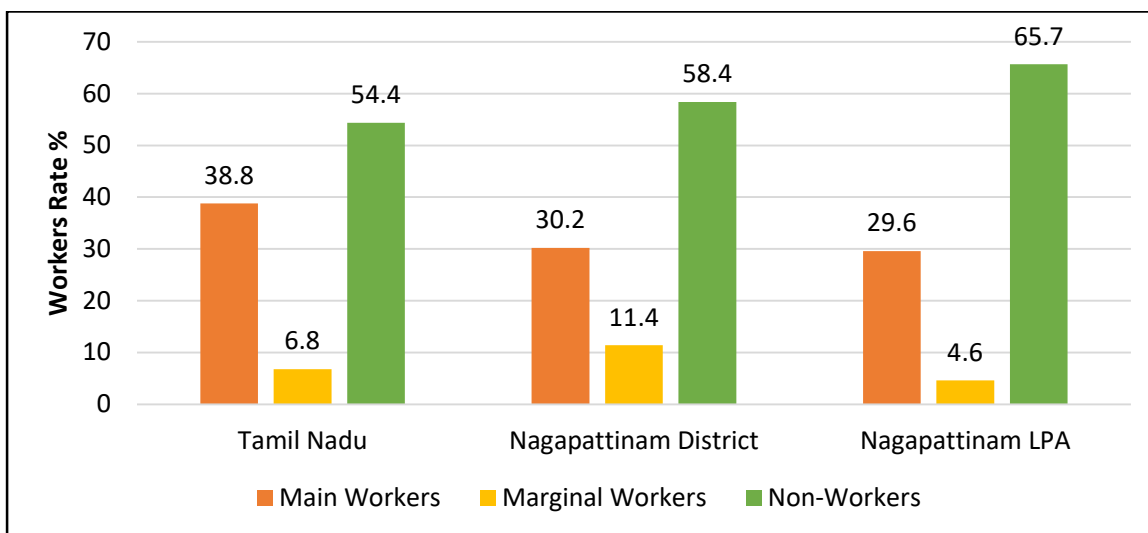


Figure 3.1: Comparison of Occupational Structure-2011

The comprehensive profile of employment in Nagapattinam LPA has been made based on the data available in census. The participation rate i.e., the proportion of total workers to the population of Nagapattinam LPA was 32.24 % in 2001 and 34.29 % in 2011. The corresponding figure for the Municipality and Town Panchayat was 32.59% and 34.97 % in 2011 (Map 3.1). The Villages in Nagapattinam LPA had an average of 37.62% of the workforce in 2011 as given in Table 3.1. It is inferred from the figure 3.1, that the share of main workers in Nagapattinam LPA (29.6 %) is lower than that of the state (30.2 %) and district (38.8 %).

**Table 3.1: Workforce Participation Rate of Nagapattinam LPA 2001 & 2011**

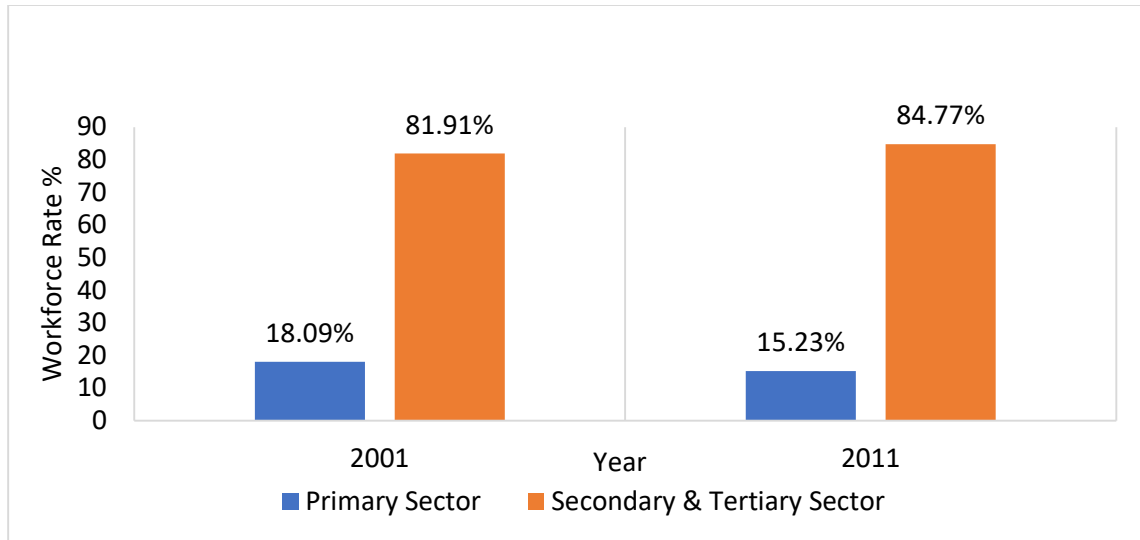
Participation Rate (%) 2001 and 2011				
Year	Municipality	Town Panchayat	Villages	Nagapattinam LPA
2001	30.01	33.80	43.82	32.24
2011	32.59	34.97	37.62	34.29

(Source: Census of India)

**Table 3.2: Sectoral Composition of Workers in Nagapattinam LPA during 2001 & 2011**

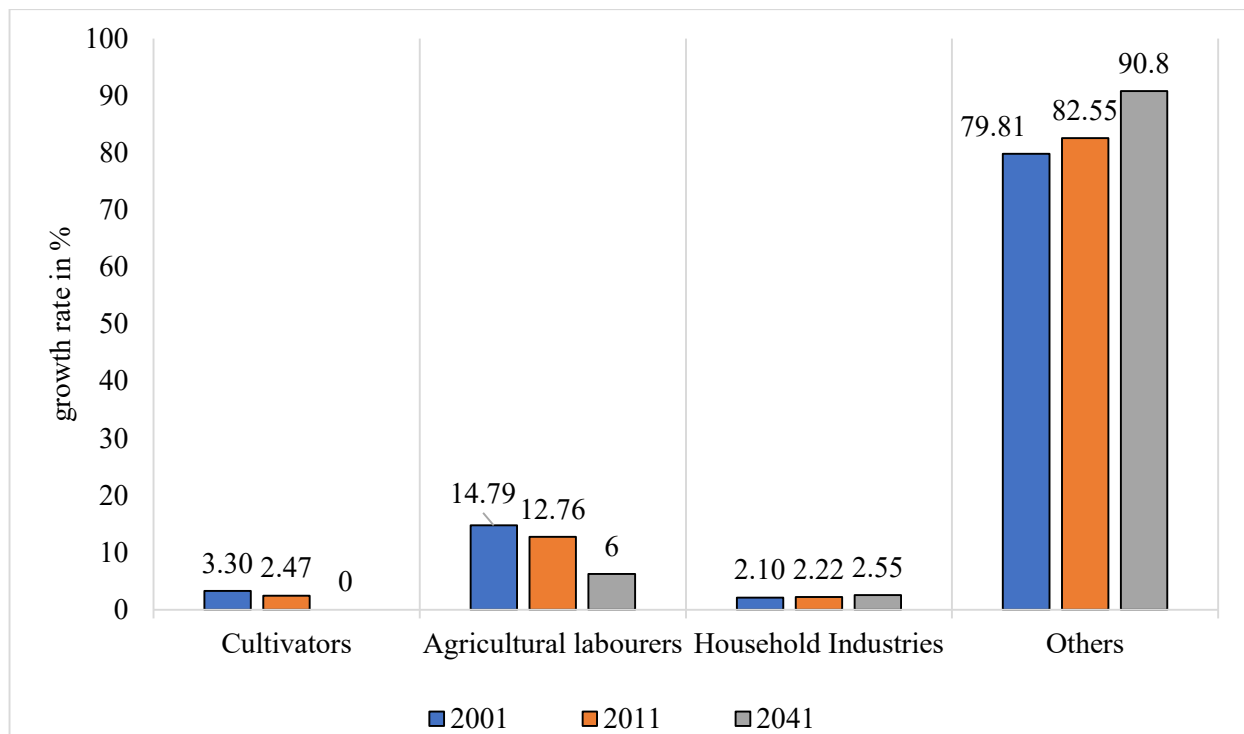
S. No.	Name of Villages/Town	% of Workers							
		Cultivators		Agricultural Labours		Household Industrial Workers		Other Workers	
		2001	2011	2001	2011	2001	2011	2001	2011
1	Nagapattinam (M)	0.95	0.73	2.27	1.34	2.31	2.00	94.47	95.94
2	Velankanni (TP)	3.00	3.11	8.71	14.47	2.68	2.16	85.60	80.26
3	Nagore	3.92	2.55	65.43	39.11	0.50	3.19	30.15	55.15
4	Palaiyur	0.41	4.53	97.54	78.33	0.00	2.18	2.05	29.70
5	Ivanalur	4.16	4.13	70.45	45.87	0.62	3.12	24.77	46.88
6	Anthanapettai	4.96	2.67	16.00	10.06	3.35	3.59	75.70	83.69
7	VadakkuPoigainallur	6.57	6.68	12.74	15.00	0.83	1.10	79.85	77.22
8	TherkkuPoigainallur	23.84	18.03	27.39	41.07	3.19	7.34	45.59	33.56
9	Poravacheri	6.64	2.74	36.99	22.19	2.38	2.49	53.99	72.57
10	Sikkal	5.53	4.71	53.02	53.41	1.27	2.42	40.18	39.46
11	Papakoil	2.67	2.68	55.67	40.79	2.35	0.60	39.31	55.93
12	Karuvelankadai	14.10	6.48	58.44	78.33	1.11	0.00	26.35	15.19
13	Nagapattinam Village	-	1.24	-	0.12	-	2.85	-	95.78
<b>Total</b>		<b>3.29</b>	<b>2.46</b>	<b>14.78</b>	<b>12.76</b>	<b>2.10</b>	<b>2.21</b>	<b>79.81</b>	<b>82.55</b>

(Source: Census of India)



**Figure 3.2: Trend of Occupational Structure in Nagapattinam LPA (2001 & 2011)**

The share of cultivators and agricultural labourers in the total working population is decreasing for the past few decades. Though Nagapattinam LPA comprises 34.03% of agricultural land use, the working population in the primary sector will become negligible if the existing growth trend continues (Figure 3.3). The development of the agricultural sector is important to promote sustainable urbanization and enhance the food security of the place.



**Figure 3.3: Occupational growth trend (in %) in 2041 of Nagapattinam LPA**

### 3.1.2 Fishing

Having a long coastal stretch, Nagapattinam plays a major role in marine commodities. From 1990 to 1996, a fluctuation in the fish productivity was experienced in both quantity and value. The marine fish catch largely comprises leognathics, sharks, flying fish, chank, catfish, prawns, silver bellies, crabs, rays, and other miscellaneous varieties. The special fish varieties of Nagapattinam are Kanavai (squid), Red Prawn, Kola fish (flying fish). Mechanized boats, catamarans, and country canoes are commonly used for fishing activities. The fishermen are advised to carry auto identification system enabled GIS device for tracking purposes in case of technical issues or other problems encountered in the mid-sea. A large number of ice factories are located here for preserving the fish.

There are around 57 fishing Villages in Nagapattinam district and Nagapattinam LPA consists of 7 fishing Villages with a total fishermen population of about 20,953. Table 3.3 reveals the total population involved in fishing & fishing allied activities is about 8,459. This constitutes 14.96 % of the total workers' population in Nagapattinam LPA. Nagore Pattinacherry has a greater number of people involved in fishing activities in Nagapattinam LPA. As many as 708 mechanizing fishing craft and 125 non-mechanized are there in Nagapattinam LPA for fishing activity. The table below gives details about the population involved in various fishing activities during 2010.

**Table 3.3: Population Involved in Various Fishing Activities (2010)**

Fishermen Settlements	Active Fishermen	Marketing of fish	No. of members involved in fishing allied activities						Total Occupied
			Making / Repairing Nets	Curing/ processing	Peeling	Labourer	Other	Other than fishing	
Akkarai Pettai	1,195	351	4	11	1	74	1	95	1,732
Ariyanattu Street	1,110	163	0	0	0	0	2	0	1,275
Kallar	281	31	1	0	0	63	9	3	388
Keechankuppam	969	439	1	1	0	230	0	5	1,645
Nagore Pattinacherry	1,364	475	26	25	1	11	28	5	1,935
Nambiyar Nagar	604	5	0	0	0	31	0	0	640
Samandhanpettai	487	213	82	29	0	18	0	15	844
<b>Total</b>	<b>6,010</b>	<b>1677</b>	<b>114</b>	<b>66</b>	<b>2</b>	<b>427</b>	<b>40</b>	<b>123</b>	<b>8,459</b>

(Source: Marine Fisheries Census 2010)



In Nagapattinam LPA, several fishery infrastructures such as ice factories, fishnet marine shops, boat manufacturing, fish markets, enterprises, etc., are situated. In Akkaraipettai village around 10 members were involved in Hygienic dry fish packing and sales activity for more than 9 years in the name of “Best Dry Fish”. There are a total number of 38 Joint Liability Groups (JLGs) in Akkaraipettai and Keechankuppam Villages in Nagapattinam LPA to provide credits to the fishermen. January, February, March, and June 15th to September are considered as peak periods for fish catching, and November, December are considered as the lean period for fish catching. The 61 days’ annual ban period for fish catching starts from April 15th to June 15th.

In an attempt to reduce congestion at Nagapattinam fishing harbour and provide better amenities for fishermen, a mini fishing harbour of area 4.36 hectares is proposed at Nambiyar Nagar at 34.30 crores. As many as 5,000 families from seven fishing hamlets would get support, in which 252 country boats and 66 motorboats will be benefitted through this project. The proposed harbour will have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres, and quarters for workers. This will stimulate the fishing industry in this region and improve the local economy.

### ***Aquaculture***

In India, Tamil Nadu state has the second-longest coastal line with rich natural coastal resources for aqua farming. Coastal aquaculture is also considered an important tool for the economic growth in Nagapattinam LPA. In Nagapattinam LPA, aquaculture is practiced over an area of about 5.49 Sq.km. Nearly 6.86% of the total area of the LPA is utilized for aquaculture production. Aquaculture is largely practiced along the Kaduvaiyar River in VadakkuPoigainallur village.

To develop a standardized pond-based technique for commercially important marine species, Kings Infra Ventures Ltd has signed a pact with TNJFU, Nagapattinam for a collaborative aqua project. The main focus of this project is to help the small and marginal farmers to adopt sustainable aquaculture practices based on the model developed by the collaborative project. There is immense scope for the development of sustainable aquaculture practice, as 49 % of global demand for fish consumption is contributed by aquaculture. In FY 2021, aquaculture shrimps have contributed 74 % value of the Indian seafood exports worth Rs. 43717 crores. So, there is tremendous scope to improve the local economy through sustainable aquaculture practice in Nagapattinam.

## **Tourism**

Tourism is another important source of income for the locals in Nagapattinam. The important tourist sites in Nagapattinam LPA are located in Nagore, Velankanni, and Sikkal. District diagnostic study reveals that the total tourist population in Nagapattinam LPA during the year 2017 was 1.12 crore. The tourist inflow in Nagapattinam LPA constitutes 3.22 % of the total tourist arrivals in Tamil Nadu. The number of domestic and foreign arrivals in the LPA accounts for 3.25 % and 1.37 % of the total domestic & foreign tourists in Tamil Nadu respectively. The tourist arrivals here are seasonal and largely depend on the festivities of the religious centres. With a large number of religious sites, tourism in the LPA could be developed through proper infrastructure & amenities.

### **3.1.3 Industries**

Most of the industries in Nagapattinam LPA are located along National Highway 32. In the north, Cauvery basin refinery, a subsidiary of Chennai Petroleum Corporation Limited (CPCL) located near Nagore village is a major contributor to the economy of the Nagapattinam LPA. Small Industrial Development Corporation (SIDCO) has established an industrial estate in Nagapattinam Municipality over an area of about 20.97 acres and it stimulates the growth of small-scale industries. Amenities such as water supply, roads, street lights, stormwater drains are provided here.

Many small-scale industries are situated in Villages like Therkkupoigainallur, Poravacheri, Anthanapettai, and Sikkal. There are 40 nos. of wax candle manufacturing units in Velankanni Town Panchayat in which as many as 1000 people are employed. A rural textile centre is located at Manjakollai and a Khadi craft sales centre is functioning at Nagapattinam Municipality. Industries such as chemical industries, Agro-based & food processing industries, brick Kilns, cottage & household industries, and other manufacturing industries are located in the Nagapattinam LPA.

An ancient port is located at the mouth of the river Kaduvaiyar in the Nagapattinam Municipality. It became more prominent during the period of Medieval Cholas (9th –12th century CE) and it was widely used by the Dutch, Portuguese and British for trading purposes. The present-day port has a commercial port complex & dockyard which handles major imports like copra cake, crude oil, edible oil, general cargo, liquid ammonia, machinery, and naphtha. The major exports are cement, crude oil, and general cargo. Approximately 160000 tonnes of imports and 53000 tonnes of exports are handled by the port annually. M/s. Foods Fats and Fertilizers Ltd. have constructed an Edible oil storage terminal at the port. A RCC jetty with an approach trestle is constructed by the M/s. Chennai Petroleum Corporation Ltd to handle crude oil required

for their refinery at Panangudi. Copra cakes are imported through this port by M/s. South India Edibles. The port, if upgraded will facilitate the shipping trade and industry in a great way.

Boat manufacturing is also an important industrial activity taking place near Nagapattinam Port. They undertake many structural fabrications and marine engineering works such as ship manufacturing, fishing boat & ferry construction, barges, and other marine structures.

Being a coastal city, the establishment of large-scale industrial activities are constrained due to the applicability of CRZ Regulations. However, the place has a good potential for oil & gas and marine-based industries such as fish processing, PVC net floats, repairing, servicing of motorboat engines, etc. which offers employment opportunities for the residents in Nagapattinam LPA. Some of the industries that have better prospects are steel rerolling mill, steel furniture, cattle feed, fish meal, power loom, mixed fertilizer insecticides, urea, ammonia, polythene.

#### **3.1.4 Trade and Commerce**

The town served as an important place for trade and commerce during the period of Medieval Cholas. During the British period, commodities such as rice, piece goods, livestock, cigars, tobacco, and hides were traded. Today, the Town functions as a centre of retail provisions trading for the surrounding Towns and Villages in Nagapattinam. The major commercial activities are concentrated near Nagore Dargah, the old Town in Nagapattinam, and Velankanni. The Central Business District (CBD) comprise of Neela East St., Neela South St., Big Bazaar St., and VOC St. The main commercial activities observed in the central business district are banking, retail trading, health services, textile shops, hardware shops, hotels, and restaurants, etc.

- Hospital Road – Pharmacy, Hotels, Marriage halls, Theater, General Business.
- VOC Street – Markets, Theaters, Informal shops, Petrol pump.
- Neela West Street – Retail, General business, Service units.
- Neela East Street – Textile shops, Jewellery shops, Grocery and Power tools.
- Neela South Street – Banks, Restaurants, General Business.
- Big Bazaar Street – Mandi, Godown, Grocery, Stationery, Vessel shops.
- Manara North Street – Hotels, Retails, Vegetable markets.
- Velankanni Main Road – Lodges, Retail, Marriage halls.
- Velankanni Beach Road – Restaurants & Lodges.

### 3.1.5 Agriculture

Agriculture is considered an important means of livelihood in many Villages in Nagapattinam LPA. Since the area is located in the deltaic region of river Cauvery and crisscrossed by several networks of irrigation canals, the place is known for paddy cultivation and also several other crops. Out of the total workforce, 15.22 % of workers are involved in primary activity. Though the LPA has a larger concentration of agricultural lands, the agriculture sector remains woefully underdeveloped. Some of the major issues confronted for practicing agriculture are inundation of water and poor drainage during monsoon which leads to major floods that damage the standing crops every year. Therefore, crop cultivation has become uneconomic in Nagapattinam LPA and people have started to move to other activities. Various schemes are implemented through the Department of Horticulture and Plantation crops to increase the productivity and income of farmers.

### 3.2 EMPLOYMENT PROJECTION

The main economic development goal for any town is the generation of adequate employment opportunities. Employment growth leads to the improvement of livelihood, in addition enhances the quality of life for the locals. In Nagapattinam LPA, the % of workers as per the 2011 Census was 34.30 % which has increased from 32.24% in 2001. However, the workforce rate of Nagapattinam LPA is still less than that of the state and district rate. The male workforce is 54.70 % and female workers are 14.30 % of the total male and female population respectively. The female work participation rate has increased by 2.19 % from 2001 to 2011, which is still lower than the national (25%) and state average (31%). Table 3.4 presents the male & female workers' participation rate in Nagapattinam LPA from 1981 to 2011.

**Table 3.4: Male & Female Workforce in Nagapattinam LPA (1991 – 2011)**

Year	Male Workers	% of male population	Female Workers	% of female population	Total Workers	% of total Population
1981	28,536	48.67	6064	9.83	34600	28.29
1991	31,302	50.23	6356	10.08	37658	28.87
2001	38,156	52.48	10083	12.11	48239	32.24
2011	44,516	54.70	12015	14.30	56531	34.30

(Source: Census of India)

The employment projection for the year 2041 has been made based on the male & female workforce participation rate. The total workforce participation rate for Nagapattinam LPA has been estimated as 36.5 % in 2041. Around 43.3 % male and 12.8 % female are projected to be

workers among the total eligible workers' population in 2041. The additional jobs to be created have been determined as 7310 for 2031 and 14621 for 2041. Expanding the job market for the projected workforce in Nagapattinam LPA will enhance the prospect for future growth. Developing the secondary and tertiary sectors will create more employment opportunities, in addition, the planning area has good scope for the generation of employment through the promotion of tourism, marine-based industries, and Agro-based industries. The projection of workforce participation rate for Nagapattinam LPA up to 2041 is given in Table 3.5.

**Table 3.5: Employment Projection for Nagapattinam LPA**

S. No.	Description	2011	2021	2031	2041
1	Total Population	1,64,824	1,82,151	1,98,431	2,14,711
2	Eligible Workers (65%)	1,07,136	1,18,398	1,28,980	1,39,562
3	Male Population (49.3%)	81,292	89,800	97,826	1,05,852
4	Female Population (50.7 %)	83,532	92,351	1,00,605	1,08,859
5	Male Willing to Work (% of Male Workers to total Eligible workers)	41.55	42.10	42.77	43.35
6	Male Willing to Work	44,516	49,843	55,169	60,496
7	Female Willing to Work (% of Female Workers to total Eligible workers)	11.21	11.82	12.39	12.87
8	Female Willing to Work	12015	13,999	15,982	17,966
9	Total Workers	56,531	63,841	71,152	78,462
10	% to total eligible workers	52.77	53.92	55.16	56.22
11	Workforce Participation Rate	34.30	35.05	35.86	36.54
12	Additional Jobs to be Created	-	-	7,310	14,621

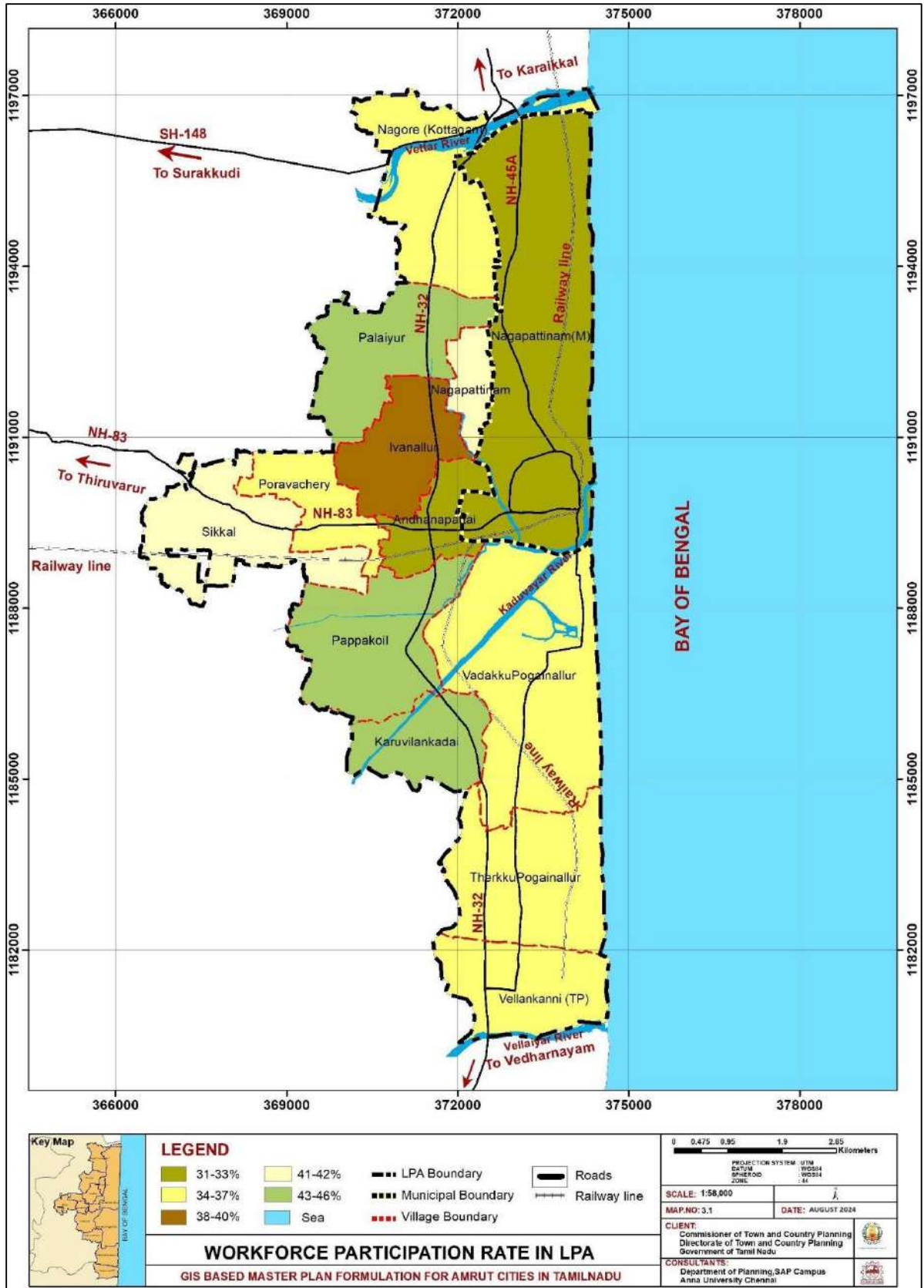
### 3.3 SUMMARY

Nagapattinam is a coastal town, fishing acts as a major economic activity of the town. Tourism is also an important economic driver with the presence of various historic and religious places in and around Nagapattinam LPA. Nagapattinam and Velankanni are flourishing with many household industries like candle making, handicrafts, etc. Since the area is located in the deltaic region of river Cauvery and crisscrossed by several networks of irrigation canals, the place is known for paddy cultivation and also several other crops.

Though Nagapattinam LPA comprises a higher concentration of agricultural land, the working population in the primary sector will become negligible if the existing growth trend continues. The development of the agricultural sector is also important to promote sustainable urbanization and enhance the food security of the place.

Workers involved in fishing-related activities constitutes 14.96 % of the total workers' population in Nagapattinam LPA. Aquaculture is also to be considered as an important driver for the economic growth in Nagapattinam LPA. Tourism also plays a major role in the economy of the planning area. The tourist inflow in Nagapattinam LPA constitutes 3.22 % of the total tourist arrivals in Tamil Nadu. Boat-building is also an economic activity taking place near Nagapattinam Port. Based on the prospects and resources, it is inferred that the planning area has a good scope for the generation of employment through the promotion of tourism, marine-based industries, and Agro-based industries.

Employment projection for Nagapattinam LPA by 2041 is estimated by considering the following factors namely eligible working population, population willing to work and workforce participation rate. Based on the employment projection, the workforce participation rate of Nagapattinam LPA in 2041 is estimated as 36.54% and to achieve this workforce participation rate 14631 additional jobs need to be created. These additional jobs can be created by proposing new projects based on the potential of the planning area.



Map 3.1: Work force participation rate in LPA

## 4. HOUSING

### 4.1 EXISTING SITUATION ANALYSIS

Housing is a key input for economic, social, and civic development. Provision of appropriate residential areas concerning workplace, industrial area, and access to various facilities is also a key to a successful city development strategy for any urban area. The main purpose of the housing sector is to assist all people especially the houseless, economically weaker sections of the society, and to expand the supply of developed land for housing possibly through land-use planning. In the housing sector, various aspects such as housing type, housing condition, period of residence and Ownership, housing stock, housing shortage, and future requirements are discussed.

#### 4.1.1 Growth in Households

As per Census 2011, Nagapattinam LPA accommodates 39572 households spread in the shape of various housing typologies, such as individual housing, plotted development, slums, and squatter resettlements in the city and village settlements.

The household growth rate of Nagapattinam LPA from 2001-2011 was about 26.3%. After 2001, Muttam and Thethi village had been merged with Nagore (Kottagam) village. After the 2004 Tsunami, the settlements near the seashore and VadakkuPoigainallur have resettled in Ivanalur and Papakoil village in Nagapattinam LPA. This results in a negative household growth rate (-16.65%) in VadakkuPoigainallur and an increased household growth rate of 131% and 37.2% in Ivanalur and Papakoil. (Table 4.1)

**Table 4.1: No. of Households in Nagapattinam LPA-2001 and 2011**

S. No.	Town/ Villages	2001	2011	Growth rate (%)
1	Nagapattinam(M)	19,062	24518	28.6
2	Velankanni (TP)	2,269	2753	21.3
3	Nagore (Kottagam) (Muttam&Thethi)	485	852	75.7
4	Palaiyur	302	346	14.6
5	Ivanalur (Sellur)	560	1295	131.3
6	Anthanapettai (Manjakollai)	1380	1625	17.8
7	VadakkuPoigainallur (Akkarapettai)	3002	2503	-16.6
8	TherkkuPoigainallur	1044	1171	12.2



S. No.	Town/ Villages	2001	2011	Growth rate (%)
9	Poravacheri	897	1029	14.7
10	Sikkal	1165	1451	24.5
11	Papakoil	858	1177	37.2
12	Karuvelankadai	313	345	10.2
13	Nagapattinam Village	0	507	0
14	Nagapattinam LPA	31,337	39572	26.3

(Source:Census of India)

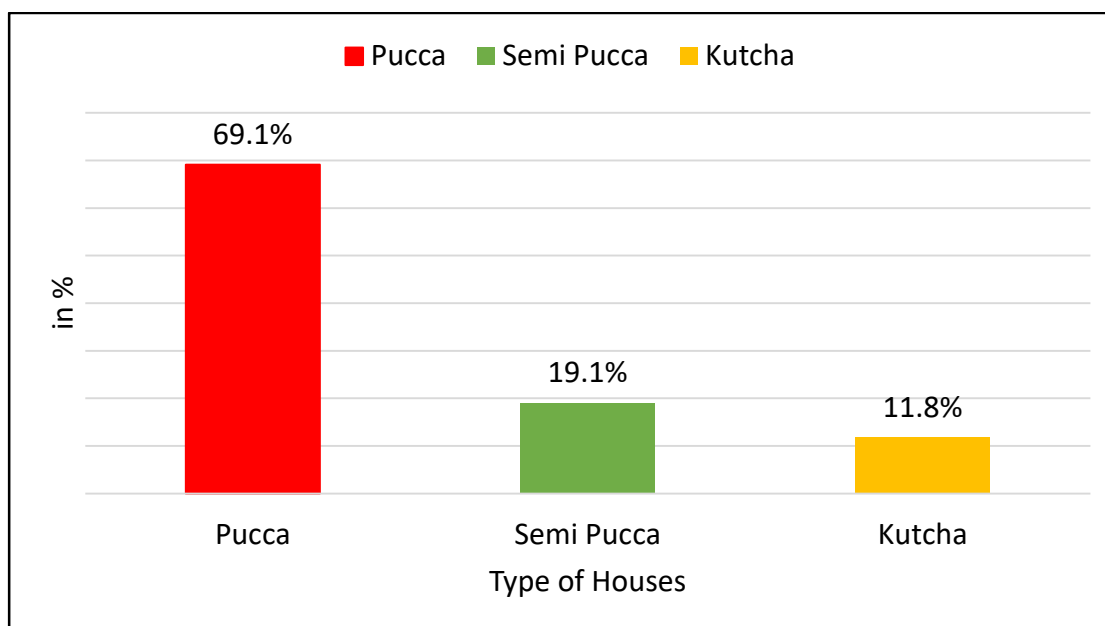
Table 4.2 shows that the household growth rate of the urban area in LPA (27.8%) is higher than the growth rate in the urban area of the district (26.1%).

**Table 4.2: Household growth rate in urban area of the LPA and Nagapattinam district**

Description	Households in 2001	Households in 2011	Household growth rate (in %)
Nagapattinam District (Urban)	71786	90487	26.1
Nagapattinam LPA(Urban)	21331	27271	27.8

(Source:Census of India)

#### 4.1.2 Housing Typology



**Figure 4.1: Housing condition in Nagapattinam LPA-2011**

Housing Condition has been analysed under 3 categories as Pucca, Semi Pucca, and Kutcha based on the material used for construction. The condition of houses in Nagapattinam LPA is predominantly Pucca which is about 69.1%, 19.1% of Semi Pucca houses and 11.8% of Kutcha houses (Figure 4.1). Though it has a lesser amount of Kutcha houses they are vulnerable to natural disasters and cyclones. Palaiyur, TherkkuPoigainallur, and Karuvelankadai Villages have a higher concentration of Kutcha houses because these Villages have a higher concentration of agriculture workers (Table 4.3). More number of Kutcha houses are available in TherkkuPoigainallur and Karuvelankadai village. Because of which the Villages TherkkuPoigainallur and Karuvelankadai were highly affected during Tsunami 2004 and Gaja cyclone. As per the field survey, there were about 120 (0.3%) dilapidated houses in Nagapattinam LPA.

**Table 4.3: Housing Condition-Nagapattinam LPA-2011**

S.No.	Town/ Villages	No. of households	Pucca	% Share	Semi Pucca	% Share	Kutcha	% Share
1	Nagapattinam(M)	24518	18021	73.5	4781	19.5	1716	7.0
2	Velankanni (TP)	2753	1776	64.5	592	21.5	385	14.0
3	Nagore (Kottagam) (Muttam&Thethi)	852	630	73.9	125	14.7	98	11.4
4	Palaiyur	346	152	43.9	82	23.7	111	32.2
5	Ivanalur (Sellur)	1295	878	67.8	89	6.9	327	25.3
6	Anthanapettai (Manjakollai)	1625	1310	80.6	171	10.5	145	8.9
7	VadakuPoigainallur (Akkarapettai)	2503	1464	58.5	663	26.5	375	15.0
8	TherkkuPoigainallur	1171	334	28.5	433	36.9	404	34.5
9	Poravacheri	1029	602	58.5	225	21.9	202	19.6
10	Sikkal	1451	897	61.8	163	11.2	392	27.0
11	Papakoil	1177	646	54.9	164	13.9	367	31.2
12	Karuvelankadai	345	150	43.5	61	17.7	134	38.7
13	Nagapattinam Village	507	501	98.8	4	0.8	2	0.4
14	Nagapattinam LPA	39572	27361	69.1	7552	19.1	4658	11.8

(Source:Census of India)

### 4.1.3 Housing Ownership

Housing tenure in Nagapattinam LPA is predominantly owned (72.4%) rather than rental (25.5%), other categories include leased houses (2.1%). The share of rental Ownership is high in urban areas which shows that for education and employment opportunities people migrated to the urban area and lived in rental housing. (Table 4.4)

**Table 4.4: Housing Tenure-Nagapattinam LPA-2011**

S. No.	Name of Villages/Town	No of households	Own	% Share	Rental	% Share	Others	% Share
1	Nagapattinam(M)	24518	15618	63.7	8263	33.7	637	2.6
2	Velankanni (TP)	2753	2034	73.9	661	24.0	58	2.1
3	Nagore (Kottagam) (Muttam&Thethi)	852	793	93.1	53	6.2	6	0.6
4	Palaiyur	346	345	99.7	1	0.3	0	0.0
5	Ivanalur (Sellur)	1295	1249	96.4	43	3.3	3	0.2
6	Anthanapettai (Manjakollai)	1625	1243	76.5	346	2.1	37	2.3
7	VadakuPoigainallur (Akkarapettai)	2503	2415	96.5	75	3.0	13	0.5
8	TherkkuPoigainallur	1171	1124	96.0	20	1.7	27	2.3
9	Poravacheri	1029	821	79.8	197	19.1	10	1.0
10	Sikkal	1451	1145	78.9	296	20.4	9	0.6
11	Papakoil	1177	1058	89.9	109	9.3	9	0.8
12	Karuvelankadai	345	339	98.2	0	0	6	1.8
13	Nagapattinam Village	507	461	90.9	45	8.9	1	0.2
14	Nagapattinam LPA	39572	28646	72.4	10109	25.5	816	2.1

(Source:Census of India)

### 4.1.4 Housing Occupancy

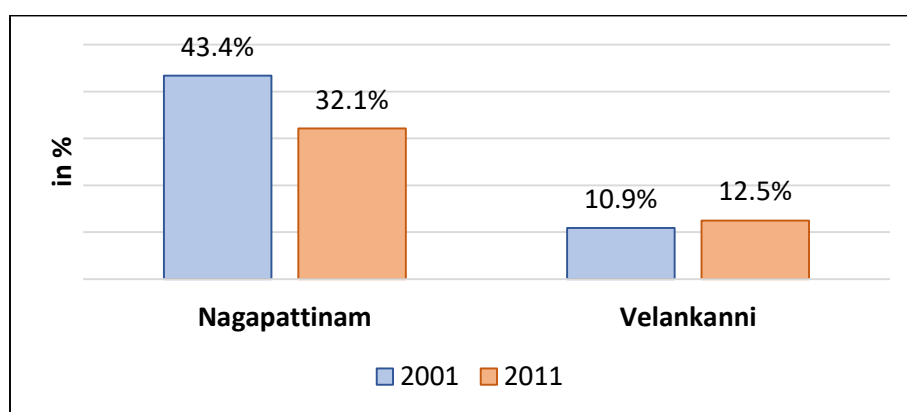
The Occupancy rate of housing in Nagapattinam LPA is high (97.8%) and the vacancy rate is negligible (2.2 %) (Table 4.5)

**Table 4.5: Housing Occupancy-Nagapattinam LPA-2011**

S. No.	Name of Villages/Town	Population 2011	No of households	Occupied residential houses	% Share
1	Nagapattinam(M)	102905	24518	24076	98.2
2	Velankanni (TP)	11108	2753	2666	96.8
3	Nagore (Kottagam) (Muttam&Thethi)	3564	852	828	97.2
4	Palaiyur	1291	346	330	95.4
5	Ivanalur (Sellur)	4921	1295	1281	98.9
6	Anthanapettai (Manjakollai)	7349	1625	1563	96.2
7	VadakuPoigainallur (Akkarapettai)	10826	2503	2440	97.5
8	TherckuPoigainallur	4731	1171	1120	95.6
9	Poravacheri	4422	1029	1010	98.2
10	Sikkal	5652	1451	1422	98.0
11	Papakoil	4915	1177	1147	97.5
12	Karuvelankadai	1201	345	321	93.1
13	Nagapattinam Village	1939	507	507	100.0
14	Nagapattinam LPA	164824	39572	38711	97.8

(Source:Census of India)

#### 4.1.5 Urban Slums



**Figure 4.2: Share of Slum Population in Nagapattinam LPA-2011**

Slums are defined based on the condition of the area and the buildings. Slum is an area, which is described as a source of danger to the health and safety of the people living in the area and its neighbourhood and buildings, which are considered as unfit for human habitation. Slums have been either improved or redeveloped under the program PMAY.

The term squatter describes a wide range of low-income settlements or poor living conditions. Slum at its simplest definition is a heavily populated area characterized by substandard housing and squatter. In the last decade, slum up gradations are executed under schemes and policies like JNNURM, and PMAY.

The urban slum population of Nagapattinam LPA decreased during 2001-2011. As per the Census 2011, Nagapattinam LPA had 8210 urban slums. The share of the slum population in Nagapattinam Municipality was about 43.9% in 2001 whereas in 2011 it was reduced to 31.8% and in Velankanni it was about 14.8% in 2001 whereas in 2011 it was 12.9% (Figure 4.2 & Table 4.7). The marginal reduction in the slum population during the inter-decennial period may be due to the improvement or redevelopment of notified slums.

**Table 4.6: Urban Slum population and share of Slum households  
-Nagapattinam LPA 2001 & 2011**

S. No.	Description	Nagapattinam		Velankanni	
		2001	2011	2001	2011
1	Total population	93,148	102905	10,151	11108
2	Total households	19062	24518	2753	2753
3	Total slum population	40,857	32707	1,500	1439
5	% Share of slum population	43.9	31.8	14.8	12.9
4	Total slum household	8276	7867	300	343
6	% Share of slum households	43.4	32.1	10.9	12.5

(Source: Census of India)

Pradhan Mantri Awas Yojana Scheme addresses urban housing shortage among the EWS/LIG and MIG categories including the slum dwellers by ensuring a Pucca house to all eligible urban households by the year 2022. Through PMAY (Urban) Nagapattinam Municipality and Velankanni had beneficiaries of 569 and 35 houses. In 2021, additional 320 dwelling units were constructed under PMAY scheme in Nagapattinam Municipality (Table 4.7). The table below shows the number of houses developed under the PMAY (Urban) Scheme in Nagapattinam LPA.

**Table 4.7: Houses proposed under PMAY (Urban) in Nagapattinam LPA**

Name of the Urban area	Houses Sanctioned	Houses Grounded	Houses Completed
Nagapattinam(M)	705	700	569
Velankanni (TP)	108	106	35

(Source:Ministry of Housing and Urban Affairs,GOI)

#### 4.1.6 Houseless population

The share of houseless population in Urban area, Nagapattinam is very negligible (1.8%). So, while providing housing for the future population only the projected additional population and slum population should be given more priority. (Table 4.8)

**Table 4.8: Share of Houseless Population in Nagapattinam Urban area-2011**

Name of the Town	Total Population	Houseless	% Share
Nagapattinam(M)	102905	125	1.2
Velankanni (TP)	11108	69	0.6

(Source:Census of India)

#### 4.1.7 Existing housing shortage

The housing shortage is analysed both in qualitative and quantitative aspects. In qualitative aspects condition of houses and in quantitative aspects houseless population is taken into consideration. The existing housing shortage (2021) in Nagapattinam LPA is about 4828. Table 4.9 shows the existing housing shortage in Nagapattinam LPA.

**Table 4.9: Existing Housing Shortage 2021**

Description	Total Houses
Kuccha Houses	4658
Dilapidated Houses	120
House less Population	50
<b>Total Shortage</b>	<b>4828</b>

## 4.2 HOUSING PROJECTION

Projected requirement for housing sector is worked under two categories namely

- Requirement based on Quantity
- Requirement based on density

Housing requirement for the projected population is arrived at taking into account the additional population in 2041, slum households, dilapidated houses, and houseless population. By 2041 Nagapattinam LPA will require 18,328 dwelling units as per the quantity arrived, to accommodate the future population and urban poor. (Table 4.10)



**Table 4.10: Quantity of Houses required in 2041**

Description	Population
Total Population 2011	1,64824
Projected Population 2041	2,14,711
Additional Population	49,887
Additional Households in 2041	13,500
Kuccha Houses	4658
Dilapidated Houses	120
Houseless Population	50
<b>Total Houses required in 2041</b>	<b>18,328</b>

The residential area requirement for the projected population is calculated based on the projected density. Population density for 2041 has been projected using the LPA area and by taking note of the future population. The existing area under residential use was about 10.5 sq. km for a population of 164824. The projected population for 2041 is 2, 14,711 and the population density will be about 8826 persons/Sq.km for the municipal area,3403 persons/Sq.km for Velankanni Town Panchayat, and 1152 persons/Sq.km for Villages. Based on the density the additional land required for the projected population density by 2041 will be about 1 Sq.km for Nagapattinam Municipality, 0.6 Sq.km for Velankanni, and 2.9 Sq.km for the Vicinity area. (Table 4.11)

**Table 4.11: Projected Residential area requirement in Nagapattinam LPA**

Town/Villages	Existing Density (Person/Sq.km)	Existing residential area (in Sq.km)	Projected density 2041 (Person/Sq.km)	Projected Residential area 2041 (in Sq.km)	Residential area required 2041 (in Sq.km)
Nagapattinam (M)	7171	4.1	8826	5.1	1
Velankanni (TP)	2020	0.9	3403	1.5	0.6
Vicinity area	886	9.6	1152	12.5	2.9
<b>Total area required for residential use</b>					<b>4.5</b>



### **4.3 SUMMARY**

Land use planning is to supply additional lands required for housing requirements. Villages having proximity to urban areas and major transport corridors have higher Household growth rates. Nagapattinam LPA as of today has 38711 households. By 2041, Nagapattinam LPA will require additional 18,328 dwelling units to accommodate the future population and urban poor. Population density for 2041 has been projected to about 8826 persons/Sq.km for the Municipal area, 3403 persons/Sq.km for Velankanni Town Panchayat, and 1152 persons/Sq.km for Villages. Based on the projected density the additional land requirement for residential purpose is 4.5 Sq.km.

## 5. PHYSICAL INFRASTRUCTURE

### 5.1 EXISTING PHYSICAL INFRASTRUCTURE FACILITIES

Quality of life in any urban area is very much conditioned by the level of availability, accessibility and quality of physical and social infrastructure. Physical Infrastructure is one of the most important driving forces for economic development. Efficient water supply systems, sewerage systems, solid waste collection, and disposal systems are essential for good urban health and for leading productive lifestyles. The rapid growth of the population generates a need for the augmentation of physical infrastructure. An overview of the existing scenario in Nagapattinam LPA is presented below followed by a future demand assessment.

#### 5.1.1 Water Supply

##### *Source and Quantity*

The existing quantity of water supply for Nagapattinam Municipality is 11 MLD, consisting of 2.0 MLD from Vettar River, 9.0 MLD from CWSS-Kollidam. As per TWAD Board Norms, the existing quantity of water supply is inadequate. So, to increase the supply, existing source need to be augmented in the municipal area. In Velankanni, the total quantity of water source available is 2 MLD, consisting of 1.2 MLD from RO plants, 0.8 MLD from CWSS-Kollidam (Table 5.1). As per TWAD Board Norms, the existing quantity of water supply is adequate for the existing population (including the floating Population) in Velankanni.

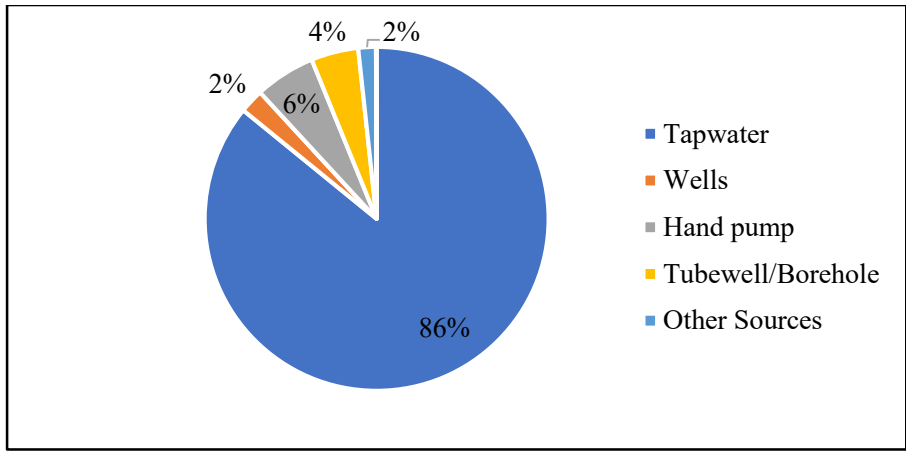
**Table 5.1: Source of Water Supply in Nagapattinam LPA**

Nagapattinam Municipality		Velankanni Town Panchayat	
Source	Quantity (MLD)	Source	Quantity (MLD)
Vettar river source at Odachery	2.0	RO Plant	1.2
TWAD (Kollidam CWSS)	9.0	TWAD (Kollidam CWSS)	0.8

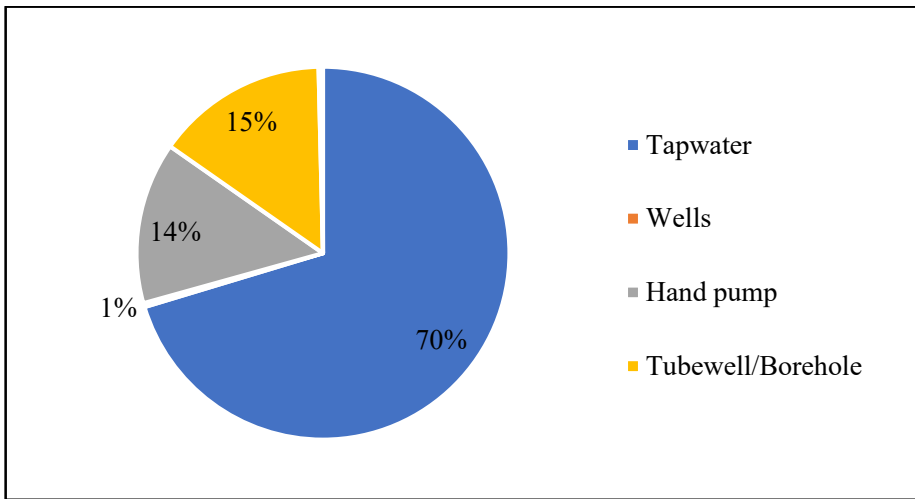
(Source: Nagapattinam Municipality Website and CHP, Velankanni )

##### *Mode of Supply*

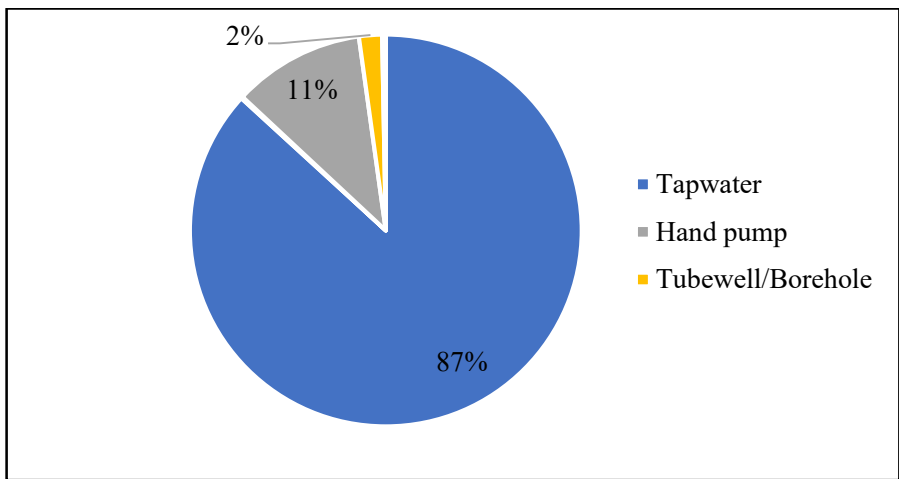
Nagapattinam LPA has different modes of water supply. In Nagapattinam Municipality (86%) and Velankanni Town Panchayat (70%) and Villages (87%), the majority of the households receive water supply through Tap Water connections. (Figure 5.1-5.3).



**Figure 5.1: Mode of water supply in Nagapattinam Municipality**



**Figure 5.2: Mode of water supply in Velankanni Town Panchayat**

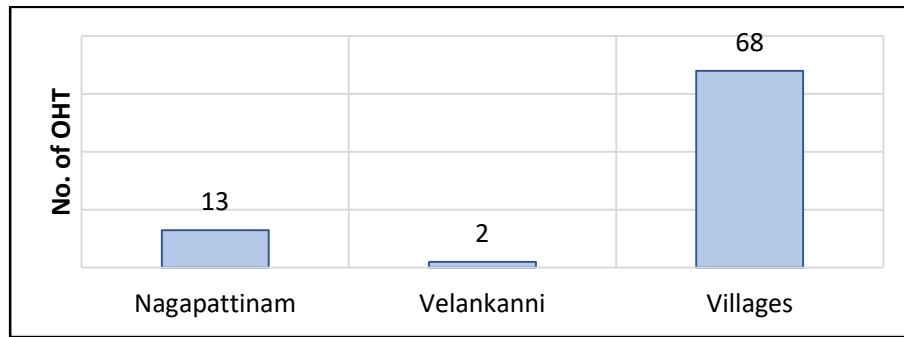


**Figure 5.3: Mode of water supply in Villages in Nagapattinam LPA**

### **Infrastructure for Water Supply**

Nagapattinam LPA is receiving water supply through a combined water supply scheme (CWSS). Nagapattinam Municipality has about 13 OHT's with a storage capacity of 10.8 MLD, Velankanni Town Panchayat has about 2 OHT's with a storage capacity of 0.6 MLD, and the rest of LPA has about 68 OHT's (Figure 5.4). The location of OHT facilities within the LPA is shown in Map 5.1.

In the Municipal area, the existing storage facilities with a total capacity of 10.8 MLD is adequate at present. for 2041 the demand for water supply is about 17.1 MLD. The existing storage facility in Nagapattinam municipal area is adequate for the future also. In the case of Velankanni, the existing storage facilities (0.6 MLD capacity) are adequate for the existing and future demand.



**Figure 5.4: Water storage facilities in Nagapattinam LPA**

### **Existing demand and supply**

The Tamil Nadu Drainage and Water Supply Board recommend a per capita water supply of 135 litres per capita per day for municipalities with an underground sewerage system, 90 litres per capita per day for Town Panchayat with an underground sewerage system, and 55 litres per capita per day for Villages.

**Table 5.2: Existing gap in water supply-Nagapattinam LPA**

S. No.	Description	Nagapattinam Municipality	Velankanni Town Panchayat	Villages
1	Population (2011)	102905	11108	50811
2	Floating Population	-	3000	-
3	Coverage of water Supply connection	72%	-	-
4	Per capita Supply (TWAD Board Norms)	135	90	55
5	Total quantity required (in MLD)	13.9	1	2.8

S. No.	Description	Nagapattinam Municipality	Velankanni Town Panchayat	Villages
6	Existing Per capita supply (in lpcd)	74	83	40
7	Total quantity supplied (in MLD)	7.6	0.9	2
8	Existing demand (in MLD)	6.3	0.1	0.8
9	Water requirement for floating Population (40 lpcd)	-	0.1	-

(Source: Municipality Website & TWAD Board)

The existing per capita supply in Nagapattinam Municipality and Velankanni Town Panchayat are 74 and 83 lpcd whereas in Villages the average per capita supply is 40 lpcd. As per the TWAD norms the per capita supply for Municipality, Town Panchayat and Villages are 135 lpcd, 90 lpcd and 55 lpcd. As per this norm, the existing gap in water supply for Nagapattinam LPA is found to be 7.3 MLD (Table 5.2). The existing water sources need to be augmented and water bodies need to rejuvenate to fulfil the existing demand in the water supply.

### 5.1.2 Sewerage and Sanitation

An Underground sewerage scheme was formulated for Nagapattinam Municipality covering Nagapattinam and Nagore under World Bank assistance from the funds received through TNUIFSL. To treat the collected sewage and to dispose of the treated effluent in prescribed standards, two sewage treatment plants under the process of Activated Sludge have been proposed separately, one for an area covering Nagapattinam town and another for an area covering Nagore.

#### ***Sewage generation and Treatment***

The total sewage generated from Nagapattinam Municipality, Velankanni Town Panchayat, and Villages within Nagapattinam LPA are presently estimated at 6.1 MLD, 0.8 MLD, and 1.6 MLD, and 90% of the Nagapattinam municipal area is covered with sewer network. Nagapattinam Municipal area has Sewage Treatment Plants with a total capacity of 12.6 MLD. The existing STP is adequate to treat the present sewage in Nagapattinam Municipality. Velankanni Town Panchayat has one STP of 2.3 MLD capacity which is adequate in the existing scenario. Villages do not have any sewage treatment facilities (Map No 5.1).

#### ***Access to Sanitation facilities***

As per Census 2011, 68.6% of total households in Nagapattinam LPA had latrine facilities within their premises while 31.4% of the total households do not have latrine facilities within the premises. It may be observed that there is a direct correlation between the extent of the slum

population and access to the sewage system. In Nagapattinam LPA, 30.1% of total households are living in slums and 31.4% of the total households in the LPA had no access to latrine facilities (Table 5.3).

**Table 5.3: Household Sanitary facilities 2011-Nagapattinam LPA**

S. No.	Name of the Town/Village	Total households	Households having latrine facility within the premises	% Share	Households not having latrine facility within the premises	% Share
1	Nagapattinam(M)	24518	18261	74.5	6257	25.5
2	Velankanni (TP)	2753	2055	74.6	581	25.4
3	Nagore(Kottagam) (Muttam&Thethi)	852	465	54.6	387	45.4
4	Palaiyur	346	81	23.5	265	76.5
5	Ivanalur (Sellur)	1295	859	66.4	436	33.6
6	Anthanapettai (Manjakollai)	1625	1304	80.3	321	19.7
7	VadakuPoigainallur (Akkarapettai)	2503	1144	45.7	1359	54.3
8	TherkkuPoigainallur	1171	396	33.8	775	66.2
9	Poravacheri	1029	674	65.5	355	34.5
10	Sikkal	1451	836	57.6	615	42.4
11	Papakoil	1177	519	44.1	658	55.9
12	Karuvelankadai	345	61	17.8	284	82.2
13	Nagapattinam Village	507	505	99.6	2	0.4
14	Nagapattinam LPA	39572	27161	68.6	12294	31.4

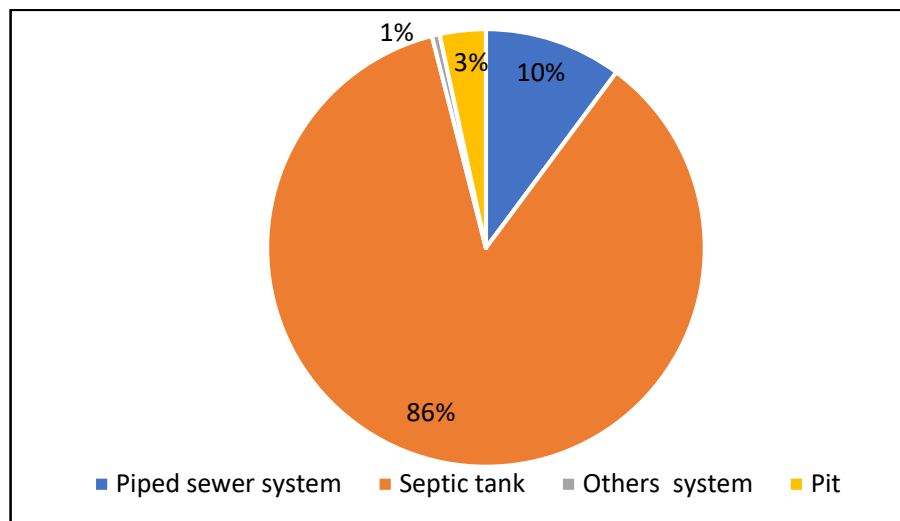
(Source:Census of India)

The concentration of EWS and LIG groups in Villages such as Palaiyur, Ivanalur, Therkku Poigainallur, Papakoil, and Karuvelankadai are higher. It can be related to a greater number of households that does not have latrine facilities within their premises. The households that do not have latrine facilities within the premises are using facilities such as public toilets and open

defecation for sanitation. 79.4% of total households not having latrine facilities are using open defecation (Table 5.3). After the introduction of the Swachh Bharat mission in 2014, LPA has become Open defecation free.

### ***Sewage disposal system***

The households having latrine facilities within the premises have different types of disposal systems such as Piped sewer system, Septic tanks, Pits, open-drain, etc. The majority of households in Nagapattinam LPA use septic tanks (86%), followed by piped water systems (10%) in the Municipal area and Velankanni. Villages use Pits for the disposal of sewage (Figure 5.5).



**Figure 5.5: Type of latrine facility within the premises-Nagapattinam LPA**

### ***Existing gap in Sewage Treatment***

Presently, Nagapattinam Municipality generates about 6.1 MLD of sewage (estimated at 80 % of water supply). Nagapattinam Municipality has an STP of 12.6 MLD capacity. The existing STP is sufficient for treating the total sewage generated in the Nagapattinam municipal area. Velankanni Town Panchayat generates an estimated 1.1 MLD sewage (using population figures and estimated at 80 % of water supply) and has an STP of capacity 2.3 MLD which is highly sufficient. Villages generate about 1.6 MLD of Sewage. At the Village level, there are no treatment facilities so Decentralized Wastewater Treatment Systems can be proposed (Table 5.5). The location of STP is shown the Map 5.1.

**Table 5.4: Status of Existing Sewerage Network and STPs in Nagapattinam LPA**

Description	Coverage of Sewerage Network	Households connected to Sewer System	Length of sewer Lines	No. of Existing STPs	Total Installed Capacity of STPs (MLD)	Disposal Area
Nagapattinam(M)	90%	70%	62.1 km	2	9.6	Vettar river
Velankanni (TP)	-	82%	19.9 km	1	2.3	Kazhugukulam

(Source:Nagapattinam Municipality Website)

**Table 5.5: Existing gap in Sewage treatment in Nagapattinam LPA**

Description	Existing Water Supply (MLD)	Existing Sewage Generated (MLD)	Present Installed Capacity of STPs (MLD)	Present Gap (MLD)
Nagapattinam(M)	7.6	6.1	12.6	6.5 (Excess)
Velankanni TP (including floating population)	1.3	1.1	2.3	1.2 (Excess)
Villages	2	1.6	-	No provision for Sewage treatment

### 5.1.3 Solid Waste management

Solid Waste management is an essential service that relates directly to public health and the environment. ULB is responsible for creating, operating, and maintaining infrastructure for the collection, storage, segregation, transportation, processing, and disposal of municipal solid wastes. Poor solid waste management has direct implications on the environmental health of the region and has a significant bearing on the quality of life of citizens.

Nagapattinam Municipality is looking after the waste management within its jurisdiction, while the rest of the area, Velankanni Town Panchayat and different Gram Panchayat's local body is responsible for waste management in their respective jurisdictions.



### **Solid Waste Generation**

Nagapattinam LPA generates about 65.9 TPD of Solid waste. Currently, in Nagapattinam Municipality Average Garbage Generated per person per day is 500g. So, the estimated quantity of Waste Generated per day in the Municipal Area is 52 T. (Table 5.6)

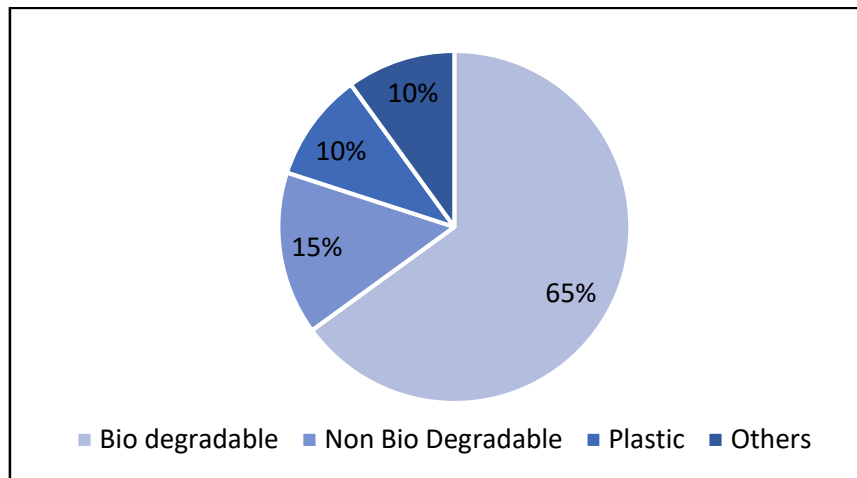
**Table 5.6: Existing Solid Waste Generation-Nagapattinam LPA**

S. No.	Local Body	Population 2011	NEERI Standards	Quantity of waste generated (TPD)
1	Nagapattinam(M)	102905	0.5 kg/capita/day	51.5
2	Velankanni (TP)	11108	0.2 kg/capita/day	2.2
3	Floating Population (per day)	3000	0.2 kg/capita/day	0.6
4	Villages	50811	0.2 kg/capita/day	10.2

(Source:CPHEEO.2016)

### **Composition of Municipal Solid Waste**

Municipal Solid Waste (MSW) in Nagapattinam Municipality comprises 65% of Biodegradable waste and 15% non-Biodegradable, 10% Plastic waste. The large quantum of it is Biodegradable waste (Figure 5.6).



**Figure 5.6: Composition of Municipal solid waste in Nagapattinam Municipality**

### **Waste Collection & Transportation**

Door or door collection has been ensured for 10 wards only in Nagapattinam Municipality. In the rest of the wards, a municipal bin (144 bins) has been kept and the community puts the

garbage in the bin. In some places, the community puts the garbage on the street corner. Only 80% of the households in municipal areas had coverage of solid waste management services.

The garbage from street sweeping and door-to-door collection are kept in a nearby municipal waste storage bin. These storage bins are cleared by the vehicle. 147 bins with a capacity of 0.75 tons have been placed in the town. Segregated waste from the eight wards and the market is collected separately.

MSW is collected through dumper placer placed in the streets. Segregation is done only for 55% of the total municipal solid waste. MSW is stored in the compost yard. for transporting the MSW to the compost yard following vehicles are used

- Truck – 1 No.
- Tippers – 4 Nos.
- Dumper placers – 4 Nos and
- Tricycles – 7 Nos.

### ***Treatment facilities***

Nagapattinam Municipality and Velankanni Town Panchayat are treating solid waste by composting. Nagapattinam Municipality is using Windrow Composting to treat 12 TPD of municipal wastes and the remaining waste generated is dumped in the dump yards. Nagapattinam Municipal area has a landfill site of 13.9 acres located adjoining Kaduvaiyar River and Bio Methanation plant of 5 TPD capacity. Velankanni Town Panchayat is having a dump yard site (Map 5.1). As per the Mission An dhodya survey, Villages namely Anthanapettai, Ivanalur, Karuvelankadai, Papakoil and Sikkal have community waste disposal system.

Nagapattinam LPA generates 64.5 TPD of Solid Waste. The LPA has a landfill site and Bio methanation plant within the municipal area and a dump yard in Velankanni. The existing landfill site in the municipal area is adequate to cater for the existing population whereas in Velankanni an additional dump yard needs to be identified to fulfil the gap in solid waste generation and dumping facilities. for all the Villages Community waste disposal system should be proposed. Recycle and reuse concept needs to be implemented to minimize waste generation.

#### **5.1.4 Storm water drainage**

The existing drainage condition of Nagapattinam consists of the natural river and man-made drainage systems (stormwater drains). Nagapattinam LPA has 3 rivers namely Vetter, Kaduvaiyar and Vellaiyar. The municipal area has a stormwater drain for a length of 86.3 km which is 70% of the total length of the road. As Nagapattinam is prone to Cyclones the Storm Water drain needs to be implemented for the entire road length to protect the town from

flooding. Though Water logging is not a major issue in Nagapattinam, the uncovered areas need to be covered.

#### **5.1.5 Electricity**

Based on the estimated requirements of power supply as per the National Electricity Policy published in 2005, the recommended consumption is 2.74 kWh per capita per day. The per capita demand of electricity includes domestic, commercial, industrial, and other requirements. Nagapattinam LPA has 2 substations, one of 110 KV capacity located within the municipal area and another one of 33KV capacity in Ivanalur village. LPA also has a 4 MW solar power project at Muttam village in Nagapattinam. The existing Substations can serve for 1.95000 Population. It is adequate for the present population.

### **5.2 PROJECTED REQUIREMENT**

The provision of high-quality physical infrastructure facilities is necessary to make any City more habitable. Based on the Projected Population 2041 the additional requirement of physical infrastructure facilities which include water supply, sewerage system, stormwater management and solid waste management are estimated and given below.

#### **5.2.1 Water Supply**

As per TWAD Board Norms the standard per capita supply for Municipality with UGSS is 135 lpcd, for Town Panchayat with UGSS the standard is 90 lpcd and for Villages, the per capita supply should be 55 lpcd. The estimated water supply demand for projected Population 2041 is shown in the Table 5.7. As per TWAD Board norms, Nagapattinam LPA will require 22.9 MLD water by the year 2041 to support 2, 14,711 Population, without accounting for losses in transmission and distribution. It is further assumed that these losses will be limited to 15%. Thus, the gross water requirement for domestic consumption is estimated at 26.3 MLD by the year 2041. Nagapattinam LPA has available water quantity of about 13 MD, the remaining 13.3 MLD needs to be augmented. Water supplied by Nagapattinam Municipality is 11 MLD. Additionally, 6.1 MLD of water is required to cater the future population. The existing source is adequate for the future population of Velankanni. As per Table 5.7, Villages need 3.8 MLD of additional water supply in 2041.

**Table 5.7: Projected requirement for water supply in 2041**

S. No.	Name of Villages/Town	Projected Population (2041)	Per capita Supply (TWAD Board Norms)	Total quantity required in 2041 (In MLD)	Quantity Available
1	Nagapattinam(M)	126644	135	17.1	11 MLD
2	Velankanni (TP)	18719	90	1.7	2 MLD
3	Floating Population per day (2041)	6600	40	0.3	
4	Villages	69348	55	3.8	-
<b>Total</b>			<b>22.9+3.4(15% transmission loss)</b>		<b>13 MLD</b>

**5.2.2 Sewage**

The Projected Sewage generation by 2041 is achieved from the projected water supply (80% of the total supply). By 2041 Nagapattinam Municipality will generate 13.7 MLD of sewage but the existing STP has only a capacity of 12.6 MLD. Additional STP is required to treat 1.1 MLD of excess sewage in 2041. Velankanni Town Panchayat will generate an estimate of about 1.4 MLD of Sewage. The existing STP is highly sufficient till 2041. At the Village level, currently there are no treatment plants. Decentralized Wastewater Treatment Systems (DEWATS) can be proposed in Villages. (Table 5.8)

**Table 5.8: Projected requirement for Sewage Treatment facilities in 2041**

Description	Projected Water Supply (MLD)	Projected Sewage Generation (MLD)	Existing Capacity of STPs (MLD)	Additional capacity required (MLD)
Nagapattinam(M)	17.1	13.7	12.6	1.1
Velankanni (TP)	2.6	2.1	2.3	0.2 excess
Villages	3.8	3	No STP	DEWATS can be proposed

As per CPHEEO, an average of 0.5 hectares is taken as the area required per MLD. To treat 1.1 MLD of additional sewage generated in 2041, 0.6 ha of land is required in Nagapattinam Municipality. for Velankanni, the existing STP is adequate for treating the sewage generated in 2041. As per the handbook on Decentralized Wastewater treatment module by the National Institute of Urban Affairs, Delhi the area required for treating 1 cubic metre of wastewater is 60.5 sq.m. so to treat 3000 Cubic meter of wastewater collected in Villages 18 ha of land is required in the Villages.

### 5.2.3 Solid Waste Management

Based on the per capita generation of solid waste it is estimated that by 2041 about 84.9 TPD of solid waste will be generated in Nagapattinam LPA. As per NEERI Standards, the existing windrow composting landfill site is sufficient to store 350 TPD of Municipal Solid Waste so there is no need for any additional Compost yards in the Municipal area. But for Velankanni the existing dump yard is not adequate for the disposal of solid waste. Therefore, a landfill site of 0.1 Ha with 2.5 TPD capacity is proposed in Velankanni Town Panchayat. At Village level community waste disposal system is proposed (Table 5.9).

**Table 5.9: Projected requirement for Solid waste generation and disposal facilities in 2041**

S. No.	Local Body	Population 2041	NEERI Standards (kg/capita /day)	Projected Quantity of waste generated (TPD)	Existing Capacity of Compost yard/land fill site (TPD)	Additional Capacity required in 2041
1	Nagapattinam(M)	126644	0.5	63	350 & 5	Nil
2	Velankanni (TP)	18719	0.2	3.7	2.5	2.5
3	Floating Population (Per day)	6600	0.2	1.3		
4	Villages	69348	0.2	13.8	Nil	Community waste disposal system needs to be proposed

### 5.2.4 Electricity

As per URDPI guidelines, for every 15000 Population, a substation of 11 KV is required. The existing substations of 110 KV and 33KV Capacity can serve a population of 1, 95,000. In 2041 the population of LPA will be 2, 14,711. To serve an additional population of 19,711, two substations of 11 KV capacity each is proposed (Table 5.10).

**Table 5.10: Substation requirement for 2041-Nagapattinam LPA**

1	Population 2011	164824
2	Projected population 2041	214711
3	Additional Population	49887
4	No. of substations existing	2
5	Existing capacity of substation	110 KV and 33 KV
6	As per URDPFI guidelines	11 KV/15000 Population
7	Existing substation coverage	Existing substation can serve for 1,95,000

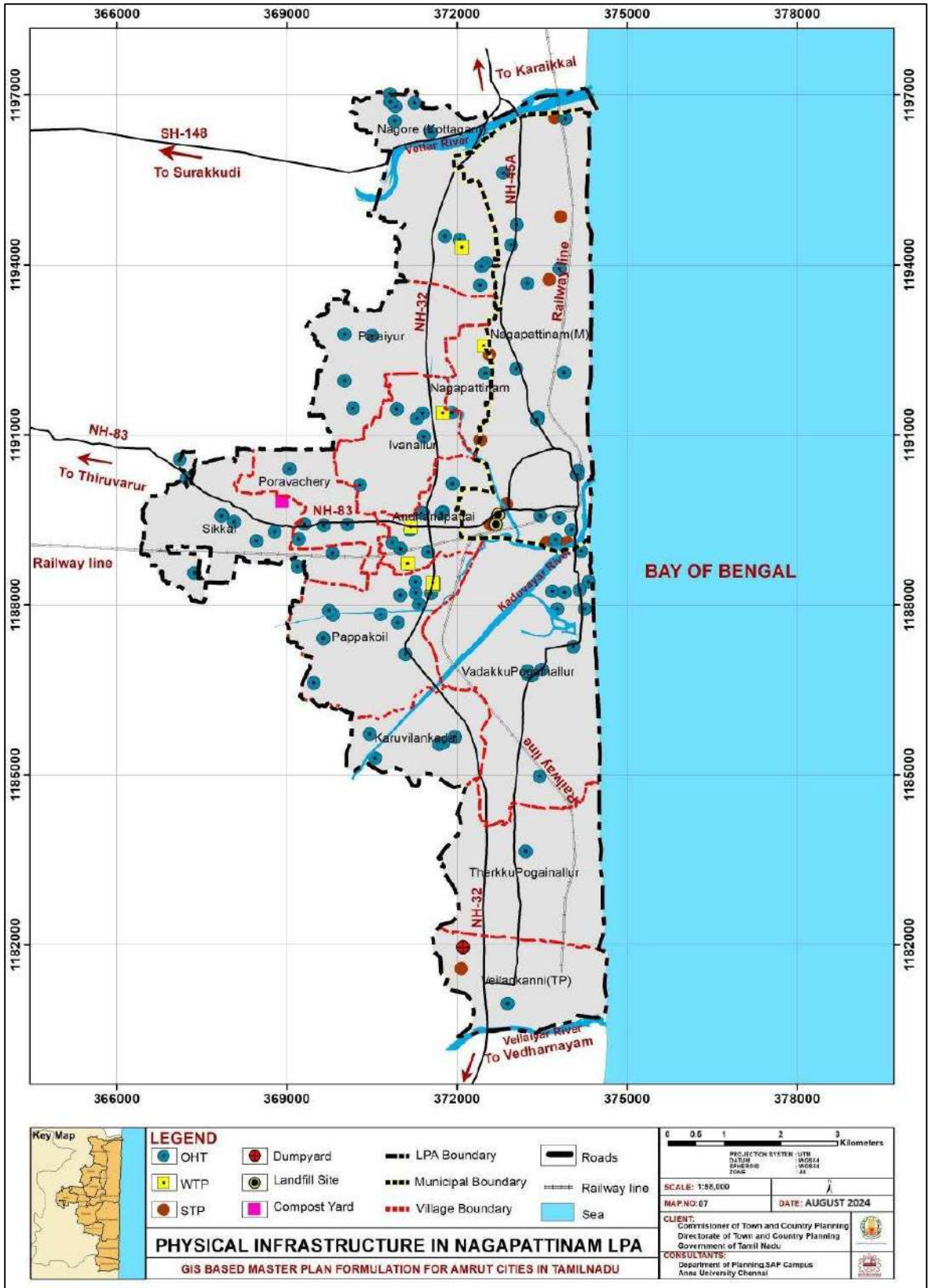
### **5.3 SUMMARY**

The major source of Water supply for Nagapattinam is through CWSS (Kollidam) by TWAD Board and Vetter River. By 2041, the additional water requirement will be 13.3 MLD. The additional requirement for water is to be met by augmenting the existing water resources. The Stormwater drain coverage is only available for 70% of the total road length in the Nagapattinam Municipality. It may be extended for the newly developing areas in the Municipality. Velankanni Town Panchayat is provided with underground drainage to dispose the stormwater.

The total sewage generated from Nagapattinam Municipality, Velankanni Town Panchayat and Villages within Nagapattinam LPA is presently estimated at 6.1 MLD, 0.8 MLD, and 1.6 MLD. By 2041 Nagapattinam Municipality will generate 13.7 MLD of sewage. The existing STP has only a capacity of 12.6 MLD. Therefore, an additional STP to treat 1.1 MLD of excess sewage in 2041 is required. Velankanni Town Panchayat will generate an estimate of about 1.4 MLD of Sewage. The existing STP available in Velankanni is highly sufficient till 2041. At the Village level, there are no treatment facilities, so Decentralized Wastewater Treatment Systems are proposed.

Nagapattinam Municipality and Velankanni Town Panchayat are treating solid waste by composting. The existing capacity of the solid waste compost plant in Nagapattinam LPA is enough for the future. Whereas in Velankanni, an additional dump yard needs to be identified to fulfil the gap. A community waste disposal system should be proposed at the Village level. Recycle and reuse concept needs to be implemented to minimize waste generation.

Nagapattinam LPA has 2 sub-stations of 110 KV and 33 KV to fulfil the existing requirements. To meet the additional requirement and to serve the projected population two substations of 11 KV capacity are required for the future.



Map 5.1: Physical Infrastructure in Nagapattinam LPA

## 6. SOCIAL INFRASTRUCTURE

### 6.1 EXISTING SOCIAL INFRASTRUCTURE FACILITIES

Social infrastructure covers a range of services and facilities that meet local needs and contribute towards a good quality of life. It includes health provision, education, community facilities, youth, recreation, sports, faith, and emergency facilities. As the city grows rapidly, the need to amplify the number of social infrastructures is essential to develop strong and inclusive communities.

#### 6.1.1 Educational facilities

The literacy rate in Nagapattinam LPA has increased by 5.66 % from 2001 to 2011. According to the Census 2011, the literacy rate in the region (87.6%) is higher than that of India (74.04%) and Tamil Nadu state (80.08%). The literacy rate is high due to several public & private educational intuitions located in Nagapattinam and it serves as an educational hub for the surrounding area. However, the literacy rate is low, when compared with other municipalities in Nagapattinam District like Sirkali (90.19%) and Mayiladuthurai (91.83%). In overall terms, Nagapattinam LPA has a fairly good network of educational infrastructure in comparison to the rest of the municipalities.

#### *Schools*

Nagapattinam LPA has approximately 180 numbers of schools managed by both private and local bodies. There are 99 primary schools, 38 middle schools, 20 high schools, and 21 higher secondary schools (Map 6.1). The total enrolment of students in Nagapattinam LPA is 33946 (Table 6.1) and it constitutes about 20.5 % of the total population of the LPA. Table 6.1 gives details about the total number of schools present in Nagapattinam LPA.

**Table 6.1: No. of Schools Available in Nagapattinam LPA**

S. No	Name of Villages/Town	Primary School	Middle School	High School	Higher Secondary	Enrolment
1	Nagapattinam (M)	53	24	13	16	21,284
2	Velankanni (TP)	7	3	1	1	3,298
3	Nagore	3	1	0	0	440
4	Palaiyur	3	1	1	1	1,533
5	Ivanalur	2	0	0	0	98
6	Anthanapettai	5	1	1	0	696
7	VadakuPoigainallur	12	5	3	2	3,206



S. No	Name of Villages/Town	Primary School	Middle School	High School	Higher Secondary	Enrolment
8	TherkkuPoigainallur	3	2	0	0	539
9	Poravacheri	3	1	0	0	249
10	Sikkal	5	0	0	1	1,777
11	Papakoil	3	0	1	0	590
12	Karuvelankadai	0	0	0	0	236
13	Nagapattinam Village	0	0	0	0	0
<b>Total</b>		<b>99</b>	<b>38</b>	<b>20</b>	<b>21</b>	<b>33,946</b>

(Source: Primary Survey & School Report Card)

The URDPFI norms for educational facilities suggest a provision of one primary school for 5000 population and one senior secondary school for 7500 population. The existing number of schools in Nagapattinam LPA is satisfactory for the present population. According to Tamil Nadu School Education Department, any place with a population of 300 and above must have schools located at a distance as mentioned in Table 6.2.

**Table 6.2: Tamil Nadu School Education Norms for Schools**

S. No.	Type of Institution	Distance
1	Primary Schools	1 Km
2	High Schools	5 Km
3	Higher Secondary School	8 Km

(Source: Tamil Nadu School Education)

According to RTE Act 2009, a primary school must be accessed within a 1 km radius and a middle school within a 3 km radius. Presently, all the areas in Nagapattinam LPA are adequately covered by school facilities based on the above-mentioned norms. (Figure 6.1, 6.2, 6.3 & 6.4). Improving the existing facilities will enhance the quality of education in Nagapattinam LPA. Spatial distribution of schools as per the standards must be ensured in the future.

### **Higher Education**

The Nagapattinam LPA has 25 colleges of which there are 3 Engineering colleges, 4 Arts & Science colleges, and 5 Polytechnic colleges (Map 6.1). There is a College of Fisheries Engineering, which was established in the year 2012 to improve the fishing sector. College of Fisheries Engineering is a constituent college of TNJFUT and was recognized by the All-India Council for Technical Education (AICTE), New Delhi and it is also certified by ISO 9001:2015. and there is one Government Industrial Training Institute that provides technical skills to develop the

industrial sector in the region. A substantial amount of skilled manpower is generated every year from the Govt. ITI & polytechnic colleges, and can be utilized properly through developing industrial sectors in this region. This can prevent out-migration of the inhabitants in search of better employment opportunities and also help to boost the economy.

The educational institutions in Nagapattinam LPA meet the planning norms for higher education mentioned in URDPFI guidelines and there is no need for the provision of additional facilities for the present population. Table 6.3 gives the list of various colleges located in Nagapattinam LPA.

**Table 6.3: List of Colleges in Nagapattinam LPA**

S. No.	Colleges	Nos
<b>Engineering</b>		
1	EGS Pillay Engineering College	3
2	Sir Isaac Newton College of Education	
3	Colleges of Fisheries Engineering	
<b>Arts &amp; Science</b>		
4	Nagapattinam Govt. arts and science college	4
5	EGS Pillai Arts & Science college	
6	Sir Isaac Newton College of Arts	
7	ADM College for Women	
<b>Polytechnic</b>		
8	Dharmambal polytechnic Colleges	5
9	Govt. Polytechnic College	
10	Valivalam Polytechnic College	
11	EGS Pillay Polytechnic College	
12	ValivalamDesikarPolytecnic College	
<b>Others</b>		
13	Andavar College of Nursing	13
14	Arabic College	
15	KPS College of education	
16	Govt. ITI Institute	
17	ICAR Krishi Vigyan Kendra – Tamil Nadu Agriculture University	
18	Taqwa Islamic women college	
19	Karithkeyan Nursing School	
20	Nagai College of Education	
21	Sir Isaac Newton College of Education	
22	EGS Pillay College of Pharmacy	
23	NSS Nursing College	
24	Sairam College of Education	
25	St.Joseph's Community College	
<b>Total</b>		<b>25</b>

(Source: Primary Survey)

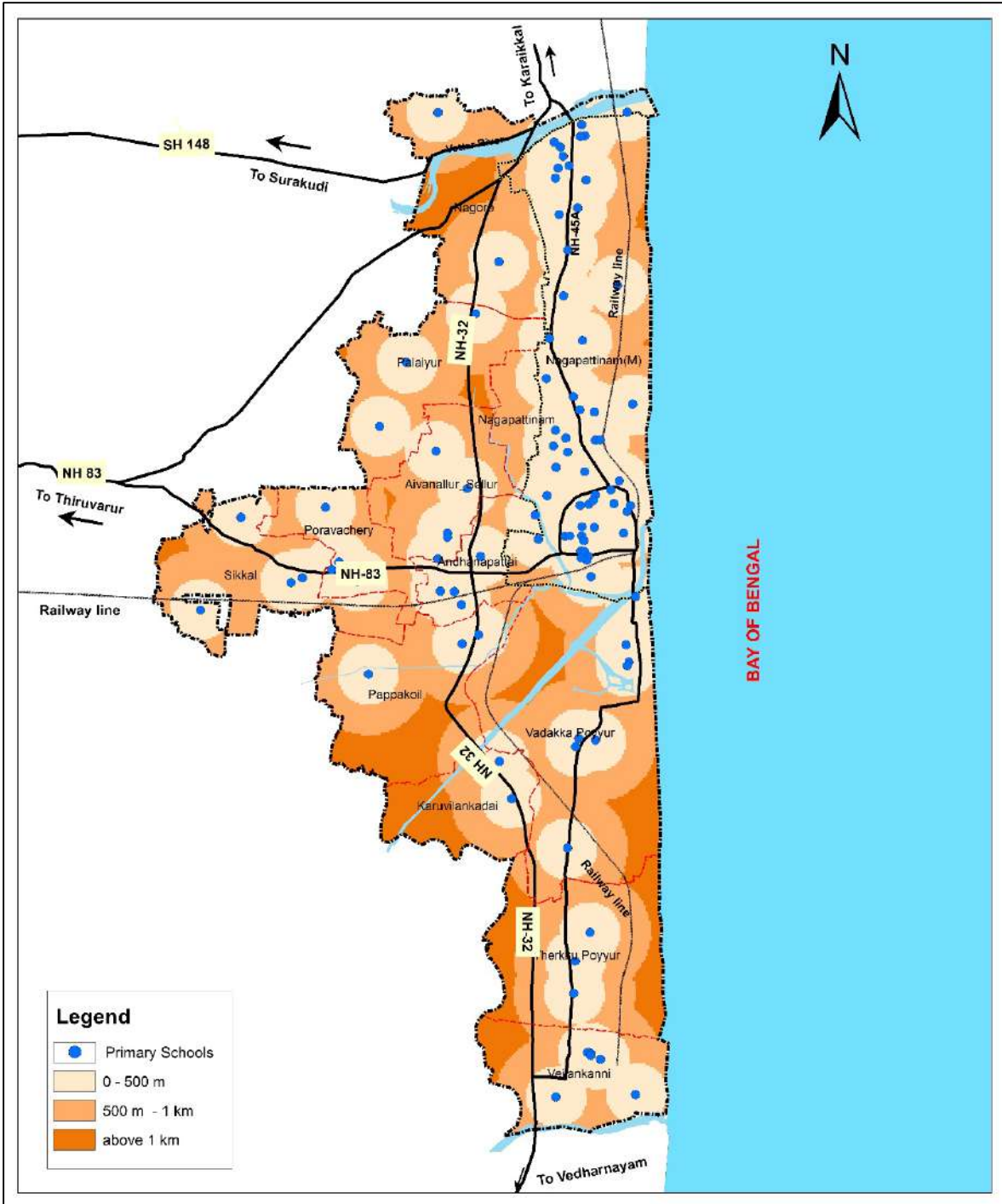


Figure 6.1: Area Covered by Existing Primary Schools

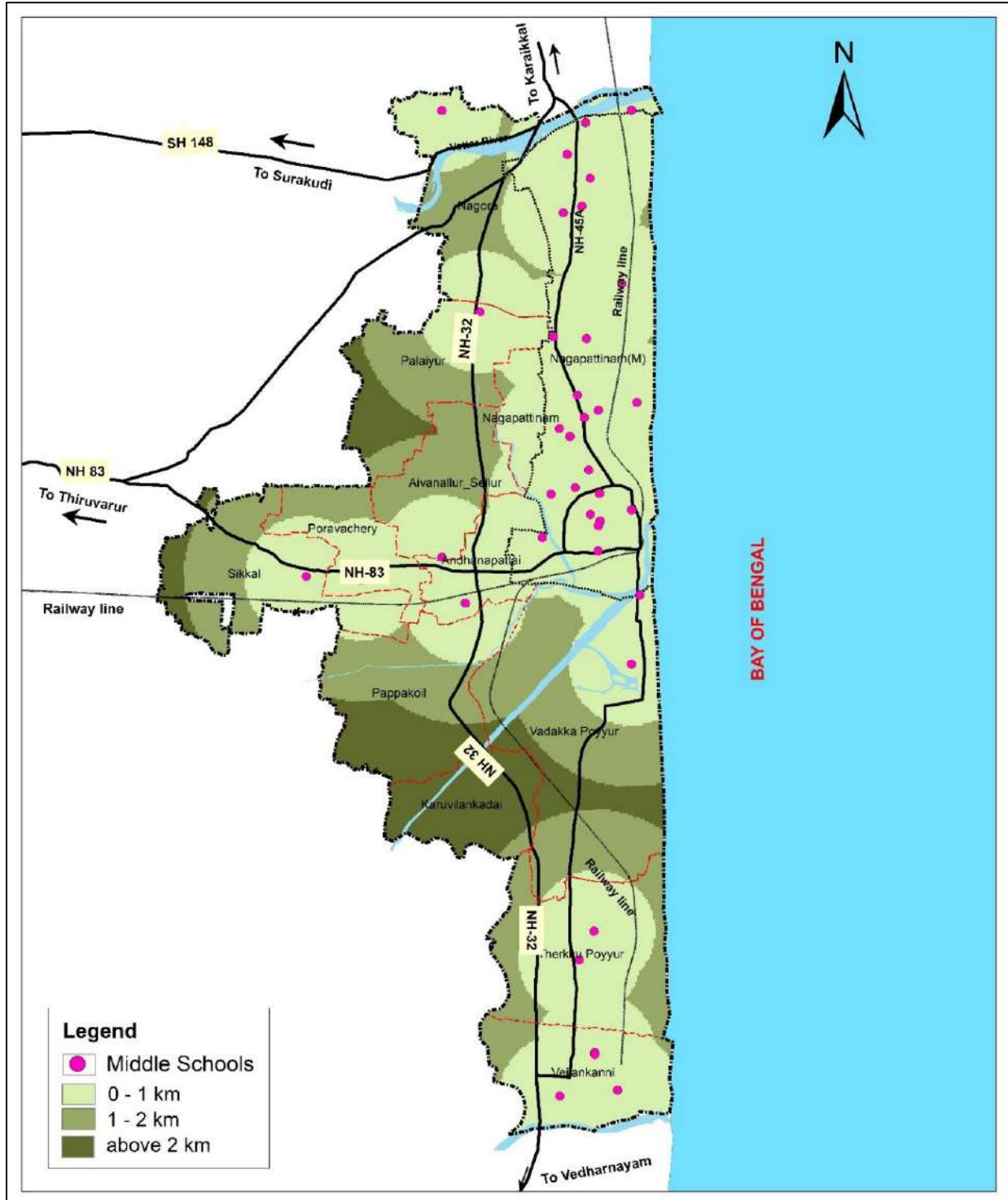


Figure 6.2: Area Covered by Existing Middle Schools

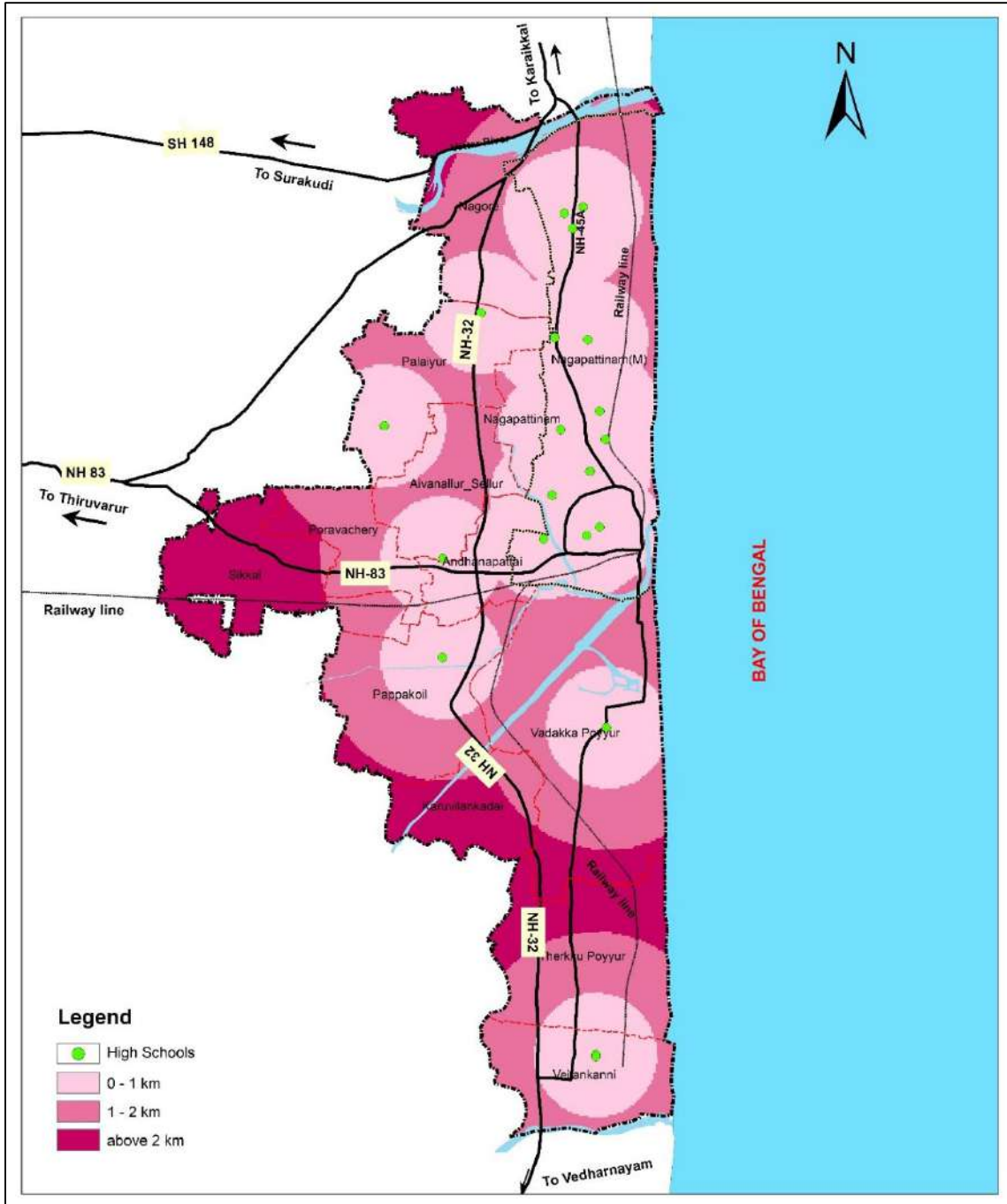
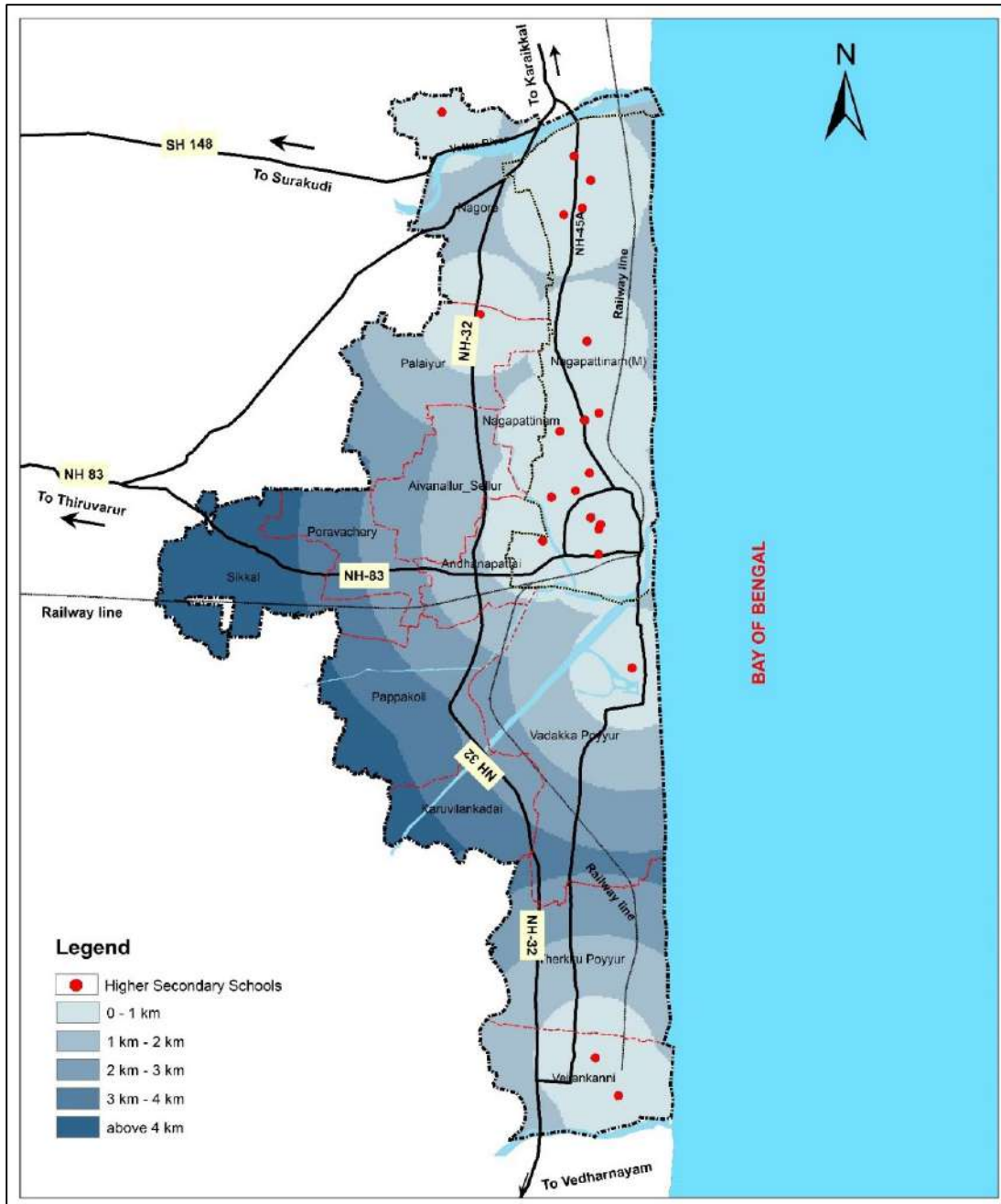


Figure 6.3: Area Covered by Existing High Schools



**Figure 6.4: Area Covered by Existing Higher Secondary Schools**

### 6.1.2 Healthcare facilities

Access to proper healthcare facilities is crucial for the well-being of the inhabitants. The Nagapattinam LPA has two government hospitals; a District Government Hospital and a Nagore GHS with a total number of 469 beds. In addition to this, there are 3 Primary Health Centres, 10 Health Sub Centres, 2 maternity & child welfare centres, 2 diagnostic centres etc., functioning (Map 6.2).

The details of healthcare facilities available in Nagapattinam LPA are given in Table 6.4.

**Table 6.4: Healthcare Facilities in Nagapattinam LPA**

S. No.	Description	No's	Beds
1	Government Hospital	2	469
2	Primary Health Centre	3	-
3	Health Sub Centre	10	-
4	Private Hospitals	10	-
5	Diagnostic Centre	2	-
6	Community Health Centre	1	-
7	Dispensary	1	-

(Source: Primary Survey)

The norms for the provision of various healthcare facilities based on the population are given in the Tamil Nadu Health Policy. It recommends one Health Sub Centre for a population of 5000, one primary Health Centre for 30,000 population and one Community Health Centre for a population of one lakh. Based on these standards, certain Villages are deprived of any health care facilities, but they avail it from the surrounding Villages in proximity. There is also an ongoing project for a medical college in Orathur near Papakoil which will satisfy the need for healthcare in Nagapattinam LPA as well as surrounding areas. Improving the existing health facilities is essential to enhance the quality of health services in Nagapattinam LPA.

### 6.1.3 Recreational Spaces

Recreational facilities include parks, playgrounds, open spaces, and cinema theatres. Parks and open spaces create a high quality of life and promote inner-city revitalization. Open space boosts local economies by attracting tourists and supporting outdoor recreation. In Nagapattinam LPA, there are 23 parks & 3 playgrounds and it is spread over an area of about 0.31 Sq.Km.(Figure 6.5). Most of these recreational facilities are mostly concentrated in the Nagapattinam Municipality and the vicinity areas are deprived of recreational facilities. Table 6.5 gives the details of various recreational facilities available in Nagapattinam LPA.

**Table 6.5: Recreational Facilities in Nagapattinam LPA**

S. No.	Facilities	No's
1	Parks	23
2	Playground	3
3	Movie Theatres	4

(Source: Primary Survey)

According to NBC rules, 3 Sq. m/person is the minimum norm for open space in a built-up area. This rule demands an area of 0.49 Sq.km as open space for the present population.

The open space reserved for recreational activities at any layout must not be less than 100 Sq.m with a minimum dimension of 10 meters as recommended in TNCDBR 2019. Based on URDPFI guidelines, neighbourhood-level parks of area 1 hectare along with playgrounds have to be developed in all proposed residential areas.

#### 6.1.4 Miscellaneous facilities

##### **Anganwadi**

The Anganwadi centres provide basic health care facilities which include contraceptive counselling and supply, nutrition education and supplementation, as well as pre-school activities for rural children. Based on URDPFI guidelines an Anganwadi must serve a population of 5000 in urban and rural areas. There is a total no. of 41 Anganwadi centres located in Nagapattinam LPA and it is satisfactory for the present population. Any Anganwadi centre must be accessible within 1 to 3 km of distance. As per this distance criteria, all the Villages in Nagapattinam LPA are easily accessible within a distance of 3 km range. (Figure 6.6)

##### **Burial Ground**

Nagapattinam LPA consists of 14 burial grounds. Table 6.6 gives details about the existing burial grounds in Nagapattinam LPA. An electric crematorium can be provided in Nagapattinam Municipality to upgrade the infrastructure facility. (Figure 6.7)

**Table 6.6: Existing Burial Grounds in Nagapattinam LPA**

S. No.	Description	No's
1	Nagapattinam(M)	2
2	Velankanni (TP)	4
3	Villages	8

(Source: Primary Survey)

##### **Fire Station**

There are 2 fire stations in Nagapattinam LPA, one in Nagapattinam Municipality and another in Velankanni Town Panchayat. As per URDPFI safety standards, one fire station is required for every 2 Lakh population with a 5 -7 km radius. The existing safety facilities in Nagapattinam are sufficient for the present population. The location of fire stations in Nagapattinam LPA are shown in the Figure 6.8.



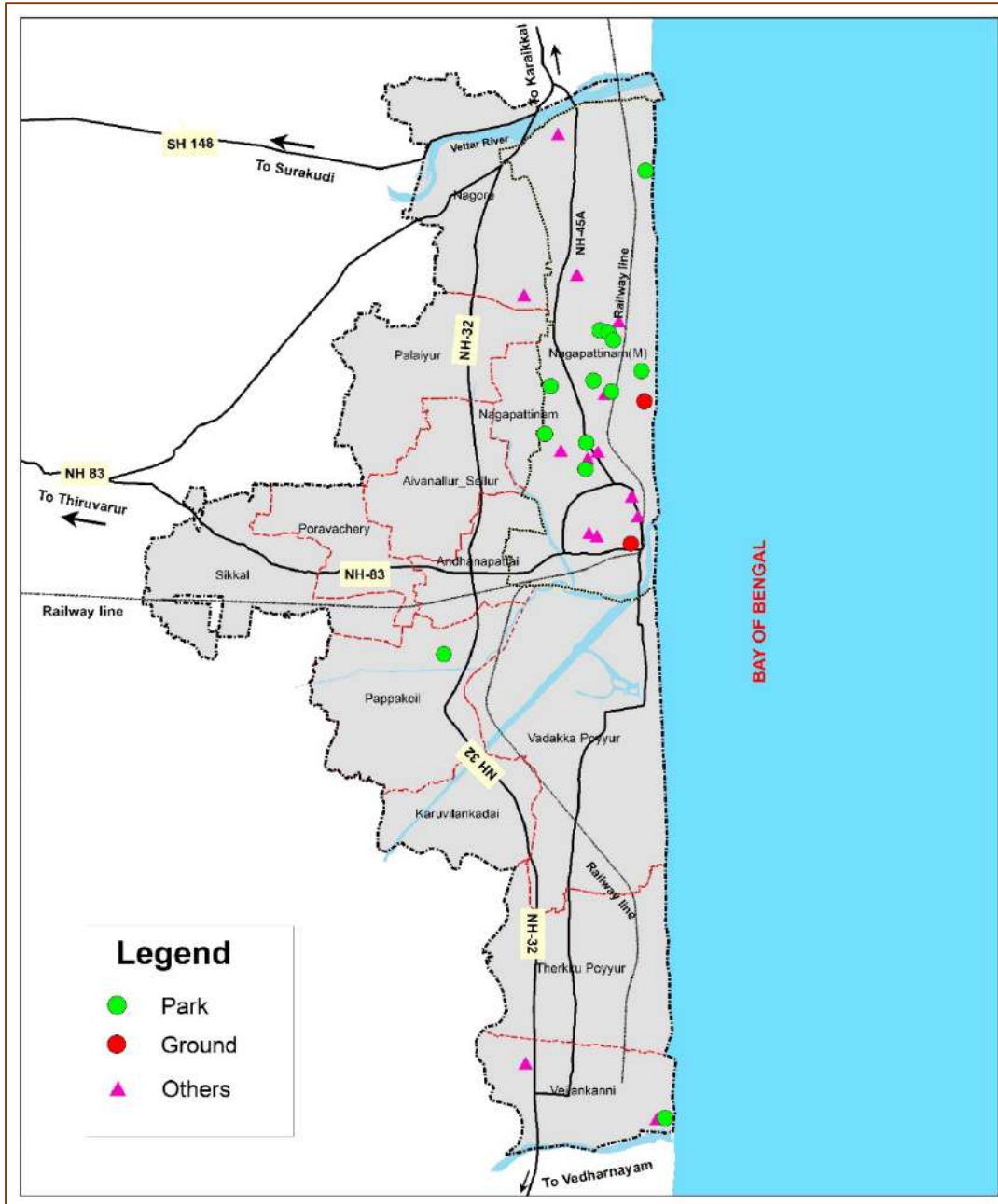


Figure 6.5: Location of Parks in Nagapattinam LPA

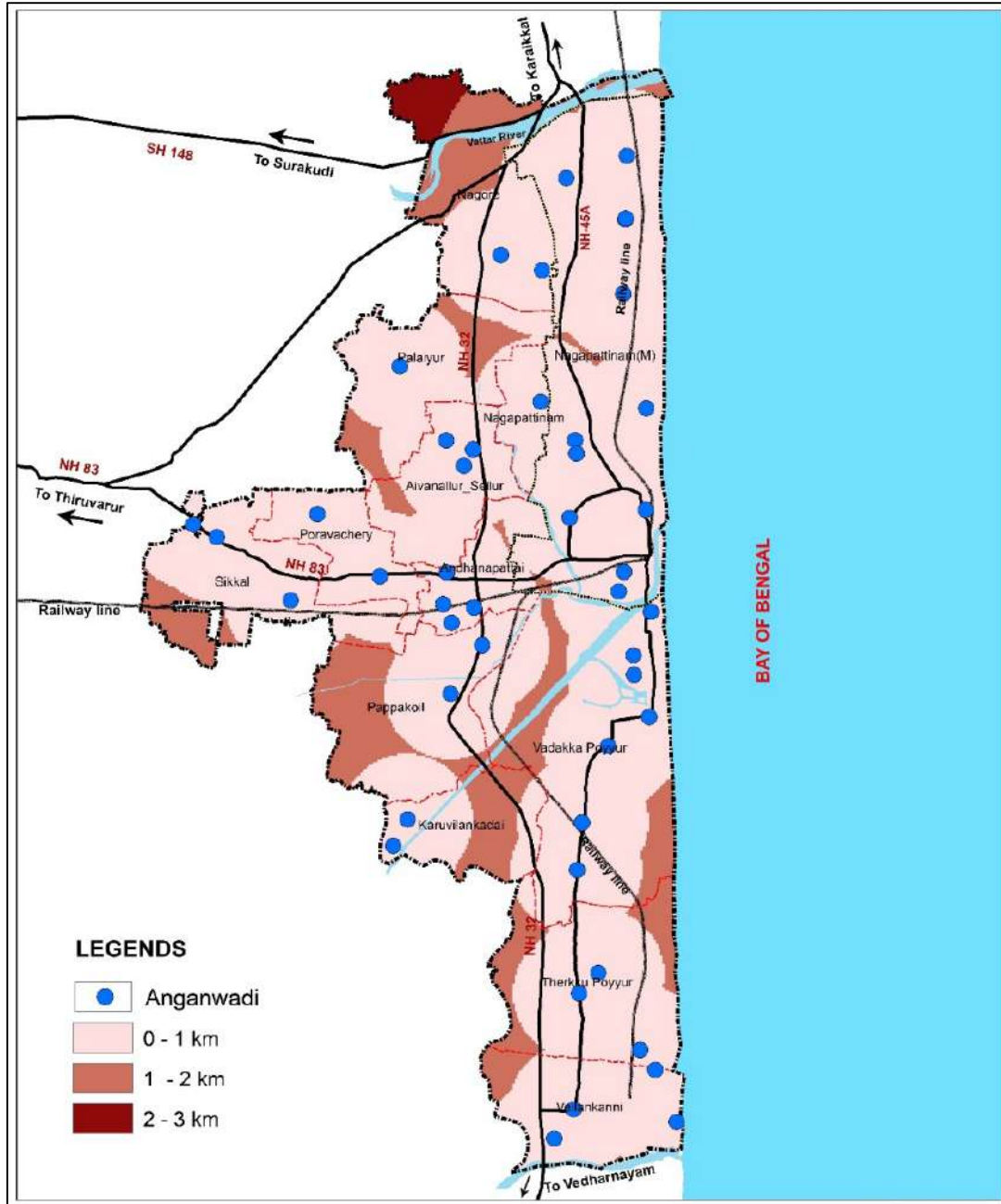


Figure 6.6: Location of Anganwadi in Nagapattinam LPA

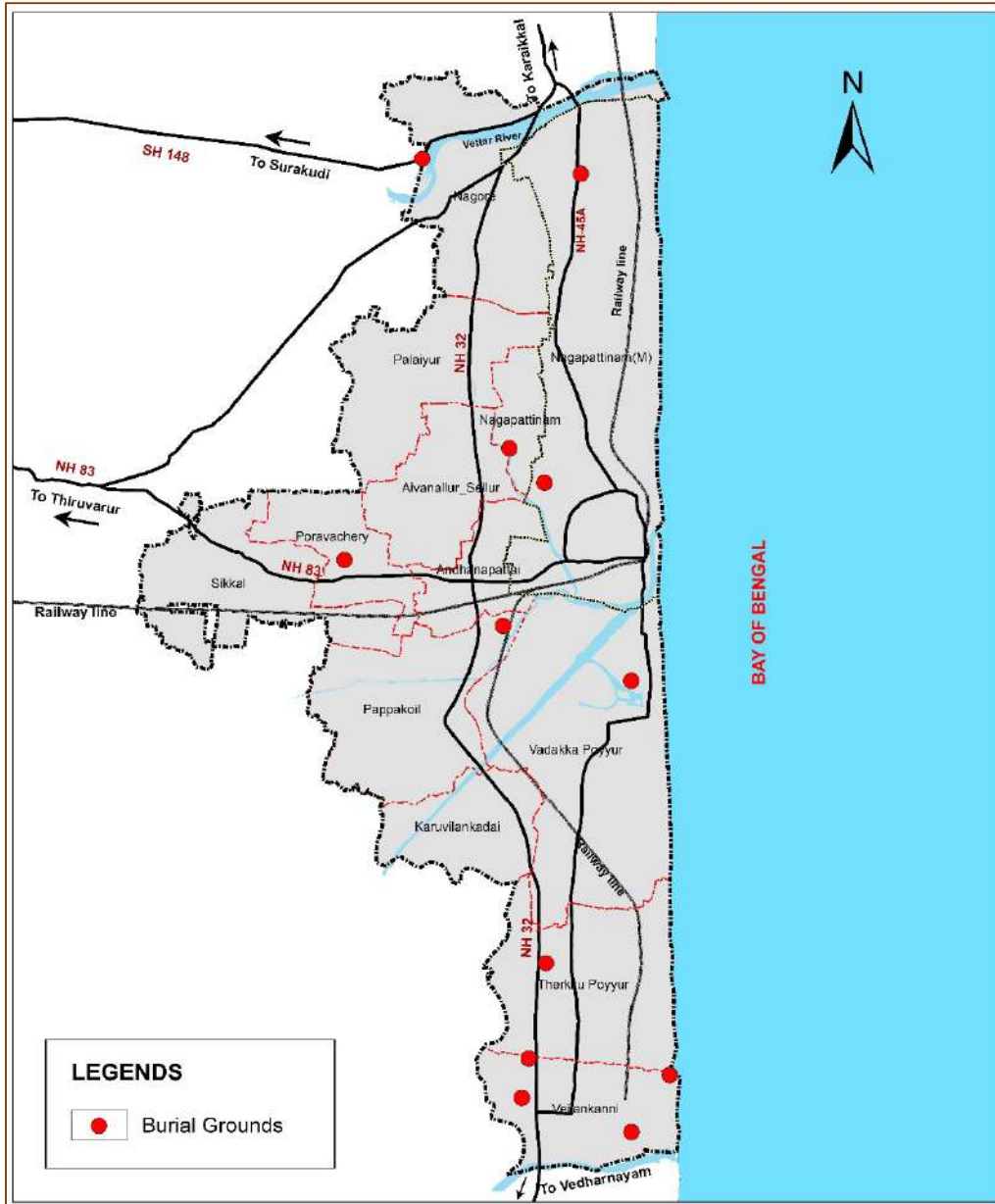
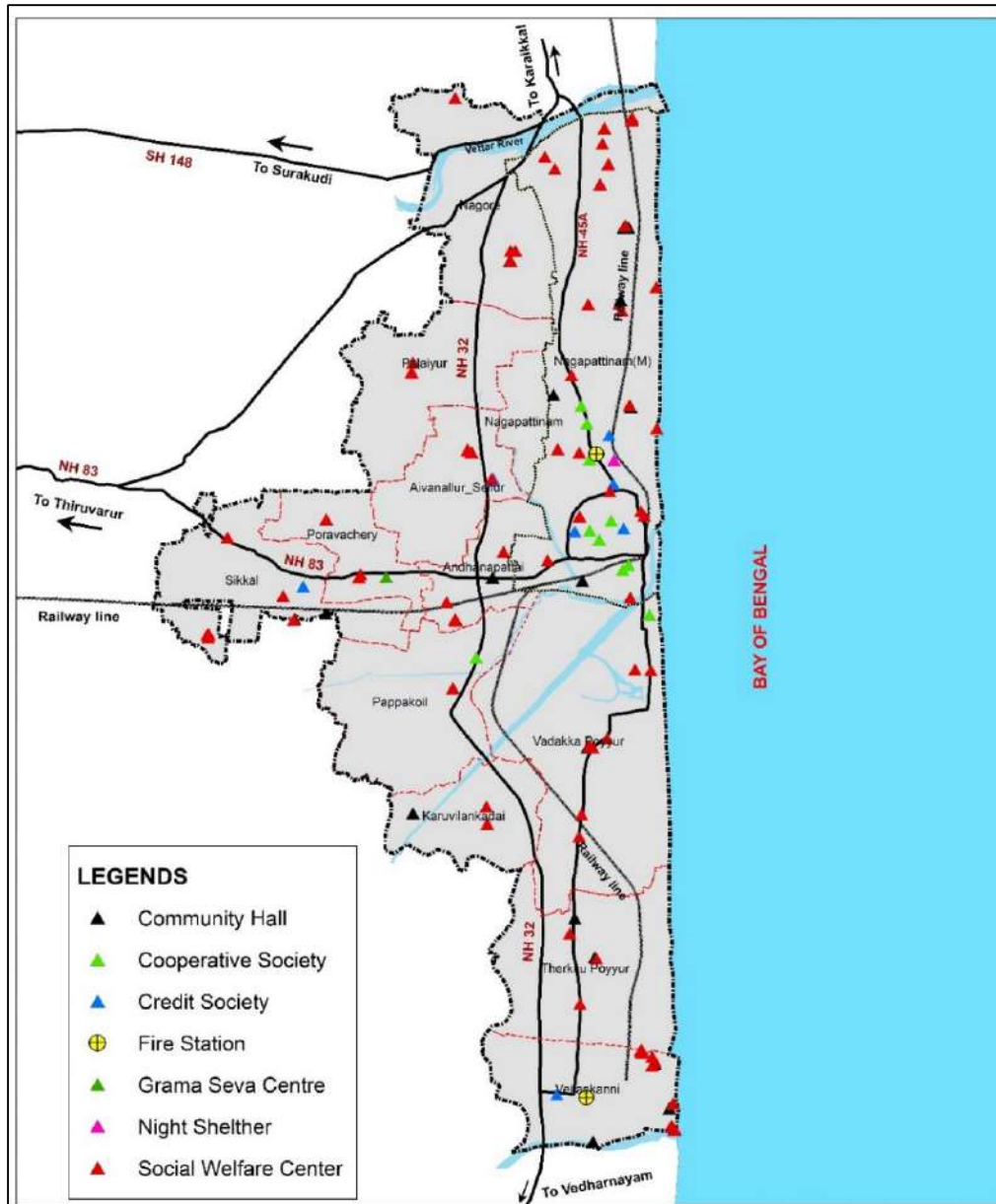


Figure 6.7: Locations of Burial Grounds in Nagapattinam LPA



**Figure 6.8: Other Social Infrastructure Facilities in Nagapattinam LPA**

## 6.2 PROJECTED REQUIREMENT

Social infrastructure covers a range of services and facilities that meet local needs and contribute towards a good quality of life. It includes health provision, education, community facilities, youth, recreation, sports, faith, and emergency facilities. As the city grows rapidly, the need to amplify the number of social infrastructures is essential to develop strong and inclusive communities. Analysis has been carried out to identify the various social infrastructure that will be required for the projected population in the year 2041. The provisions for the required services will be facilitated through the proposed land use plan.

### 6.2.1 Education

The total number of schools available in Nagapattinam LPA is 180 managed by both private and local bodies. A gap analysis study has been made for the projected population based on the URDPFI guidelines. It suggests one primary school for every 5,000 population and one senior secondary school for every 7,500 population. Table 6.7 shows the gap analysis study of education facilities for the projected population, 2041. It reveals that the current school facilities available within the LPA cater to the educational need of the present population as well as the projected future population. There will be no necessity to provide additional educational facilities in Nagapattinam LPA. Improving the existing facilities will enhance the quality of education in Nagapattinam LPA. Spatial distribution of schools as per the standards must be ensured for new schools in the future.

**Table 6.7: Gap Analysis for Projected Population - 2041**

S. No.	Type of Institution	Existing Population 2011	Existing Number	Projected Population 2041	Required Nos as Per URDPFI
1	Primary schools	1,64,824	99	2,14,711	Nil
2	Middle School	1,64,824	38	2,14,711	Nil
3	High School	1,64,824	20	2,14,711	Nil
4	Higher Secondary	1,64,824	21	2,14,711	Nil

### 6.2.2 Health

The town is served by 2 Government hospitals, 3 primary health centres, and several private hospitals. The World Health Organization (WHO) has recommended a norm of 5 beds per thousand population and URDPFI guidelines suggest 500 beds for a population of 2.5 lakh. From the analysis, it is estimated that the total number of beds required for the projected population in the year 2041 will be around 215. The details are given in Table 6.8 indicates that the Nagapattinam LPA is well established with healthcare infrastructure facilities for the future.

**Table 6.8: Gap Analysis for Health Facilities**

Existing Population (2011)	Existing Beds	URDPFI Norms	Future Population (2041)	Bed Requirement
1,64,824	469	500 Beds/2.5 Lakh Population	2,14,711	Nil

The norms for the provision of various healthcare facilities based on the population are given in the Tamil Nadu Health Policy. It recommends one Health Sub Centre for a population of 5000, one primary Health Centre for 30,000 population and one Community Health Centre for a population of one lakh. Based on these standards, certain Villages are deprived of any health care facilities, but they avail it from the surrounding Villages in proximity. There is also an ongoing project for a medical college in Orathur near Papakoil which will satisfy the need for healthcare in Nagapattinam LPA as well as surrounding areas. Improving the existing health facilities is essential to enhance the quality of health services in Nagapattinam LPA.

### 6.2.3 Recreation & Open Space

According to NBC rules, 3 Sq. m/person is the minimum norm for open space in a built-up area. This rule demands an area of 0.64 Sq.km as open space for the projected population in 2041. The open space reserved for recreational activities at any layout must not be less than 100 Sq.m with a minimum dimension of 10 meters as recommended in TNCDBR 2019.

Based on URDPFI guidelines, neighbourhood-level parks of area 1 hectare along with playgrounds have to be developed in all proposed residential areas. A total no. of 14 Neighbourhood level parks is required for the projected population. And two community park of area 5 hectares each has to be developed in Nagapattinam Municipality. The norms for Multipurpose Ground suggest for a provision of one Community level multipurpose ground of area 2 ha for the present and future population. Table 6.9 shows the details of the required open space for Nagapattinam LPA.

**Table 6.9: Gap Analysis for Organized Open Space**

Category	Population Served	Future Population	Requirement	Area Required
Neighbourhood Park	15000	2,14,711	14	14 Ha
Community Park	1 lakh	2,14,711	2	10 Ha

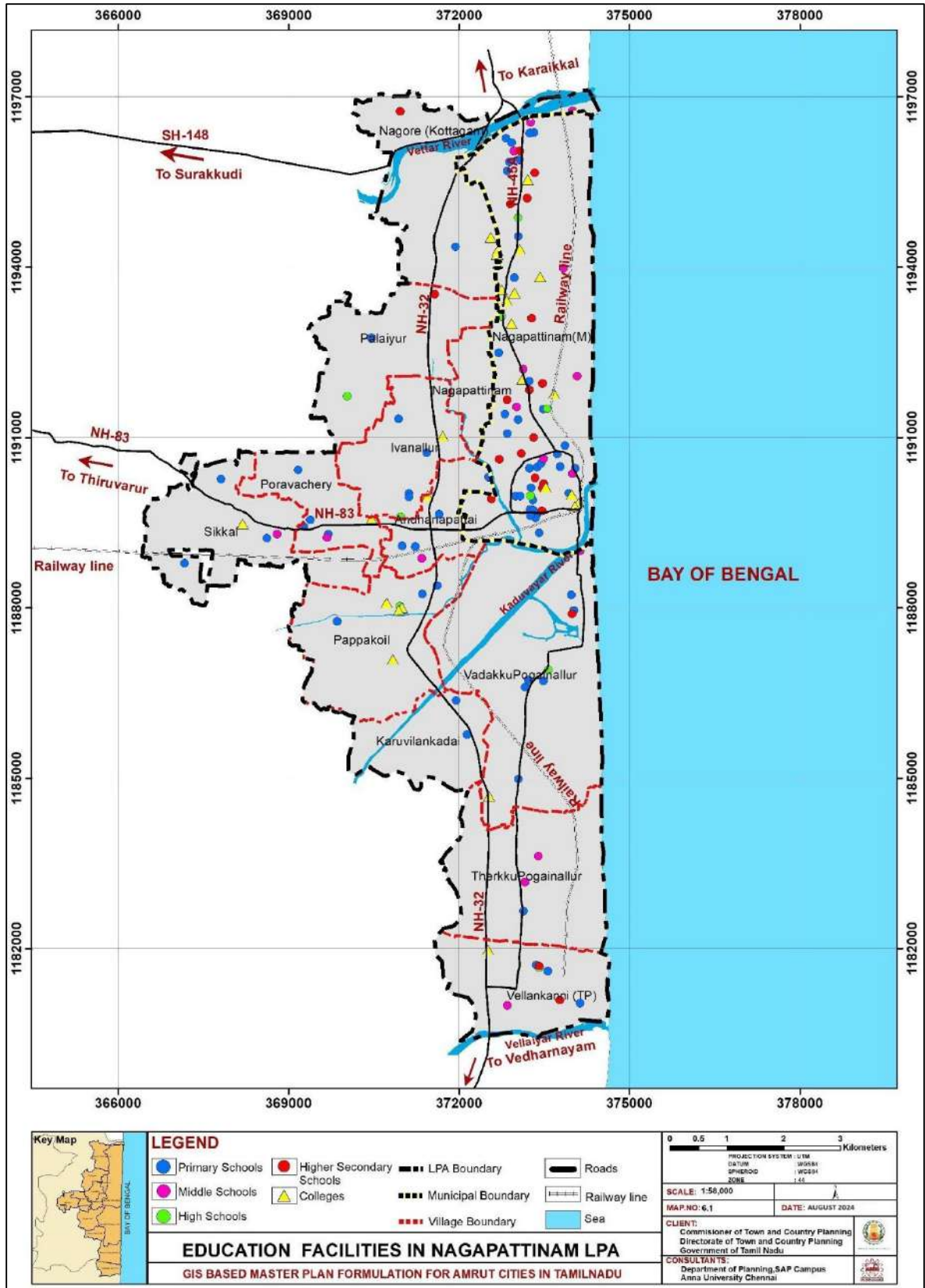
Being a coastal city with three rivers running through it, Nagapattinam LPA has the potential for the development of riverfront & beachfront recreational activities. This will not only protect and rejuvenate the river but also promote recreational tourism for domestic as well as international tourist. Providing other leisure & recreational activities like water sports, aquariums, marine parks, etc., will help to promote the tourism industry in the area.

### **6.3 SUMMARY**

Social infrastructure covers a range of services and facilities that meet local needs and contribute towards a good quality of life. As per Census 2011, the literacy rate of Nagapattinam LPA was about 87.6% which is higher than the state and the district. Nagapattinam LPA has 99 primary schools, 38 middle schools, 20 high schools, and 21 higher secondary schools serving the existing population of 1,64, 824. As per URDPFI guidelines and the RTE Act 2009, distance criteria, the existing number of schools in Nagapattinam LPA is satisfactory for the existing as well as the future population. Spatial distribution of schools as per the standards must be ensured for new schools in the future. Nagapattinam LPA has 25 colleges including Engineering colleges, Arts & Science colleges, Polytechnic colleges and College of fisheries Engineering. The higher education facilities in Nagapattinam LPA are adequate to cater for the existing as well as the future population.

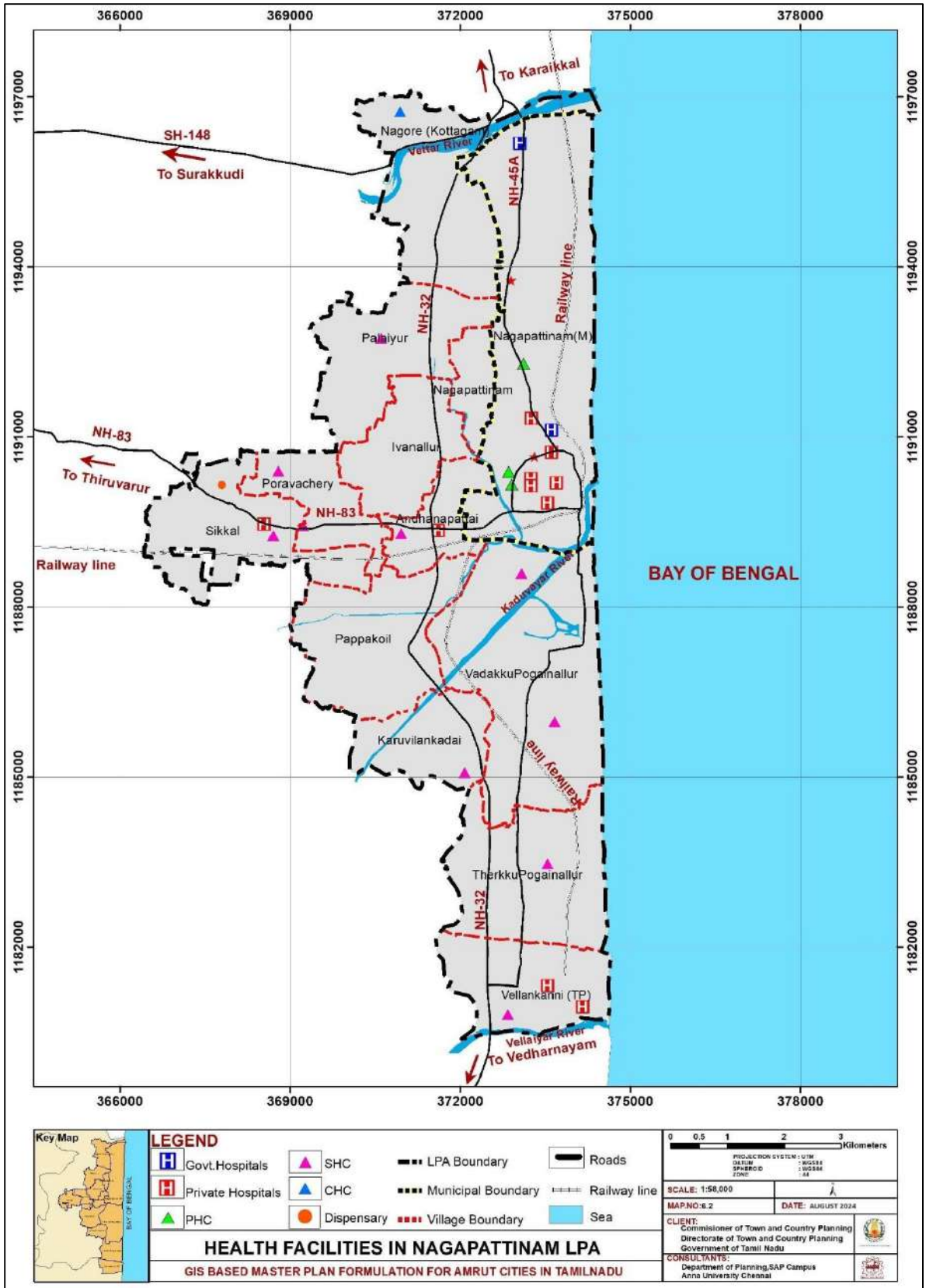
Being a district headquarter, Nagapattinam has a District Government Hospital with 469 beds and also a government hospital in Nagore. In addition to this, there are 3 Primary Health Centres, 10 Health Sub Centres located within the LPA. There is also an ongoing project for a medical college in Orathur near Papakoil which will satisfy the need for healthcare in Nagapattinam LPA as well as surrounding areas in the future.

Nagapattinam LPA has 23 parks & 3 playgrounds and is spread over an area of 0.3 Sq.km. As per URDPFI guidelines to cater for the future population, Nagapattinam LPA requires a 14-ha area for a neighbourhood park and 10 ha for a community park. These facilities are to be provided in the future to cater to the requirements. As Nagapattinam LPA is bestowed with beaches and rivers, it has greater potential for the development of riverfront & beachfront recreational activities to improve the green infrastructure.



Map 6.1: Education facilities in Nagapattinam LPA





Map 6.2: Health facilities in Nagapattinam LPA

## 7. TRAFFIC & TRANSPORTATION

Transportation is the main element of urban infrastructure and an important factor for economic development for any place. The decisions made in developing new neighbourhoods or expanding the economic base of any region will have a direct and tangible impact on the transportation system. Insufficiency in the provision of transportation infrastructure has been the main cause of the deterioration of quality of life in urban areas. And also, the absence of efficient transportation planning for the growing population will create an imbalanced and unequal distribution of activities leading to more congestion in the core city. Therefore, transportation has to be carefully planned to meet the demand for the increasing population.

### 7.1 EXISTING TRAFFIC & TRANSPORTATION SCENARIO AND FACILITIES

Nagapattinam LPA is well connected with the state capital and surrounding district headquarters by State highways, National highways, and railway networks. The LPA is located at a distance of 84 km from Thanjavur, 14 km from Karaikal, 40 km from Mayiladuthurai, 40 km from Kumbakonam, 25 km from Thiruvarur, and 305 km from Chennai, the state capital of Tamil Nadu.

#### 7.1.1 Road Network

##### *Hierarchy of Roads*

Based on the function and capacity, the roads in Nagapattinam LPA are classified as Arterial Roads, Sub Arterial Roads, Collector Roads, and Local Roads. (Refer Map No. 10)

- i. **Arterial Roads** -The primary roads which facilitate traffic movement to the external area are the two National highways and two State highways in the Nagapattinam LPA. The NH 83 connects Nagapattinam with Thiruvarur, Thanjavur, Tiruchirappalli, and Dindigul in the west. The NH 32 also known as East Coastal Road connects Nagapattinam with Karaikal, Cuddalore, Puducherry, Chengalpattu, Chennai in the North and Ramanathapuram, Thoothukudi in the South. The two State Highway SH 148 connects the LPA with Vettar in the west and SH 67 connects the LPA with Nachiyar Koil and Kumbakonam in the west. The total length of NH 83 and NH 32 is 4.9 km and 16.4 km respectively. These roads are maintained by the Roads and Highway Department, Government of Tamil Nadu (Map 7.1).
- ii. **Sub Arterial Roads** – The major roads that carry a large volume of traffic to important urban nodes within the planning area are NH 45A and AkkarapettaiPoigainallur roads. The NH 45A connects Nagore with the Nagapattinam Municipality and the AkkarapettaiPoigainallur road connects Akkarapettai to Velankanni via

Vadakkupoigainallur village. The core city has a circular pattern of road network surrounding the old port town (Map 7.1).

**iii. Collector Roads** - The major collector roads which channel traffic from the local roads to the arterial roads are V.O.C Road, Hospital Road, Nethaji Road, EGS Pillai Road, Nambiyar Nagar Road, Neela west street, Naduvar Keela Veedhi, Thethi Road, Perumal street, and Velankanni Church Road. The circular pattern of roads in the old port town is interconnected by cross collector roads.

**iv. Local Roads** - The local roads that provide direct access to the properties in Nagapattinam LPA are in a grid pattern in the core city and tree-like road pattern in the sub-urban areas.

### ***Bus terminus***

There are four bus stands in Nagapattinam LPA, two within Nagapattinam Municipality, one in Nagore area, and another one in Velankanni Town Panchayat. The bus stand at Nagapattinam is a class B bus stand that has 28 bus bays and the Nagore bus stand has 6 bays.

### **7.1.2 Railway Connectivity**

The Nagapattinam LPA is served by a total number of 6 railway stations including Nagapattinam Junction. Nagapattinam Junction railway station is located at Nethaji Road, Tata Nagar in Nagapattinam Municipality and it is 2.3 km from Nagapattinam New bus stand. It connects Thiruvarur, Thanjavur, and Tiruchirappalli in the west, Nagore, Karaikal in the North, and Velankanni in the South. The Nagore railway station in Nagapattinam Municipality has located 1 km from Nagore Dargah and 7 km from Nagapattinam Junction. The important trains passing via Nagore station are Ernakulam Express, Karaikal Express, Chennai Express, etc.

The railway station at Velankanni is a terminal station with 3 platforms and 5 tracks. The Chennai Egmore– Velankanni Link Express functions daily from Velankanni station and halts at important stations like Nagapattinam Junction, Cuddalore Port Junction, Villupuram Junction, etc. There is also a weekly express train Vasco da Gama – Velankanni Express connecting Vasco da Gama in Goa with Velankanni via Madgaon, Hubli junction, Yesvantpur, Salem, Karur, Tiruchirappalli, Thanjavur, Thiruvarur, and Nagapattinam. This is the only dedicated express train for Velankanni, all other trains are slip trains, slow passenger trains, and special trains to Velankanni. Table 7.1 gives details about the No. of train arrivals and departures in the stations.

**Table 7.1: Train Arrival and Departure**

<b>Stations</b>	<b>No. of Platforms</b>	<b>Type of track</b>	<b>No. of Train Arrivals/ Departures</b>
Nagore	3	Single – Line Electrification	9
Vellipalayam	1	Single – Line Electrification	8
Nagapattinam	3	Single – Line Electrification	27
Anthanapettai	1	Single – Line Electrification	8
Velankanni	3	Single – Line Electrification	6
Sikkal	1	Single – Line Electrification	8

### **7.1.3 Port**

The Nagapattinam Port is an ancient port located on the banks of the Bay of Bengal near the mouth of river Kaduvaiyar. It is one of the 15 minor ports in Tamil Nadu under the control of the Tamil Nadu Maritime Board (TNMB). The anchorage of this port is an open roadstead. The port facilities such as Wharves, stacking area, Cargo shed, Passenger terminal station, Weigh Bridge and Slipway are provided. Lighthouse and VHF are operating at the port for navigational purposes. The Nagapattinam lighthouse is the first conventional 20m high lighthouse tower to be built inside the port premises by the British in 1869.

### **7.1.4 Traffic analysis**

Traffic analysis is the most essential and complex component for planning, building, and operating transportation infrastructure. This analysis forms the basis for evaluating the transportation needs during the planning process. To determine the existing traffic conditions in Nagapattinam LPA the following traffic surveys were conducted;

- Volume count
- Moving car method
- Parking survey

#### ***Volume Count***

The traffic volume survey determines the volume of traffic moving on a road at a particular section during a specific time. It is usually expressed in terms of passenger car unit (PCU) and measured to calculate the level of service (LOS) of the roads and other related attributes like congestion, carrying capacity, v/c ratio, identification of peak hour, etc. This analysis was carried out at six intersections (Figure 7.1) in Nagapattinam LPA, namely

- Bus stand Junction
- Four Pillar Junction
- Thonithurai Junction
- Puthur Junction
- Water Tank Junction
- Anna Statue Junction

### ***Volume to Capacity Ratio (V/C)***

Volume capacity ratio (V/C) is one of the most used indices for the assessment of traffic conditions in urban areas. V is the total number of vehicles passing a given point in one hour and C is the maximum number of cars that can pass the same point at a reasonable traffic condition. A v/c ratio less than 0.85 generally implies that adequate capacity is available and vehicles are not expected to experience significant queues and delays. As the v/c ratio approaches 1.0, traffic flow may become unstable, and delay & queuing conditions may occur. Once the demand exceeds the capacity (v/c ratio greater than 1.0), traffic flow is unstable and excessive delay and queuing is expected.

The analysis carried out reveals that the v/c ratio of all six intersections is below 1.0 indicating that there is no delay or disruption in the traffic flow.

However, the Anna Statue Junction which serves as an important linkage between the central business district and other areas has a high concentration of vehicular movement during the peak hours. When the development takes place in the surrounding areas of this junction, it will lead to traffic congestion in the future. So, a junction improvement will be required at Anna Statue Junction. Necessary investments in traffic facilities such as enhanced public transportation, road widening, construction of new roads & overpasses, and more lanes can avoid traffic congestion in the future. Table 7.2 presents the peak hour traffic volume at the intersections.

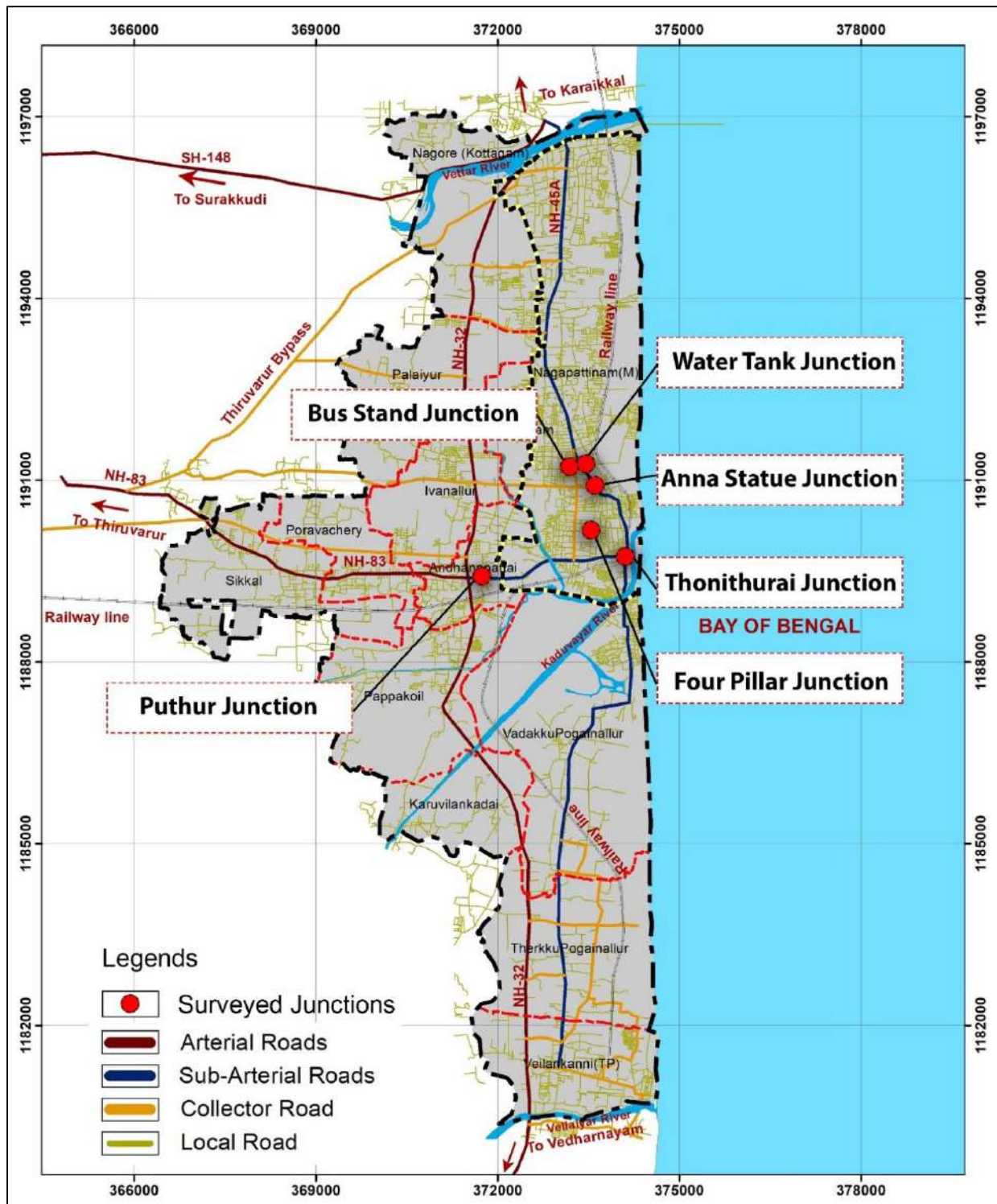


Figure 7.1: Surveyed Junctions in Nagapattinam LPA

**Table 7.2: Traffic Volume at Intersections**

S. No.	Location	Peak Morning Hour	Total PCUs	Total Vehicles	Peak Evening Hour	Total PCUs	Total Vehicles
1	Bus Stand Junction	09.00am – 10.00am	3758	4982	05.00pm – 06.00pm	3608	4210
2	Four Pillar Junction	09.30am – 10.30am	2658	3702	05.00pm – 06.00pm	3030	3754
3	Thonithurai Junction	08.30am – 9.30am	2537	3771	06.00pm – 07.00pm	2644	3740
4	Puthur Junction	09.00am – 10.00am	3840	5351	05.00pm – 06.00pm	3583	4615
5	Water Tank Junction	09.00am – 10.00am	3235	4364	05.00pm – 06.00pm	2788	3679
6	Anna Statue Junction	09.15am – 10.15am	4704	6476	04.45pm – 05.45pm	4073	5412

***Moving Observer Method***

The moving observer method is usually used to assess the average flow and journey time of traffic on a road stretch through collected data of moving vehicles. The enumerators in the test vehicle record the no. of opposing vehicles met, no. of vehicles to which test vehicle overtook, number of vehicles overtaking the test vehicle while it was travelling, the average speed of the test vehicle, and journey time of the observer in each run. Using these data, the traffic flow on the roads is computed. This survey is conducted on 11 road stretches in Nagapattinam LPA (Figure 7.2).

Figure 7.3 reveals that the stretches FE, IK, and KF are the most congested roads having a journey speed of 8.79 KMPH, 10.11 KMPH, and 12.18 KMPH respectively in the northbound. Similarly, the stretches DC, BA, and IJ have the maximum journey speed of about 50.48 KMPH, 48.17 KMPH, and 50.07 KMPH respectively in the northbound direction. Table 7.3 shows that the maximum journey speed of all the stretches in southbound direction is not more than 35 KMPH approximately. This implies that the number of vehicles entering the planning area is more when compared to the vehicles moving away from the planning area.

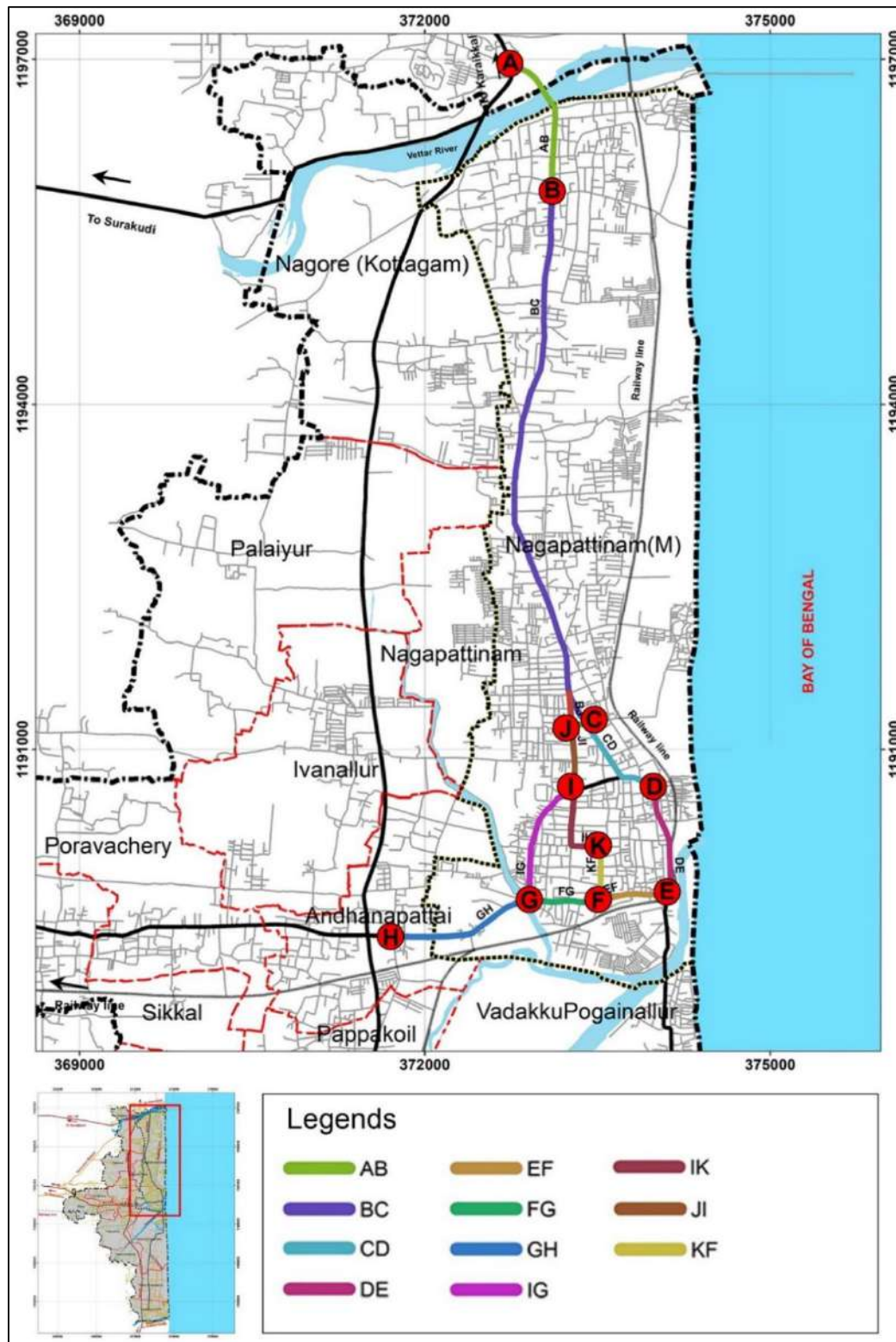


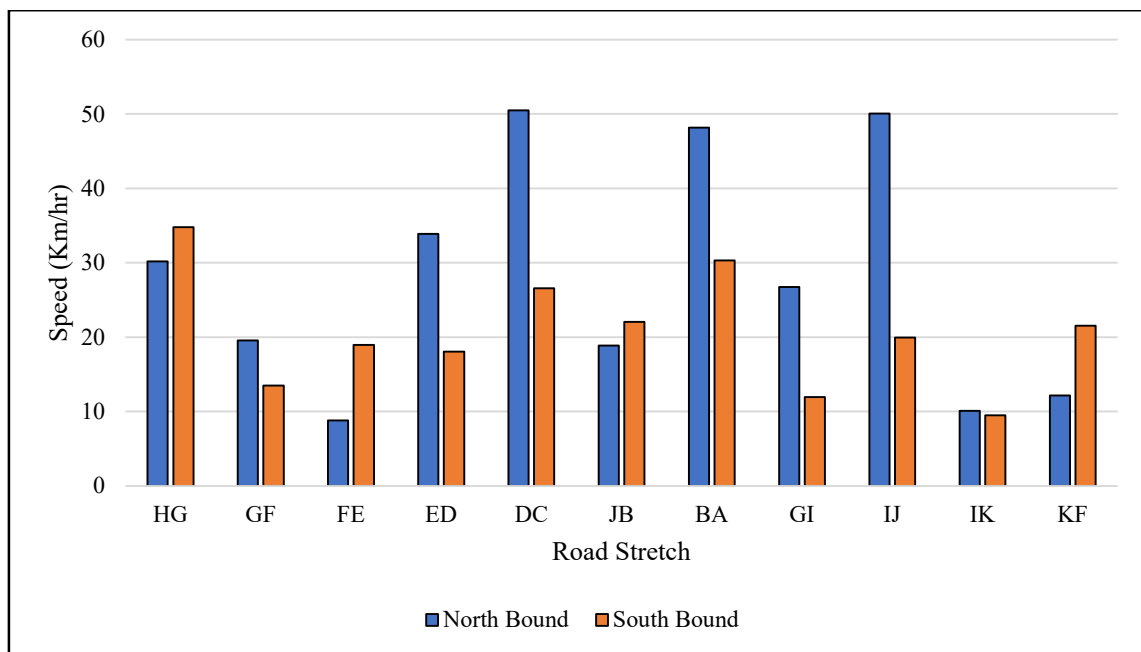
Figure 7.2: Running/journey speed in different stretches



**Table 7.3: Moving Vehicle Method Data Collection**

Stretch	qn	qs	tn'	ts'	Mean journey speed Km/hr		Mean running time (min)		Mean running speed (Km/hr)	
	PCU/hr		min		North Bound	South Bound	North Bound	South Bound	North Bound	South Bound
HG	480.48	229.40	2.60	2.25	30.21	34.78	2.55	1.93	30.80	40.62
GF	293.28	109.75	1.73	2.51	19.57	13.48	1.68	2.48	20.15	13.67
FE	62.23	112.38	4.24	1.96	8.79	18.95	3.93	1.87	12.55	19.86
ED	180.04	161.53	1.75	3.29	33.91	18.07	1.69	3.24	35.21	18.38
DC	351.33	180.04	1.02	1.95	50.48	26.59	0.87	1.88	59.44	27.51
JB	203.86	273.61	1.98	2.89	38.13	25.65	2.45	3.76	40.50	28.13
BA	456.52	275.05	1.63	2.59	48.17	30.31	1.55	2.46	50.66	31.85
GI	121.86	76.98	2.53	5.67	26.75	11.95	0.25	5.64	61.41	12.01
IJ	309.95	147.03	0.69	1.74	50.07	19.97	0.57	1.41	60.52	24.64
IK	97.90	80.67	4.26	4.52	10.11	9.51	4.22	4.38	10.20	9.81
KF	129.63	169.08	2.34	1.32	12.18	21.55	2.25	1.28	12.69	22.22

(Source: Traffic Survey)



**Figure 7.3: Average Journey Speed on the surveyed Road Stretch**

## **Parking**

Parking is one of the major issues created by the increase in urban mobility and vehicular density. The availability of less space in the urban area has increased the demand for parking spaces, especially in the central business districts. Therefore, a Parking survey is necessary to help in the effective management of on-street and off-street parking requirements at necessary places.

### **On-Street Parking**

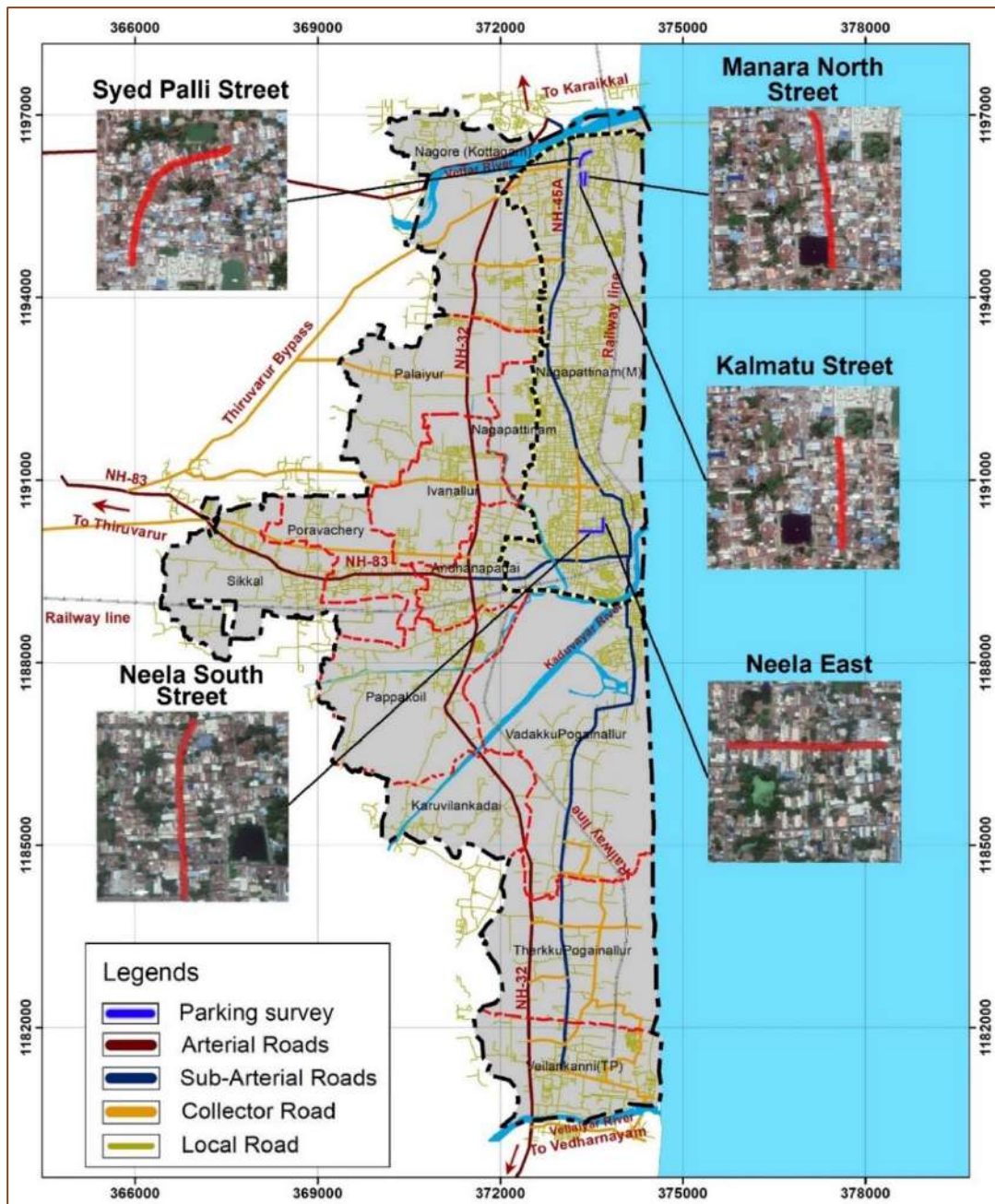
The on-street parking survey is carried out on five roads in the most important commercial and tourist areas in Nagapattinam. The roads selected for the on-street parking survey were Syed Palli Street, Manara North Street, Kalmatu Street, Neela East Street, and Neela South Street (Figure 7.4). The number of vehicles parked within these defined zones is noted at regular predetermined time intervals for 12 hrs. With the help of this data peak parking hours and their accumulation are determined. Table 7.4 reveals that maximum parking is observed in Neela South Street with 4799 vehicles parked from 9.00 am to 8.00 pm. and the least amount of parking is observed in Kalmatu St. among the surveyed locations. However, during festival seasons inadequacy in parking space is observed in Syed Palli Street, Manara North Street, and Kalmatu street. The number of vehicles parked over different times are shown in the figure 7.6.

The table below shows the summary of the on-street parking in the survey locations in Nagapattinam.

**Table 7.4: Summary of on-street parking**

Name of the Road	No. of vehicles parked (12 Hrs)								
	Car	Two-Wheeler	Auto	Cycle	Rickshaw	Tempo	Truck	LGV	Total
Syed Palli Street	143	944	113	72	0	7	1	0	1280
Manara North Street	185	443	58	56	0	0	0	0	742
Kalmatu Street	54	338	49	25	0	0	0	1	467
Neela East Street	255	1733	53	155	26	20	9	4	2255
Neela South Street	80	3891	51	736	25	5	1	10	4799

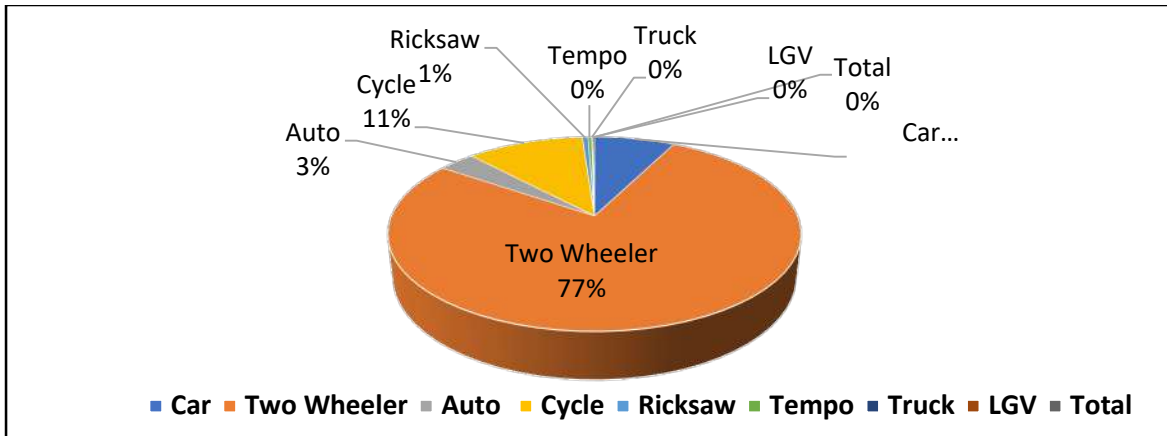
(Source: Primary Survey)



**Figure 7.4: Parking Survey locations in Nagapattinam LPA**

### **Composition of Vehicles**

It is noticed from the figure 7.5, that the two-wheelers shared the majority of total vehicles parked, which constitutes 77 % of total vehicles followed by bicycles. A maximum number of two-wheeler parking is observed at Neela South Street in the central business district. Maximum car parking is observed in Neela East Street and the total car parking constitutes 11 % of the total vehicles. Large Goods Vehicles are largely seen in Neela South Street.



**Figure 7.5: Average Composition of Vehicles parked**

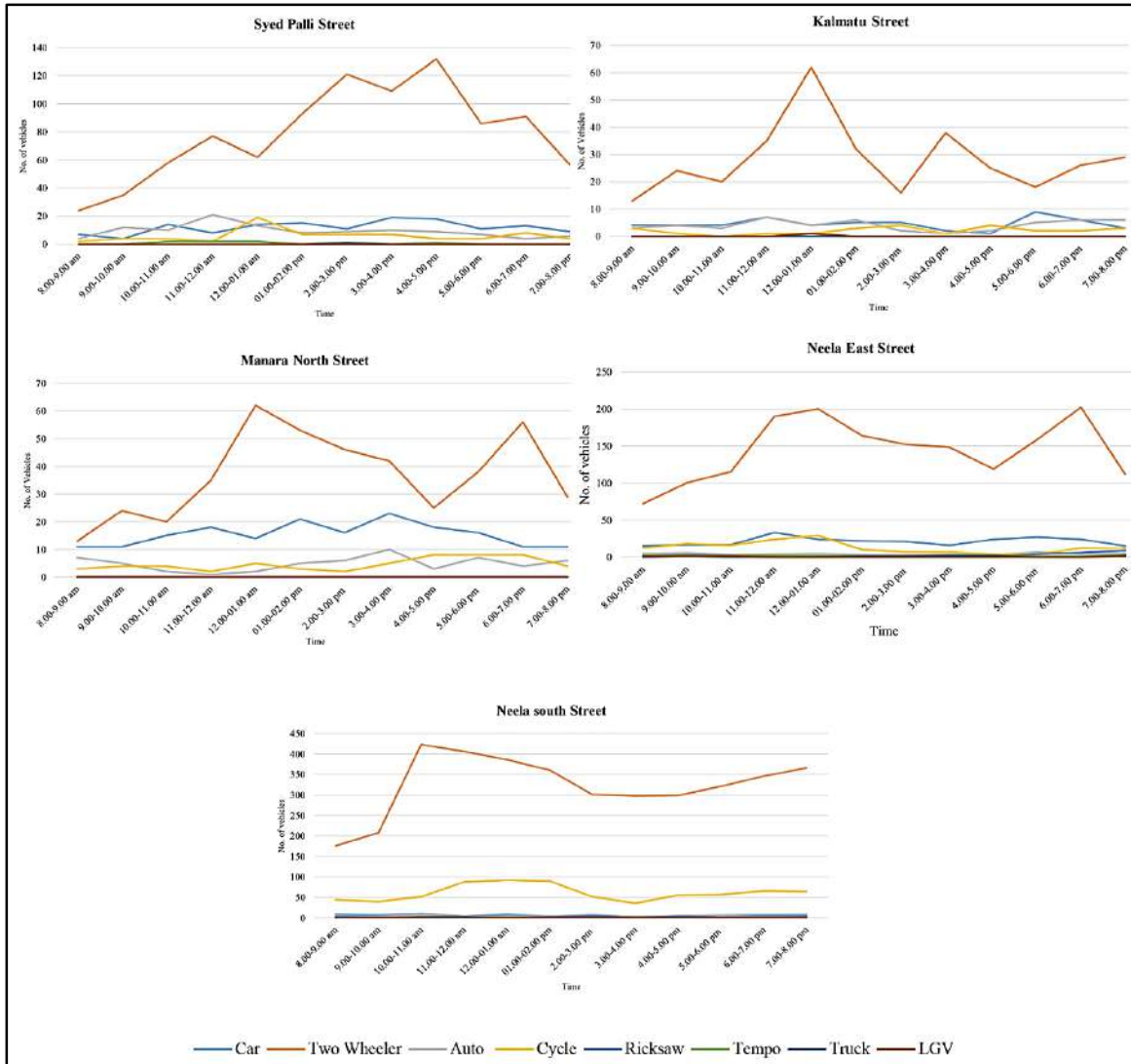
### **Peak Parking Hour**

Average parking accumulation and peak parking accumulation are determined using the Equivalent Car Space (ECS) value recommended by IRC standards for each vehicle. The peak parking hour and its parking accumulation for the surveyed roads are given in Table 7.5. It is observed that Neela South Street has the maximum parking accumulation from 10.00 am to 11.00 am and it is mainly associated with the existence of several banks and other semi-public buildings. Whereas in Neela East Street, the peak parking hour is between 11.00 am to 12.00 pm due to the presence of a large number of commercial buildings. Inadequacy in parking spaces is noticed in most of the survey locations and the provision of the additional parking area will decrease traffic congestion. The table below gives the summary of parking accumulation at the surveyed location.

**Table 7.5: Peak parking Ratio**

S. No.	Name of the Road	Peak Parking Hour	Peak Parking Accumulation	Average Parking Accumulation	Peak Parking Ratio
1	Syed Palli Street	4.00 - 5.00 pm	58	39	1.49
2	Manara North Street	3.00 - 4.00 pm	39	27.5	1.42
3	Kalmatu Street	12.00 - 1.00 pm	24	14	1.71
4	Neela East Street	11.00 - 12.00 pm	90	69	1.3
5	Neela South Street	10.00 - 11.00 am	132	101	1.31

(Source: Primary Survey)



**Figure 7.6: On-street Parking**

## 7.2 Grid of roads

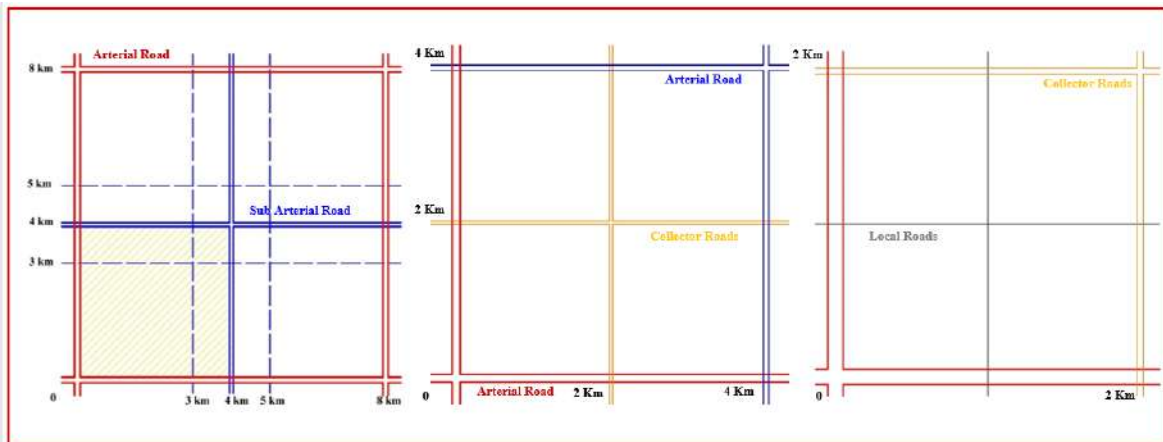
The Grid of Roads is prepared for Nagapattinam LPA to address the problems confronted in the linkage and connectivity of the road network. A well-planned Grid of Roads Network provides better connectivity and access to the major arterial and sub-arterial roads. It strengthens the supply of lower order roads and their effective networking in the hierarchy.

As per the IRC norms, the minimum standard distance to reach the Arterial, Sub arterial and Collector roads are,

- i. Arterial Roads - 4 km
- ii. Sub Arterial Roads - 2 km
- iii. Collector roads - 1 km

The above-mentioned roads are classified following the functions they serve irrespective of the right of way, carriageway, or volume of traffic. Map 7.1 shows the existing road network pattern in Nagapattinam LPA.

The IRC recommends that the arterial roads are spaced at 8km or more in the sparsely developed urban areas and the sub-arterial roads in the similar area spaced between 3 to 5 km. Similarly, the collector roads are spaced between 2 km. This would enable easy access to any arterials within a 4 km distance and sub arterial within a 2 km distance. Figure 7.7 presents the conceptual grid of the road network pattern.



**Figure 7.7: Conceptual Road Network Pattern**

### 7.2.1 Grid of Roads Network Plan

The grid of road network plan is formulated for Nagapattinam LPA to develop a strong hierarchical order of roads which ensures smooth flow of traffic. The proposals are expected to enhance the functioning of the Neighbourhoods through improved accessibility of the inner area. The road development proposals identified as part of this study are the development of new collector roads & widening of the existing collector roads under Local bodies. The new road developments are identified at places where the intensity of developments is less and where it is considered essential in the view of the long-time development perspective. While proposing for the widening of roads, criteria such as abutting land use, length/width of roads, the hierarchy of roads, and traffic flow have been considered to meet the demand for present and future.

The connectivity issues are mostly spotted in Villages like Palaiyur, Ivanalur, Poravacheri, Sikkal, and Papakoil. The absence of proper approach roads to the arterial and sub-arterial roads, and inadequate width of internal roads are the common problems observed at the Neighbourhood level. To provide better accessibility in the planning area, new road linkages are proposed at places where major inadequacies are experienced.

## 7.2.2 ROAD DEVELOPMENT PROPOSALS

There are 11 new collector road development proposals identified as part of the formulation of the grid of road network plan. The proposed new collector roads cover Villages like Palaiyur, Ivanalur, Poravacheri, Sikkal, Nagapattinam, and Papakoil. The total length of the proposed new collector road is 34.64 km. Table 7.6 gives details about the proposed collector roads in Nagapattinam LPA (Map 7.2)

**Table 7.6: Proposed New Collector Roads for Nagapattinam LPA**

S.No.	Road Description	Road Annotation	Proposed Width	Length (m)
1.	Connects NH 32 to Thiruvarur Road	A-A	30 m	7,719
2.	Connects NH 32 to Thiruvarur Road via Sikkal Village	B-B	30 m	6,519
3.	New Road from Thiruvarur Road to Palaiyur village from Poravacheri Village	C-C	30 m	3,531
4.	Connects proposed New road C-C to Nagapattinam Public office Road	D-D	18 m	2,892
5.	Connects proposed new road C-C to NH 32	E-E	18 m	1,742
6.	Road Connecting NH-32 in Nagore Kotagam village	F-F	18 m	847
7.	Road Linking NH-32 and Proposed Road H-H	G-G	18 m	1311
8.	Road Linking NH-32 and Akkaraippettai Poigainallur Road	H-H	30 m	5036
9.	Road connecting NH-32 with Karuvelankadai road	I-I	18 m	2337
10.	Road Connecting NH-32 with Nagore Road	K-K	18 m	1277
11.	Road Connecting NH-32 with Proposed Road H-H	L-L	18 m	1429

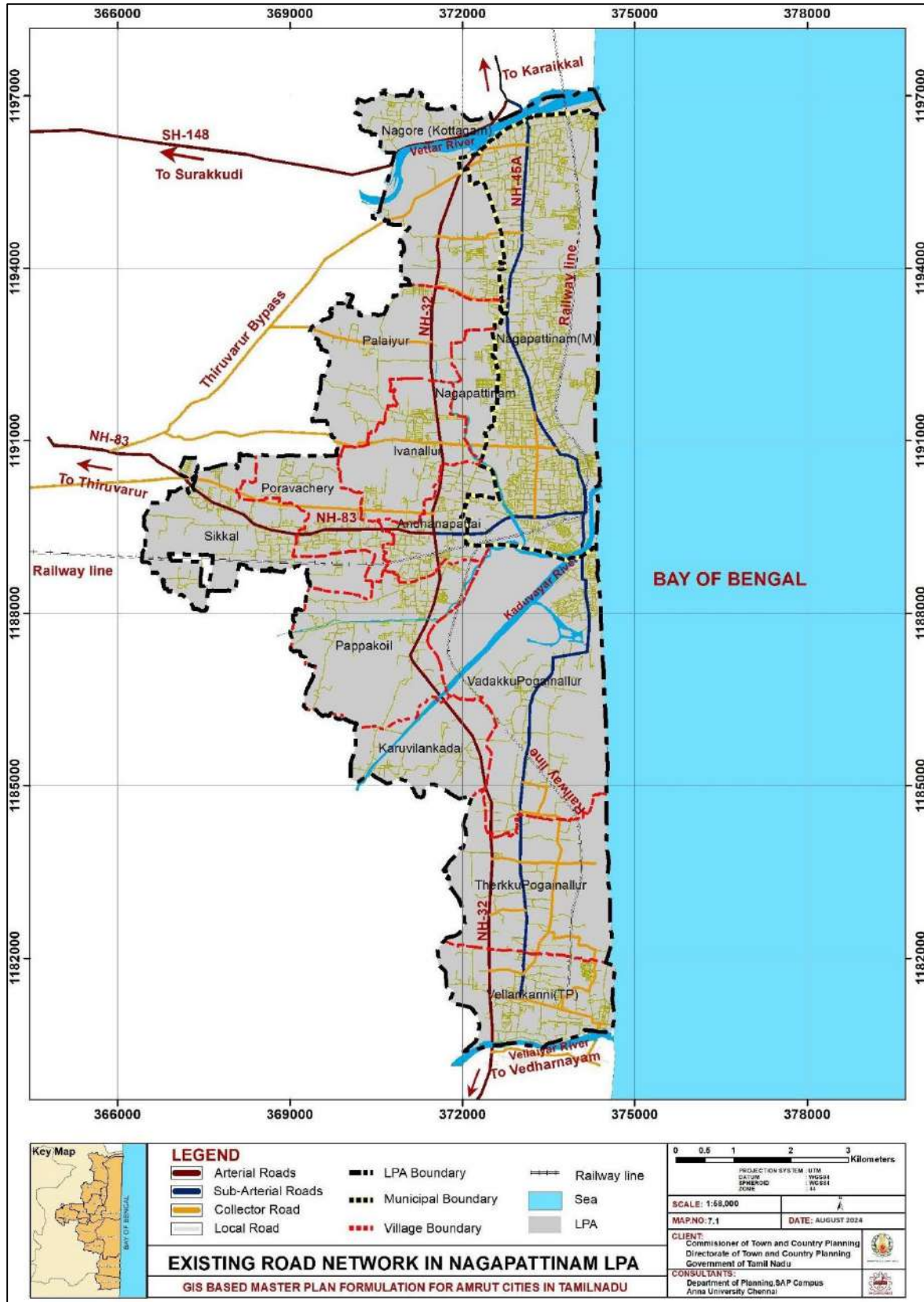
### 7.3 SUMMARY

Transportation is the main element of urban infrastructure and an important factor for economic development for any place. Nagapattinam LPA has a good transportation network and it is well connected to all the nearby important towns. NH 83 and NH 32 are the two major roads that connect Nagapattinam with other cities. The major roads that carry a large volume of traffic to important urban nodes within the planning area are NH 45A and Akkarapettai-Poigainallur road. The Bus stand facilities in Nagapattinam LPA are two within Nagapattinam Municipality, one in Nagore area, and another one in Velankanni Town Panchayat. The rail connectivity in Nagapattinam connects the town to Chennai, Trichy, Karaikal. Nagapattinam Port is an ancient port and one of the 15 minor ports in Tamil Nadu under the control of the Tamil Nadu Maritime Board (TNMB).

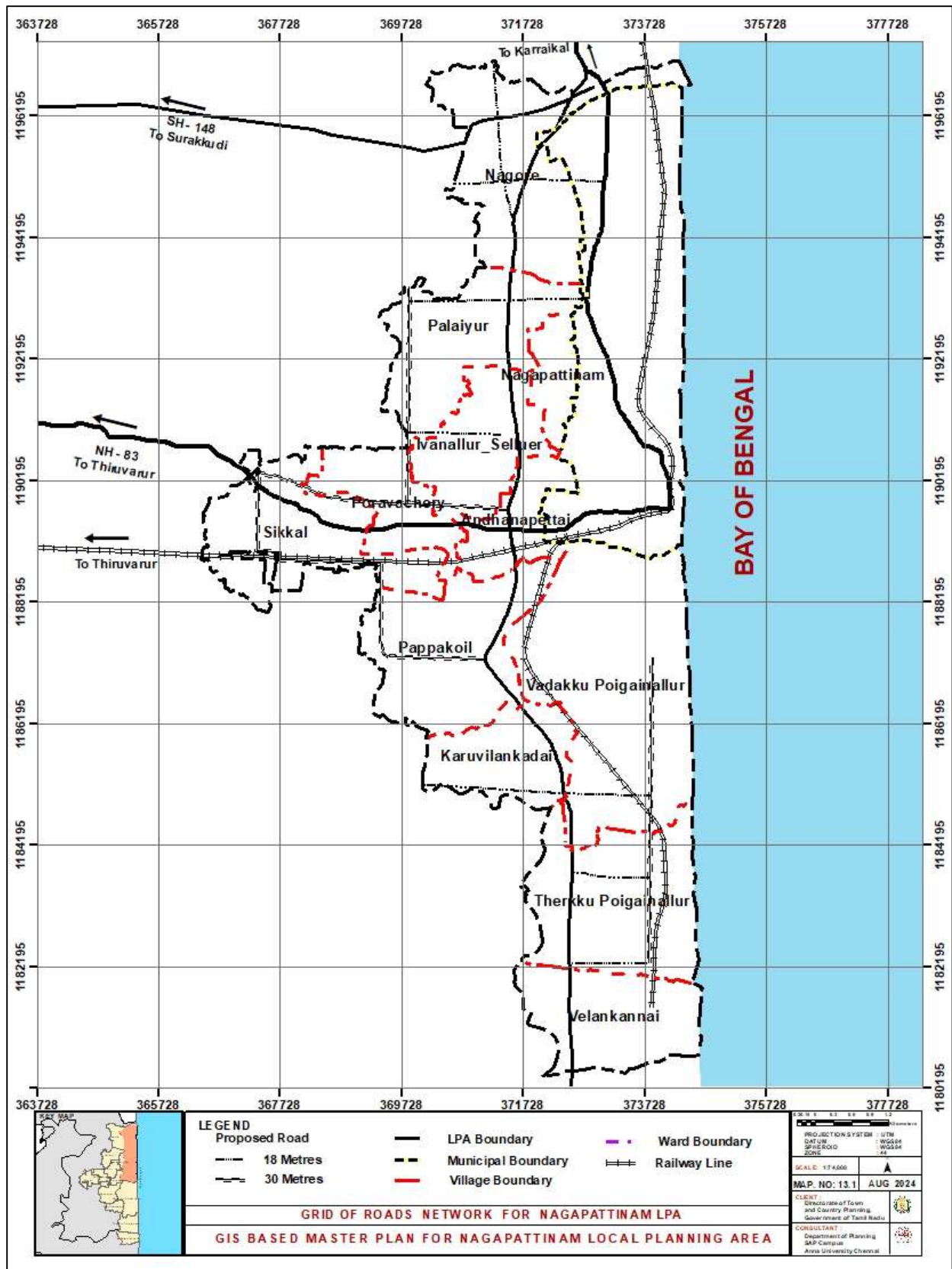
To determine the existing traffic conditions in Nagapattinam LPA, various traffic surveys were conducted. Volume count survey shows that the v/c ratio of all six intersections is below 1.0 indicating that there is no delay or disruption in the traffic flow. Anna Statue Junction which serves as an important linkage between the central business district and other areas has a high concentration of vehicular movement during peak hours. So, a junction improvement proposal will be required at Anna Statue Junction. The moving observer method is conducted on 11 road stretches in Nagapattinam LPA to identify the congested roads. Three stretches are identified as the most congested roads having a journey speed of 8.79 KMPH, 10.11 KMPH, and 12.18 KMPH respectively. A parking survey was conducted for both on-street and off-street parking. The maximum parking is observed in Neela South Street with 4799 vehicles parked from 9.00 am to 8.00 pm it is mainly associated with the existence of several banks and other semi-public buildings. Two-wheelers shared the majority of total vehicles parked, which constitutes 77 % of total vehicles followed by bicycles. Inadequacy in parking spaces is noticed in most of the survey locations and the provision of the additional parking area will decrease traffic congestion.

The connectivity issues are mostly spotted in Villages like Palaiyur, Ivanalur, Poravacheri, Sikkal, and Papakoil. The absence of proper approach roads to the arterial and sub-arterial roads, and inadequate width of internal roads are the common problems observed at the neighbourhood level. The grid of road network plan is formulated for Nagapattinam LPA to develop a strong hierarchical order of roads which ensures smooth flow of traffic. The road development proposals identified as part of this study are the development of new collector roads & widening of the existing collector roads under Local bodies. The proposed new collector roads (34.8 km) cover Villages like Palaiyur, Ivanalur, Poravacheri, Sikkal, Nagapattinam, and Papakoil.





Map 7.1: Existing Road network in Nagapattinam LPA



Map 7.2: Grid of Roads for Nagapattinam LPA

## **8. ENVIRONMENT**

The Environment is important because everything that supports the survival of human beings is dependent on it. The quality of the environment is directly related to the quality of life of the people. Environment plays an important role in spatial planning. Environmental factors need to be taken into account in spatial planning, to ensure safety and adequate conditions of life of the population and to limit the negative impact of economic and other activities on the environment, and to ensure the protection and rational use of natural resources for the benefit of present and future generations. Air and Water Quality, green cover, Agriculture lands, water Bodies, surface temperature, environmentally sensitive areas, and natural hazards should be considered and protected in spatial planning to improve the quality of life and enhance sustainable development.

Nagapattinam is one of the coastal areas in Tamil Nadu. It is bestowed with beaches, lakes and abundant with unique and rare flora and fauna. Nagapattinam is situated in a plain terrain with a gentle slope towards the east and southeast. The town is built on the banks of two rivers namely Vettar and Kaduvaiyar. Nagapattinam LPA has a higher share of agricultural land (42.46% of the total area). Nagapattinam is one of the cyclone-prone zones in Tamil Nadu.

### **8.1 CLIMATE AND RAINFALL**

Nagapattinam has a Tropical Savana climate with a wet season from October to December due to the Northeast monsoon. The town receives an annual rainfall of 1393.3 mm. Proximity to the sea results in high humidity throughout the year, which reaches 70% from August to May. The mean maximum temperature in 2020 is varied in the range of 31°C to 23.7°C. As Nagapattinam is located in the Coastal area the intensity of heat will not be much higher due to frequent breezes. As Nagapattinam is located in the coastal area the rainfall of Nagapattinam is higher than the state level.

### **8.2 ENVIRONMENTAL ASSETS**

Nagapattinam LPA has unique environmental features. On the one hand, it has more agricultural lands and on the other hand, it has 2 rivers, Water Bodies, and a sea.

#### **8.2.1 Green Cover**

The presence of more green spaces will enhance biodiversity and improve the quality of life. one square meter of green space can retain up to 200 grams per year of small contaminating particles that are harmful to health. So, by having more green spaces pollution levels can be reduced. Protecting local green spaces can help to minimize the impacts of urban heat in towns.

The classification of Non-Vegetation, Low Vegetation, and High Vegetation is based on the NDVI Index. NDVI map has been prepared to analyse the vegetation in Nagapattinam LPA which shows that Nagapattinam LPA does not have any dense vegetation/forest. The presence of more agricultural land results in a higher concentration of low vegetation area. Nagapattinam LPA has more green cover which indicates that the quality of the environment is fairly good. These green spaces need to be further protected to maintain an ecological balance.

### **8.2.2 Agriculture**

As per the existing land use survey, the share of agricultural land is about 46.85% (37.52 Sq.km) of the total LPA area. Agriculture and fishing are the major means of livelihood for the people of Nagapattinam. As Nagapattinam falls under the “protected agricultural zone” declared by Tamil Nadu Government in 2020, the agricultural lands need to be protected. To ensure food security and enhance the source of livelihood, conversion of agricultural land for urban development need to be prevented. Protecting agricultural lands will create an ecological balance and enhance the quality of life (Map 8.1).

### **8.2.3 Water Bodies**

The total area of water bodies which includes lakes, rivers, and streams constitute 7.86 Sq. km. which is 9.82 % of the total planning area. Nagapattinam LPA has 2 rivers running into the planning area. Vettar River acts as a major source of drinking water for Nagapattinam Municipality. Water bodies help in improving biodiversity, prevent waterlogging and improve the microclimate. As Nagapattinam is blessed with an abundance of green spaces and water bodies they can be protected through development regulations and enhance the quality of the environment.

As Nagapattinam LPA is rich in green cover (open space and agriculture land) the land surface temperature is comparatively less. The maximum surface Temperature in April is about 31°C which shows that the town has a very moderate temperature with a greener cover.

## **8.3 TOPOGRAPHY & CONTOURS**

Nagapattinam LPA lies between 10°49'32.22"N and 79°46'46.02"E. The entire Nagapattinam LPA is a plain terrain with a slope of less than 1.3°. The topographical slope is towards the east and southeast. The elevation of Nagapattinam LPA varies between -2 to 10m. The highest point is at Nagore bus stand of 10m elevation and the lowest point is at Keechankuppam fishing harbour of -2m elevation. The topology of Nagapattinam is flat. Gentle slopes with low lying area constitutes harbour area and riverside. There are 2 rivers namely Vettar and Kaduvaiyar running in the north and south parts of the planning area.

Digital Elevation Model (DEM) map and Slope map of the planning area have been generated to study topography. One of the critical factors that led to massive devastation in the area of Nagapattinam during Tsunami 2004 is the topography of the area. Nagapattinam LPA has a very gentle slope of less than 1.3°. Gentle slope in Nagapattinam has both merits and demerits, the merit is as the slope is very gentle it will be highly suitable for residential development. But as it is located in the coastal area, the gentle slope will result in more damage during flooding due to Tsunami and cyclones. The DEM and the slope map are utilized while proposing and planning infrastructures such as road and drainage system and for delineation of low-lying areas and hazard-prone areas which needs to be prevented from developments.

## 8.4 ENVIRONMENTAL DEGRADATION

### 8.4.1 Air Pollution

The major cause of air pollution is Vehicular and industrial emission. As there are very few industries and Vehicular emissions the air quality of Nagapattinam LPA is very good and free from pollution. The concentrations of ambient parameters in the Nagapattinam LPA were well below the permissible CPCB standards which indicate that the entire area has access to clean air. Ambient air quality within the LPA is within the permissible level (Table 8.1).

**Table 8.1: Air Quality Index of Nagapattinam LPA**

S. No.	Pollutant	National ambient air quality standards for Good AQI (in µg/m <sup>3</sup> )	AQI in Nagapattinam (inµg/m <sup>3</sup> )
1	NO <sub>2</sub>	0-40	12
2	O <sub>3</sub>	0-50	30
3	PM <sub>2.5</sub>	0-30	23
4	SO <sub>2</sub>	0-40	18
5	PM <sub>10</sub>	0-50	42

(Source: [www.accuweather.com](http://www.accuweather.com))

### 8.4.2 Noise Pollution

As per EA Report for UG Electric Cable Works in Nagapattinam Municipality, in the roadside and market area activities, expected noise level at the day time and night time could be as high as 70 and 50 dB (A) in the busy road corridors and market centres which is within the desirable limit as per the Noise Pollution (Regulation and Control) Rules, 2000. Though Noise pollution is not a major problem in Nagapattinam, buffer areas can be created on both sides of the roads in the form of commercial activities to prevent residential areas from noise pollution.

## 8.5 COASTAL REGULATION ZONE

Under the Environment Protection Act, 1986 a notification was issued in February 1991, for the regulation of activities in the coastal area by the Ministry of Environment and forests (MoEF). As per the notification, the coastal land up to 500m from the High Tide Line (HTL) and a distance of 100m along banks of creeks, estuaries, backwater, and rivers subject to tidal fluctuations, is called the Coastal Regulation Zone (CRZ).

### 8.5.1 Distribution of Coastal Regulation Zone in Nagapattinam LPA

Nagapattinam municipal area and Velankanni Town fall under CRZ II. Villages in the LPA fall under CRZ III. The total extent of CRZ in Nagapattinam LPA is about 17.51 Sq.km which is about 21.87% of the total LPA area (Map 8.2 & 8.3). The different coastal regulation zone classes of the Nagapattinam coast and their areal extent are presented in Table.8.2.

**Table 8.2: CRZ classification of Nagapattinam LPA**

Category	Area
CRZ-I	5.04 Sq.km
CRZ-II	4.58 Sq.km
CRZ-III	4.97 Sq.km
CRZ-IV	2.92 Sq.km

*(Source:Coastal Zone Management Plan-TamilNadu,2018)*

As per CRZ notification 2011, the regulations need to incorporate CRZ areas in the preparation of the proposed land use map. Developments need to be restricted and regulated as per the notification to protect and preserve the coastal areas.

## 8.6 HAZARDS AFFECTING NAGAPATTINAM

Nagapattinam owing to its location is severely affected by Tsunami and Cyclones. The major hazards affecting Nagapattinam LPA are discussed below.

### 8.6.1 GAJA Cyclone-2018

As Nagapattinam is located in the coastal area it is highly prone to Natural hazards. The cyclone Gaja affected districts of Nagapattinam, Thanjavur, Thiruvarur, Pudukottai, Karaikal, Cuddalore, Trichy and Ramanathapuram. Coastal population were reported to be one among the worst affected due to Gaja cyclone. The relief centres functioning during cyclones in Nagapattinam district is furnished in the Table 8.3. The Villages which are severely affected during Gaja Cyclone are as follows,

- Nagapattinam Town

- Papakoil
- TherkuPoigainallur
- North Poigainallur
- Velankanni

**Table 8.3: GAJA Cyclone relief Centres in Nagapattinam District**

Description	No. of Relief Centres identified other than Multi-Purpose Evacuation Shelters (MPES) constructed under CDRRP				No. of Multi-Purpose Evacuation Shelters (MPES)
	Schools	Colleges	Community halls	Other buildings	
Nagapattinam District	283	21	177	21	9

(Source: Study Report on GAJA Cyclone)

### 8.6.2 Tsunami-2004

The earthquake epicentre off the coast of Sumatra Island of Indonesia on 26th December 2004 in the Indian Ocean triggered a series of devastating tsunami waves. Nagapattinam, on the east coast of India, was severely affected during the tsunami. About 19.4 sq. km of the total LPA area had been inundated. The tsunami caused heavy damage to life and property, and the death toll was about 3,378 in Nagapattinam. Nagapattinam beach, which is a tourist spot, was destroyed and about 30 people lost their lives. Nagapattinam port also got worse affected. The extent of inundation during Tsunami 2004 are furnished in the Table 8.4.

**Table 8.4: Extent of inundation during Tsunami 2004**

Name of the Place	Inundation distance (m)	Run up height (m)
Nagapattinam Town	1460	3.7
Nagore	976	3.6
Nambiyar Nagar	772	3.8
Akkarapettai	2822	8.0
VadakuPoigainallur	880	-
TherkkuPoigainallur	804	5.7
Velankanni	853	4.5

(Source: Science of Tsunami Hazards Report)

Nagapattinam was the worst hit, accounting for about 76% of the deaths in the State, besides heavy loss of cattle, houses and property. Large numbers of livestock - cows, buffaloes, sheep, goats, and poultry – were also killed, resulting in huge economic loss (Table 8.5).

**Table 8.5: Damages due to Tsunami 2004 in Nagapattinam district**

<b>S. No</b>	<b>Damages caused by Tsunami 2004</b>	<b>No's</b>
1	No. of Coastal Villages affected	38
2	Human Loss	6065
3	Cattle loss	12821
4	Houses fully damaged	17461

*(Source: Science of Tsunami Hazards Report)*

Geomorphic features such as sand dunes and spits act as shields and assimilate the energy of the tsunami waves, thereby protecting the areas just behind them. Therkku and Vadakku Poigainallur Villages have long sand dunes all across their shores and hence were well protected from the onslaught of the tsunami waves. Akkarapettai was badly affected with inundation up to a distance of 3 km mainly due to the flat topography.

### **8.7 VULNERABLE AREAS**

As per the Nagapattinam district disaster management report, Vulnerable areas has been identified based on the risk assessment. The vulnerable areas have been classified into 4 categories such as-

- Highly Vulnerable areas
- Medium Vulnerable areas
- Low Vulnerable areas

Ivanalur and Anthanapettai Villages are identified as highly Vulnerable area within the LPA and Villages such as Sikkal, Papakoil comes under medium Vulnerable areas (Table 8.6). The other Villages and municipal area constitute low vulnerability areas.



**Table 8.6: Vulnerable Area in Nagapattinam LPA**

S. No	Highly Vulnerable areas	Medium Vulnerable	Less Vulnerable areas
1	Ivanalur	Sikkal	Nagapattinam Village
2	Anthanapettai	Papakoil	Nagore
3	-	-	Poravachery
4	-	-	Nagore (Kottagam)
5	-	-	Palaiyur
6	-	-	Vadaku Poigainallur
7	-	-	Karuvelankadai
8	-	-	TherkuPoigainallur

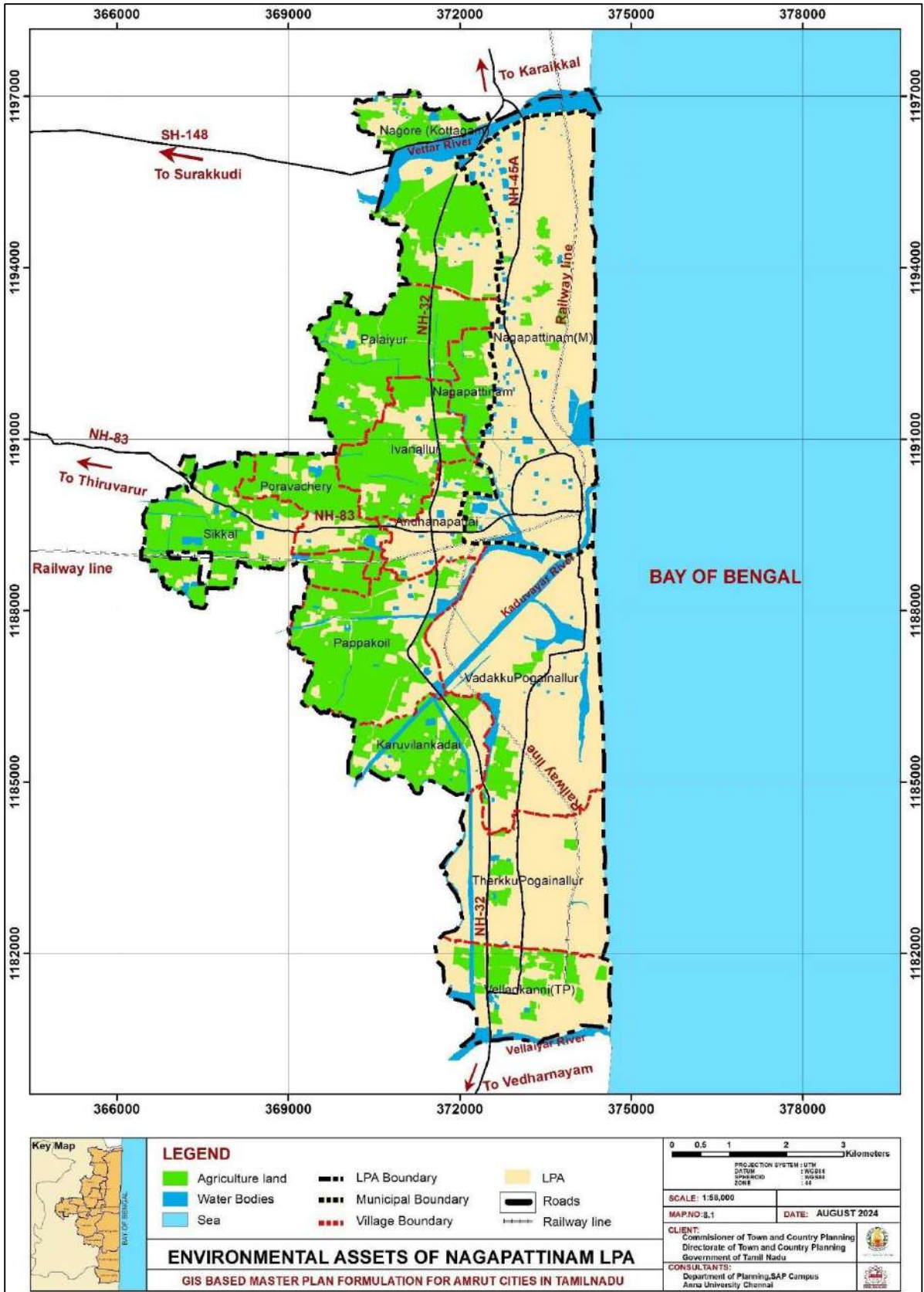
*(Source: Nagapattinam District Website)*

## **8.8 SUMMARY**

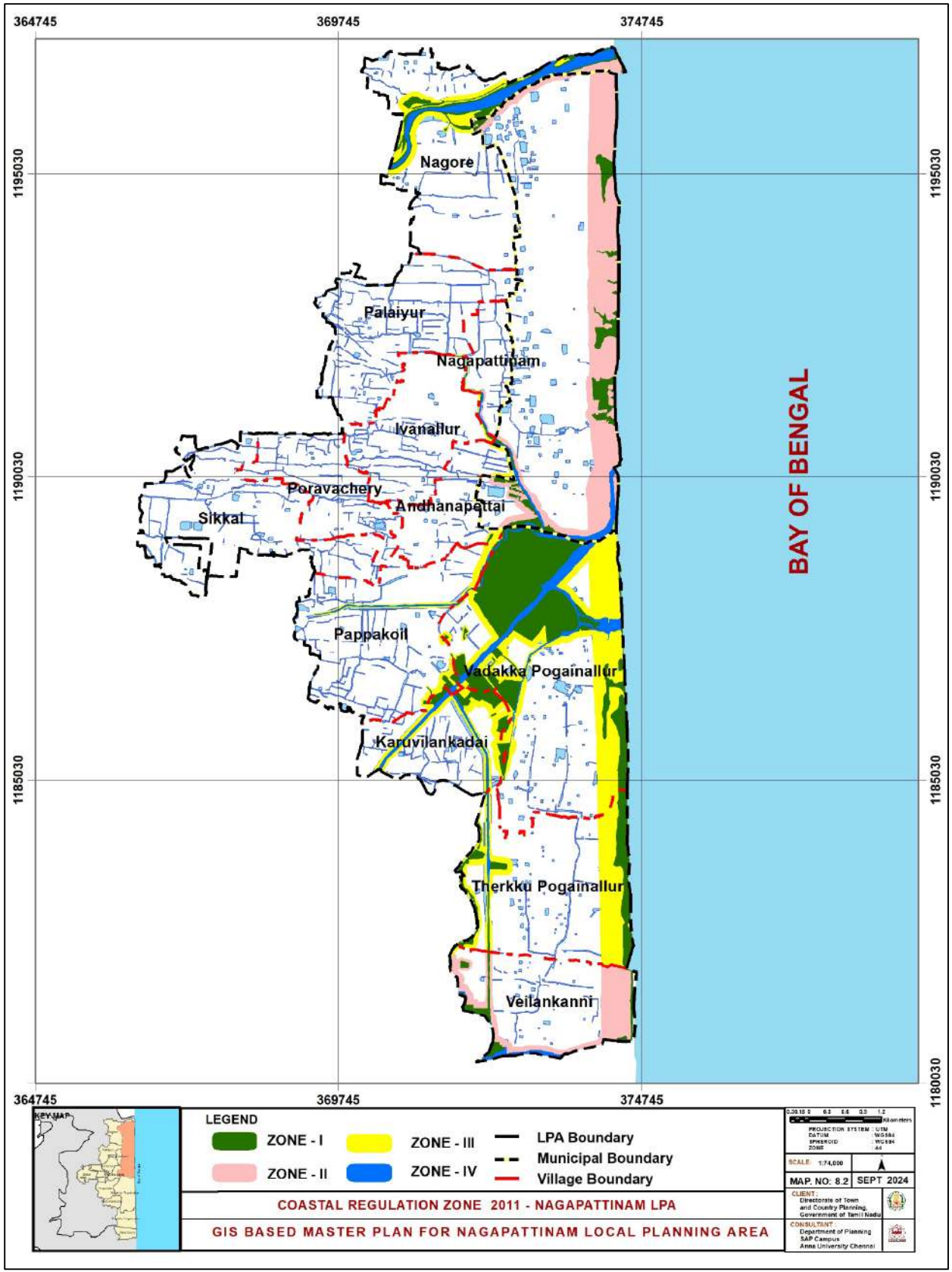
The quality of the environment is directly related to the quality of life of the people. Therefore, environment plays an important role in spatial planning. As Nagapattinam is one of the coastal areas in Tamil Nadu, it is bestowed with beaches. Nagapattinam is situated in a plain terrain with a gentle slope towards the east and southeast. The town is built on the banks of two rivers namely Vettar and Kaduvaiyar. Nagapattinam has a Tropical Savana climate. The elevation of Nagapattinam LPA varies between -2 to 10m. While preparing land-use plan, developments need to be restricted in low lying areas.

As per the existing land use survey, the share of agricultural land is about 42.46% (34.03 Sq.km) of the total LPA area. In 2020, Tamil Nadu government has declared Nagapattinam under a protected Agricultural Zone. To ensure food security and enhance the source of livelihood, conversion of agricultural land for urban development need to be prevented.

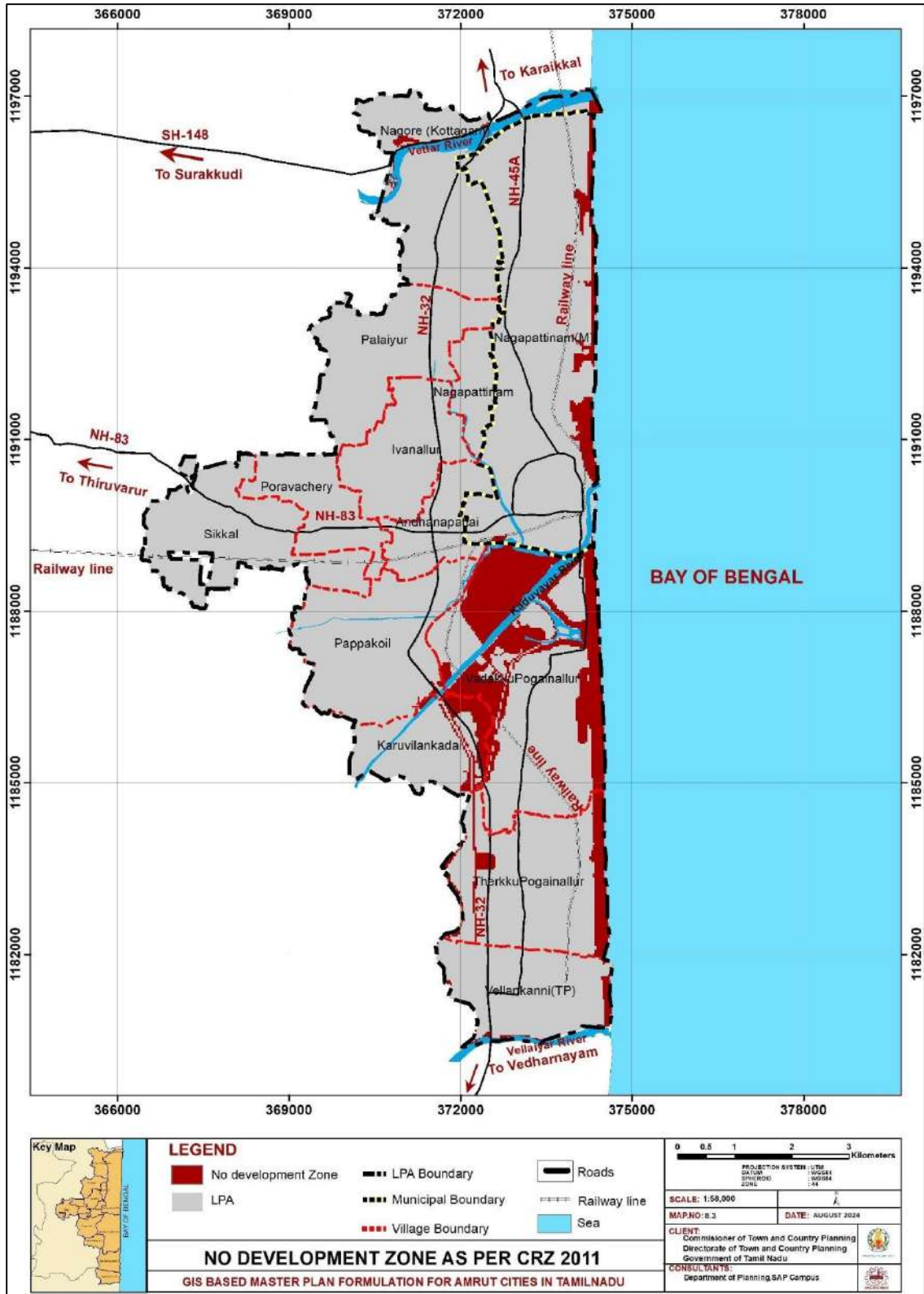
The total extent of CRZ in Nagapattinam LPA is about 14.2 Sq.km which is about 17.7% of the total LPA area. Naturally, Nagapattinam has dunes that are created to act as a barrier and protect the development from Coastal flooding. Dune stretches are missing in many places due to the human activities which results in severe flood events in Nagapattinam. As per the Nagapattinam district disaster management report, Ivanalur and Anthanapettai Villages are identified as highly vulnerable areas within the LPA. Proposals such as cyclone shelters need to be provided to protect people in highly vulnerable areas during natural disasters.



Map 8.1: Environmental Assets of Nagapattinam LPA



Map 8.2: Coastal Regulation Zone 2011-Nagapattinam LPA



Map 8.3: No Development Zone as per CRZ 2011

## 9. TOURISM

The tourism industry is one of the important industries in India which provides direct and indirect employment opportunities to the people. Tourism contributes 7% to the national GDP and it is also a major contributor to the state GDP. It is estimated that in 2028 tourism industry will contribute up to 9.9% to the national GDP. It acts as an important tool for employment generation, poverty alleviation, and sustainable human development. The economic multiplier effect is induced by the tourism sector through which other industries such as transportation, telecommunication, hotels, and allied industries are stimulated. Nagapattinam is a tourism hub that has numerous sites with cultural and heritage significance. One of the ways to improve the economy in Nagapattinam LPA is to foster the Tourism Industry. Therefore, tourism has to be promoted in the Master Plan to improve the economy and the livelihood of the people.

### 9.1 PLACES OF INTEREST AND TOURIST ARRIVALS

Nagapattinam is renowned for its rich cultural and built heritage sites dating back from the Chola dynasty to the British period. It has many historic places like Nagore, Velankanni, Sikkal, Kodyakkarai, Mannargudi. The city attracts many pilgrims since numerous temples like Kayarohanaswami Temple, Neelayadakshi Temple, Nellukkadai Mariamman Temple, Soundararaja Perumal Temple, etc., are located here (Map 9.1). Besides the temple, it also houses the ancient Nagore Dargah and the famous church, The Basilica of Our Lady of Good Health at Velankanni (Figure 9.1). Therefore, it is apparent that tourism is a major economic driver in Nagapattinam LPA. Nagapattinam is also a place of religious harmony because it exemplifies the unity of three major religions Hinduism, Islam, and Christianity playing a significant role in the lives of the people. The important tourist centres in Nagapattinam LPA are situated in Nagapattinam Municipality, Nagore, Velankanni, and Sikkal. The important tourist destination in Nagapattinam LPA is listed in Table 9.1.



**Figure 9.1: Places of Interest in Nagapattinam LPA**

### **9.1.1 Nagapattinam Municipality**

Nagapattinam is a famous pilgrimage and tourist centre. It is an ideal place that attracts many pilgrims and that too from different kinds of backgrounds. Numerous historic temples, museums, towering lighthouse, and a beautiful beach are located here. Some of the most popular temples are Kayarohanaswami Temple, Soundararaja Perumal Temple, and Nellukkadai Mariamman Temple.

#### ***Kayarohanaswami Temple***

Kayarohanaswami Temple has been in existence since 6th AD and was built by the Lakolisa cult. The temple was rebuilt by Pallavas and Cholas. This temple was praised by Tamil Saints (Nayanmars) Appar, Sambandar, and Sudarar in their Thevaram Hymns. Kayarohanaswami temple is one of the seven temples called SapthaVidangam of the Thyagaraja Cult. Kayarohanaswami temple has festivals throughout the year.

#### ***Soundararaja Perumal Temple***

Soundararaja Perumal temple is one of the 108 Divya Desam for Lord Vishnu. The temple was built by Cholas in the 8th Century AD and later Nayaks built the seven-tier temple tower (90feet). This tower acted as a lighthouse during the period of Thanjavur Nayak's trade through Nagapattinam Port. The temple is constructed in the Dravidian style of architecture. Tamil saint Thirumangai Alvar visited this temple and praised the lord Vishnu by his poem. Soundararaja Perumal temple has festivals throughout the year.

#### ***Nellukkadai Mariamman Temple***

Nellukkadai Temple was constructed from the late 19th century to the early 20th century. The temple was built by a rice trader and the devotees believe that the goddess here has mystical powers.

#### ***Nagapattinam New Beach***

Nagapattinam beach lies on the shore of the Bay of Bengal. Nagapattinam beach is only known to seasonal and local tourists. This is the best spot for enjoying the beauty of the Sun Sea and sand. Beach is the major entertainment centre for Nagapattinam town people.

#### ***Museum***

The museum displays collections of wood carving and metal sculptures. The Museum showcases the Poompohar excavation photos, leather puppets, and musical instruments. Museum attracts minimal tourists compared to other tourist spots of Nagapattinam.

### ***Syed Shahul Hameed Dargah, Nagore***

The Dargah located in Nagore is famous among the Muslim pilgrims and it is visited by them frequently. This place is considered as 'Holy Land of Muslims'. Not only the Muslims but also Hindus, Christians & Jains visit this sacred place throughout the year to offer their prayers and get the blessings of the saint. The Nagore Dargah is also known as Syed Shahul Hameed Dargah. Syed Shahul Hameed Dargah is built over the tomb of the Sufi saint Shahul Hameed who lived from 1490 to 1579 A.D. It is also known for its religious harmony. The Dargah was built on land donated by King Achuthappa Nayak who is a Hindu King. The dargah has five minarets in different heights and the tallest one is 131 feet high. The tallest minarets were built by the Marthia King Maharaja Pratap Singh in the eighteenth century.

Commemoration of the anniversary of saint death is celebrated as Kandhuri. The Kandhuri festival is a 14 days' event celebrated in Nagore Dargah attracts lakhs of pilgrims of both religions of the state and other countries like Sri Lanka, Singapore, Malaysia, Burma, and Gulf Countries. This festival also expresses the mixed-faith of Muslims and Hindus. Thousands of people visit the dargah on Thursday to attend the worship and make offerings.

### ***Nagore Beach***

Nagore beach lies on the shore of the Bay of Bengal and it is a 5-minute walk from Nagore dargah. Nagore beach attracts tourists from visitors of Nagore Dargah. Nagore Beach is the best entertainment spot for tourists. It gets crowded at the time of the Kandhuri festival and every Thursday.

### **9.1.2 Velankanni**

Velankanni is located 12kms from Nagapattinam Municipality. Velankanni is known as the Lourdes of the East and it is the top holy place for Christians in India. Recognizing the significance of the place, the Pope of Vatican City has declared Velankanni as a 'Holy City'. The most renowned site to visit here is the well-known Basilica of Our Lady of Good Health. The people of other faiths also visit this church to offer their prayers. Other places of interest are Velankanni Beach, Mary Book Depot, Velankanni Museum of offerings, Naduthittu Church, Holy Path, Lady's Tank Church, Fountain of Revelation, and St Sebastian Church.

### ***The Basilica of Our Lady of Good Health***

The Basilica of Our Lady of Good Health shrine was started in the mid-sixteenth century and became a parish church in 1771. The Basilica was built in the European style of gothic architecture. In 1962, the Basilica of Our Lady of Good Health was granted a special status of a

Minor Basilica by Pope John XXIII. Later, the Basilica church was merged with the Basilica of St. Mary Major in Rome on 3 November 1962 by Pope John XXIII.

The Basilica of Our Lady of Health witnesses a huge footfall of tourists mostly attracted by creed and devotion. The Major season for pilgrimages is August and September and December to January. In the annual feast season (August to September) average tourist footfall is 2 lakhs per day. In the Christmas and New Year season (December to January) average tourist's footfall is 60000 per day. On weekends average tourist's footfall is 25000 per day.

### ***Velankanni Beach***

Velankanni beach is 500meters from Basilica Our Lady of Health. The way leading to the beach consists of many shopping centres for the pilgrims. The tourists visiting the church, definitely pay a visit to the beach. The beach has recreational activities but is mostly crowded with pilgrims.

### **9.1.3 Sikkal**

The most popular Singaravelavar temple dedicated to Lord Murugan is located in Sikkal which is at a distance of 5 km from Nagapattinam Municipality. The famous Soora Samharam festival associated with Lord Murugan is celebrated every year and during this time a large crowd is gathered here.

### ***Singaravelavar Temple***

Singaravelavar temple was constructed by Kochchenganan Cholan in the earlier period of the Chola dynasty. This temple is as popular as Arupadaiveedu for Lord Murugan. This temple was mentioned in their hymns by great poets Appar, Thirugnanasambandar, Sudaras, and Manickavasagar. The Most Important festival of the temple is Sashti in October and November. Sashti pulls a major crowd of people in and around the Nagapattinam district.

**Table 9.1: Tourist Destination in Nagapattinam LPA**

<b>S. No.</b>	<b>Tourist Attraction</b>	<b>Type (Natural, adventure, pilgrimage, heritage etc.,)</b>	<b>Season</b>
1	Basilica of Our Lady of Good Health, Velankanni	Pilgrimage	August to September and
2	Nagore Dargah, Nagore	Pilgrimage	February to May
3	Kayarohanaswami Temple, Nagapattinam	Pilgrimage	All the year
4	Nellukkadai Mariamman Temple, Nagapattinam	Pilgrimage	All the year



S. No.	Tourist Attraction	Type (Natural, adventure, pilgrimage, heritage etc.,)	Season
5	Soundararaja Perumal Temple, Nagapattinam	Pilgrimage	All the year
6	Singaravelavar Temple, Sikkal	Pilgrimage	All the year
7	Nagapattinam New Beach, Nagapattinam	Leisure	All the year
8	Nagore Beach, Nagore	Leisure	All the year
9	Velankanni Beach, Velankanni	Leisure	All the year
10	Museum, Nagapattinam	Cultural	All the year

### ***Tourist footfall***

Among the above-mentioned places, Velankanni and Nagore are the major attractions for tourists in Nagapattinam LPA. Other tourist spots are majorly attracted by local tourists and some of the seasonal tourists only. According to the department of tourism, Velankanni and Nagore attract tourists throughout the year. However, Velankanni attracts a huge crowd mostly during the annual feast and Nagore attracts a huge crowd during the Kandhuri festival.

**Table 9.2: Year-wise tourist footfall of Velankanni and Nagore**

Tourist Place	Year	Domestic	foreign	Total
<b>Velankanni</b>	2006	5,50,432	7185	5,57,617
	2007	6,79,117	9565	6,88,682
	2008	9,60,000	10815	9,70,815
	2009	12,68,973	9164	12,78,137
	2010	21,81,314	10231	21,91,545
	2011	30,30,519	64141	30,94,660
	2012	40,58,824	67848	41,26,672
	2013	58,98,353	77338	59,75,691
	2014	74,35,350	69825	75,05,175
	2015	69,06,293	61883	69,68,176
2017	64,55,329	58555	65,13,884	
<b>Nagore</b>	2006	4,30,912	1598	4,32,510
	2007	3,40,124	4214	3,44,338
	2008	5,58,289	5617	5,63,906
	2009	10,18,811	3389	10,22,200
	2010	24,80,365	9776	24,90,141
	2011	27,69,317	12825	27,82,142
	2012	36,90,610	15900	37,06,510
	2013	49,48,828	18113	49,66,941
	2014	58,67,411	17885	58,85,296
	2015	50,02,413	16218	50,18,631
2017	47,76,174	8317	47,84,491	

(Source: District Diagnostic Study Nagapattinam)

It is observed from Table 9.2 that the tourists' arrival in Velankanni and Nagore from the year 2015 has decreased. In the year 2017, around 65 lakh and 47 lakh tourists have visited Velankanni and Nagore respectively. Therefore, the total tourist population in Nagapattinam LPA during the year 2017 is approximately around 1.12 crore. The tourist population growth trend in Nagore and Velankanni are shown in Figure 9.2.

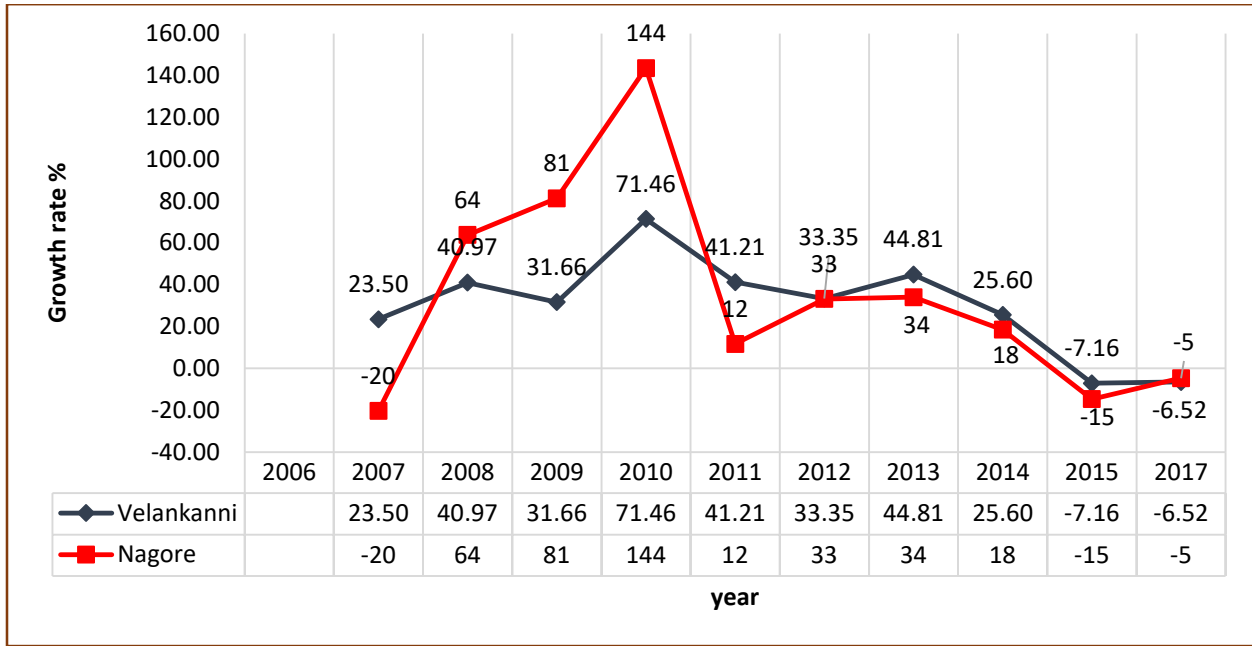


Figure 9.2: Tourist Growth trend in Velankanni & Nagore

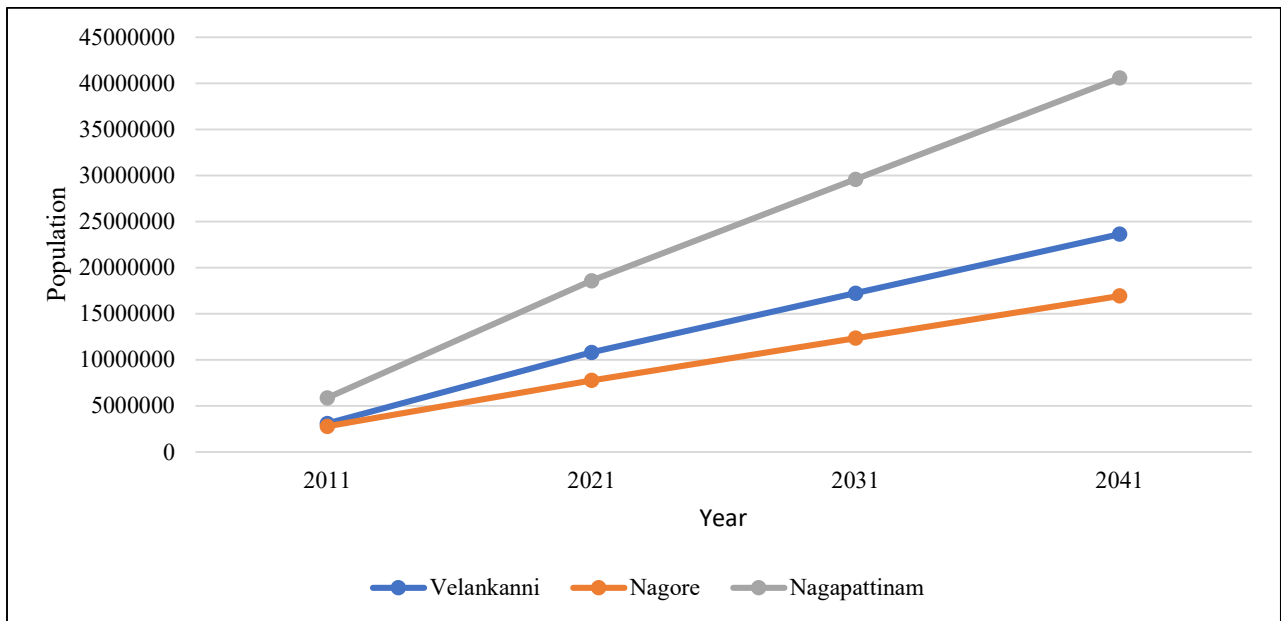
## 9.2 PROJECTED TOURIST POPULATION AND INFRASTRUCTURE REQUIREMENT

### 9.2.1 Projected tourist population

The annual tourist population projection is carried out for Velankanni and Nagore using arithmetic increase method. The projected tourist population of Velankanni & Nagore for the year 2041 is estimated as 2.3 Crore and 1.6 Crore respectively. And the total projected tourist population of Nagapattinam LPA for 2041 will be around 4 Crore. Table 9.3 and Figure 9.3 gives the projected domestic & foreign tourist population for Nagapattinam LPA.

**Table 9.3: Tourist Population Projection for Nagapattinam LPA**

Year	Velankanni		Nagore		Total Domestic	Total foreign	Nagapattinam LPA
	Domestic	foreign	Domestic	foreign			
2011	30,30,519	64,141	27,69,317	12,825	57,99,836	76,966	58,76,802
2021	1,07,19,809	94,701	77,45,313	24,990	1,84,65,122	1,19,691	1,85,84,813
2031	1,70,75,670	1,49,399	1,23,16,814	39,610	2,93,92,484	1,89,009	2,95,81,493
2041	2,34,31,531	2,04,097	1,68,88,315	54,230	4,03,19,846	2,58,327	4,05,78,173



**Figure 9.3: Tourist Population projection for Nagapattinam LPA**

### 9.2.2 Infrastructure requirement

According to the survey conducted by NSSO on Domestic Tourism in India, 21% of households reported at least one overnight stay with the leading purpose of business, social, religious & pilgrimage, education & training, and other activities. Based on these statistics the demand for accommodation facilities for the projected tourist population has been estimated.

**Table 9.4: Projected Tourist Infrastructure Requirement**

<b>Description</b>	<b>Existing Tourist Population Stay per day</b>	<b>Existing No. of Beds</b>	<b>Projected Tourist Population Stay per day (2041)</b>	<b>Additional Beds Required</b>	<b>Area Required</b>
Velankanni	630	14950	2500	Nil	Nil
Nagore	210	200 & Home stay	850	600 Beds	0.2 Ha

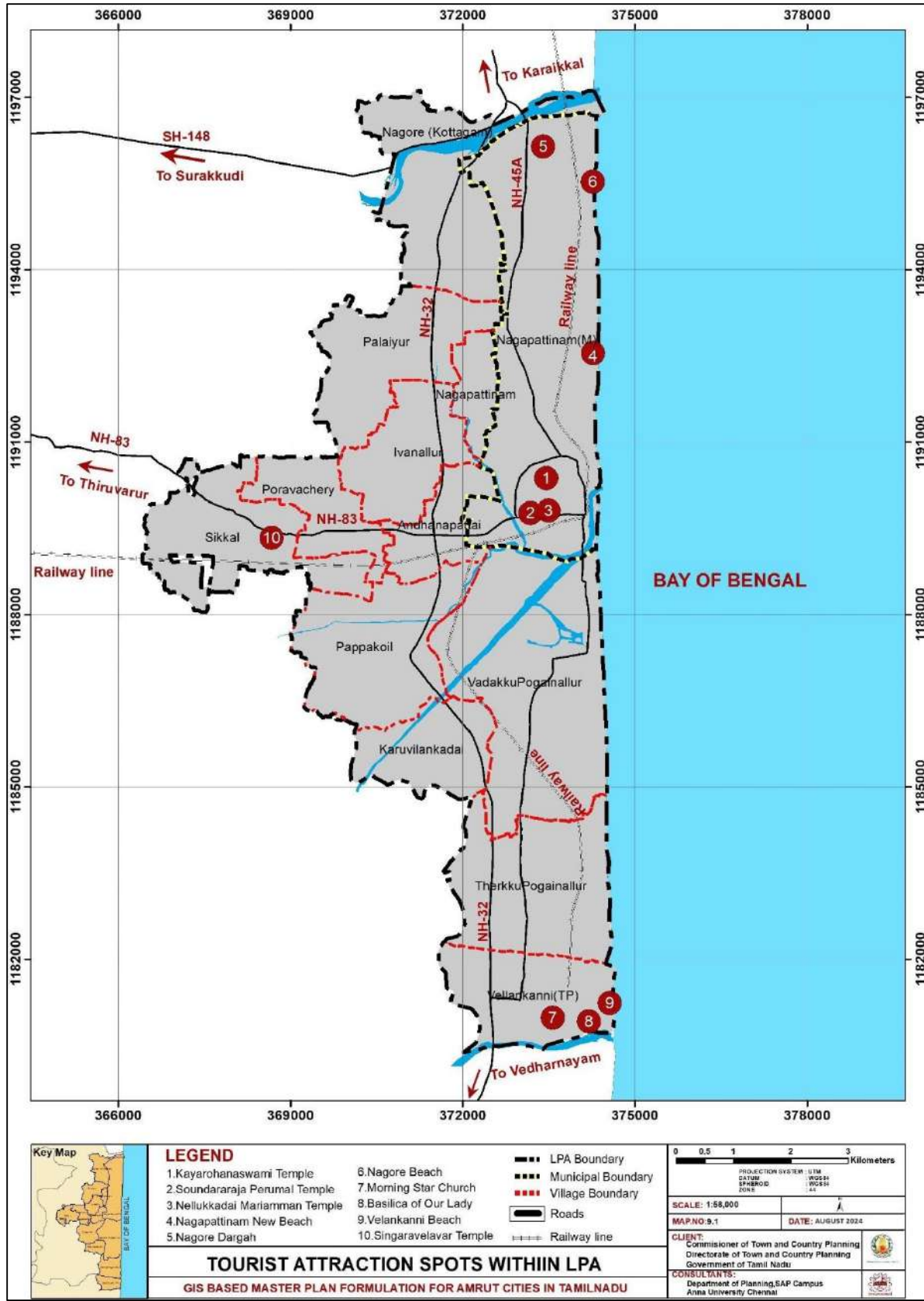
Gap analysis identified that an additional supply of 600 beds will be required to accommodate the tourist population at Nagore in the year 2041 (Table 9.4). And the land area required to provide additional accommodation facilities for the tourists will be around 0.2 ha. Like Velankanni, dormitory kind of accommodation facilities can also be provided at Nagore to enhance the quality of accommodation facilities. Upgrading the basic infrastructure facilities and proper maintenance of tourist sites will boost the tourism industry in Nagapattinam LPA.

### **9.3 SUMMARY**

Nagapattinam is a tourism hub that has numerous sites with cultural and heritage significance. Tourism act as a major economic driver in Nagapattinam. The planning area houses the ancient Nagore Dargah and the famous church, The Basilica of Our Lady of Good Health at Velankanni. In the year 2017, around 65 lakh and 47 lakh tourists have visited Velankanni and Nagore respectively.

To facilitate tourists, tourism infrastructure facilities are to be ramped up to cater to the requirements. The annual tourist population projection is carried out for Velankanni and Nagore using the arithmetic increase method. The projected annual tourist population of Velankanni& Nagore for the year 2041 is estimated as 2.3 Crore and 1.6 Crore respectively.

In terms of accommodation facilities for tourists, Velankanni has dormitory kind of facilities to accommodate the tourist population whereas in Nagore home stays were found predominant. The existing accommodation facilities in Velankanni are adequate to cater for the future population. An additional supply of 600 beds will be required to accommodate the tourist population at Nagore in the year 2041. The land area required to provide additional accommodation facilities for the tourists in Nagore will be around 0.2 ha.



Map 9.1: Tourist Attraction Spots within LPA

## 10. EXISTING LAND USE

### 10.1 EVALUATION OF NAGAPATTINAM MASTER PLAN 2001

The planning area of Nagapattinam master plan 2001 comprises of Nagapattinam municipal area and parts of 3 Villages. The area under different land use was 14.35 Sq.km.

Nagapattinam Master Plan-2001 envisaged that proposed residential use in 2001 is 8.4 sq. km which is 58% of the total area of the town. The reason for predicting a higher concentration of residential use can be because of the port related activities, fishing and flourishing agriculture. But in the existing scenario (2021) non-functioning of Nagapattinam port results in a lower concentration of residential use of about 4.17 sq. km. The land reserved for commercial was about 0.4 sq. km in 2001 proposed land use. The total land of 0.17 sq. km is developed under commercial use as per existing land use 2021, which shows that the town has less commercial development. The existing commercial areas are concentrated along the major transport corridors in Nagapattinam municipal area, Nagore and Velankanni. As Nagapattinam LPA has a high potential for tourism, tourism related infrastructures can be promoted to induce higher growth.

The reserved area under industrial use was about 0.6 Sq. km. as per the proposed land use 2001. Whereas, in the existing land use (2021) only 0.10 Sq.km. of the total area is utilized for the industrial use. The land allocated for agriculture was about 0.5 sq. km in the proposed land use 2001 and 0.90 sq. km is under agriculture use as per the existing land use 2021. This shows that the agriculture area has not been converted for any other uses. As Nagapattinam is an agriculture-rich area Agro-based industries can be proposed. Nagapattinam has a vast coast line with potential for fisheries. Therefore, there is a good scope for marine-based industries. An area of about 3.9 Sq.km. is proposed for the year 2001 under Institutional use and the area developed under this use as per the existing land use 2021 is 2.16 Sq.km. Institutional land use almost followed the proposed land use plan 2001 because Nagapattinam became district headquarter in 1991.

Nagapattinam is highly prone to natural disasters. The concentration of vacant land is higher on the east side of the railway track. This is because, the railway track and the seashore act as a barrier for developments. The above analysis shows that there is only static growth in the town over the past two decades because of less economic activities.

**Table 10.1: Evaluation of proposed land use 2001 and Existing land use 2021  
– Nagapattinam Municipality**

S. No.	Land Use	Proposed land use-2001 (in sq.km)	Existing landuse-2021 (in sq.km)
1	Residential	8.40	4.17
2	Commercial	0.40	0.17
3	Industrial	0.60	0.10
4	Institutional	3.90	2.16
5	Agriculture	0.50	0.90
6	Vacant Land	0.60	4.70

## 10.2 EXISTING LAND USE

The Existing land use is the important input in devising the future growth strategy of any city/town, formulating alternatives and proposals in the master plan. The land use zoning for existing land use plan is categorized based on the DTCP master plan rules. The existing land use maps show various current land uses indicating residential, commercial, industrial, public & semi-public uses, recreational, vacant land, land under agriculture and water bodies. The existing land use map for Nagapattinam LPA has been prepared by conducting a field survey with the support of high-resolution satellite imagery and base maps provided by National Remote Sensing Centre (NRSC), Hyderabad. From the existing land use map, the growth potential for the town and suitable locations for future developments can be identified. (Map 10.1 & 10.2)

### 10.2.1 Residential

As per the existing land use 2021, the area under residential use in Nagapattinam LPA is about 14.35 Sq.km, which is about 17.92% of the total LPA area (Table 10.2). As per URDPFI guidelines, Nagapattinam LPA falls under the medium town category. URDPFI guidelines suggests that a medium town can have 43-48% of the developed area as residential use. As of now, the share of residential development in Nagapattinam LPA is 52.03 % of the developed area.

The concentration of residential area is high in the municipal area (27.93%). Next to the municipal area, Therkkupoigainallur has higher residential developments of about 1.77 sq. km which is 12.33 % of the total residential area. Velankanni (6.27%) and Anthanapettai Village (6.20%) has moderate residential concentration. The residential growth in Nagapattinam Municipality is more towards north and west directions i.e.) from Nagapattinam core town to Nagore and Nagapattinam core town to Sikkal. Railway lines act as a barrier for the growth on the east side (Map 10.1 & 10.2).

### **10.2.2 Commercial**

The share of commercial use in Nagapattinam LPA is only 0.64 Sq.km (Table 10.2). As per URDPFI guidelines, 0.24 to 0.32ha/1000 persons of the area is required for commercial activities. The existing commercial area of 0.64sq. km is sufficient for the present population. The concentration of commercial activities is along with three major areas such as Nagapattinam core area, Nagore Dargah, and Velankanni Church (Map 10.1 & 10.2). Velankanni and Nagore have higher tourism Potentials. Commercial activities can be developed more in these areas. All the commercial area is concentrated in the core area and tourism spots. To promote development in a balanced manner, commercial activities should be made accessible to all the areas within the LPA. Fish markets are located in the Nagapattinam core area and Velankanni. The concentration of Retail Shops is higher in Nagapattinam core area, Nagore and Velankanni. Commercial areas in Nagapattinam LPA are majorly present in the following locations,

- Big Bazaar Street, Nagapattinam
- Opposite to railway Station
- Beach Road
- Neela South and East Street
- Saalai Street
- Big Bazaar Street, Nagore
- New Bazaar line, Nagore
- Along State Highway in Nagore
- Velankanni Main Road
- Railway Station Road, Velankanni
- Church Road, Velankanni and Beach Road, Velankanni

### **10.2.3 Industrial**

The existing Industrial use in Nagapattinam LPA is about 0.33 Sq.km which is only 0.41% of the total LPA area (Table 10.2). SIDCO industrial estate of 21acres area is located along National highway 45-A within Nagapattinam Municipality. Manufacturing industries are located in and around the SIDCO (Map 10.1 & 10.2). Agro-based Industries are located along State Highway 49. The majority of the Chemical industries are located in Nagore Village. Nagapattinam core area has only one industry (Manufacturing). Ice plants are located near the seashore in Nagapattinam and VadakkuPoigainallur Village. Velankanni has no industrial developments. As per the micro small and medium scale enterprises (MSME) report, Nagapattinam has potential for Petrochemical Industries. The existing SIDCO industrial estate has seven industrial units and the



products manufactured are steel trunks, iron, and steel fabrications. As Nagapattinam is rich in agriculture and with vast coastal stretch, Agro-based industries and marine based industries such as Fish processing units, shipbuilding, etc. can be proposed which will create more employment and thereby the economy of the town can be improved.

#### **10.2.4 Institutional**

As per the existing land use 2021, the area under public and semi-public use is 4.49 Sq.km which is 5.57% of the overall planning area (Table 10.2). The concentration of public and semi-public use is more in the Nagapattinam core area (31.38% of the total area under public and semi-public use) and in and around Velankanni church (Map 10.1 & 10.2). As Nagapattinam became district headquarter in 1991, the area under administrative and other institutions increased. Nagapattinam Municipality has public and semi-public uses such as hospitals, educational institutions, religious buildings, and government offices, etc. Nagapattinam government district headquarter hospital is located along National Highway 45-A opposite to new bus stand. Tamil Nadu ware house Corporation's warehouse is located in Nambiyar Nagar. Animal husbandry-related institutions are located in Cooks Road near the government hospital. District Collectorate is located in Amirtha Nagar along New Beach Road and National highway 45-A. The Superintendent of Police office and police quarters are located in Elancheran Nagar in Velipalayam. Government institutions such as district Court and revenue offices are located in VOC Nagar. Educational institutions are located along cook's road.

The Public and Semi-Public use in Nagore is majorly masjid and Dargah. As Velankanni is a famous tourist spot majority of the public and semi-public use are mainly religious buildings and lodging facilities.

#### **10.2.5 Recreation**

Recreational use, part of institutional use, includes open spaces, Parks and playgrounds. The existing recreation use in Nagapattinam LPA is 0.19 sq. km which is 0.24% of the total LPA area (Table 10.2). As Nagapattinam lies in the coastal area, beaches form a major part of recreational use. There are 3 beaches located within the LPA namely,

- Nagapattinam Beach
- Nagore Beach
- Velankanni Beach

Following are the Parks in Nagapattinam LPA,

- Kodimarathu Park in Thoonuthurai Road,
- Park near Thamaraikulam in Public office road,

- Thambi Thurai Park in Elancheran Nagar
- Maraimalai Nagar Park
- Neithal Nagar Park
- Neithal Nagar Park-2

A district sports complex is located in Vellipalayam. Residential areas lack open spaces for recreation. As Nagapattinam is enriched with beaches, Waterfront developments, Parks, promenades along the seashore can be developed to improve the open space requirement as per the standards. Open spaces can enhance the quality of life and reduce the impact of heat.

### **10.2.6 Transportation**

Transport corridors play an important role in developments within Nagapattinam LPA. The existing land use map of Nagapattinam LPA reveals that the growth of the city is in the form of ribbon development along the major roads and railway lines. The major transport corridor along which developments exist are National Highway 45-A and along the railway line.

The area under Transportation use in Nagapattinam LPA is about 2.51 Sq.km which is 3.14% of the total LPA area (Table 10.2). Transportation in existing land use comprises major road networks, railway lines, bus stands. Railway stations and ports. In terms of Nagapattinam Municipality, it has 2 bus stands, a new bus stand of 0.9 ha at Vellipalayam and an old bus stand near Nagapattinam Junction. Nagapattinam has a Junction railway station located in Tata Nagar.

Along the National Highway 45-A, the majority of the developments are in residential use. Within the LPA there is also National Highway 32 passing by, but there are no major developments along this road. In the core area of Nagapattinam Municipality, along the major streets, commercial use is the predominant use. Nearby the bus stand, there are only limited commercial uses but around the railway station, there is a higher concentration of commercial activities. As Nagapattinam has major transport corridors, commercial and industrial activities can be proposed along those corridors.

Nagore Bus stand is located along the National Highway 45-A. Around the bus stand and Nagore railway station, there are only limited commercial use. Whereas along the bazaar street commercial activities are highly concentrated. Velankanni having a high tourist potential, is connected by National Highway-32. Velankanni has a bus stand along the Velankanni main road and a railway station. The developments around the bus stand are predominantly commercial where nearby the railway station there is no commercial use. Along the main road connecting the National highway-32 to the church, commercial activities are concentrated.

National Highway 83 passes through Sikkal village has a high potential for developments. Transportation can be integrated with land use to promote development in LPA.

### **10.2.7 Water Bodies**

Water bodies are an important environmental asset for an urban area. Nagapattinam LPA has an extent of 7.86 sq. km under Water Bodies which is 9.82% of the overall LPA area (Table 10.2). As the cities expand, the land use gets changed with the hitherto non-urban areas like agricultural lands, other vegetative areas, water bodies etc., getting replaced by concrete structures and black-topped roads.

This situation needs to be avoided, water bodies need to be conserved and protected from urban development to maintain an ecological balance.

### **10.2.8 Agriculture use**

As Nagapattinam is a fertile agriculture resource area the share of agriculture use will be higher. Nagapattinam LPA has about 37.52 Sq.km of agriculture use which is 46.85% of the total LPA area (Table 10.2). Agriculture use in municipal area is only 0.90 Sq.km which is 6.04% of the total agriculture use in the LPA. Villages have a higher concentration of agriculture use. Velankanni has 1.19 Sq.km of agriculture use which is 3.73% of the total agriculture use. Palaiyur Village has a higher concentration (4.31 Sq.km) of agriculture use which is 13.52 % of the total agriculture use in LPA. Next to Palaiyur, Sikkal (4.32 Sq.km) and Ivanalur (2.96 Sq.km) Villages have a higher concentration of agriculture use (Map 10.1 & 10.2). While preparing a land-use plan the existing agriculture use needs to be retained.

### **10.2.9 Vacant land**

The share of vacant land in Nagapattinam LPA is about 7.11 Sq.km which is 8.88% of the total LPA area. The municipal area has a higher concentration of Vacant land (4.70 Sq.km) which is 31.49% of the total municipal area (Map 10.1 & 10.2). The presence of more vacant land in the municipal area will have lots of opportunities for urban development proposals such as residential developments, industries and recreational spaces. So Nagapattinam Municipality has a higher potential for urban development proposals.

**Table 10.2: Existing land use in Nagapattinam LPA**

Sl. No	Use	Extent in Sq.km	% of developed area	% of total area
<b>Developed area</b>				
1	Residential	14.35	52.03	17.92
2	Commercial	0.64	2.32	0.81
3	Institutional	9.75	35.35	12.18
4	Industrial	0.33	1.20	0.42
5	Transportation	2.51	9.10	3.14
	Total developed area	27.58	100	34.45
<b>Undeveloped area</b>				
6	Agriculture	37.52	71.48	46.85
7	Vacant lands	7.11	13.55	8.88
8	Water Bodies	7.86	14.97	9.82
	Total undeveloped area	52.49	100	65.55
<b>Total LPA area</b>		<b>80.08</b>		

(Source: Land Use Survey)

### 10.3 URDPFI GUIDELINES STANDARDS FOR LAND USE STRUCTURE

As per the URDPFI guideline, Nagapattinam falls under the category of medium town. Table 10.3 represents the existing land use and URDPFI set standards. The share of each land use in Nagapattinam LPA is not up to the standards given by URDPFI guidelines.

After identifying the suitable areas for urban development land use proposals will be given to boost economic opportunities in the town and the existing land use structure will be increased as per the requirements given in URDPFI guidelines. (Table 10.3)

**Table 10.3: Land use standards as per URDPFI guidelines**

S. No.	Land Use	% Share in Existing land Use	As per URDPFI guidelines (for the developed area)
1	Residential	17.92	43-48 %
2	Commercial	0.81	4-6 %
3	Industrial	0.41	7-9 %
4	Institutional	12.18	18-22 %
5	Transportation	3.14	10-12 %

### 10.4 SUMMARY

As per the proposed land use 2001, of Nagapattinam, a higher concentration of land is allocated for Residential use and Institutional use. The reason for predicting a higher

concentration of residential use was due to vibrancy created by the port related activities and due to the economic activities proposed. As of now, the port was not functioning and due to lack of other economic opportunities, the residential area as projected in the proposed land use 2001 was not achieved. The existing growth pattern of Nagapattinam LPA is along the major transport corridors in North, West, and east directions. Sea Shore and Railway line passing through the municipal area from Nagapattinam to Nagore acts as a barrier for development along the east side of the municipal area. As per URDPFI guidelines, a medium size town can have residential use of 43-48% of the total developed area. Nagapattinam LPA is categorized under medium size town. Currently Nagapattinam LPA has residential use of about 17.92 % of the total developed area in the LPA. It is not sufficient, to accommodate the future population. Therefore, residential areas need to be increased based on the residential requirement.

As per the existing land use 2021, the concentration of residential area is high in the municipal area (29.34%) followed by Therkkupoigainallur village (12.33%). The residential growth in Nagapattinam Municipality is towards north and west directions i.e., from Nagapattinam core town to Nagore and Nagapattinam core town to Sikkal. The concentration of commercial activities is found in three major areas of the LPA, i.e., Nagapattinam core area, Nagore Dargah, and Velankanni Church. The existing commercial area of 0.72 sq. km is sufficient for the present population. The commercial area is concentrated in the core area and tourism spots. It is to be distributed to the other parts of the LPA to make it accessible.

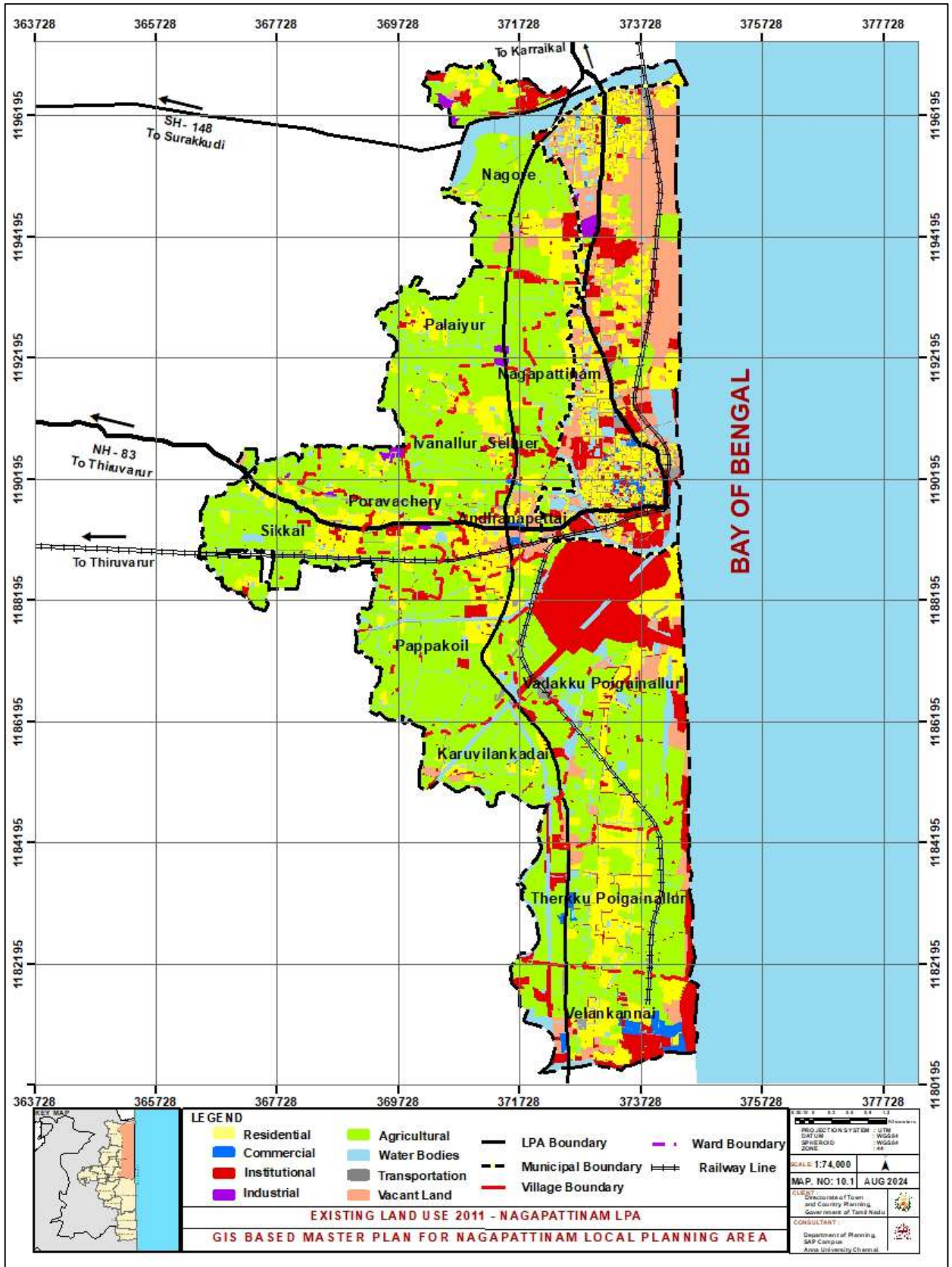
Nagapattinam LPA constitutes an industrial use of about 0.37 Sq.km which is only 0.47% of the total LPA area. SIDCO industrial estate of 21 acres area is located along National highway 45-A within Nagapattinam Municipality. Ice plants are located near the seashore in VadakkuPoigainallur Village. Velankanni has no industrial developments. As per MSME report, Nagapattinam has potential for Petro Chemical Industries.

As Nagapattinam LPA is rich in agriculture, and vast coastal area, Agro-based industries and Marine based industries such as Fish processing units, shipbuilding, etc. can be proposed to generate employment.

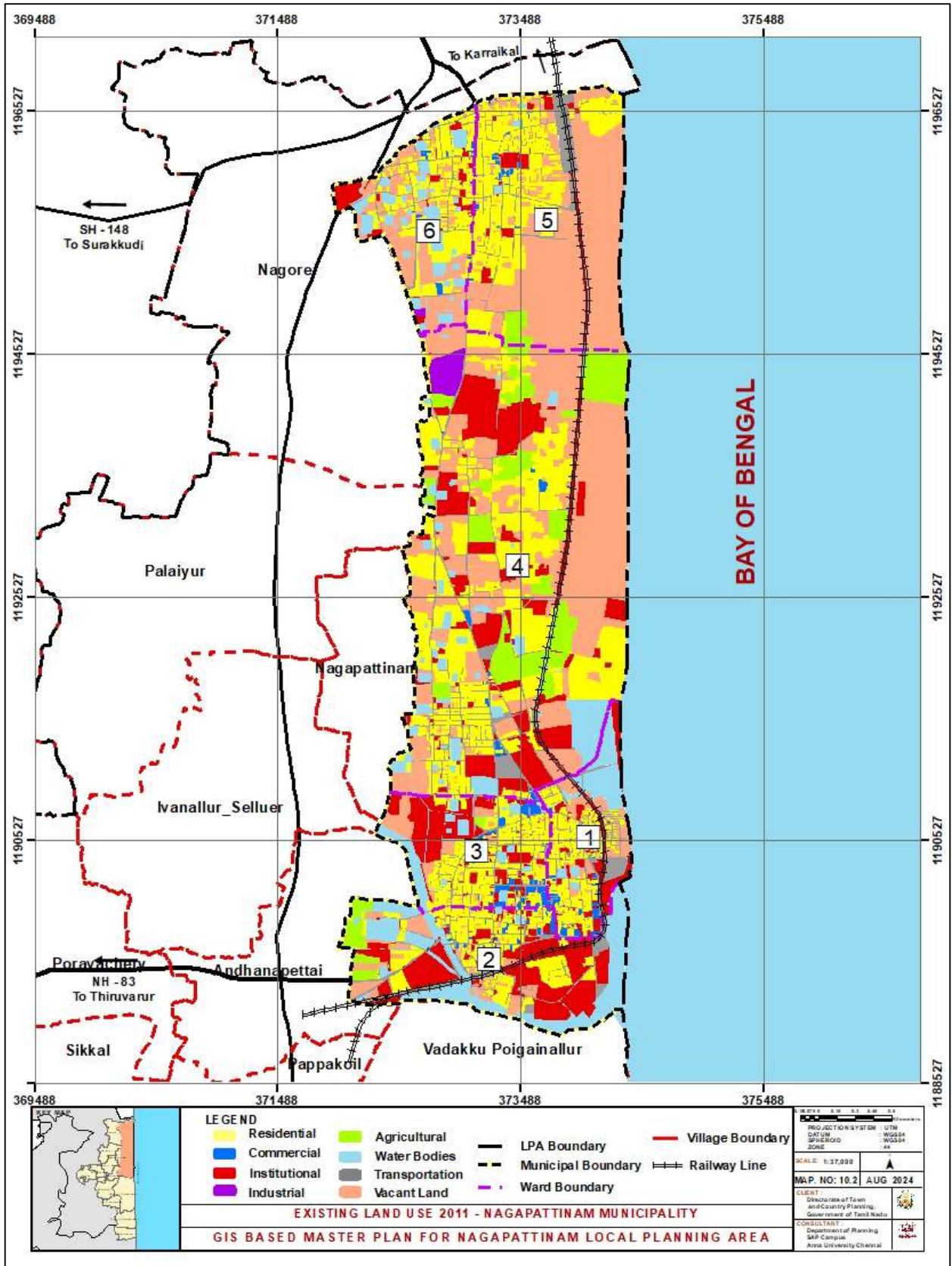
Nagapattinam became district headquarter in 1991 which propelled the growth of administrative and other institutions in Nagapattinam Municipality by 1.18sq. km which is about 31.38% of the total institutional use in the Nagapattinam. Nagapattinam LPA has about 40.04 Sq.km of agriculture use which is 50.01% of the total LPA area. While preparing a land-use plan, the planning strategy for Nagapattinam LPA should be to retain most of the agricultural wetlands.

In terms of Vacant land, the municipal area has a higher concentration of Vacant land (5.6 Sq.km) which is 39.02 % of the total Municipal area. The presence of more vacant land in the municipal area will have lots of opportunities for urban development proposals such as

residential developments, industries and recreational spaces. Commercial and Industrial activities promote economic development and employment for any town. So, to improve employment and economic development in Nagapattinam LPA commercial and industrial land use is to be promoted by assigning more area for the above-mentioned uses.



Map 10.1: Existing land use 2021-Nagapattinam LPA



Map 10.2: Existing land use 2021-Nagapattinam Municipality



## 11. ISSUES & POTENTIALS

### 11.1 ISSUES IN NAGAPATTINAM LPA

#### *Less Growth Rate*

The trend of population growth rate in Nagapattinam LPA is generally declining (Figure 11.1 & Table 11.1). Since 1971, the LPA has witnessed an unstable growth and decrease in population growth rate and it has remained inconsistent due to various happenings. The overall growth in Nagapattinam town is slow when compared with other similar-sized towns. Migration to large cities with better employment opportunities and facilities led to the reduced growth rate in Nagapattinam. This is associated with low population density and a decrease in child ratio in rural areas within the LPA from 2001 to 2011. Furthermore, the decrease of population in rural areas has an impact on the level of output and leads to uneven distribution of population resulting in increased pressure on the provision of services in urban areas. Expanding the job market, providing proper infrastructure facilities and other amenities can boost the development and stabilize the growth in Nagapattinam.

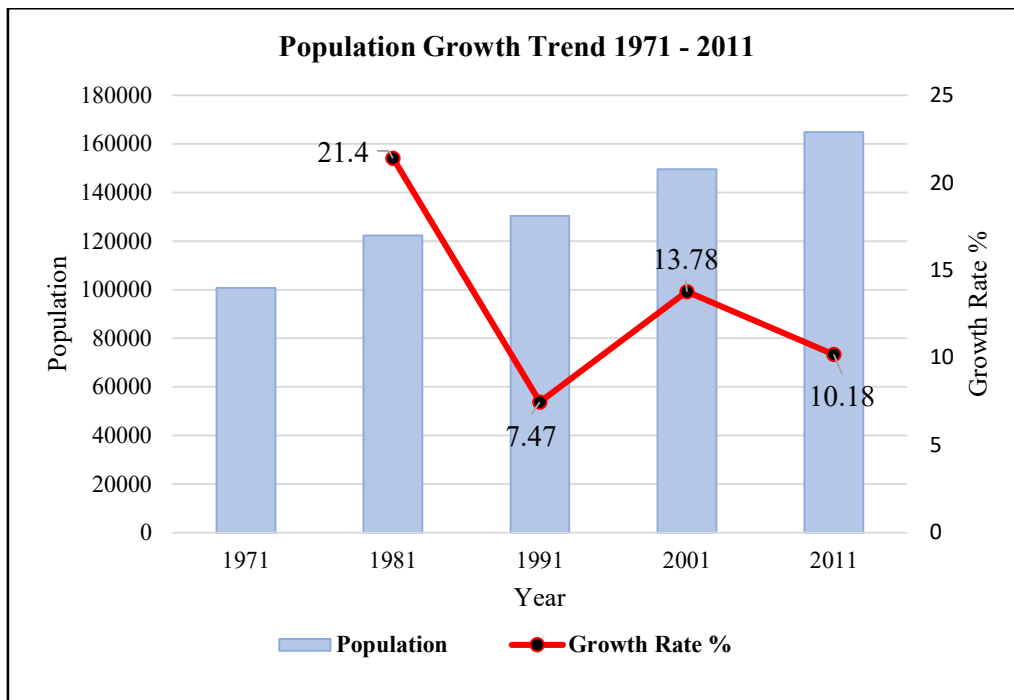


Figure 11.1: Population Growth Trend in Nagapattinam LPA

**Table 11.1: Village/Town wise Growth Trend of the LPA**

S. No	Description	Name of Villages/Towns	Population			Decadal Growth rate %	
			1991	2001	2011	1991-2001	2001-2011
1	Urban	Nagapattinam (M)	86489	93148	102905	7.70	10.47
2		Velankanni (TP)	6155	10151	11108	64.92	9.43
3	Rural	Nagore (Kottagam) (Muttam&Thethi)	1597	2269	3564	42.08	57.07
4		Palaiyur	1277	1296	1291	1.49	-0.39
5		Ivanalur (Sellur)	1878	2225	4921	18.48	121.17
6		Anthanapettai (Manjakollai)	4500	6454	7349	43.42	13.87
7		VadakkuPoigainallur (Akkarapettai)	13041	15566	10826	19.36	-30.45
8		TherkkuPoigainallur	4304	4368	4731	1.49	8.31
9		Poravacheri	3606	4115	4422	14.12	7.46
10		Sikkal	4823	5164	5652	7.07	9.45
11		Papakoil	2752	3623	4915	31.65	35.66
12		Karuvelankadai	1051	1212	1201	15.32	-0.91
13		Nagapattinam	0	0	1939		
		<b>Total</b>	<b>131473</b>	<b>149591</b>	<b>164824</b>	<b>13.78</b>	<b>10.18</b>

(Source: Census of India)

### **Reduction in Agricultural Labourers**

The share of cultivators and agricultural labourers in the total working population is decreasing for the past few decades. Though Nagapattinam LPA comprises 42.46 % of agricultural land use, the working population in the primary sector will become negligible if the existing growth trend continues (Figure 11.2). The development of the agricultural sector is important to promote sustainable urbanization and enhance the food security of the place.



**Figure 11.2: Occupational Growth Trend in Nagapattinam**

### **Higher Concentration of Slums**

As per Census 2011, the slum population in Nagapattinam Municipality is about 32707 i.e.) 31.8% of the total Municipality Population and 7867 households (Table 11.2). The concentration of the slum population is slightly higher in Nagapattinam Municipality. PMAY scheme has provided 569 housing units within Nagapattinam (Table 11.3). Though having a higher Concentration of Slums PMAY has provided housing only for 7.2% of the total slum households.

**Table 11.2: Slum Population in Nagapattinam Municipality and Velankanni**

S. No.	Description	Nagapattinam	Velankanni
1	Total Population	102905	11108
2	Total Households	24518	2753
3	Total Slum Population	32707	1439
5	%Share of Slum Population	31.8	12.9
4	Total slum household	7867	343
6	%Share of Slum households	32.1	12.5

(Source: Census of India)

Velankanni has a slum population of about 1439 i.e., 12.9% of the total Population in Velankanni. Under PMAY Velankanni has about only 35 beneficiaries. As Velankanni is a famous Tourist place presence of more slums will degrade the image of the town so slum redevelopment in Velankanni will enhance the image of the town. So PMAY and JNNURM Schemes need to be implemented effectively to provide new housing and infrastructure facilities to upgrade existing slums.

**Table 11.3: PMAY (Urban) Beneficiaries in Nagapattinam and Cuddalore**

Name of the Urban area	Houses Sanctioned	Houses Grounded	Houses Completed
Nagapattinam Municipality	705	700	569
Velankanni	108	106	35

(Source: <https://pmaymis.gov.in/>)

### ***Sewage Treatment facilities***

The existing Sewage treatment plant in Nagapattinam Municipality has a capacity of 12.6 MLD and it is not adequate for the Projected Population in 2041. The projected sewage generated in the municipal area in 2041 is about 13.7 MLD. So, the capacity of the existing STP needs to be increased from 12.6 to 13.7 MLD. At the Village level, there are no sewage treatment facilities so DEWATS can be proposed at a community level. The projected sewage generation for Villages in 2041 is 3 MLD (Table 11.4). To treat 3MLD of Sewage generated in the Villages in the LPA, (Decentralized waste water treatment plant) DEWATS is to be provided in all the Villages. The total area required for the provision of DEWATS plant in all the Villages is 18 hectares.

**Table 11.4: Projected requirement for Sewage Treatment facilities**

Description	Projected Water Supply (MLD)	Projected Sewage Generation (MLD)	Existing Capacity of STPs (MLD)	Additional capacity required (MLD)
Nagapattinam Municipality	17.1	13.7	12.6	1.1
Velankanni Town Panchayat	2.6	2.1	2.3	0.2 excess
Villages	3.8	3	No STP	DEWATS can be proposed

### ***Dump yard in Velankanni***

The existing dump yard in Velankanni has a capacity of about 2.3TPD (Tonnes per day). The projected solid waste generation in 2041 for Velankanni is about 5TPD. To cater to this requirement, a new dump yard of 2.7TPD capacity needs to be proposed. As per the Manual on municipal solid waste management report, for a new composting yard of 2.5 TPD capacity, the land requirement is 0.1 ha (Table 11.5).

**Table 11.5: Projected requirement for Solid Waste disposal system**

S. No.	Local Body	Population 2041	NEERI Standards (kg/capita/day)	Projected Quantity of waste generated (TPD)	Existing Capacity of Compost yard/land fill site (TPD)	Additional Capacity required in 2041
1	Nagapattinam Municipality	126644	0.5	63	350 & 5	Nil
2	Velankanni Town Panchayat	18719	0.2	3.7	2.5	2.5
3	Floating Population (Per day)	6600	0.2	1.3		
4	Villages	69348	0.2	13.8	Nil	Community waste disposal system needs to be proposed

**Coverage of Storm Water Drainage Network**

In Nagapattinam Municipality the coverage of Storm Water drainage Network is about 70% of the total road length in the Municipal area. As Nagapattinam is highly prone to natural disasters coverage of stormwater drain needs to be 100%. Therefore, it is proposed to cover the remaining unattended areas with stormwater network.

**Prone to Natural Hazards**

Nagapattinam being a coastal town is highly prone to natural hazards such as Tsunami and Cyclones. During the 2004 Tsunami, Nagapattinam is the worst affected district in Tamil Nadu with more than 6000 human losses (Table 11.6). It is also worse affected during Cyclones such as THANE-2011 and GAJA-2018. During these natural hazards, people living in the seashore areas and low-lying areas are accommodated in the nearby educational institutions and Community halls. Exclusive Multi-Purpose Cyclone Shelters are to be proposed to accommodate the people living in the flood-prone areas and minimize human loss during natural disasters (Table 11.7).

**Table 11.6: Damages caused by Tsunami 2004 in Nagapattinam district**

S. No	Damages caused by Tsunami 2004	No's
1	No. of Coastal Villages affected	38
2	Human Loss	6065
3	Cattle loss	12821
4	Houses fully damaged	17461

(Source: Science of Tsunami Hazards Report)

**Table 11.7: Relief centres in Nagapattinam district during GAJA Cyclone, 2018**

Description	No. of Relief Centres identified other than Multi-Purpose Evacuation Shelters (MPES)				No. of Multi-Purpose Evacuation Shelters (MPES)
	Schools	Colleges	Community halls	Other buildings	
Nagapattinam District	283	21	177	21	9

(Source: Study Report on GAJA Cyclone)

### ***Lack of Recreational Space***

In Nagapattinam LPA, recreational spaces such as parks & playgrounds are spread over an area of about 0.17Sq.Km. According to NBC rules, 3 Sq. m/person is the minimum norm for open space in a built-up area. Based on this rule, the recreational open space in Nagapattinam LPA is not satisfactory and the development proposals must focus on creating more recreational spaces. Investment in the development of parks, open spaces, and recreational spaces will promote social integration and provide a healthy lifestyle in Nagapattinam.

### ***Issues Related to Parking***

Issues related to parking seems to be a major concern at the CBD in Nagapattinam, Velankanni, Nagore and tourism zones in the planning area especially during the festival seasons (Table 11.8). Inadequacy in parking spaces is noticed in most of the surveyed locations and the provision of the additional parking area is required. The spill-over parking problems creates road congestion. Decentralizing the CBD and identifying opportunities to make greater use of remote parking locations near CBD and tourist areas will reduce congestion. Providing shuttle services will lower the parking issues in the below identified areas.

**Table 11.8: Peak parking Ratio**

S. No.	Name of the Road	Peak Parking Hour	Peak Parking Accumulation	Average Parking Accumulation	Peak Parking Ratio
1	Syed Pillai Street	4.00 - 5.00 pm	58	39	1.49
2	Manara North Street	3.00 - 4.00 pm	39	27.5	1.42
3	Kalmatu Street	12.00 - 1.00 pm	24	14	1.71
4	Neela East Street	11.00 - 12.00 am	90	69	1.3
5	Neela South Street	10.00 - 11.00 am	132	101	1.31

### ***Lack of Commercial and Industrial developments***

As per the land use survey conducted, the existing land use of Nagapattinam LPA reveals the share of Commercial and Industrial use is about 0.81 % and 0.41 % of the total planning area. As per URDPFI guidelines, Nagapattinam LPA falls under medium size town. URDPFI guidelines suggest the share of Commercial and Industrial use as 4-6% and 7-9% for medium size towns. Nagapattinam district is one of the backward districts in Tamil Nadu. To promote the economy and growth of the town the commercial and industrial land use needs to be increased.

### ***Concentration of Commercial areas in the LPA***

Commercial areas in the planning area are concentrated in the core area of the Municipality, around Nagore Dargah and Velankanni Church. As Velankanni and Nagore has tourism potential, the concentration of commercial areas around these destinations will result in Congestion and disfigure the image of the Town. So commercial areas need to be decentralized to other parts of the LPA to enhance the visual quality of the town.

## **11.2 POTENTIALS OF NAGAPATTINAM LPA**

### ***District Head Quarter***

Nagapattinam is a district headquarter for Nagapattinam district. Being a district quarter, it has a higher potential to attract more commercial and industrial investments. District head quarter will attract more Institutional developments such as Education, Health, and Public Institutions. Nagapattinam as a district headquarters has a high potential for urban developments.

### ***Pilgrimage Sites***

The Planning area attracts many pilgrims since numerous temples like Kayarohanaswami Temple, Nellukkadai Mariamman Temple, Soundararaja Perumal Temple, etc., are located here. Besides the temple, it also houses the ancient Nagore Dargah and the famous Church, 'The Basilica of Our Lady of Good Health' at Velankanni. Therefore, it is apparent that tourism is a major economic driver in Nagapattinam LPA. Nagapattinam is also a place of religious harmony because it exemplifies the unity of three major religions Hinduism, Islam, and Christianity.

The important tourist centres in Nagapattinam LPA are situated in Nagapattinam Municipality, Nagore, Velankanni, and Sikkal (Figure 11.3). Tourism plays a key economic role in Nagapattinam.



**Figure 11.3: Pilgrimage sites in Nagapattinam LPA**

Velankanni and Nagore are the major attractions for tourists in Nagapattinam LPA. Other tourist spots are majorly attracted by local tourists and some of the seasonal tourists only. According to the department of tourism, Velankanni and Nagore attract tourists throughout the year. However, Velankanni attracts a huge crowd mostly during the annual feast and Nagore attracts a huge crowd during the Kandhuri festival (Table 11.9).

Providing Tourism Infrastructure facilities such as accommodation, transportation and other services will attract more tourists. There is high potential for economic development through tourism.

**Table 11.9: Year-wise tourist footfall of Velankanni and Nagore**

<b>Tourist Place</b>	<b>Year</b>	<b>Domestic</b>	<b>foreign</b>	<b>Total</b>
<b>Velankanni</b>	2006	5,50,432	7185	5,57,617
	2007	6,79,117	9565	6,88,682
	2008	9,60,000	10815	9,70,815
	2009	12,68,973	9164	12,78,137
	2010	21,81,314	10231	21,91,545
	2011	30,30,519	64141	30,94,660
	2012	40,58,824	67848	41,26,672
	2013	58,98,353	77338	59,75,691
	2014	74,35,350	69825	75,05,175
	2015	69,06,293	61883	69,68,176
2017	64,55,329	58555	65,13,884	
<b>Nagore</b>	2006	4,30,912	1598	4,32,510
	2007	3,40,124	4214	3,44,338
	2008	5,58,289	5617	5,63,906
	2009	10,18,811	3389	10,22,200
	2010	24,80,365	9776	24,90,141
	2011	27,69,317	12825	27,82,142
	2012	36,90,610	15900	37,06,510



Tourist Place	Year	Domestic	foreign	Total
Nagore	2013	49,48,828	18113	49,66,941
	2014	58,67,411	17885	58,85,296
	2015	50,02,413	16218	50,18,631
	2017	47,76,174	8317	47,84,491

(Source: District Diagnostic Study Nagapattinam)

### **Coastal Town**

Nagapattinam is one of the Coastal Towns in Tamil Nadu. Fishing plays a major role in the economy of Nagapattinam. The marine fish catch largely comprises leognathics, sharks, flying fish, chank, catfish, prawns, silver bellies, crabs, rays, and other miscellaneous varieties. The special fish varieties of Nagapattinam are Kanavai (squid), Red Prawn, Kola fish (flying fish). There are around 7 fishing Villages in Nagapattinam LPA, with a total fishermen population of about 20,953. As many as 708 mechanizing fishing craft and 125 non-mechanized boats are there in Nagapattinam LPA for fishing activity. So, there is high potential for fishing-related infrastructures such as ice plants, Cold Storage units, fishnet mending shops, boat manufacturing, fish markets, etc.

Coastal aquaculture is also considered an important tool for the economic growth in Nagapattinam LPA. In Nagapattinam LPA, aquaculture is practiced over an area of about 5.49 Sq.km. Nearly 6.86% of the total area of the LPA is utilized for aquaculture production. Aquaculture is largely practiced along the Kaduvaiyar River in VadakkuPoigainallur village. So, there is tremendous scope to improve the local economy through sustainable aquaculture practice in Nagapattinam. Overall, there is a high Potential for the Blue economy which is nothing but Sustainable use of ocean resources for economic growth and improved livelihood.

### **Blessed with Beaches**

Nagapattinam LPA is enriched with three Beaches namely Nagapattinam New Beach, Nagore Beach, and Velankanni Beach. Beaches in Nagapattinam LPA, are not exploited to promote tourism. Due to the presence of these beaches, there is high potential for Eco-Tourism developments and Water Sports activities.

### **Proximity to Karaikal Port**

Nagapattinam is located 11km away from Karaikal Port. Karaikal Port is the largest port spread over an area of 600 acres. The port has handled diverse cargo such as Coal, Sugar, Cement, Fertilizers, Project cargo, Agro commodities etc. In the next few years, Karaikal port private limited (KPPL) is expected to increase the cargo handling capacity to over 125 MMT by 2025. Being located near this Port, Nagapattinam LPA has a high potential for Trade and Commerce.

### ***Extensive agricultural land***

Nagapattinam LPA has 37.52 Sq.km of agricultural land which is 46.85% of the total LPA area. Tamil Nadu government has recently declared Nagapattinam District under “protected agricultural zone”. The main objective of this zone is to increase agricultural productivity and enhance food security. The act has the provision to facilitate the promotion of Agro-based and allied industries in the protected agricultural zone and preservation of agricultural land. So, the Planning area has a high potential for Agro-based and allied industries.

### **11.3 SUMMARY**

The major issues identified in the planning area are, less growth rate (both in terms of population and development) and natural hazards. The overall growth in Nagapattinam town is slow when compared with other similar-sized towns. The decline in the growth rate is due to a lack of employment opportunities. This growth rate can be enhanced through various project proposals in Nagapattinam LPA, to create more employment opportunities. Nagapattinam LPA is prone to natural disasters as it is located along the coastal stretch. During the 2004 Tsunami, Nagapattinam was the worst affected district in Tamil Nadu. It was also worse affected during Cyclones such as THANE-2011 and GAJA-2018. Exclusive multi-purpose cyclone shelters can be Proposed to accommodate the people living in the flood-prone areas and minimize human loss during natural disasters. Nagapattinam LPA lacks in commercial and industrial development. It is to be promoted by creating opportunities for commercial and industrial developments.

The major potentials of Nagapattinam are tourism, fishing and agriculture. The location of major pilgrimage sites such as the ancient Nagore Dargah and the famous Church ‘The Basilica of Our Lady of Good Health’ at Velankanni increases the tourism prospects of Nagapattinam LPA. Promotion of tourism-related activities will enhance the economy of the town. The presence of beaches and extensive agricultural land will also act as a major strength for Nagapattinam LPA. The LPA constitutes about 41.8% of the total planning area under agriculture use. Therefore, agricultural activities can be promoted by proposing projects like Agro-based industries.

The issues and potentials identified in this chapter is to be used as a guideline for evolving concept plan and preparation of proposed land use plan for Nagapattinam LPA.

## **12. LAND SUITABILITY ANALYSIS**

Identification of suitable land for urban development is more important for preparing the proposed land use plan. Land Suitability analysis is worked out by the weighted index method. Land Suitability analysis helps in the identification of suitable land for urban development and reduces the impact on Urban Environment.

### **12.1 PARAMETERS CONSIDERED FOR SUITABILITY**

for land Suitability analysis the following 5 parameters have been taken into considerations

- Existing land use
- Coastal Regulation Zone
- Elevation
- Distance to Roads
- Distance from Water Body

Weightages are given to five physical parameters by comparing the relative importance of each parameter with respect to other parameters.

#### **12.1.1 Existing land use**

Land use plays an important role in suitability analysis as it comprises of many classes out of which we analyse the priority of the most suitable and the least suitable class. While giving the weightage preference waterbody and built up are considered as not suitable classes while vacant land and agricultural land are considered as highly suitable classes for urban development.

#### **12.1.2 Coastal Regulation Zone**

The coastal regulation Zone is very significant for the Nagapattinam Planning area. As per CZMP the coastal regulation Zones have been demarcated and based on the regulations in CRZ notification 2019, No development Zone has been identified and considered as not suitable for urban development.

#### **12.1.3 Elevation**

The elevation is considered an important element in land suitability. From the elevation map, a low-lying area has been identified and considered as not suitable and other areas as highly suitable for urban development to prevent water-logging.

#### 12.1.4 Distance to Roads

Proximity to roads is also an important parameter in urban development. The area nearest to the roads is considered highly suitable for urban development. The priority descends as the distance between the road and plot increases.

#### 12.1.5 Distance from Water Body

To improve Biodiversity Water Bodies should be protected from urban development. So, the areas nearest to the waterbodies are to be conserved hence considered least suitable for urban development. 50m buffer Zone has been maintained and this buffer zone is considered to be not suitable for urban development.

### 12.2 WEIGHTAGE INDEX FOR SUITABILITY

Weightage index is given to the above themes and classes for suitability analysis. In this land suitability model (Map 12.1) high priority is given to existing land use, CRZ, and Distance to roads, to find out the land suitable based on these factors (Table 12.1 & 12.2).

**Table 12.1: Weightage Index for land suitability analysis**

Theme	Weightage	Class	Rank Weight
Existing Land Use	30	Vacant	5
		Agriculture	3
		Built-up and Water	0
Coastal Regulation Zone	20	CRZ and NDZ	0
Elevation	10	More than 0 m	5
		Less than 0 m	0
Distance to road	30	0-500 m	5
		500-1000	4
		1000-1500 m	3
		1500-2000 m	2
		More than 2000 m	1
Distance from Water Body	10	Above 50m	5
		0-50 m	0

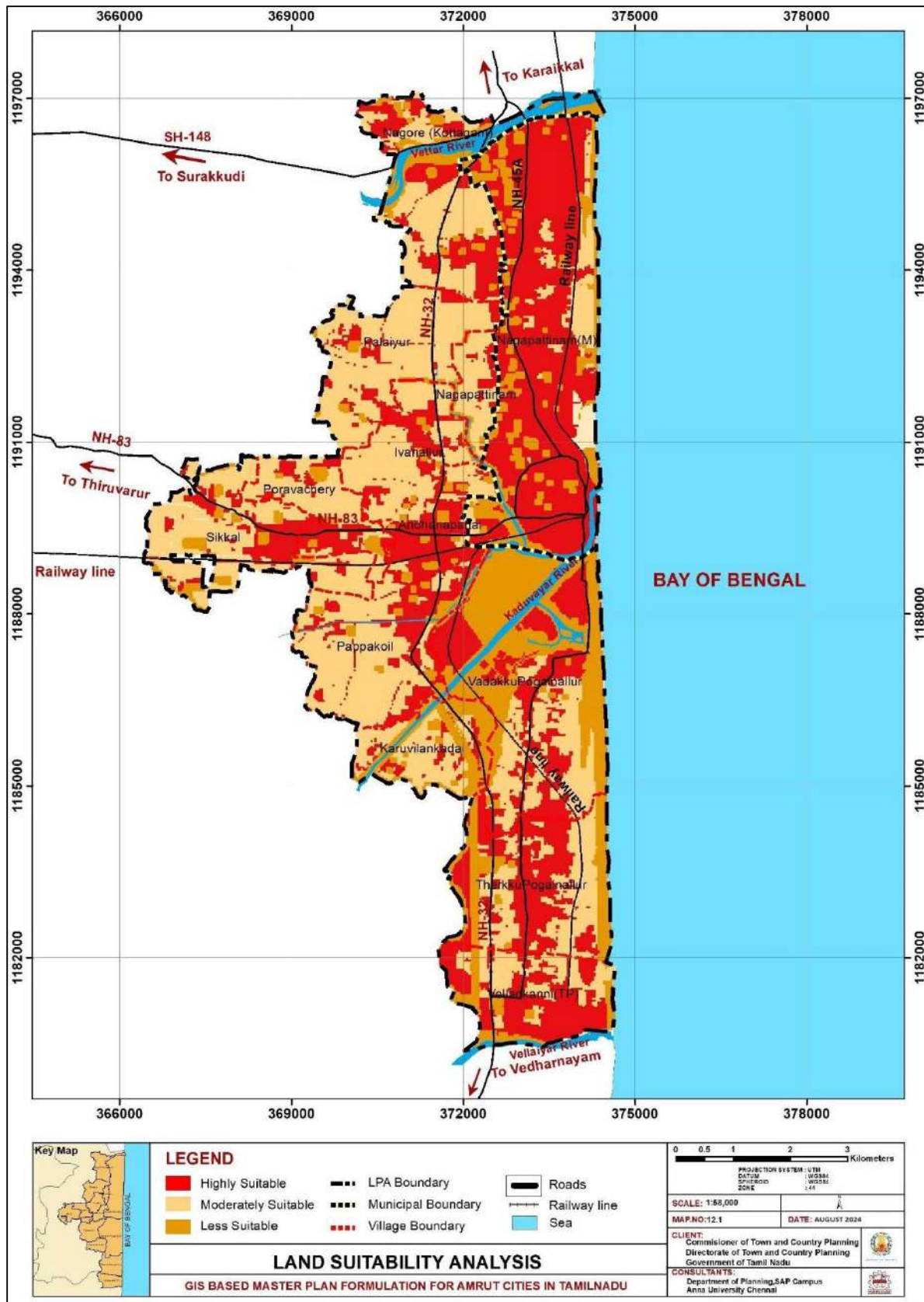
**Table 12.2: Categorization of parameters**

<b>S.No.</b>	<b>Parameters</b>	<b>Highly Suitable</b>	<b>Moderately suitable</b>	<b>Less suitable</b>
1	Existing land use	Vaccant	Agriculture	All Other uses
2	CRZ	Doesn't apply	Doesn't apply	CRZ andNDZ
3	Elevation	More than 0 m	Doesn't apply	Less than 0 m
4	Distance to road	0-500 m	500-1500 m	More than 1500 m
5	Distance from Water Body	More than 50m	Doesn't apply	0-50m

The same procedure with different parameters is followed for the identification of suitable land for different uses such as residential, commercial, industry and recreational.

### **12.3 SUMMARY**

Land Suitability analysis is carried out before proposing any kind of development in Nagapattinam LPA. The potential of the land is important for any land-use proposal. Land suitability analysis categorizes, the total planning area into three categories i.e., highly suitable, Moderately Suitable, and less suitable areas. for proposing land use categories, five parameters such as existing land use, elevation, distance to road, distance to water body and CRZ were used and weightage is given to all the categories to identify the highly suitable areas for urban development. Land use suitability analysis was carried out for residential, commercial, industry and recreational uses before assigning proposed land use.



Map 12.1: Land Suitability analysis

## 13. PLANNING PROPOSALS AND IMPLEMENTATION

The vision of Nagapattinam master Plan 2041 is to improve the socio-economic standard of living of the people and to enhance their quality of life by the generation of employment opportunities, social facilities, basic amenities, transport infrastructure and services and others. This chapter deals with the land use planning strategies adopted to meet the objectives of the master plan. Future requirements and growth prospects are considered and a concept Plan is evolved to minimize the existing issues found in Nagapattinam. Various project proposals have been identified to improve the economy and quality of life in Nagapattinam LPA. To regulate the growth of the planning area in an orderly manner and also to ensure its economic viability, social stability for the present and the foreseeable future, the master plan with zoning is prepared.

### 13.1 LAND USE PLANNING STRATEGIES

- The land use zoning to be provided is to be as per the provisions of the Tamil Nadu Combined Development and Building Rules, 2019.
- The commercial areas, industrial areas, and amenity areas have been spatially distributed across different areas, along major transport corridors and potential areas for balancing the growth at the LPA Level.
- Commercial centres have been proposed to decentralize the commercial centre in Nagapattinam core town.
- The development constraints such as regulations related to eco-sensitive zones, coastal regulation zones have to be given due cognizance while formulating the land-use proposals.
- Except for the developments proposed along the major transport corridors the agricultural belt admeasuring nearly 24.7 Sq.km (31.1%) has to be retained in the entire LPA.
- Based on the past and present trend residential use has to be proposed along the north and west part of the LPA.
- The road hierarchy has to be given special attention by way of identifying major activities and the importance of the area concerning the envisaged density patterns.
- Using the grid of roads concept missing links are to be identified in the LPA and proposals are to be given.
- The land for public and semi-public and the public utilities has to be earmarked across different parts of the LPA to cater to the district level requirements.
- Efforts are to be made in such a way that the land for Public and Semi-public and the public utilities are proposed in the Government lands, to the extent possible.

- Excepting already developed areas, Coastal regulation Zones and No Development Zones are to be earmarked as Agricultural use in the proposed land use map to restrict development in these zones.

## 13.2 CONCEPT PLAN

A concept plan has been prepared for Nagapattinam LPA based on the issues and their potential. The major potential of the Planning Area is a higher concentration of agricultural land, Coastal area, and Pilgrimage Centre. The major potentials of the planning area can be utilized to arrive at various proposals to spur the existing growth and economy of the town. 65.7 % of the total population is under the non-workers category. It is proposed to increase the workforce participation from 34.3 % to 36.5% gradually over the years, by creating additional employment opportunities of approximately about 14000. To enhance the employment opportunities in the Nagapattinam LPA, project proposals like Industries, Beachfront Development, Waterfront Development, fishing harbour are proposed.

Though the planning area has a higher concentration of agricultural land (39.9%), Agro-based activities are decreasing at a rapid pace. To conserve and promote agriculture-related activities and encourage agriculture workers, Agro-based industries are proposed as they will enhance food security.

Tuticorin leads in salt production at about 5.78 lakh tonnes followed by Nagapattinam at 4.57 lakh tonnes. In that context, Salt-based Chemical Industries are proposed to improve employment in Nagapattinam Local Planning Area.

Chennai Petroleum Corporation Ltd. (CPCL) has kick-started project activities for the construction of the 9 million metric tonnes per annum (MMTPA) refinery in Nagapattinam, at an estimated investment of ₹31,580 crores. This new refinery will produce petrol, diesel and polypropylene as a value-added product, for ₹31,580 crores. Therefore, using the by-product petroleum refinery-based Industries are proposed in the LPA.

The area proposed for Industrial use is 2.8 Square Kilometers. Out of 2.8 Square Kilometers, 50% of the area will be used for constructing Industries. As per URDPFI guidelines, 100 Industrial Employments can be created in one hectare. Through the proposed Industrial area, the employment that can be generated in the Nagapattinam Planning Area will meet the requirements as projected above.

The planning area falls under the Coastal area having a linear stretch of 16.7 Kilometers, which is 8.9% of the Nagapattinam District coastal stretch. The present fishcatch at Nagapattinam Fishing Harbour is estimated to be 18,600 TPA whereas in Thoothukudi the average fish catch is 23000 TPA. About 15% of the total working population are from fisheries. Therefore, fisheries form a major part of the economy in the Nagapattinam Local Planning Area.



As the town has a higher potential for fisheries, marine-based industries are proposed to improve employment opportunities.

Velankanni and Nagore are famous Pilgrimage centres in Tamil Nadu having a total share of 3.2% of the total tourist footfall in Tamil Nādu. To support tourist footfall in Nagapattinam Local Planning area, Recreational activities and Commercial activities are proposed. The Proposed activities will improve the employment prospects and image of the town.

The existing commercial area (28.6% of overall Commercial Area) is concentrated in the core town of Nagapattinam LPA. It creates congestion in the core area. In that context, it needs to be decentralized to other parts of the LPA to have balanced growth. New Commercial centres are proposed near the tourism sites and along the Transport corridors in a spatially balanced distributed manner to reduce congestion and to create employment.

Nagapattinam, Nagore, and Velankanni are enriched with beaches. Available recreational space is only 0.3% of the total planning area. In that context providing more recreational spaces in the form of beachfront development in Nagapattinam and riverfront development along Vettar River in Nagore, will enhance the quality of the town, attract more tourist population and create employment. Beachfront development and Riverfront development proposed, will act as a lung space for the town and acts as a gathering space for the people of the town and the Tourists.

Nagapattinam falls under the Coastal regulation zone, having a share of 15.5% of the Total Planning Area. 58.9 % of the Coastal Regulation Zone falls under the No Development Zone. In No Development Zone, activities such as Waterfront Development, Agriculture, Horticulture, Parks, Playfields, fishing relating activities such as Auction halls, drying yards and Boat Building yards are permissible.

Therefore, No Development Zone is utilized for providing recreational spaces, Beachfront Development, Waterfront Development and Boat Building yard.

To support the above facilities and the projected population growth, additional residential requirement for the year 2041 will be 4.5 Square Kilometers. The existing trend of the residential areas are getting developed along the north (Nagapattinam-Nagore) and west (Nagapattinam-Sikkal) part of the core town. Following the existing trend and looking into land suitability maps prepared, residential use is proposed for future requirements. (Figure 13.1)

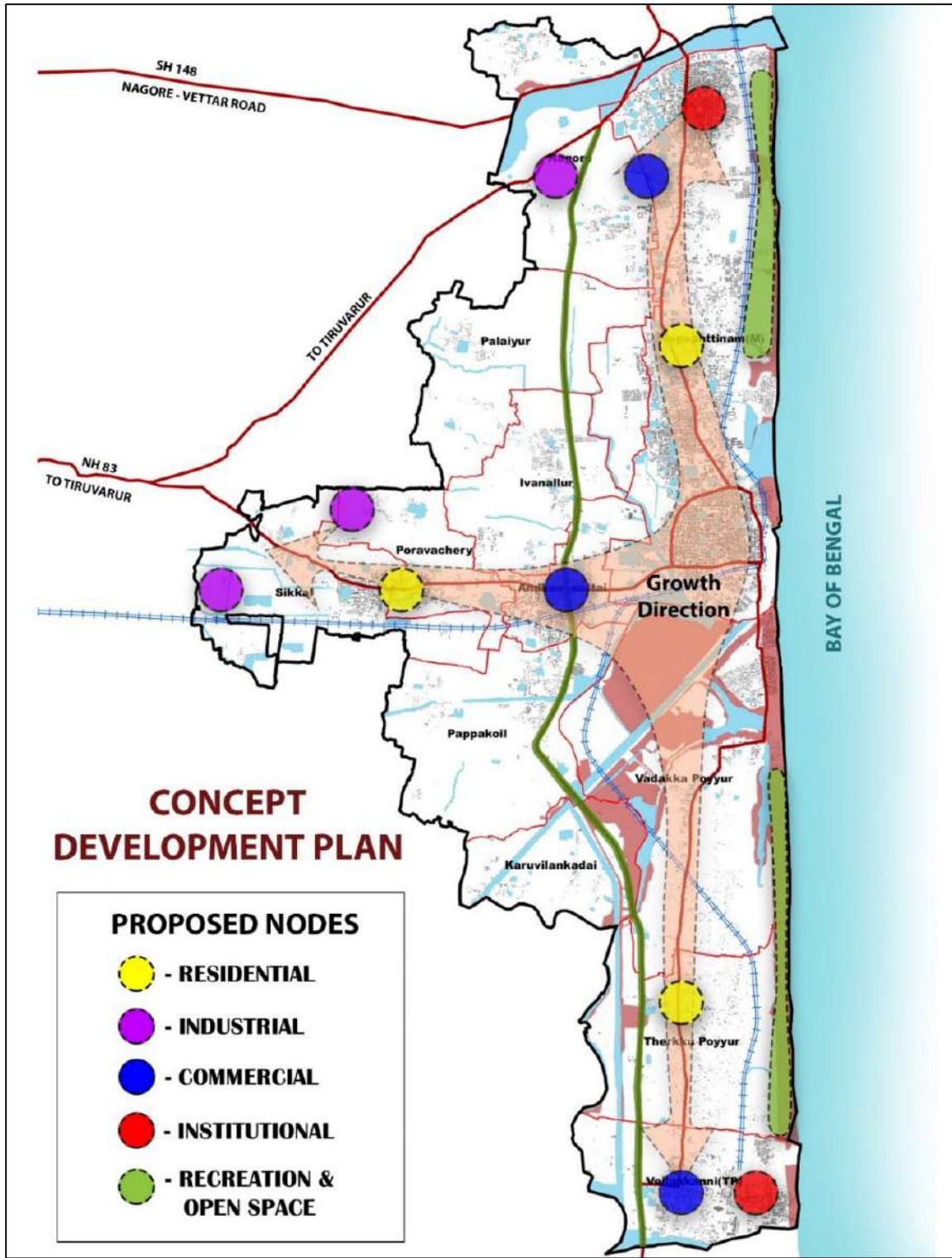


Figure 13.1: Concept Plan for Nagapattinam LPA

### **13.3 PROJECT PROPOSALS**

The Master Plan for Nagapattinam LPA 2041 has identified various project proposals considering the different components of infrastructure and urban development and evolved a spatial plan to support it. The responsibility for the implementation of projects across different sectors along with the phasing plan and the agencies responsible for the implementation of these projects has been illustrated in this section.

Identified Projects, implementing agencies, schedule and approximate costing shall help concerned departments to visualize long-term requirements and prioritize their actions in their budgets and financial resources taking into account the projects identified by master plan. Project proposals would also help in better coordination among various line agencies and concerned stakeholders. The following projects are identified in each sector in the master plan for implementation.

#### ***SIDCO (Food Park)***

Trichy-Nagapattinam transport corridor is declared as Agro-Industrial corridor by micro small and medium enterprises department to encourage the formation of new Agro and food processing units in the region and initiatives such as the formation of new industrial estates are planned. MSME also suggest that Nagapattinam block has good scope for marine-based industries also. By considering the above prospects an Industrial estate comprising of Agro-based Industries and Marine based Industries is proposed along NH-83 in Sikkal Village. The components comprised in Agro-based and Marine based industries are discussed below.

#### ***Agro based Industries***

Nagapattinam block is rich in Paddy cultivation. Nagapattinam block has an average yield of about 2182 kg/ha in Paddy cultivation. The total Paddy production in the Nagapattinam block is about 35933 Tonnes/year. Among all the other blocks in the Nagapattinam district, the Nagapattinam block has a higher quantity of Paddy production (Table13.1). So, by providing Paddy based industries in the district headquarters Nagapattinam will help in processing the Paddy and export to other parts of the country which will improve the economy and as well create employment opportunities. Rice bran is the most important source of edible oil among the unconventional source. Though having higher productivity of Paddy there are no Oil extraction mills in Nagapattinam Taluk. So, Oil mills can be proposed through which rice bran oils can be extracted from rice husk.

Nagapattinam Taluk also has Mango cultivation for about 128 ha. In the LPA VadakkuPoigainallur Village has Mango Cultivation and the nearby Kilvelur and Vedaranyam

Taluks have higher mango productivity (Table13.1). Taking note of this, mango pulp processing industry is proposed in Sikkal which has greater accessibility to nearby taluks and districts.

Nagapattinam Taluk has 160 ha of land under Coconut Cultivation which produces about 13 lakh nuts per year and the nearby taluks namely Kilvelur and Vedaranyam also have higher coconut productivity (Table13.1). By Utilizing the above potentials Coconut based processing units to produce plain coconut oil, packaged tender coconut water and coconut milk cream can be proposed. Coconut oil extraction and coir manufacturing industries are also Proposed.

Paddy is the major crop both in terms of area under cultivation as well as production. So, MSME has identified that Paddy based Straw Board can be manufactured through Straw board manufacturing Industries. It can be exploited as an income generation activity.

Agriculture is practiced in nearly 40 % of the Total Planning Area. Therefore, the Agro-based industry will become at the Centre stage of the economic development of the district. In that context, Agro-based industries are Proposed for an extent of about 15 acres.

**Table 13.1: Taluk wise agricultural productivity in Nagapattinam District**

Name of the Taluk	Paddy		Mango		Coconut	
	Area (in ha)	Total Production (in Tones)	Area (in ha)	Total Production (in Kg)	Area (in ha)	Total Production (No. of Nuts)
Nagapattinam	16,467.96	35933	128	666	161.79	13 lakhs
Kilvelur	15001.00	32732	523	2,720	522.14	42.6 lakhs
Vedaranyam	16149.00	35237	1929	10,031	1548.42	126 lakhs
Thirukkuvalai	10665.60	23272	6	31	37.16	3 lakhs

(Source: District Diagnostic Study Nagapattinam)

#### **Project Components**

- Rice Mills
- Rice Bran oil extraction mills
- Straw board manufacturing mills
- Mango Pulp processing industry
- Coir manufacturing industry

#### **Marine based industries**

As per the MSME techno-economic survey report of Nagapattinam district, Nagapattinam Block has good scope for marine-based industries such as fish processing, PVC net floats, repairing and servicing of a motorboat engine. The present fish catch at Nagapattinam fishing

harbour is estimated to be 18,600 TPA whereas in Thoothukudi the average fish catch is 23000 TPA. Though the fish catch in Nagapattinam is nearly 3/4th of the fish catch in Thoothukudi, Nagapattinam lacks in fish processing and storage facilities. Among the other Taluks in Nagapattinam district, Nagapattinam block has a higher quantity of fish Catch. Tharangambadi fishing harbour has 8500 TPA whereas Nagapattinam fishing harbour has fish catch of about 18600 LPA. Nagapattinam Taluk has a higher concentration of fishermen Population (20953) and Population involved in fishing-related activities (8459) in the entire district (Table13.2). The above statements show the potential for marine-based industries in Nagapattinam. So marine-based industries such as fish processing units, Ice plants and fish oil extraction mills can be proposed to increase the potential for fisheries export and promote the economy of the Fishermen population and provide employment opportunities for the fishermen population. The area proposed for marine-based industries is about 10 acres. Among the two harbours in Nagapattinam district, Nagapattinam LPA has a higher number of fishing Crafts (including Trawlers, Mechanized and Non-mechanized boats) of about 1468. The capacity of the existing boat building yard in Nagapattinam is 20 Boats. so, a new land for the boat building yard is proposed to repair and build new boats in Nagapattinam. This will increase the fish catch potential and create employment opportunities for the fishermen population.

**Table 13.2: Taluk wise contribution in fisheries sector**

<b>Description</b>	<b>Nagapattinam</b>	<b>Tarangambadi</b>	<b>Vedaranyam</b>	<b>Kilvelur</b>
Fisher men Population	20953	13161	17,656	5574
Population involved in fishing related activities	8459	4580	7,867	3,032
Fish catch (in Tonnes per annum)	18600	8500	-	-
Craft owned by Fisher folk	833	584	1172	543

*(Source:Tamil Nadu Marine fisheries Census,2010)*

### **Project Components**

- Fish processing units
- Ice plants
- Fish oil extraction mills
- Boat building yard

### ***Salt based Chemical Industry***

Thoothukudi is the major salt producer in Tamil Nadu with Vedaranyam following close on its heels. Tuticorin leads in salt production at about 5.78 lakh tonnes followed by Nagapattinam at 4.57 lakh tonnes. MSME has identified fish, Prawn and Industrial Salt as major exportable Items in Nagapattinam. Being a large salt producer, the Salt-based industry can be Proposed in the district headquarter of Nagapattinam to process the salt and increase the export to other parts of the country which will create more employment opportunities, and enhance the local economy.

### ***Petroleum refinery Industry***

The petrochemical industry has carved itself a niche and emerged as the most vibrant segment of our industrial structure. Chennai Petroleum Corporation Ltd. (CPCL) has kick-started project activities for the construction of the 9 million metric tonnes per annum (MMTPA) refinery in Nagapattinam, at an estimated investment of ₹31,580 crores. This new refinery will produce petrol, diesel and polypropylene as a value-added product, for ₹31,580 crores. Polypropylene can be used in plastic manufacturing. So, there is a potential for Plastic manufacturing and Chemical based Industries in Nagapattinam LPA.

### **Project Components**

- Plastic manufacturing and Packaging Industries
- Chemical based Industries

### ***Mini power plant based on paddy husk***

Paddy husk, which is available in plenty in the planning area can be utilized for power generation. Paddy husk which has a caloric value of 3000 kCal/kg, is capable of high-efficiency combustion. Therefore, it can serve as the fuel for mini power plants of 1 to 2 MW capacity that can be set up in rural areas. Considering the paddy production of around 35933tonnes/annum in Nagapattinam Taluk, the paddy husk availability is around 7186 tonnes.

As per the MSME Survey report,104700Tonnes of paddy husk can support 22 Mini power plants So, the paddy husk generated from Nagapattinam Taluk can support 2, No's of Mini power plants in Nagapattinam Taluk. Mini Power Plant (2 No's) based on Paddy husk is proposed in the planning area to generate electricity for rural areas.

### ***New fishing harbour at Nambiyar Nagar in Nagapattinam***

The existing fishing harbour in Nagapattinam has become congested. So, the Department of Fisheries has proposed a fishing harbour of 10.8 acres area at a cost of 34.3 crores at Nambiyar Nagar in Nagapattinam Municipality. The project location has more than 10,000 traditional boat

fishing communities. The proposed fish handling capacity of the new harbour is about 25,000 Metric Tonne per annum. The Mini Fishing Harbour Project at Nambiyar Nagar will facilitate holding 66 mechanized boats and 252 fishing boats and will also help more than 5,000 fishermen for whom fishing is the main source of livelihood. The fishermen get a fish catch of 180 Tonnes in a year valuing about INR 100 lakhs for a vessel. The proposed development of a fishing harbour at Nambiar Nagar will generate more employment opportunities for the local unemployed people and the fishermen community.

### **Project Components**

- Jetty
- Administrative building
- Fish handling halls,
- Auction hall,
- Ice Plant – I
- Ice Plant - II
- Cold storage units,
- Net mending shed
- Fuelling station,
- Wastewater treatment plant
- Fish drying Platform
- Parking area
- Parking area-Trucks
- Power-back up centres and
- Public rest room

### ***Redevelopment of existing fishing harbour in Nagapattinam and fish landing centre in Nagore village***

The existing harbour in Nagapattinam has become congested and lacks ancillary facilities such as Cold storage units, ice plants etc. So, the department of fisheries has proposed are development of the existing harbour in Nagapattinam. The fish landing centre in Nagore village also needs to be strengthened to encourage fisheries in Nagapattinam LPA.

### **Project Components**

- Auction hall – 3nos
- Net mending Shed - 2nos
- Gear Locker Shed

- Admin Building
- UG Sump Fresh Water
- UG Sump Saline Water
- Gen Set Room
- Security Cabin
- Toilets - 2 no's
- Drainage Network
- Solid Waste Management
- Sewage Treatment Plant
- Road & lightings
- Parking area.

***Beachfront development at Nagapattinam (Blue Green Infrastructure)***

The seaside town Nagapattinam has a coastal stretch of about 16.7 km. Due to this, the planning area is enriched with beaches. The new beach at Nagapattinam is the major entertainment spot for the residents as well as tourists. The area surrounding these sea coasts is a crucial spot as it acts as a transitional zone between land and water. Therefore, converting these zones into active and appealing public spaces helps to develop connectivity between the stiffness of the built environment and the fluidity of water. Developing the beachfront trails also provides residents to access new recreational opportunities, develop tourism, generate employment, support the local economy, and stimulate growth. So, the coastal area of a 1.5 km stretch of New Beach in Nagapattinam Municipality (Figure 13.2) is proposed for beachfront development.

The objective of this project are as follows,

- Creating a coherent, visually pleasing order to the water's edge,
- Protecting existing natural areas from development.
- Revenue generation
- Tourism potential can be improved by offering a variety of attractions like water sports, entertainment arenas, parks.



### Project Components

- Green Roadways
- Parking
- Cycling track
- Food Courts
- Retail spaces
- Water sports
- Sit outs
- Promenades
- Meditation spaces
- Toilets
- Landscapes



**Figure 13.2: Conceptual design of Beach Front development (for reference only)**

### ***Riverfront development at Nagore (Blue Green Infrastructure)***

The riverfront development provides a unique opportunity to enhance the image of the town. Three rivers namely Kaduvaiyar, Vettar, Vellaiyar running through the planning area offer an interesting track of natural space. Unplanned developments in Nagapattinam LPA resulted to lack of recreational spaces in the core areas. Therefore, the development of Riverfront is a better idea for transforming underutilized space into a vibrant & active centre for leisure, tourism, culture and business activities. Promoting riverfront development also improves the image of the town, enhance the environment, protect the river ecosystem meanwhile providing a place for people to relish.

Being the largest river in the LPA Vettar River is taken for riverfront development. Hence, a riverfront of 1.5 km length along Vettar river in Nagore has been proposed for riverfront development (Figure 13.3).

### Project Components

- Riparian Buffer
- Park
- Children's play area
- Promenades
- Cycling track
- Food Courts
- Petty shops
- Sit outs
- Parking
- Toilets



**Figure 13.3: Conceptual design of River front development (for reference only)**

### *Eco-tourism at Velankanni*

Mangrove forests provide many significant functions for land and sea. They stabilize the shoreline, prevent erosion, provide habitation for many species, function as pollutant absorbents, and offer many other benefits. One of the social functions of the mangrove ecosystem is tourism attraction. Developing these areas not only boosts tourism activity but also enhances the well-being of coastal communities.

Vast mangrove vegetation is seen along the Vellaiyar and Kaduvaiyar rivers in Nagapattinam. Nagapattinam district administration has an idea to develop ecotourism along these mangroves. The promotion of Mangrove ecotourism not only preserves these natural resources but also generates employment for the local community, provides more recreational opportunities for the tourists, and conserves the natural resource. So, the mangrove forests along Vedaranyam Canal (Vellaiyar River) at Velankanni have been chosen for the development of ecotourism (Figure 13.4).

In the Sindhudurg district in Maharashtra, a Self-Help Group protects its mangroves through ecotourism. The Mangrove Safari Programme organized by this group has been recognized as a model for community-led conservation through ecotourism. The Maharashtra forest Department has decided to replicate this model in other parts of the state. Similar types of initiatives can be thought of for Nagapattinam to empower women in rural areas. The project components listed below is proposed to be located at Survey No 106 of Velankanni Village.

### Project Components

- Mangrove Safari
- Bamboo Pathways
- Observatory Platforms
- Jetty
- Parking
- Food Court
- Visitor's Centre
- Children's Park



**Figure 13.4: Conceptual design for Eco-Tourism (for reference only)**

### ***Central Park at Nagapattinam (Blue Green Infrastructure)***

Nagapattinam acts as a district headquarter for Nagapattinam District. Being a district headquarter, it does not have any large public gathering space/Community Park. Green /Open spaces are the most vital element in urban living. Rapid urban development and increasing population put open spaces under pressure. Nagapattinam does not have any central park kind of space which can even act as a landmark for the town. So, a central park of 12 acres is proposed (Figure 13.5) in Nagapattinam Municipality to enhance the image of the town and quality of life.

### Project Components

- Children's play area
- Parking
- Toilets
- Pedestrian path
- Benches and seating area
- Fitness area
- Fountain plaza
- Iconic Tower
- Edible Landscapes / Lawns



**Figure 13.5: Conceptual design for Central Park (for reference only)**

### ***UlavarSandhai in Nagore and Velankanni***

Nagapattinam block has more production on following crops namely Brinjal, Ladies finger, Coconut and Tamarind. Nagapattinam (52.6 ha) and Kilvelur (266 ha) Taluks have a higher concentration of land under Horticulture crops. Nagapattinam block has only one regulated market in Nagapattinam Core town. The % age of procurement of produce in the existing regulated market is only 30%. Wholesale market kind of facilities is not available in Nagore and Velankanni. So, providing two markets in the form of UlavarSandhai in Nagore and Velankanni will cater for the farmers in the nearby Kilvelur Taluk.

This proposal will contribute to the income generation of the farmers and promote agriculture. UlavarSandhai of 2.5 acres each is proposed in Nagore and Velankanni.

### **Cyclone Shelters**

The primary use of the cyclone shelter is for protecting people from the vagaries of nature such as floods, cyclones and tsunami. It also acts as relief camp during other disasters. Nagapattinam is highly prone to natural disasters. So, Cyclone shelters play a major role to protect people from damage. As shown in the Table 13.3 Nagapattinam Municipal area has 2 cyclone shelters of 300 Capacity each and another Cyclone shelter in Velankanni of 500 Capacity and 10 Community halls in different Villages in the LPA with a total capacity of 1430 are used as relief centres.

**Table 13.3: Cyclone shelters in Nagapattinam LPA**

<b>S. No</b>	<b>Name of the Town</b>	<b>No. of Cyclone shelter</b>	<b>Capacity</b>
1	Nagapattinam Town	2	600
2	Velankanni Town Panchayat	1	500
3	Community halls used as relief centres	10	1430

*(Source: Disaster Management Plan for Nagapattinam District)*

Nagapattinam LPA also has several relief centres in the form of Schools, Colleges and Marriage/Community halls. The municipal area, Velankanni, VadakkuPoigainallur and TherkuPoigainallur are located along with the coastal areas. The existing capacity of Cyclone shelters in Nagapattinam LPA is about 2530 which can accommodate only 7.6% of the total population in vulnerable areas coastal areas. Relief Centres such as schools, colleges and community serve the remaining people during the disaster period.

The district administration has a proposal for a new Multipurpose Community Hall in Nambiyar Nagar of Nagapattinam. The Nambiyar Nagar shelter got completely dilapidated and was demolished in 2021. It was catering to 5000 people living in Nambiyar Nagar, Maraimalai Nagar, Elancheran Nagar and Cooks Road. Hence it is proposed to build a multi-purpose evacuation shelter to function as a community hall during the non-monsoon season and as an evacuation shelter during the monsoon season.

### **New bus stand in Nagapattinam**

The present New Bus stand was constructed in 1988 at Nagapattinam. The existing bus stand in Nagapattinam Municipality is located in the core area which is creating congestion and traffic issues. To ease the traffic movement within the urban area and being administrative head quarter, the existing bus stand needs to be relocated to the outskirts of the city along the East

Coast Road (NH-32). By proposing a new bus stand on the outskirts will increase the accessibility to other parts of the district and Pondicherry state and the core area will be free from heavy traffic movement.

### **Project Components**

- Terminal building with adequate bus bays
- Public amenities such as drinking water facilities, shops, Toilets etc.
- Passenger waiting halls
- Pedestrian Corridors
- Ticketing facilities
- Parking facilities

### ***New bus stand in Velankanni***

The existing bus stand in the Velankanni town is located along Velankanni main road. The tourist footfall will be high along this road during festival times and during the weekends. The location of the bus stand on this road makes the road congested and the bus stand is inadequate to cater for the needs of the floating population. The bus stand gets highly congested during the peak festival time. For this purpose, shifting of bus stand has been proposed from the city core to nearby east coast road. In that context, a new bus stand is proposed along the NH-32.

Through this proposal, the image and the heritage value of the town can be retained. The New Bus stand in Velankanni is proposed to an extent of 4 acres along NH-32.

### **Project Components**

- Terminal building with adequate bus bays
- Public amenities such as drinking water facilities, shops, Toilets etc.
- Passenger waiting halls
- Pedestrian Corridors
- Ticketing facilities
- Parking facilities

### ***Multi-level parking in Nagapattinam and Nagore***

Issues related to parking seem to be a major concern at the tourism zones in the planning area, especially during the festival seasons. Inadequacy in parking spaces is noticed in most of the surveyed locations in Nagapattinam Town and Nagore. Table 13.4 reveals that maximum parking is observed in Neela South Street with 4799 vehicles parked from 9.00 am to 8.00 pm. and the least amount of parking is observed in Kalmatu Street (467 vehicles) among the surveyed locations.

However, during festival seasons inadequacy in parking space is observed in Syed Palli Street, Manara North Street, and Kalmatu Street.

Multi-level car parking systems can help maximize parking capacity. Providing Multilevel parking in Nagapattinam and Nagore will relieve the roads from unlawfully parked vehicles, increasing the rate of traffic flow. The proposed multi-level parking facilities in Nagore will decongest the roads around the dargah and improve the quality of the space.

**Table 13.4: On-Street Parking details in Nagapattinam Municipality**

S. No.	Name of the Road	No. of vehicles parked (12 Hrs)								
		Car	Two-Wheeler	Auto	Cycle	Rickshaw	Tempo	Truck	LGV	Total
1	Syed Palli Street	143	944	113	72	0	7	1	0	1280
2	Manara North Street	185	443	58	56	0	0	0	0	742
3	Kalmatu Street	54	338	49	25	0	0	0	1	467
4	Neela East Street	255	1733	53	155	26	20	9	4	2255
5	Neela South Street	80	3891	51	736	25	5	1	10	4799

#### ***Food court with Aquarium***

The pilgrims, who visit Velankanni church, certainly visit the nearby beach. Keeping in this mind proposals to create recreational space in the form of food court combined with an aquarium have been proposed in Velankanni which will enhance the image of the town and also act as source of employment generation. Food Court with Aquarium is proposed to an extent of about 2 acres.

#### ***Hotels in Nagore and Velankanni***

Nagore and Velankanni are famous Pilgrimage sites in the Planning area. The tourist footfall in these places is high. The tourist footfall in Velankanni and Nagore is about 65 and 47 lakhs per year. According to the survey conducted by NSSO on Domestic Tourism in India, 21% of households reported at least one overnight stay Based on these statistics the demand for accommodation facilities for the present and projected tourist population has been estimated.

Velankanni Basilica's Trust has its accommodation facilities with 5000 beds which makes tourist accommodation easier. Nagore has hotels with 200 beds and homestays. To increase the tourist footfall in Nagore and enhance the quality of stay, new accommodation facilities need to

be proposed in Nagore. To accommodate the Projected tourist population in Nagore and Velankanni, Tamil Nadu Tourism Development Corporation has a Proposal for hotels of 5 acres area in Nagore and Velankanni.

### ***Rejuvenation of Panangudi lake (Blue Green Infrastructure)***

The water body is an important feature of the urban landscape. Water bodies serve many environmental functions including flood and soil erosion control and are useful for irrigation, drinking water supply and groundwater recharge. The scarce and costly land resources stress the water bodies ultimately. Panangudi lake in Nagapattinam is the largest lake of 176 acres. By rejuvenating this lake, the water source from this lake can be used for drinking as well as agricultural purposes in Nagapattinam Local Planning Area.

### ***Storm water drainage channel improvement***

Being in a Coastal line, the area is Vulnerable to frequent cyclonic storms. Agastheeswarar Swami Thirukulam (Sivan Koil Kulam) located in Ward No.16 of Nagapattinam Municipality always overflows during the North-East monsoon and the excess water runs into streets and nearby houses causing heavy damage to local inhabitants. Hence the district administration has the proposal to desilt the tank and to rebuild the revetment wall, besides making a necessary channel for the overflowing water to reach the Vettar river located at a distance of 300 m away from the tank.

### ***Deepening of Devanathi channel in Nagapattinam Municipality***

Devanathi Channel is located at the mouth of the Bay of Bengal. Although desilted by Nagapattinam Municipality every year, it gets flooded during every monsoon period. Besides flood, the backwater from the sea is creating troubles to localities of wards 12,15,16,20 and 28 of Nagapattinam Municipality, thereby affecting 3500-4000 residents along with Cattle Population. The cause for such devastation is found to be because of low channel depth and no proper revetment wall. Hence the district administration proposed to construct a revetment wall and to deepen the Channel. It will protect the locality from inundation.

### ***Proposal for creation of Bio-shield along the coastal stretch (Blue Green Infrastructure)***

The Coastal Stretch in Nagapattinam LPA is about 16.8 Sq.km. Casuarina plantations are acting as shelterbelts. But most of the plantations mainly from the Nagore to Velankanni belt got severely damaged during Gaja Cyclone. Hence, the district administration has a proposal for raising new Casuarina shelterbelt plantations along the coastline, which will act as a Bio-shield. This will ensure the benefit of coastal protection through shelterbelt plantation, Carbon Sequestration and revenue generation through the supply of mature pulpwood to the paper industry.

### **Sea water protection weir proposal in VadakkuPoigainallur**

During Cyclones, Sea Water Intrusion takes place through river mouths in VadakkuPoigainallur. This seawater intrusion led to increased salinity in the groundwater which results in a reduction in agricultural production and fertility of the soil. So, to stop the seawater from entering into the developed areas Protection weirs of 1m height wall with 1m shutters is proposed in VadakkuPoigainallur Village to avoid the intrusion of Sea Water. The CheckDam proposed will act as a water storage system, thereby improving groundwater quality and also act as a barrier for seawater intrusion.

### **Heritage Plan for Nagore**

Nagore Dargah is a famous Pilgrimage centre in the Planning area. To restore, revive and strengthen the soul and heritage of Nagore town Heritage plan needs to be prepared. The Heritage Plan should focus on the development of civic infrastructure development projects around heritage sites, leading to the revitalization of the city as a heritage and cultural destination. The project proposal, land requirement, Project cost and implementing agency for the projects listed above are given the Table13.5.

**Table 13.5: Project Proposals for Nagapattinam LPA-2041**

<b>S. No</b>	<b>Name of the Project</b>	<b>Land requirement (in acres)</b>	<b>Approximate Cost (in Crore)</b>	<b>Implementing agency</b>
1	SIPCOT (Food Park)	20	25.0	TANSIDCO/ PPP
Agro based Industries		15	20.0	
Marine based Industries		10	10.0	
2	Salt based Chemical Industry	5	15.0	Tamil Nādu Industrial Development Corporation limited
3	Petroleum refinery Industry	3	10.0	
4	Mini Power Plant based on Paddy husk	5 No's	3.0	Tamil Nadu Energy Development Agency (TEDA)



<b>S. No</b>	<b>Name of the Project</b>	<b>Land requirement (in acres)</b>	<b>Approximate Cost (in Crore)</b>	<b>Implementing agency</b>
5	New fishing harbour at Nambiyar Nagar in Nagapattinam	10.8	34.3	Department of Fisheries
6	Redevelopment of existing fishing harbour in Nagapattinam	-	6.0	
7	Beach front development at Nagapattinam	1.5 km Stretch	55.0	Nagapattinam Municipality
8	River front development of Vettar River in Nagore	1.5 km Stretch	120.0	Nagapattinam Municipality
9	Eco-Tourism at Velankanni	-	-	Velankanni Town Panchayat and Nagapattinam District administration
10	Central Park at Nagapattinam	12 Acres	5.0	Nagapattinam Municipality
7	Ulavar Sandhai in Nagore and Velankanni	2	2.0	Tamil Nadu Agricultural Marketing Department
8	Cyclone Shelters in Nambiyar Nagar, Nagapattinam	1	5.3	Tamil Nadu State Disaster Management Authority
9	New Bus Stand in Nagapattinam	10	15.0	Nagapattinam Municipality
10	New Bus Stand in Velankanni	4	6.0	Velankanni Town Panchayat
11	Multi-level parking in Nagapattinam and Nagore	500 Vehicles (100 Cars)	35.0	Nagapattinam Municipality
12	Food Court with Aquarium in Velankanni	1	1.5	Velankanni Town Panchayat

S. No	Name of the Project	Land requirement (in acres)	Approximate Cost (in Crore)	Implementing agency
13	Hotels in Nagore and Velankanni	5	2.0	Tamil Nadu Tourism development Corporation
14	Rejuvenation of Panangudi lake	176	2.5	Water resources department
15	Deepening of Devanathi channel in Nagapattinam Municipality	-	7.0	Water resources department
16	Proposal for creation of Bio-Shield along the Coastal Stretch	16.7 km stretch	0.5	Department of forestry
17	Sea Water Protection Weir in Vadakku Poigainallur Village	1 m height wall with 1m height shutter	1.2	Water resources department
18	Heritage Plan for Nagore	-	25.0	Ministry of Urban development
19	Construction of Barrage to prevent salt water intrusion in Kaduvaiyar and Vettar River in Nagapattinam Municipality	-	100	Water Resource Department
19	Construction of curved Training walls in Velankanni	-	20	Department of fisheries and Water Resource

#### 13.4 PROPOSED LAND USE 2041

To regulate the growth of the local Planning in an orderly manner and also to ensure its economic viability, social stability and sound management for the present and the foreseeable future, the Master Plan with zoning and development regulation is necessary. The idea of zoning is that the segregation of certain uses from others reduces the effect of negative externalities, which some uses have on others. Based on the Project Proposals Proposed land use Plan is prepared for Nagapattinam LPA. Table 13.6 shows the Proposed Land structure for Nagapattinam LPA.

**Table 13.6: Proposed land use area split up for Nagapattinam LPA**

Land Use Classification	Nagapattinam Municipal Area		Revenue Villages outside Municipal area		Nagapattinam LPA	
	in Sq.km	%	in Sq.km	%	in Sq.km	%
Residential	6.37	44.36	16.66	25.34	23.02	28.75
Commercial	0.43	2.99	2.05	3.13	2.48	3.10
Institutional	3.28	22.83	7.56	11.50	10.83	13.52
Industrial	0.12	0.85	2.28	3.46	2.40	3.00
Agricultural	0.20	1.36	23.66	35.99	23.85	29.78
Water Bodies	1.46	10.17	6.66	10.14	8.12	10.14
Transportation	1.24	8.65	2.85	4.34	4.10	5.12
Open Space and Recreational	1.26	8.79	1.75	2.66	3.01	3.76
Non-Urban use	0.00	0.00	2.27	3.45	2.27	2.83
<b>TOTAL</b>	<b>14.35</b>	<b>100.00</b>	<b>65.73</b>	<b>100</b>	<b>80.08</b>	<b>100</b>

The overall objective of this proposed land use is to improve the economy and cater future population of the town with its potential. Proposed land use zoning for Nagapattinam LPA is done based on TNCDBR, 2019. In the proposed land use 2041 of Nagapattinam LPA land use zones are classified as residential, commercial, institutional (Public and semi-public, service and utilities and communication), Industrial and Agricultural uses. The proposed land use of Nagapattinam LPA has residential use of about 28.75% of the total area (23.02 Sq.km). Residential use has been proposed based on the residential area requirement calculated based on the projected density.

Residential areas are proposed along the north and west direction of the Municipality because the natural growth in Nagapattinam LPA takes place along these two directions only. As Nagapattinam lacks in economic development Commercial and Industrial activities are encouraged to boost the economy of the town. Commercial use is proposed to about 3.10% i.e. 2.48 Sq.km. Three commercial centres identified along the major transport corridors, will reduce the congestion in Core town and also improve the economy of the town. Nagore and Velankanni which is located within the Planning area have tourism potential. Taking note of this, commercial activities are provided in those areas to cater the future tourism growth (Map 13.1 & 13.2).

The Planning area has a higher concentration of agricultural land and coastal activities. Industrial developments to suit the above activity are proposed to enhance the economy and

provide opportunities for the future population. In the proposed land use, industrial use has been proposed to an area of about 2.40 Sq.km (3 %). Agricultural share in the planning area has higher potential. Therefore, while proposing developments, agricultural land has been retained to the maximum extent. Retaining Agricultural land to the maximum extent possible will help in maintaining the ecological balance and food security. The share of agricultural land in the proposed land use is about 29.78 % which is 23.85 Sq.km. Water bodies are kept undisturbed which has an area of about 8.12 Sq.km (10.14%). In the proposed land use plan for Nagapattinam LPA, Commercial, Industrial and Recreational activities are given higher priority so that more opportunities can be created to improve the economy of the town.

In addition to adhering to the Tamil Nadu Combined Development and Building Rules (TNCDBR), 2019, the Nagapattinam Master Plan will introduce two new land use categories, Non-Urban Use Zone and Open Space and Recreational Zone, which were not previously available for Nagapattinam under the existing TNCDBR guidelines.

**Non-Urban Use Zone:** Covering an area of 2.27 square kilometers, this zone is primarily designated along the coastal areas to prevent development and protect the coastal environment. The intent is to preserve the natural landscape and prevent urban sprawl in sensitive regions, contributing to the overall sustainability of the area.

**Open Space and Recreational Zone:** Allocated an area of 3.01 square kilometers, this zone will provide much-needed recreational spaces such as parks, playgrounds, and green spaces for the community. It will ensure that residents have access to open areas for leisure, promoting a healthier and more balanced urban environment.

These additions are in line with the overarching objectives of the Nagapattinam Master Plan, which aims to balance development with environmental preservation and provide spaces for recreation. Along with the traditional land use categories of Residential, Commercial, Industrial, Institutional, Transportation, Agriculture, and Water Bodies, the introduction of these two zones will contribute to a more comprehensive and sustainable approach to urban planning in the Nagapattinam Local Planning Area.

**Table 13.7: Comparison of Existing and proposed land use share in Nagapattinam LPA**

Type of Use	Existing land use-2021 (in Sq.km)	%Share	Proposed land use-2041 (in Sq.km)	% Share
Residential	14.35	17.92	23.02	28.75
Commercial	0.64	0.81	2.48	3.10
Institutional	9.50	12.17	10.83	13.52
Industrial	0.33	0.41	2.40	3.00
Vacant land	7.11	8.88	0.00	0.00
Agricultural	37.52	46.85	23.85	29.78
Water Bodies	8.12	9.82	8.12	10.14
Transportation	2.51	3.14	4.10	5.12
Open Space and Recreational	0.00	0.00	3.01	3.76
Non-Urban use zone	0.00	0.00	2.27	2.83
<b>TOTAL</b>	-	-	<b>80.08</b>	<b>100</b>

### 13.5 COASTAL REGULATION ZONE (CRZ) NOTIFICATION IN THE NAGAPATTINAM MASTER PLAN

The Nagapattinam Master Plan for the Local Planning Area is set to incorporate the Coastal Regulation Zone (CRZ) Notification 2011. This notification is a critical framework for managing and regulating activities along Nagapattinam’s coastline, aiming to protect the district's unique coastal ecosystems while allowing for sustainable development. However, the CRZ Notification 2019, once approved, will supersede the CRZ Notification 2011. This transition will introduce updated guidelines and regulations that reflect current environmental and developmental priorities.

#### CRZ Notification 2011: Current Framework

The CRZ Notification 2011 is currently applied within the Nagapattinam Master Plan. This notification establishes guidelines for coastal zone management, with a focus on conserving coastal and marine ecosystems. It categorizes coastal areas into distinct zones, each with specific permissible activities and development restrictions:

- **CRZ-I:** Areas that are ecologically sensitive, where new construction is largely prohibited to preserve natural habitats.

- **CRZ-II:** Areas that have already been developed close to the shoreline, where development is regulated to prevent further degradation of the coast.
- **CRZ-III:** Relatively undisturbed areas that allow for controlled development, ensuring that rural and natural characteristics are maintained.
- **CRZ-IV:** Water areas, including the sea up to 12 nautical miles and tidal-influenced water bodies, where activities are regulated to prevent pollution and over-exploitation of resources.

The CRZ Notification 2011 emphasizes the conservation of natural resources while allowing for economic activities that do not harm the coastal environment. It is a vital tool for ensuring that development in Nagapattinam is both environmentally and socially sustainable.

### **Transition to CRZ Notification 2019**

The proposed CRZ Notification 2019, once approved, will supersede the CRZ Notification 2011. This updated notification aims to enhance the regulatory framework by introducing several key changes and improvements:

1. **Simplification of Processes:** The 2019 notification focuses on simplifying the clearance process, making it easier for development projects to receive necessary approvals. This is expected to facilitate sustainable development and attract investment to the Nagapattinam region.
2. **Updated Coastal Zone Management Plans (CZMPs):** Under the 2019 notification, Nagapattinam will develop updated CZMPs that reflect the latest environmental data and development priorities. These plans will guide the management of coastal resources and the implementation of regulations.
3. **Promoting Economic Activities:** The 2019 notification aims to promote sustainable tourism and other economic activities in coastal areas, recognizing their potential to drive growth and create employment. Temporary tourism facilities may be permitted in specific zones, subject to environmental safeguards.
4. **Empowerment of Local Bodies:** The notification enhances the role of local authorities and communities in managing coastal resources. This empowerment encourages participatory governance and ensures that local needs and priorities are considered in the implementation of CRZ regulations.
5. **Increased Floor Space Index (FSI):** The notification allows for an increased FSI in urban areas, facilitating vertical growth and optimizing land use. This change addresses the challenges of urbanization and population growth in Nagapattinam.

## **Implications for Nagapattinam**

The transition from the CRZ Notification 2011 to the CRZ Notification 2019 will have significant implications for Nagapattinam's development. The updated notification is expected to provide a more flexible and responsive framework for managing coastal resources, balancing economic growth with environmental conservation.

In conclusion, the integration of the CRZ Notification 2019 into the Nagapattinam Master Plan represents a forward-looking approach to coastal management. It underscores the importance of balancing development and conservation, ensuring that Nagapattinam's coastline remains a vibrant and sustainable resource for all.

### **13.6 BLUE GREEN INFRASTRUCTURE IN NAGAPATTINAM LOCAL PLANNING AREA**

As part of the Blue-Green Infrastructure (BGI) initiatives, the preservation of waterbodies in the Nagapattinam Local Planning Area is paramount. Waterbodies, including lakes, ponds, rivers, and wetlands, play a crucial role in maintaining the ecological balance, enhancing biodiversity, and providing essential ecosystem services. The proactive preservation of these waterbodies aligns with our commitment to sustainable urban development and resilience against climate change.

Preservation of waterbodies will provide the following outcomes in Nagapattinam Local Planning Area

1. Restoration projects will support a variety of plant and animal species, increasing the region's biodiversity.
2. Natural waterbodies will effectively manage stormwater, reducing the incidence and severity of urban flooding.
3. Groundwater recharge through preserved waterbodies will contribute to a reliable and sustainable water supply.
4. Preserved waterbodies will provide aesthetic, recreational, and educational opportunities for residents, enhancing their quality of life.

The preservation of waterbodies in the Nagapattinam Local Planning Area is a cornerstone of our Blue-Green Infrastructure initiatives. By protecting these vital resources, we are ensuring

ecological balance, enhancing biodiversity, and fostering a sustainable and resilient urban environment. Through concerted efforts in legal protection, pollution control, community engagement, ecological restoration, and sustainable development, Nagapattinam can continue to benefit from the myriad services provided by its waterbodies for generations to come. Waterbodies are preserved in the Master Plan of Nagapattinam Local Planning Area and the area of water bodies in Nagapattinam LPA is 1962 hectares. (Refer map no. 8.1 for waterbodies)

As per DTCP Circular ROC No. 4637/2019-BA2 dated 13.03.2019, the setback distances given below are to be treated as buffer distances from the waterbodies, where developments are not allowed.

1. Field Channel of Less than 1 m width - 1m
2. Major Canal more than 1 m width - 3m
3. River - 15m
4. Lake - 3m

It is proposed in the Master Plan that the Setback distances prescribed, where developments are not allowed, may be utilized to plant trees and improve the green cover in the Nagapattinam Local Planning Area and thereby try to reduce the impacts of Heat Island in the Local Planning Area.

### **13.7 URBAN FORESTRY**

An Urban forest include thick woody plant vegetation growing around human settlements for the purpose of improving the urban environment. Urban Heat Island is experienced in Nagapattinam Municipality. To prevent Urban Heat Island effect in the extended areas, an area of 9.35 acres in Vadakku Poigainallur village has been earmarked for Urban forestry.

### **13.8 PROPOSED PARKS**

Parks are already provided in the Nagapattinam Municipality. In the extended areas, that is within the Nagapattinam Local Planning Area and outside the Nagapattinam Municipality, Space for Parks and Playgrounds has been reserved as per table given below in the Master Plan to offset the Urban Heat Island.



### 13.9 PROPOSED PLAYGROUND

Parks & Playground is an essential component in an urban area to promote healthy balanced lifestyle. Adequate playgrounds are provided in the Nagapattinam Municipality. Outside the Nagapattinam Municipality and within the Nagapattinam Local Planning Area, space for Parks & Playgrounds are reserved in the Master Plan as per the table given below to promote healthy lifestyle.

**Table 13.8: Proposed Parks & Playground – Open Space and Recreational**

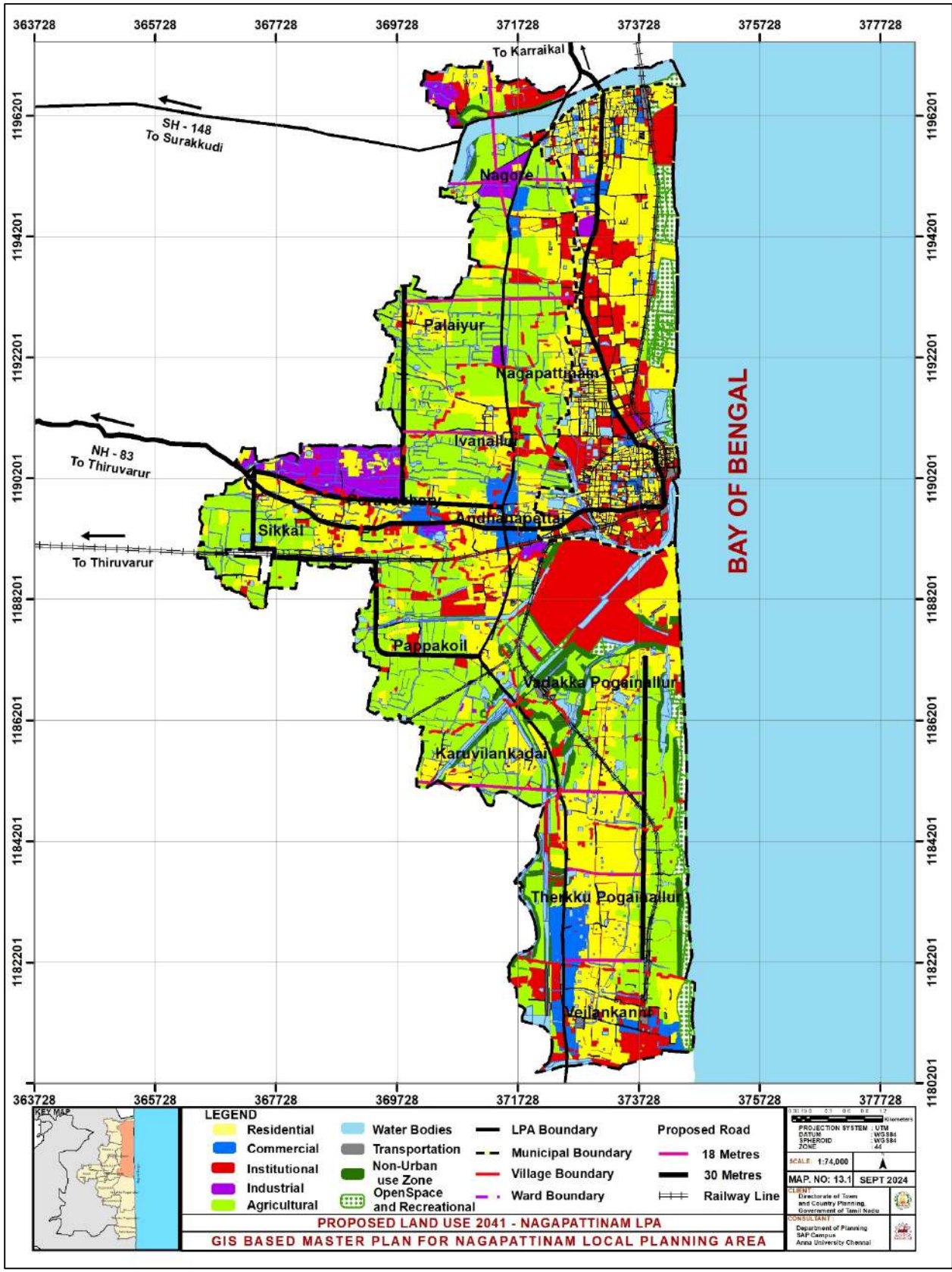
S.no	Clustering of neighborhood villages	Population as per census 2011	Land requirement as per RADPFI Guideline	Land area allocated for proposed Park and playground	Ownership of land	Survey Number
1.	1. Nagore, Muttam, Thethi 2. Paliyur 3. Nagapatinam village	4855	1 hectare	1.5 hectare	Govt Land	67/3A,3B (Muttam)
2.	4. Ivanalur, Manjakolai 5. Andhanapettai	12290	2.3 hectare	0.8 hectare	Govt land	28/1 (Ivanallur)
3.	6. Vadakku Poigainallur 7. Akkarapettai	10826	2 hectare	8 hectare	Govt Land	115 (Vadakku poigainallur)
4.	8. Therkku poigainallur 9. velankanni	15839	3.2 hectare	1.64 hectare	Govt Land	12 (Therkku poigainallur)
5.	10. Paravacheri 11. Sikkal	10073	2 hectare	0.5 hectare	Govt Land	29 (Sikkal)
6.	12. Papakovil 13. Karvvelan kadai	6116	1.2 hectare	0.3 hectare	Govt Land	290/3 (Papakovil)
	<b>Total</b>	<b>60000</b>	<b>11.7</b>	<b>12.74</b>		

### **13.10 SUMMARY**

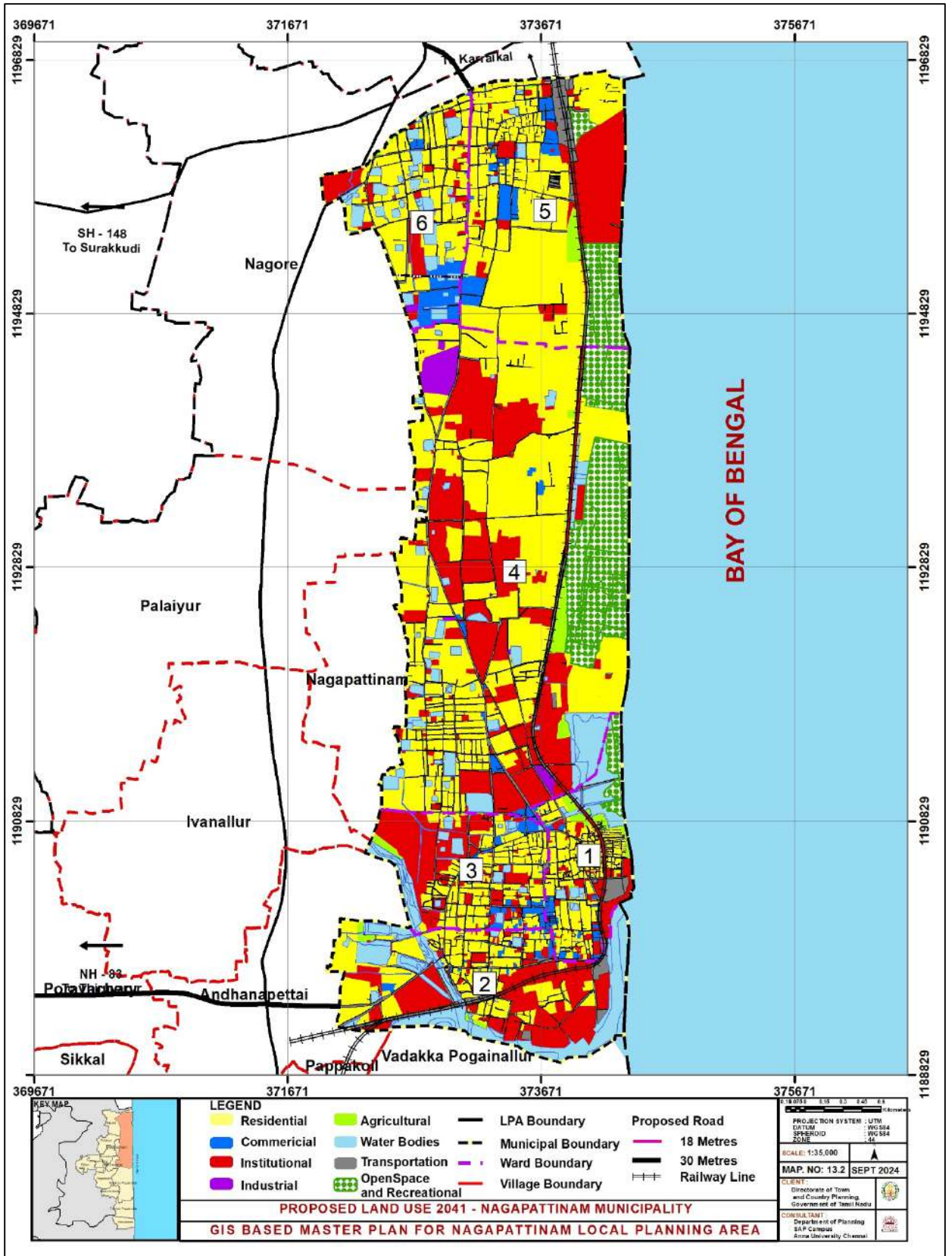
The growth of Nagapattinam town is promoted by inducing developments in a sustainable manner. To stimulate the growth prospects and regulate the growth of the urban area in an orderly manner and also to ensure the economic viability and social stability for the present and the future, a proposed land use plan has been prepared for Nagapattinam LPA. The proposed land use and the project proposals had been arrived using the inputs arrived from the analysis of the existing growth trend, suitable areas for development and potential sectors of the town.

Major proposals which will stimulate the economic activity in Nagapattinam are Agro-based, marine-based industries, salt and petroleum-based industries. Adequate land has been proposed for the major proposals in the proposed land use plan. The proposed projects will invigorate employment opportunities in the Nagapattinam LPA. Fishing plays a major role in Nagapattinam. A new fishing harbour is proposed to increase the fishing activities and improve the livelihood of fishermen.

As Nagapattinam is bestowed with beaches and rivers, recreational facilities are proposed along the Nagapattinam Beach and Vettar River in Nagore, in the form of beachfront and riverfront development projects. These proposals will enhance the employment opportunities and improve the quality of life of the people. Nagapattinam, due to its location, is prone to Natural hazards, so cyclone shelters are proposed to accommodate the people during disaster. To cater for the future tourist population in Nagapattinam and Nagore accommodation facilities are proposed. To improve the tourism potential in Nagapattinam, a new bus stand along with commercial area are proposed in Nagapattinam and Nagore. To protect the coastal environment and prevent seawater intrusion projects such as the creation of Bio-Shield and seawater protection weir are proposed in the planning area. All the project proposals embedded in the proposed land use for Nagapattinam LPA 2041, will ensure the creation of employment opportunities and enhance the quality of life of the people.



Map 13.1: Proposed land use 2041-Nagapattinam LPA



Map 13.2: Proposed land use 2041-Nagapattinam Municipality