

# **Gram Panchayat Spatial Development Plan**

**Morai Panchayat  
2020-2030**

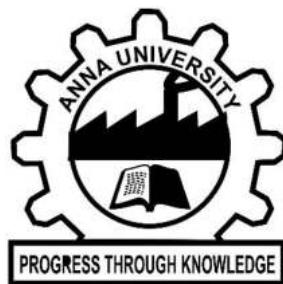
**SCHOOL OF ARCHITECTURE AND PLANNING  
ANNA UNIVERSITY**



# GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN

*for*

MORAI PANCHAYAT  
2020-2030



SCHOOL OF ARCHITECTURE AND PLANNING  
ANNA UNIVERSITY, CHENNAI

DECEMBER, 2020

## PREFACE

India is primarily a rural country with nearly 68.8% of the population living in villages covering 94% of land area, while urban area holds 31.2% of population in 6% of land area. According to the Census of India, in 2001 there were 6,38,588 villages while in 2011 there were 6,40,867 villages, highlighting an increase of 2,279 village within ten years. During the same decade, the number of Towns increased by 2,774; the number of Census towns increased by 2,532; and the statutory towns increased by 242. Further, for the first time since independence the percentage of rural population has declined from 72.19 to 68.84% and the absolute increase in urban population is more than the absolute increase in rural population. As such, Rural India is transforming rapidly and this is due to the uni-directional migration of people from rural to urban areas.

Rural India lags behind Urban India in nearly every indicator of progress. Indian states have legislative frameworks in place for spatio-economic planning of urban areas. However, when it comes to rural areas, there is lack of integration of spatial aspects in development plans. The efforts by government towards improving the scenario can be boosted significantly through spatial decision making, wherein the physical, socio-economic and infrastructure conditions shall be mapped spatially, offering options for data-driven planning.

In 2016, Ministry of Panchayati Raj came up with the Rural Area Development and Plan Formulation and Implementation (RADPFI) Guidelines. The XIV Finance Commission also created an opportunity for responsive local governance at Gram Panchayat level through the preparation of Gram Panchayat Development Plan (GPDP), by the Gram Panchayats. In this regard, The Ministry of Panchayati Raj has assigned the task of preparing Gram Panchayat Spatial Development Plan (GPSDP) for Morai village in Tiruvallur district of Tamil Nadu. Morai village is located in Ambattur Taluka of Thiruvallur district, Tamil Nadu with an area of 11.6 Square kilometres and total population of 19850 residing in it.

The GPSDP incorporates the spatial layers corresponding to attributes like physical features, land holding, land ownership, land use in Abadi area, overall physical and social infrastructure, etc; built environment parameters like housing typology, building age, etc.; economic parameters like land-holding wise cropping pattern, etc. It also considers the non-spatial attributes like socio-economic condition, skill level, etc. Primary surveys for physical verification and assessment of socio-economic conditions were part of the study, along with stakeholders and key informant surveys. This made this spatial plan at the village level a participatory plan. A ten-year phasing plan has also been prepared for the proposed interventions.

We hope this Spatial Development Plan (SDP) will make the GPDP more effective and successful one.

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# TABLE OF CONTENT

PREFACE	
ACNOWLEDGEMENT	
TABLE OF CONTENT	
LIST OF TABLES	
LIST OF FIGURES	
LIST OF MAPS	
LIST OF ABBREVIATION	
<b>CHAPTER 1</b>	<b>1</b>
<b>1 INTRODUCTION</b>	<b>1</b>
1.1 RURAL INDIA IN TRANSFORMATION	1
1.2 THE RURAL-URBAN INTERFACE IN RURAL DEVELOPMENT	2
1.3 NEED FOR INTEGRATED SPATIAL-ECONOMIC PLANNING FRAMEWORK FOR RURAL SETTLEMENTS IN INDIA	3
1.4 METHODOLOGY FOR PREPARING THE GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN	3
<b>CHAPTER 2</b>	<b>5</b>
<b>2 STUDY AREA</b>	<b>5</b>
2.1 PANCHAYATI RAJ INSTITUTIONAL SET-UP IN TAMILNADU	5
2.2 PANCHAYAT RAJ INSTITUTIONAL SET-UP IN TIRUVALLUR DISTRICT	6
2.3 DELINEATION OF GRAM PANCHAYAT	10
2.4 PROFILE OF THE MORAI PANCHAYAT	10
2.5 EVOLUTION OF THE VILLAGE	15
2.6 APPLICATION OF GEO-SPATIAL TECHNOLOGY	20
2.7 PHYSICAL FEATURES OF MORAI PANCHAYAT	23
2.7.1 Hydro-Geomorphology	24
2.7.2 Soil Texture	24
2.7.3 Settlement and Transportation Network	25
2.7.4 Land Use Land Cover	26
2.7.5 Agricultural Use	31
2.7.6 Rainfall & Runoff estimates	31
2.7.7 Digital Elevation Model (DEM)	33

2.7.8 Topography and Slope	33
2.7.9 Drainage network & surface water bodies	35
2.7.10 Ground water quality	35
<b>CHAPTER 3</b>	<b>38</b>
<b>3 CHARACTERISTIC ANALYSIS OF THE VILLAGE</b>	<b>38</b>
3.1 DEMOGRAPHIC CHARACTERISTICS	38
3.1.1 Population Growth	38
3.1.2 Population Density	39
3.1.3 Age Structure	40
3.1.4 Sex Ratio	40
3.1.5 Household Growth	41
3.1.6 Literacy Rate	41
3.1.7 Employment Rate	43
3.2 LAND-USE CHANGE ANALYSIS	45
3.2.1 Land Use and Land Cover	45
3.2.2 Land Ownership	47
3.3 HOUSEHOLD SURVEY DATA ANALYSIS	49
3.3.1 Housing Characteristics	50
3.3.2 Infrastructure and Services	57
3.3.3 House Hold Utilities and Services	60
3.3.4 Health Care	62
3.3.5 Finance	63
3.3.6 Key Issues and Concerns from House Hold Survey	65
3.3.7 Population and Housing Projection	68
3.4 ANIMAL HUSBANDRY	69
3.5 SOCIAL INFRASTRUCTURE	70
3.5.1 Education	70
3.5.2 Health	73
3.5.3 Socio cultural facilities	73
3.6 PHYSICAL INFRASTRUTURE	77
3.6.1 Water Supply	77
3.6.2 Road Networks	79
3.6.3 Solid waste Management	79
3.6.4 Liquid Waste Management	81

3.6.5 Sanitation	81
3.6.6 Electricity	82
<b>CHAPTER 4</b>	<b>83</b>
<b>4 PROPOSAL FOR GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN</b>	<b>83</b>
4.1 CREATING ECONOMIC OPPORTUNITIES IN THE VILLAGE	83
4.2 IMPROVEMENT OF PHYSICAL INFRASTRUCTURE	84
4.2.1 Water supply	84
4.2.2 Liquid Waste Management	84
4.2.3 Solid Waste Management	85
4.2.4 Sanitation	86
4.3 IMPROVEMENT OF SOCIAL INFRASTRUCTURE	86
4.4 PROPOSED LAND USE PLAN FOR 2030	87
4.4.1 Generation of comprehensive development plan	87
4.4.2 Recommendations & Suggestions for improving natural resources	92
4.4.3 Proposed Land use plan- Morai - 2030	95
4.5 DETAILS OF BUDGET, IMPLEMENTATION PERIOD AND EXISTING SCHEMES UNDER THE PROPOSALS CAN BE IMPLEMENTED	104
<b>5 REFERENCES</b>	<b>107</b>



## LIST OF TABLES

Table 1: Tiruvallur District Local body classification for Development	8
Table 2: Demography of CD Block in the Tiruvallur District	9
Table 3: Demographic profile of Morai GP	14
Table 4: Information sources for development planning	22
Table 5: Derived spatial databases required for planning	22
Table 6: Road length for different Road categories in Morai GP	25
Table 7: Areal spread of different Settlement categories in Morai GP	25
Table 8: Area estimates of various LULC classes in Morai GP (1:10k map)	27
Table 9: Temporal variability of Rainfall and Runoff estimates for Morai GP	32
Table 10: Ground Water Quality Parameters – Morai GP	36
Table 11: Demographic Statistics of Morai GP	38
Table 12: Morai- Percentage of land use change from 2011 - 2020	46
Table 13: Summary - Social Characteristics	65
Table 14: Summary - Housing Characteristics	65
Table 15: Summary - Infrastructure services	65
Table 16: Summary - Fuel Energy	67
Table 17: Summary - Finance	67
Table 18: Key Issues and Concern	67
Table 19: Education Infrastructure Facilities in Morai GP	70
Table 20: Socio-cultural facilities in Morai GP	73
Table 21: Other Public Social Facilities in Morai GP	76
Table 22: Existing Land use based on primary survey	95
Table 23: Proposed Land use percentage	95
Table 24: Overview of Plan proposed	104

## LIST OF FIGURES

Figure 1: Methodology of the study	4
Figure 2: CD Block-wise Population Composition	9
Figure 3: Study area location map of Morai GP	14
Figure 4: Morai GP as seen through HRS data in NCC mode (2.5m)	23
Figure 5: Land use and Land cover percentage of Morai GP in 2011	28
Figure 6: Land use and Land cover percentage of Morai GP in 2020	28
Figure 7: Population Growth over the decade 1981 - 2020	39
Figure 8: Population Density of Morai GP	39
Figure 9: Age structure of Population in Morai GP	40
Figure 10: Sex ratio of Population in Morai GP	40
Figure 11: Household Growth over the year 1981 – 2020	41
Figure 12: Literacy rate over the year 1991 – 2011	41
Figure 13: Classification of Literacy rate, 2011	42
Figure 14: Classification of Literacy rate, 2020	42
Figure 15: Literacy level of Morai GP in 2020	43
Figure 16: Employment rate over the year 1991 – 2011	43
Figure 17: Trends of Employment over the year 2011 - 2020	44
Figure 18: Distribution of Sample Household Survey conducted	49
Figure 19: Family member distribution in the Household	49
Figure 20: Ownership of houses	50
Figure 21: Distribution of Household Ownership	50
Figure 22: Distribution of Household	51
Figure 23: Distribution of Excluded households	52
Figure 23: Distribution of Deprived households	52
Figure 25: HH Distribution based on Period of Residence	53
Figure 26: Year of Residence	53
Figure 27: Housing Typology	54
Figure 28: HH Distribution based on Housing Type	55
Figure 29: HH Distribution based on Housing Height	55
Figure 30: HH Distribution based on liveable condition with Kutcha House	56
Figure 31: Housing Condition	56
Figure 32: HH Distribution based on source of water supply	57

Figure 33: Water supply system in Morai GP	58
Figure 34: HH Distribution based on Toilet availability with Kutcha House	58
Figure 35: Toilet Facilities available in Morai GP	59
Figure 36: HH Distribution based on Solid Waste Disposal with Kutcha House	59
Figure 37: Solid Waste Collection	60
Figure 38: Modal split in the Morai GP	60
Figure 39: Electricity supply duration in Morai GP	61
Figure 40: Household Utility	61
Figure 41: Cooking Energy Source	62
Figure 42: Hospital Care service available in Morai GP	62
Figure 43: Hospital fee detail and Vaccination	63
Figure 44: Expenditure Ranking	64
Figure 45: Loan Payments	64
Figure 46: Key Issues inferred from Household survey	67
Figure 47: Population Projection	68
Figure 48: Projected Population comparison	69
Figure 49: Livestock Population in Morai GP	69

## LIST OF MAPS

Map 1: Administrative division of Tiruvallur District	7
Map 2: Chennai Administrative Boundary	11
Map 3: Villages between Corporation and CMA Limit	12
Map 4: Ambattur Taluk Administrative Division	13
Map 5: Evolution study - Google Earth Image 2005	16
Map 6: Evolution study - Google Earth Image 2010	17
Map 7: Evolution study - Google Earth Image 2015	18
Map 8: Evolution study - Google Earth Image 2020	19
Map 9: Hydro-Geomorphology of Morai GP	24
Map 10: Soil Texture Map of Morai	25
Map 11: Settlement and Transportation Network of Morai GP	26
Map 12: Existing Land use Land cover 2011 from NRSC	29
Map 13: Existing Land use and Land Cover 2020 from NRSC	30
Map 14: Agricultural Land-use in Morai GP	31
Map 15: Digital Elevation Model of Morai GP	33
Map 16: Contour Interval of Morai GP	34
Map 17: Slope terrain of Morai GP	34
Map 18: Drainage & Surface Waterbodies of Morai GP	35
Map 19: Ground water Quality Locations of Morai GP	36
Map 20: Ground water potential of Morai GP	37
Map 21: Land ownership in Morai GP	48
Map 22: Social Infrastructure - Education	71
Map 23: Social Infrastructure - Health	72
Map 24: Social Infrastructure – Socio-Cultural Facilities	74
Map 25: Social Infrastructure – Other Public Social Facility	75
Map 26: Physical Infrastructure – Water Supply	78
Map 27: Physical Infrastructure - Road Network	80
Map 28: Water Resources Development Plan map of Morai GP	89
Map 29: Land Resources Development Plan map of Morai GP	89
Map 30: Master Plan Proposed for CMA-2026	94
Map 31: Existing Land use 2020 of Morai Panchayat based on Primary survey	96
Map 32: Proposed Land Use for Morai Panchayat 2030	97

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Map 33: Proposed Land use- Ward I & II	98
Map 34: Proposed Land use- Ward VII	99
Map 35: Proposed Land use- Ward VIII	100
Map 36: Proposed Land use- Ward IX & X	101
Map 37: Proposed Land use- Ward XI	102
Map 38: Proposed Drainage Network Plan	103

## LIST OF ABBREVIATIONS

CDB	Community Development Block
CMA	Chennai Metropolitan Area
CMDA	Chennai Metropolitan Development Authority
DEM	Digital Elevation Model
DPC	District Planning Committee
DPSP	Directive Principles of State Policy
GIS	Geographic Information System
GP	Gram Panchayat
GPS	Global Positioning System
GPSDP	Gram Panchayat Spatial Development Plan
HH	Household
HRS	High Resolution Satellite
ICT	Information and Communication Technology
IRS	Indian Remote Sensing
IMD	India Meteorological Department
IMSD	Integrated Mission for Sustainable Development
ISRO	Indian Space Research Organisation
LISS	Linear Imaging Self Scanner
LRDP	Land Resources Development Plan
LULC	Land Use Land Cover
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoPR	Ministry of Panchayati Raj
MPC	Metropolitan Planning Committee
MTC	Metropolitan Transport Corporation
NABARD	National Bank for Agriculture and Rural Development
NCC	Natural Colour Composite
NIC	National Informatics Centre
NRIS	Natural Resources Information System
NRSC	National Remote Sensing Centre
ORR	Outer Ring Road
PMGSY	Pradhan Mantri Gram Sadak Yojana
PRI	Panchayat Raj Institution
RIDF	Rural Infrastructure Development Fund
RS	Remote Sensing
SDP	Spatial Development Plan
SECC	Socio-Economic Caste Census
SIS-DP	Space based Information Support for Decentralized Planning
SMP	Second Master Plan
SWOT	Strength Weakness Opportunity Threat
WRDP	Water Resources Development Plan

## **CHAPTER 1**

### **1 INTRODUCTION**

#### **1.1 RURAL INDIA IN TRANSFORMATION**

Rural transformation is a proactive, dynamic and positive process of change and development of rural communities in the context of national and global socio-economic changes. It involves bringing features of urban environments into rural settings, changes to systems and processes that favourably impact rural people's standard of living and livelihoods. Rural transformation is usually characterized by changes in civic amenities, female literacy, gender ratio, employment structure, agricultural intensity, crop selection pattern, farm income, labour productivity and major improvements in rural housing and economic and social conditions resulting from industrialization and urbanization.

India is primarily a rural country covering 94% of land with nearly 68.84% of the population living in villages, while urban area holds 6% of land and 31% of population. According to the census 2001, there were 6,38,588 villages while in 2011 there were 6,40,867 villages, highlighting an increase of 2,279 village within ten years. During the same decade, the number of towns have been increased by 2,774: the number of Census towns increased by 2,532 and the statutory towns increased by 242. Further, for the first time since independence the percentage of rural population has declined from 72.19 to 68.84% and the raise in urban population is more than the absolute increase in rural population. As such, rural India is transforming rapidly and this is due to the uni-directional migration of people from rural to urban areas.

The peri-urban interface has emerged mainly due to migration and haphazard pattern of urbanization possess a mix of rural-urban character. Understanding the spatio-temporal pattern of expansion in these areas, and the important of proper planning and management, necessitates the need for spatial development planning of rural areas. The Government schemes and policies has always been a part of providing the facilities and services required for villages. However, the formulation of a spatial development plan for the villages needs to be incorporated highlighting the spatial application of the various facilities and services so that the change which

these villages witness will ensure the sustainable development of the country's rural areas.

## **1.2 THE RURAL-URBAN INTERFACE IN RURAL DEVELOPMENT**

Rural areas share a number of characteristics that are distinctly different from urban areas. Development strategies need to be differentiated for urban and rural areas. However, there should be an overall coherence between urban and rural development. Economic development is a dynamic process potentially affecting all areas of a society, and urban growth can be a catalyst for rural economic activities. Population flows are ongoing, not static, so the actual boundaries of rural and urban areas are constantly shifting. Rural areas can often be more prosperous and productive when they are close to, or integrally linked to, urban centres which provide opportunities for agglomeration, major markets, financial resources, and employment options. At the urban periphery and in small and medium towns, the “rural” and “urban” distinctions can be blurred. Non-farm employment (small manufacturing and services) is important in rural economies, and urban agriculture (household plots) is a significant source of food and incomes in many cities.

Urban-rural dichotomy was a discourse that lasted from the 1950s until the end of the 1980s. In this period differences between the countryside and the city were clear. However, we now have global economic changes, new forms taken by industrial production, technological innovations in information and communication, decentralization processes and the need to consider environmental issues at different levels of action. All of these factors have contributed to modify the vision and functions of urban and the rural area within a global context. These changes have produced alternative approaches to urban and rural planning, going from sectoral to comprehensive ones. They have the purpose of assessing the role of territory in its various scales and dimensions: geographical, ecological, cultural and political, and so the levels of development, participation of community actors and administrative management of resources.



### **1.3 NEED FOR INTEGRATED SPATIAL-ECONOMIC PLANNING FRAMEWORK FOR RURAL SETTLEMENTS IN INDIA**

Indian states have a legislative framework in place for spatial-economic planning of urban areas. However, when it comes to rural, there is a lack of integration of spatial aspects in development plans. The Constitution of India requires the states to constitute District Planning Committee (DPC) and Metropolitan Planning Committee (MPC) to consolidate plans at the district and metropolitan level respectively, taking into account the concerns of both rural and urban local bodies. Interestingly, as per the Constitution, DPCs and MPCs are to incorporate spatial planning aspects in the District and Metropolitan Level Plans respectively. However, the legislative framework of most states is yet to be updated to make the spatial planning aspect for rural settlements in India mandatory, in the absence of which sectoral plans lack the desired spatial underpinning.

Spatial planning of villages is of utmost importance to ensure a sustainable development. This realization by government came as guidelines which came recently in 2016 by Ministry of Panchayati Raj known as Rural Area Development and Plan Formulation and Implementation (RADPFI) Guidelines. This was a first step by the government towards spatial planning of rural areas. This is a recent intervention its implementation on ground and its accomplishment has not been apprehended. This project is an opportunity to link and reframe RADPFI Guidelines with Gram Panchayat Spatial Development plan (GPSDP). To demonstrate the planning process the village chosen is Morai in Tiruvallur district of Tamil Nadu.

### **1.4 METHODOLOGY FOR PREPARING THE GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN**

The village that has been chosen for the Gram Panchayat Spatial Development Plan is Morai Village located in Thiruvallur district of Tamilnadu as it exemplifies typical peri urban character. This village lies inside the boundary of Chennai Metropolitan boundary Area and is prone to intense transformation due to approaching urbanization. The GPSDP incorporates the spatial layers corresponding to attributes like physical features, land holding and land ownership of revenue lands, land use in, overall physical and social infrastructure, etc; The study was intensively

based on primary survey and Census data 2011. Spatial and Non-Spatial data was collected by team members of SAP, Anna University who made the necessary number of visits to the village.

The project consisted of three major stages; Collection of data (Primary and secondary data) including updating of existing maps and statistics; Gap analysis and identification of the issues within the panchayats as well as potential through the SWOT analysis; and the preparation of the proposal for the development of the panchayats consisting of land use plan, resource management strategies and others.

The data related to demography was procured from Census 2011, which was subsequently updated with information collected from the panchayat office and other government sources. Rest of the data regarding land use for the village area, socio-economic condition of population, services, infrastructure, housing condition etc. was collected on ground. During the visit, meetings were conducted with the Sarpanch and Gram Sabha members. The data collected reflects interest of residents as most of it was procured through household survey. Considering spatial emphasis of the project pertinent spatial data related to land use, cropping pattern, infrastructure, housing etc was collected on ground and then transferred to map through GIS.

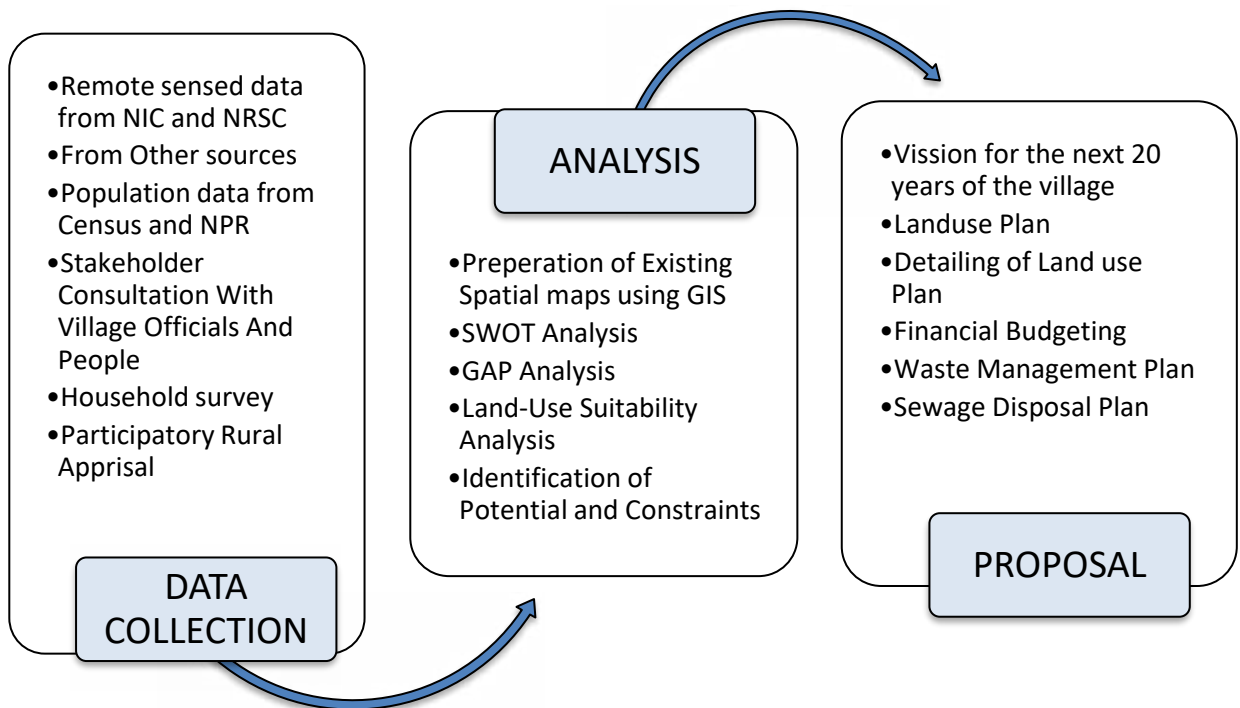


Figure 1: Methodology of the study

## CHAPTER 2

### 2 STUDY AREA

This Chapter describes about the Panchayat Raj institutional set-up existing in Tamilnadu and the Tiruvallur district. Also, the delineation of Village Panchayat for this Development Plan is included along with the brief discussion of its profile of the delineated Planning area.

#### 2.1 PANCHAYATI RAJ INSTITUTIONAL SET-UP IN TAMILNADU

The Directive Principles of State Policy (DPSP) under Article-40 of the Indian Constitution talks about Panchayati Raj System. Panchayat is the basic institution of local self-governance. It is the responsibility of the State to take all the steps for the establishment of the Panchayati Raj. Following the 73rd Constitutional Amendment Act, the three-tier system of Panchayati Raj Institution (PRI), were institutionalized through Part-IX of the Constitution. It comprises of Village Panchayat at local level, Panchayat Union or Community Development Block (CDB) at Block level and District Panchayat at District level. Members under the Panchayat Raj are elected by the people. The Tamil Nadu has a long history of local self-governance as it evident from the *Uthiramerur* stone inscriptions in Kancheepuram district, wherein the village administration was taken care by a Village Assembly known as ‘*Sabai*’ in every village. Further, each village was divided into several wards known as ‘*mandalams*’. This is evident from the epigraph inscriptions found in *Vaikuntha Perumal Temple* near *Uthiramerur*. They used the Pot-ticket system<sup>1</sup> of election (*Kudavolai Murai*) to elect the representatives to the assembly.

In Tamil Nadu, three tier system of Panchayat Raj has been working for the development of the people. Developmental administration is the main objective of these three-tier system. It is responsible for the Implementation of various centrally sponsored, state-funded, and externally aided schemes for provision of basic amenities and other services to the people. Elections are held to elect the representatives for this three-tier institution. Ministry of Municipal Administration

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<sup>1</sup> There is an election ballot, a pot, in which the electors polled candidates of their choice with names written on papers. Each person’s preference vote is written on a paper and is dropped into the ballot pot

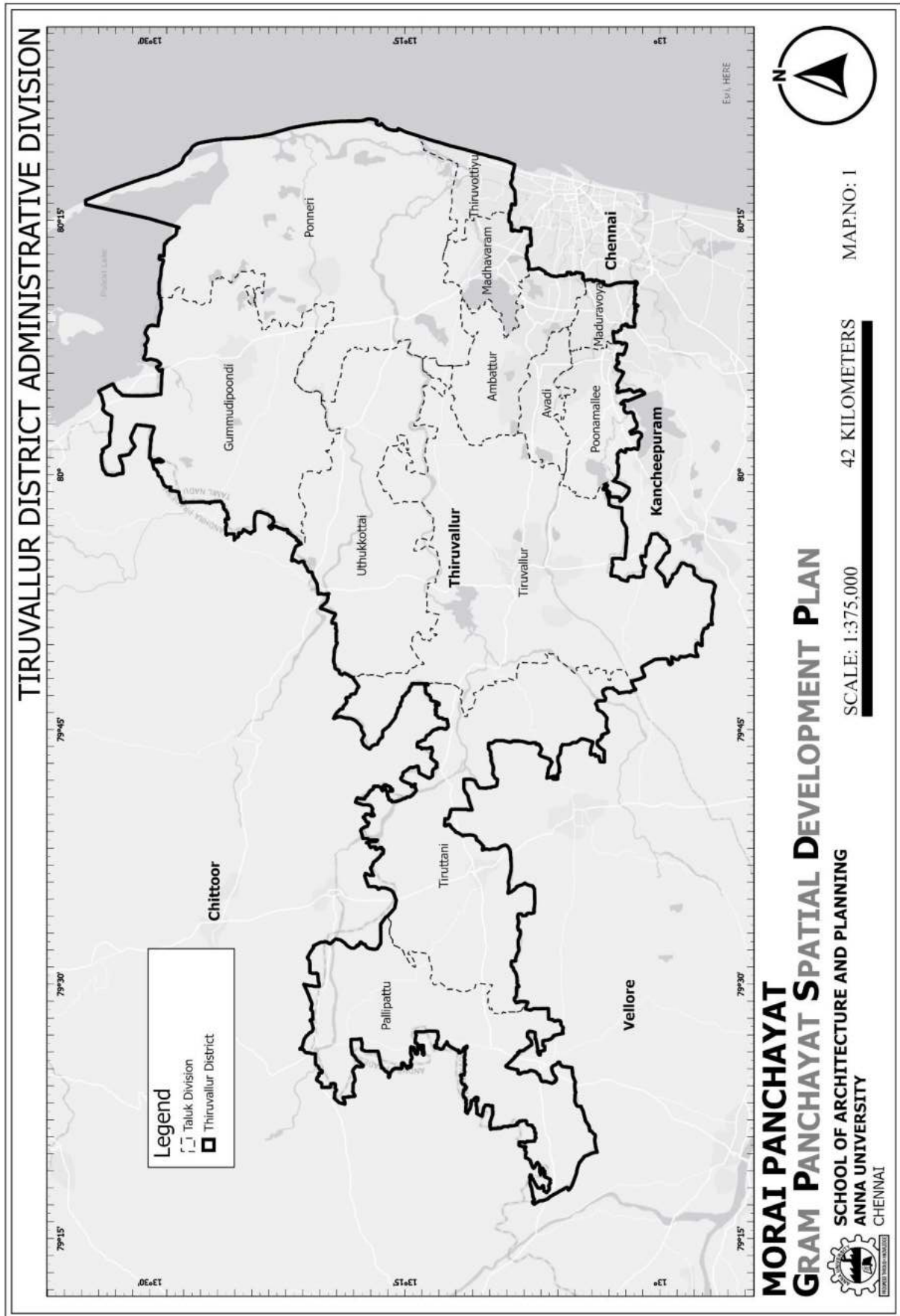
and Rural Development, Government of Tamil Nadu is the State Government governing body for these institutions.

Three tier system of Panchayat Raj is generally referred to as Local Body for both Urban and Rural areas. The urban local bodies act as platform between the people in the urban areas and the administration. Depending on the population and income of the urban areas, there are 3 levels of Local Body institutions in Tamil Nadu; Municipal Corporations, Municipalities and Town Panchayats. The Rural Local Body includes Village Panchayats, Panchayat Unions (co-terminus with Blocks) and District Panchayats. For the Urban Local Body, the elected head of the institutions are Corporation Mayor, Municipality / Town Panchayat Chairperson and Corporation / Municipality / Town Panchayat Councillor.

Village Panchayat is a statutory institution of local self-government. Village Panchayat President along with Village Panchayat Ward Members constitutes Gram Panchayat or Village Panchayat. Major functions of Gram or Village Panchayat in Tamil Nadu are Drinking water supply, construction of public roads, drains, small irrigation projects, maintaining sanitation and public health, lighting on roads and public places, controlling and maintaining village cremation ground and/or cemetery, taking part in agricultural development, maintaining a library and opening elementary school, planting and preservation of trees on the sides of the public roads and collection of taxes

## **2.2 PANCHAYAT RAJ INSTITUTIONAL SET-UP IN TIRUVALLUR DISTRICT**

The District of Tiruvallur has been carved out by bifurcating erstwhile Chengalpattu District (which was renamed as Chengalpattu-MGR/Kancheepuram at the time of 1991 Census). At present this District is comprised of twelve taluks namely Ambattur, Gummindipoondi, Ponneri, Uthukkottai, Tiruvallur, Poonamallee, Tiruttani, Pallipattu, Madhavaram, Maduravoyal, Thiruvottiyur and Avadi and four Revenue Divisions namely Ambattur, Ponneri, Tiruvallur and Tiruttani. The Tiruvallur district is ranked as fourth in terms of the highest population in the state of Tamil Nadu, with the urban population share of 65.1%.



Map 1: Administrative division of Tiruvallur District

The population density of the district was 1098 persons/ sq.km and the district Sex ratio was 987, which is lower when compared to the State's sex ratio of 996. The district has recorded higher literacy rate (84%) as compared with the State literacy rate of 80.1%. The district decadal population growth during 2001-2011 was 35.3%.

Table 1: Tiruvallur District Local body classification for Development

<b>Local Body Type</b>	<b>Description</b>	<b>No. of Local Bodies</b>
Rural	District Panchayat	1
	Panchayat Unions or CDB	14
	Village Panchayats	526
Urban	Municipalities	5
	Town Panchayats	10

*Source: Tiruvallur District Directory*

Tiruvallur district is one of the fastest developing districts with leading industries like Madras Refineries, Madras Fertilizers, Manali Petro-chemicals, MRF, Ashok Leyland, Tube Investments of India Limited (TI Cycles), Britannia Industries Ltd., Parry India Ltd., Hindustan Motors and notably Ennore thermal power plant, Avadi Tank factory, as well as other 18 Meso and small enterprises (leather, chemical engineering and textiles) are located within it. It also has rural artisans engaged in producing Jute, coconut shell, palm leaf products, paper cups etc. It has regulated markets located in Gummidipoondi, and Red Hills (*Sengundram*). It has good public transport connectivity viz., Chennai – Bangalore Broad gauge railway line, Chennai-Tirupati national highway; two major roads connecting Chennai and Tiruvallur, Pattabhiram, Avadi, Ambattur, Villivakkam and Poonamallee and Koyambedu. It is well connected by MTC bus service. It has good source of Electricity from Ennore Thermal power station- (capacity 450 MW). All villages and hamlets are electrified. Villages in the Thiruvallur district are affected by the growth of the Chennai city and cone under the pressures due to Chennai's rapid urbanization. Many villages exhibit sub-urban characteristics. Under SMP Chennai - 2026, The CMA falls in three Districts of the Tamil Nadu State viz. Chennai District, part of Thiruvallur District, and part of Kancheepuram District. The extent of the Chennai District (covered in Chennai Municipal Corporation area) is 176 sq.km. In Thiruvallur District out of total district area of 3427 sq.km, 637 sq.km. in Ambattur, Thiruvallur, Ponneri and



Poonamallee taluks fall in CMA. In Kancheepuram District out of 4433 sq.km, 376 sq.km in Tambaram, Sriperumbudur and Chengalpattu Taluks fall in the Metropolitan area.

Table 2: Demography of CD Block in the Tiruvallur District

Name of CD Block	Village Panchayat	Population		
		Persons	Males	Females
Villivakkam	13	104678	53414	51264
Puzhal	7	21437	10795	10642
Minjur	55	164718	82398	82320
Sholavaram	39	141603	71106	70497
Gummidipoondi	61	170877	85803	85074
Tiruvelangadu	42	92280	46091	46189
Tiruttani	27	74230	37124	37106
Pallipattu	33	78816	39384	39432
R.K.Pet	38	104496	52844	51652
Thiruvallur	38	140113	69924	70189
Poondi	49	102279	51098	51181
Kadambattur	43	127964	64332	63632
Ellapuram	53	120509	59727	60782
Poonamallee	28	141280	71070	70210
<b>Total</b>	<b>526</b>	<b>1585280</b>	<b>795110</b>	<b>790170</b>

Source: Census of India 2011

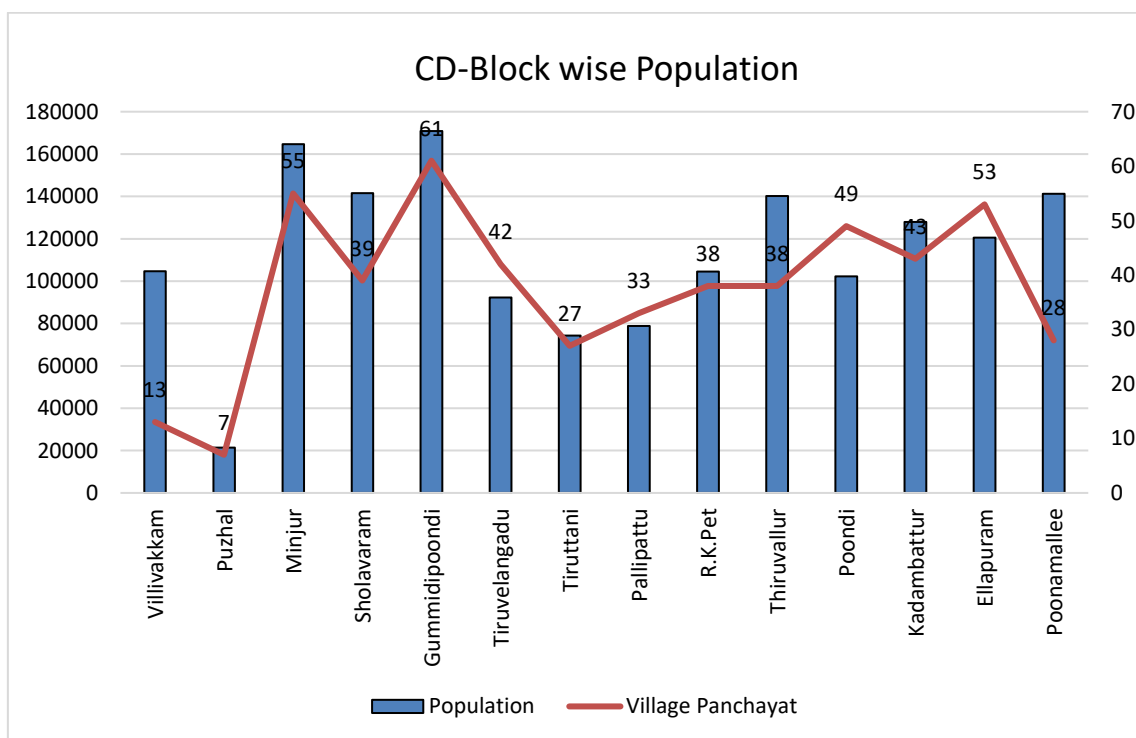


Figure 2: CD Block-wise Population Composition

From the *Figure 2: CD Block-wise Population Composition*, the Villivakkam Block and the Poonamallee block shows the irregular composition of Total number of village and total village population than any other blocks in the District of Tiruvallur.

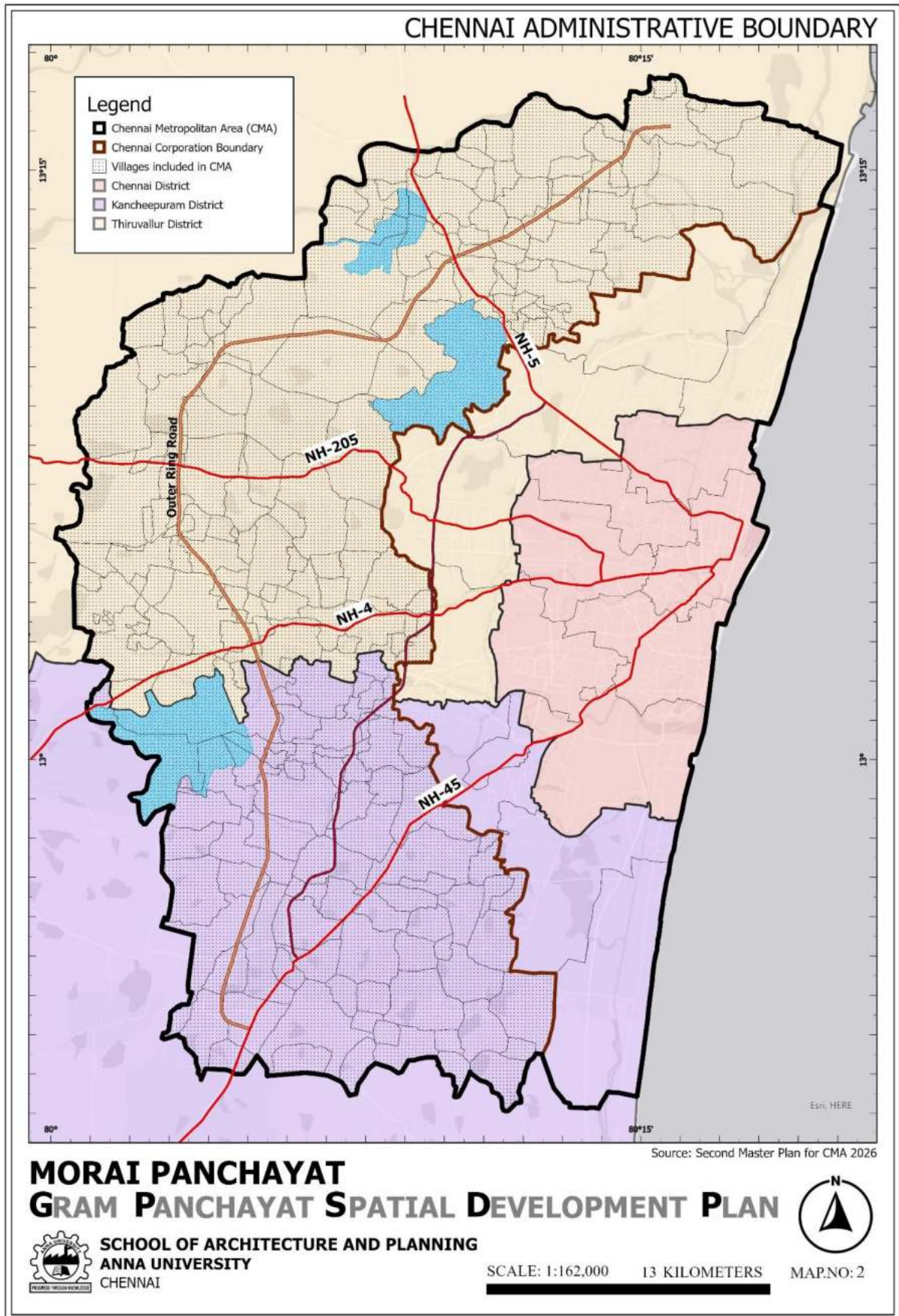
### **2.3 DELINEATION OF GRAM PANCHAYAT**

The Planning area was selected or delineated based on several criteria described below. The Transportation network primarily supports the land-use change pattern, which might result in both ways of development. In Chennai, the development of Outer Ring Road (ORR) was taken up as part of the recommendations made in the first master plan for Chennai, to reduce traffic congestion by connecting the National Highways to the city. The ORR connects the rural nature of the Gram Panchayats with the sprawling urban area. From SMP for Chennai, they identified areas along ORR as potential areas to absorb the future growth as shown in Map 2: Chennai Administrative Boundary. Which clearly indicates the transportation network leads the land use change. Hence the criteria of panchayat located along the vicinity of the National Highway or State Highway, with potential for economic development is considered for land-use planning. Also considering the data availability on land use, demography and the potential for socio-economic developments, the planning area is selected. The *Table 2: Demography of CD Block in the Tiruvallur District* shows drastic changes in composition in the Villivakkam and Poonamallee block. Based on criteria considered, Morai Gram Panchayat from the Villivakkam Block of Ambattur Taluk in Thiruvallur district has been selected in order to prepare SDP.

### **2.4 PROFILE OF THE MORAI PANCHAYAT**

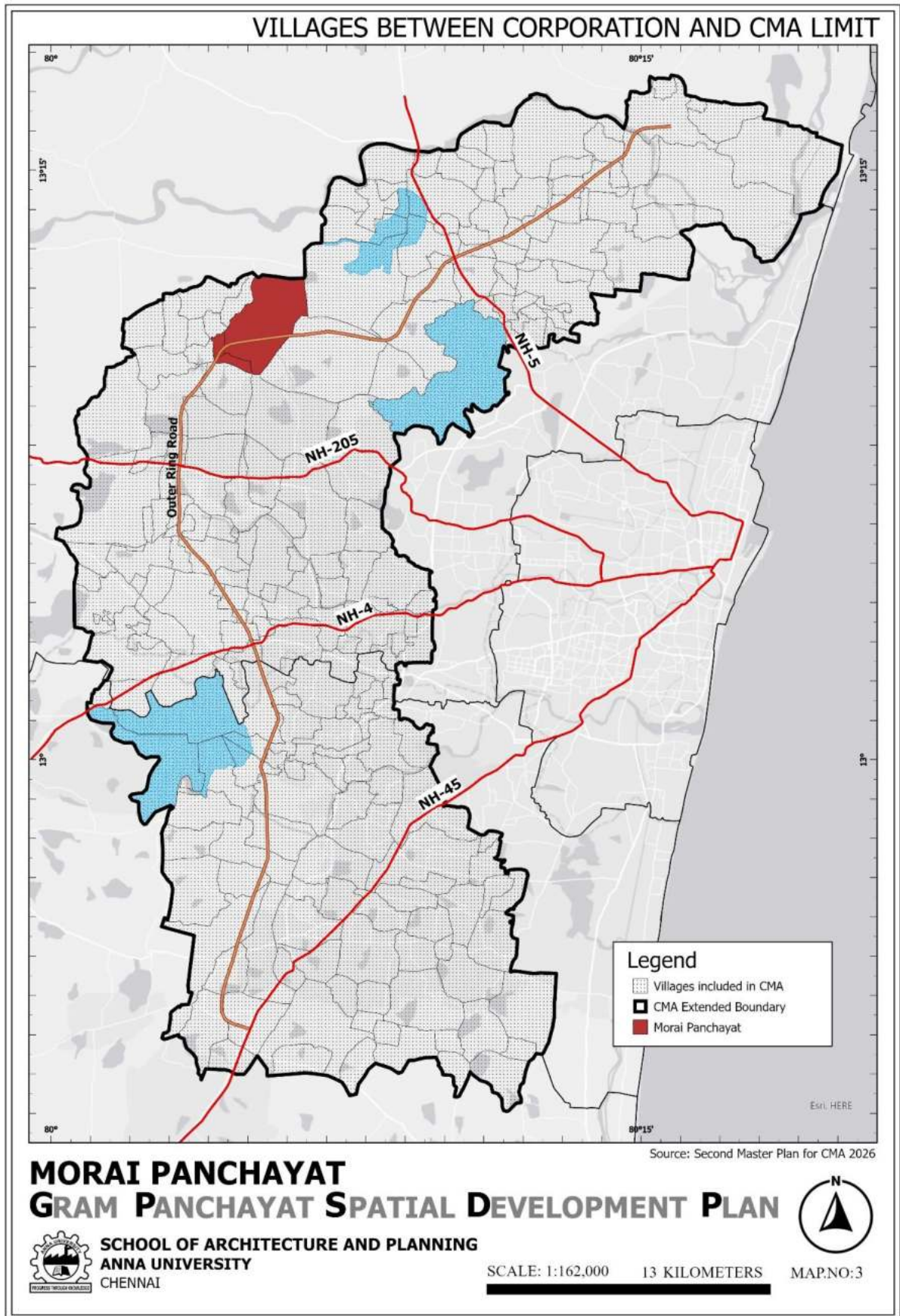
The Morai Panchayat is a village located in Ambattur Taluk of Thiruvallur district, Tamil Nadu, with a total of 2718 families residing in it. According to census 2011, The Morai Panchayat has population of 10873 of which 5462 are males while 5411 are females as per Population Census 2011. In Morai, population of children with age 0-6 is 1158 which makes up 10.65% of total population of panchayat. Average Sex Ratio of Morai is 991 which is lower than Tamil Nadu state average of 996. Child Sex Ratio for the Morai as per census is 886, lower than Tamil Nadu avg.



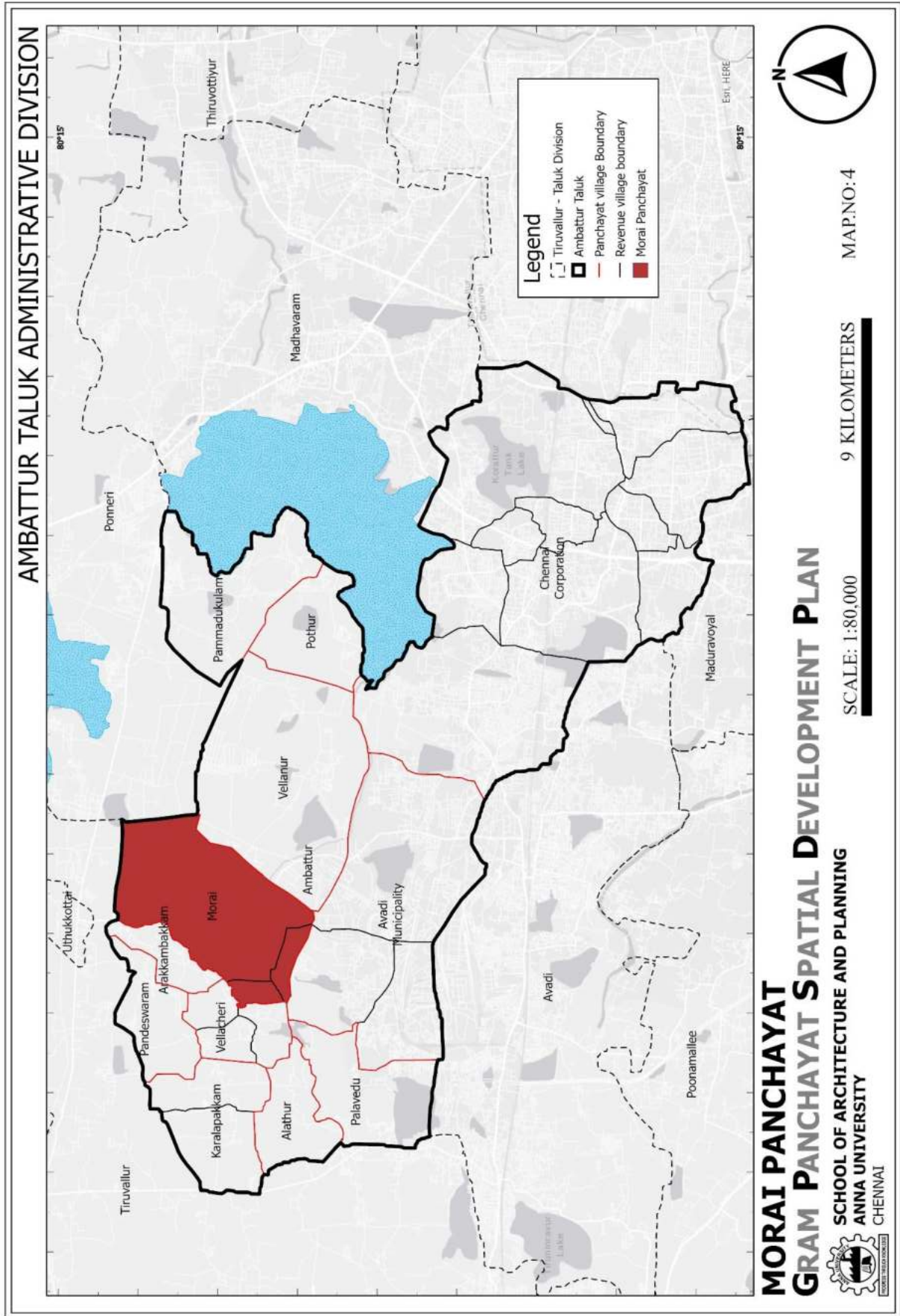


Map 2: Chennai Administrative Boundary





Map 3: Villages between Corporation and CMA Limit



Map 4: Ambattur Taluk Administrative Division



of 943. The Morai has higher literacy rate compared to Tamil Nadu. In 2011, literacy rate of Morai was 82.78% compared to 80.09% of Tamil Nadu.

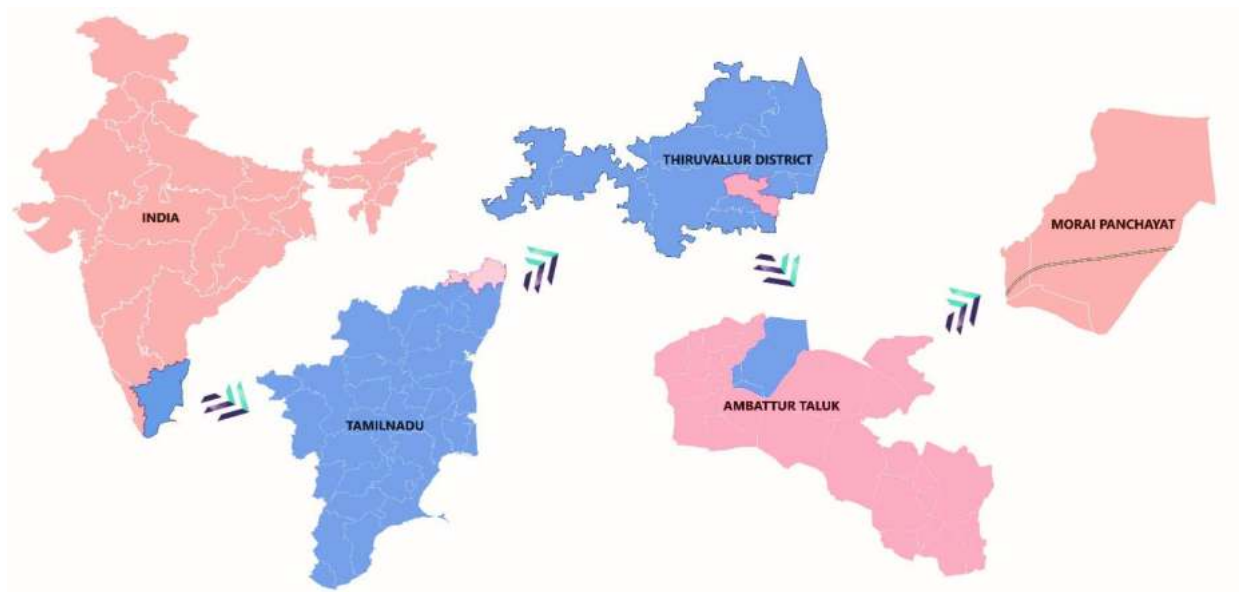


Figure 3: Study area location map of Morai GP

Table 3: Demographic profile of Morai GP

Total Population	10873
Total Male Population	5462
Total Female Population	5411
0-6 Age group Total population	1158
0-6 Age group Male population	614
0-6 Age group Female population	544
Total Person Literates	8042
Total Male Literates	4312
Total Female Literates	3730
Total Person Illiterates	2831
Total Male Illiterates	1150
Total Female Illiterates	1681
Scheduled Caste Persons	2992
Scheduled Caste Males	1489
Scheduled Caste Females	1503
Scheduled Tribe Persons	102
Scheduled Tribe Males	54
Scheduled Tribe Females	48

*Source – Census of India 2011*

In Morai Male literacy stands at 88.94% while female literacy rate was 76.64%. As per constitution of India and Panchayat Raj Act, Morai is administrated by Sarpanch (Head of Village) who is elected representative of village.

## **2.5 EVOLUTION OF THE VILLAGE**

From the primary survey with the stakeholders, we inferred that the Village has two old settlements Kandigai and Veerapuram. These are having the unique characteristics of organic development compared to the new developments consisting of slum rehabilitation and layout developments in the past two decades. The village was changing its character over the years due to rapid urbanisation. Agriculture was the prime occupation 40 years back, but has changed its character due to rapid urbanisation in the city and its metropolitan areas over the years. It is found from the primary survey and newspaper articles, that few land grabbing cases were also filed in Morai, till the village was announced as catchment area by the government.

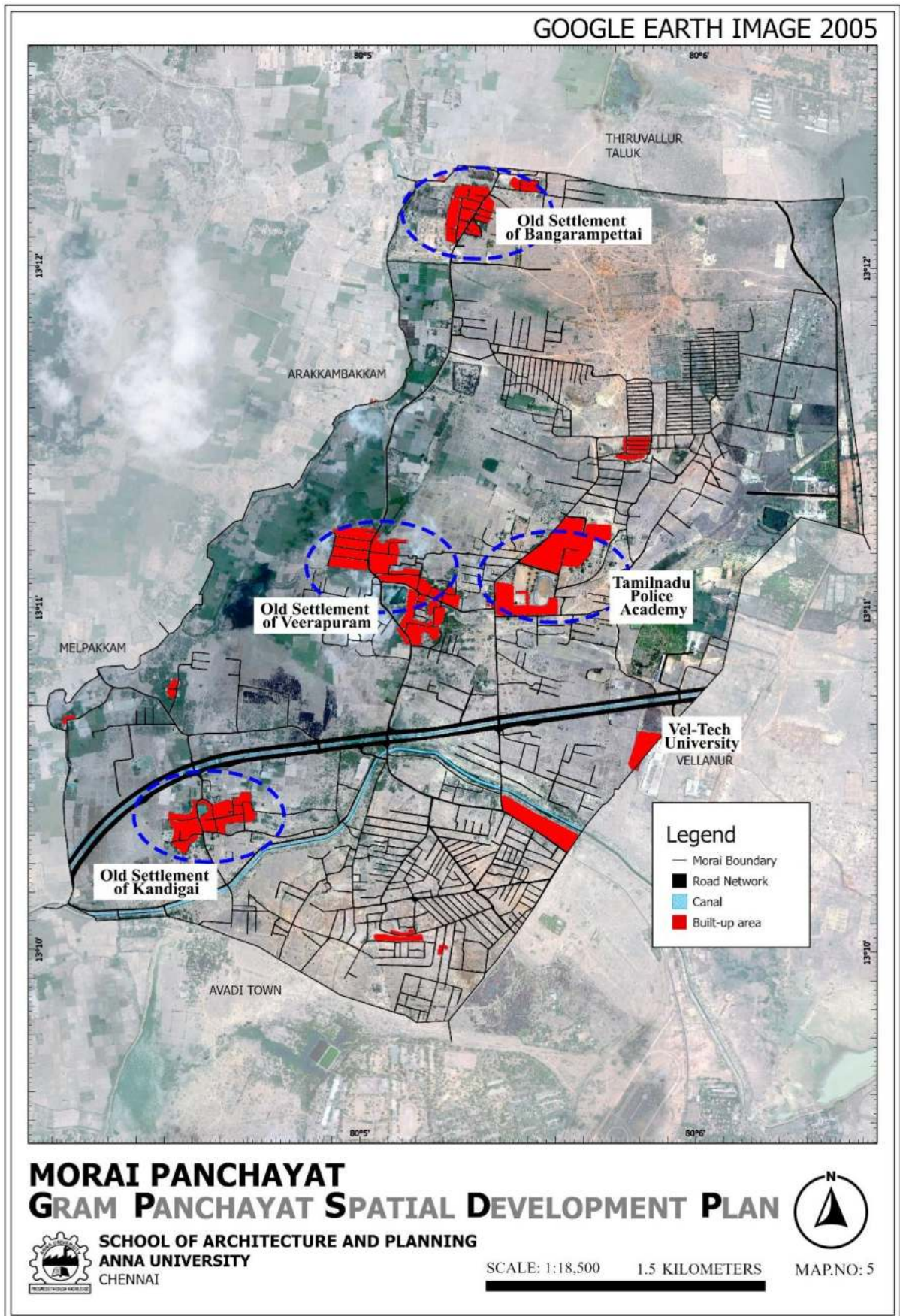
Urbanisation in the form of private developments started in the village after the globalisation and liberalisation policies adopted in India in 1990. The agriculture lands were converted in to plots due to the urban pressure for development. At the same time, private institution ‘Vel-tech University’, covering over 100-acre lands also started developing from 1997 onwards. In addition, government projects too were initiated in the village consisting of various state and central government institutions. The Tamil Nadu Police Academy was established in the 1994 covering 168 acres in the ‘*Veerapuram*’ ward<sup>2</sup> Part of the village accommodates the residences of the CRPF officials in the southern region.

As per 2011 census, the village had 2718 households and this has increased double fold to 5700 houses in 2019. The population of the village increased after 2014 due to the relocation of the people occupying water bodies, from the Avadi region (Jeyyaseelan & Premraj, 2014), in the year 2014. The Tamilnadu Slum Clearance Board has created resettlement colonies in the north side of the village namely; JJ.nagar and Kanniamman nagar. The Figure no. shows the change in the settlement pattern over the years in Morai due to both private and government interventions.

The development of ORR was taken up as part of the recommendations made in the first master plan for Chennai, to reduce traffic congestion by connecting the National Highways to the city.

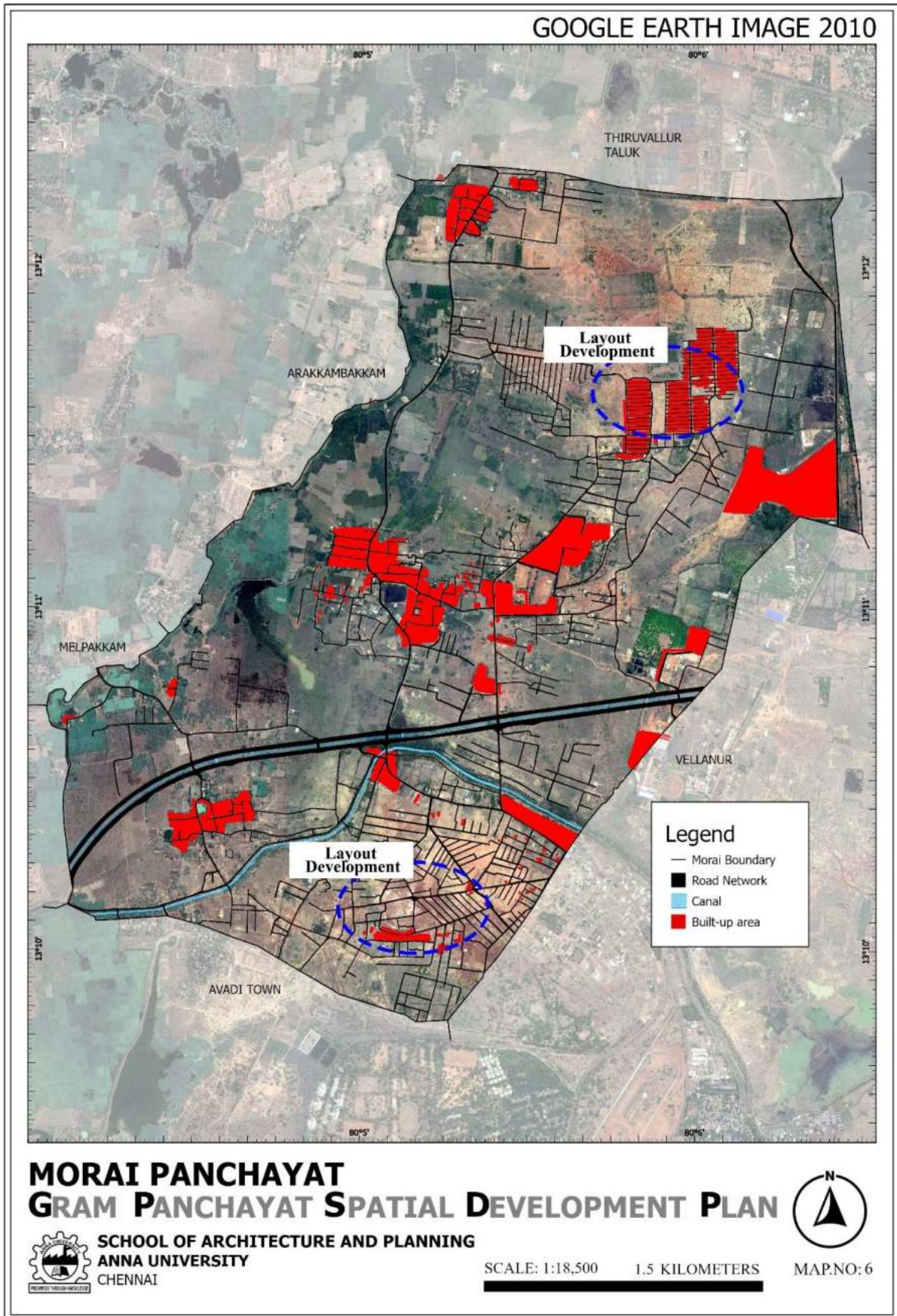
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2 - (<http://www.tnpa.tn.gov.in/history.html>).



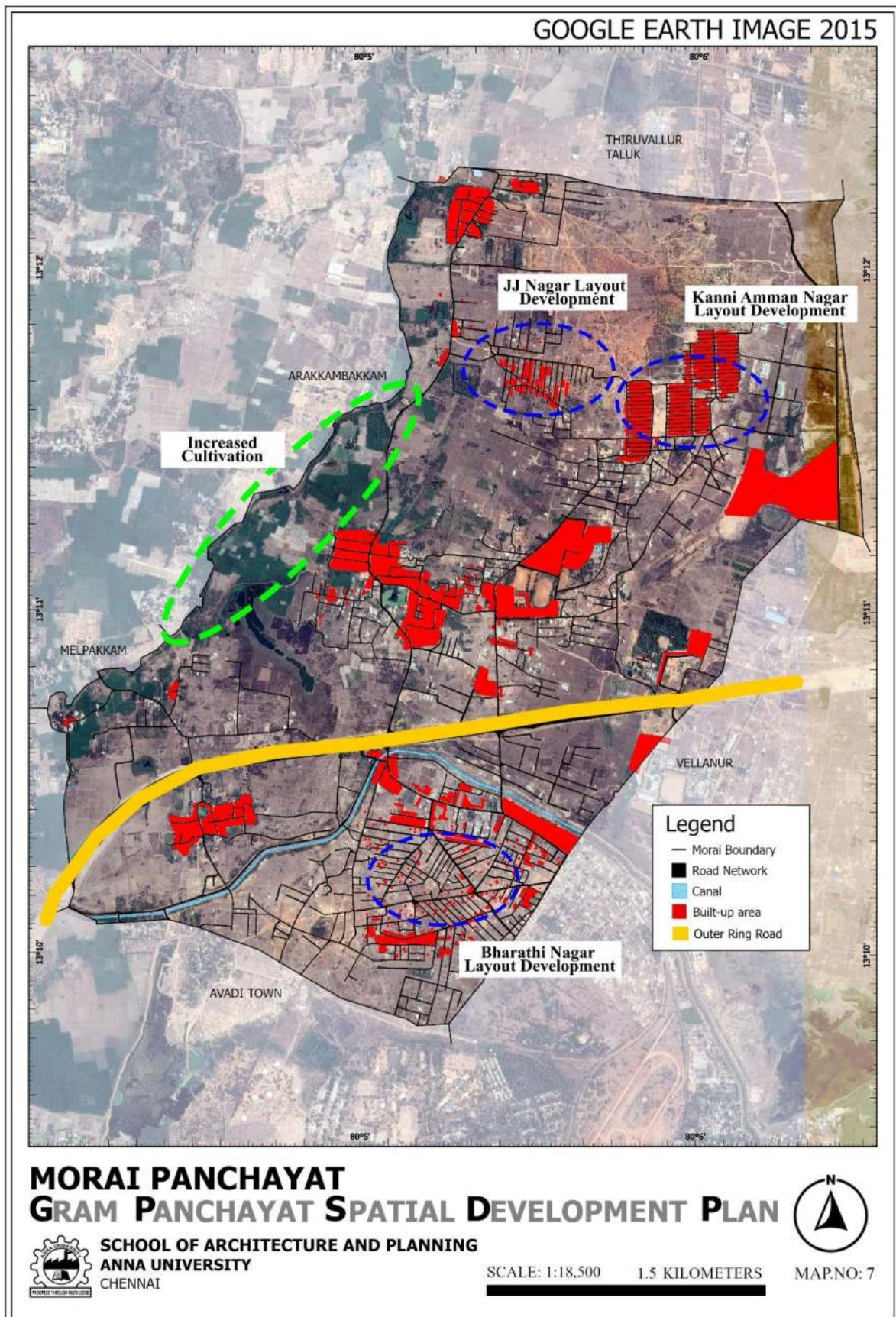
Map 5: Evolution study - Google Earth Image 2005





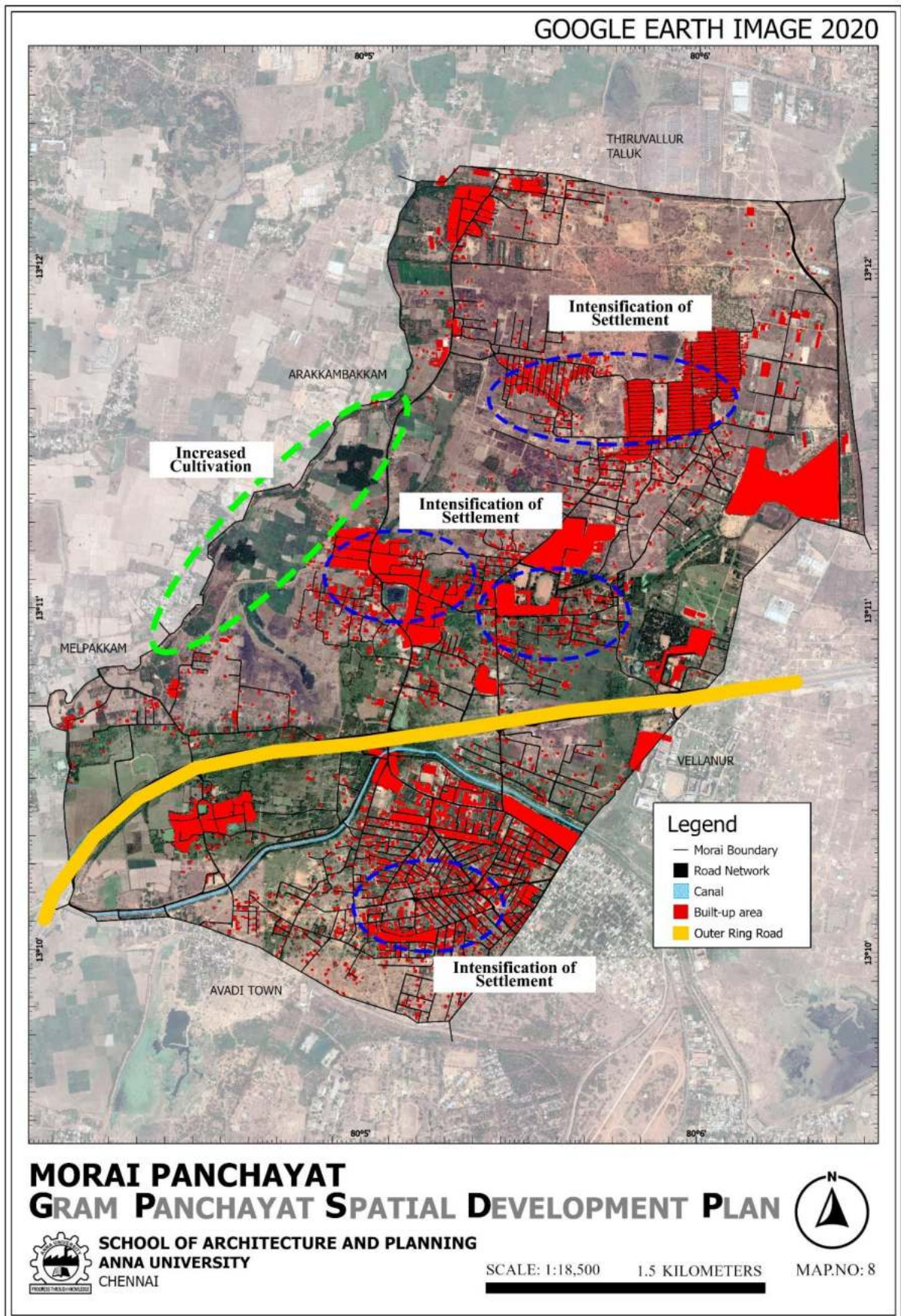
Map 6: Evolution study - Google Earth Image 2010





Map 7: Evolution study - Google Earth Image 2015





Map 8: Evolution study - Google Earth Image 2020

The 62 km long Outer Ring Road was developed in two phases; first between Vandalur to Nemilichery; and the second between Nemilichery to Minjur; with the latter stretch passing through Morai. The entire stretch is completed and will be the key for the development of Tidel Park-3 in Pattabhiram, spread across 5.57 lakh square feet and generating over 25,000 jobs<sup>3</sup>. This boom in development and land value, has also led to the development of residential plots over the last decade. Even though over the years there is a lot of changes are happening in Morai, but as a good sign, it is seen from the present study that the agriculture land area has marginally increased in the recent years and gives hope that the village has the potential for self-sustaining growth over the coming years.

## **2.6 APPLICATION OF GEO-SPATIAL TECHNOLOGY**

The conventional techniques employed to provide spatial information on natural resources are highly tedious, time consuming and more often subjective; whereas satellite remote sensing with synoptic and regular coverage has the requisite potential to provide up to date information in a timely and more objective manner. Remote sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) constituting the emerging field of geospatial technology offer great promise for generating spatial information on natural resources at national and subsequent disaggregated levels. With advancements in space technology, availability of high-resolution data and advanced processing techniques, the remote sensing technique has become a powerful tool for mapping and monitoring of natural resources. These techniques have immense potential for providing spatial information on natural resources resource mapping and monitoring at regular intervals.

GIS is a powerful tool for integrating natural resources for development of spatial decision support systems. Thus, geospatial technology along with Information and Communication technology (ICT) has become a very useful technique and powerful tool for providing spatial information including development of land use information systems, towards decision making. Further, the system is also highly

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3 - <https://www.newindianexpress.com/cities/chennai/2020/oct/14/finally-chennai-set-to-have-an-outer-ring-road-2209881.html>

useful for updating and monitoring the dynamics of land use changes through the monitoring capabilities of the multi-temporal remote sensing data. Remote Sensing in conjunction with Geographical Information System (GIS) and other IT tools is also emerging as flexible, efficient, speedy, cost-effective and reliable technology for obtaining information on natural resources analysis and modelling. It is an integral part of data management in large number of applications. Spatial information - images and maps, forms the foundation and basis for the most planning and implementation of developmental activities; infrastructure development; disaster management support; environmental monitoring; natural resources management and many other national activities.

Over the last two decades remote sensing and GIS have been widely used for the preparation of different types of thematic layers and integrating them for different applications that include land and water resources planning, agricultural applications, water resource management, disaster management, forestry applications, watershed management and urban applications etc.

For the Study of Gram Panchayat various thematic maps as spatial database are prepared from Satellite data of CARTOSAT-1, IRS P6 LISS-IV, IRS-1D LISS III datasets and other collateral data from major source. The data acquired from the multi-spectral sensors LISS-IV (5.8m resolution) & CARTOSAT-1 (2.5 m resolution) of the Indian Remote Sensing Satellite (IRS) series are extensively used for generating spatial databases. The data needed for this study is completely relied upon IRSC, where they studied in detail and grouping the collected primary maps into hydro-geomorphological, topographical, land use and land cover, hydrology and socio-economic parameters (*Table 4: Information sources for development planning*).

Sometimes, these primary maps are used to produce utilitarian types of maps to serve planning decisions. They are derived, in some cases, by direct translation of single thematic map and in others by combination of two or more thematic maps or chosen parameters of the different themes (*Table 5: Derived spatial databases required for planning*). Natural resources data representing environmental status of



the study area that were generated under various national level projects at 1:50,000 scale was considered for the study are presented below. The database was standardized for integrated analysis under GIS environment.

Table 4: Information sources for development planning

Data/map	Source	Spatial/ Non-spatial	Scale
Digital Elevation Model	CARTOSAT Stereo data	Spatial	10 m
Contour	CARTODEM	Spatial	5m
Geological map	Rajiv Gandhi National Drinking Water Mission, NRSC	Spatial	1:50K
Geomorphological map		Spatial	1:50K
Structures/Lineaments		Spatial	1:50K
Soil Texture	NRIS, NRSC	Spatial	1:50K
Ground water potential map	NRSC	Spatial	1:50K
Ground water quality borewell location map	NRSC	Spatial	1:50K
Land use/ Land cover	High-resolution data	Spatial	1:10K
Drainage map and Surface water bodies	High resolution satellite data	Spatial	1:10K
Meteorological data	IMD	Spatial	25 km grid
Settlement	High-resolution data	Spatial	1:10K
Infrastructure	High resolution satellite data	Spatial	1:10K
Gram Panchayat boundary	NIC	Spatial	1:50K
Village boundaries	NRSC	Spatial	1:50K

*Source: NRSC*

Table 5: Derived spatial databases required for planning

Derived map	Theme map	Remarks
Contour/Slope	Topographical map/IRS PAN stereo data	Derived from DEM
Groundwater potential	Geology, Geomorphology, borewell, Lithology and yield data	Integration of thematic maps and point database
Water Resource Development Plan	Slope, soil map, land use, drainage order, lineament, Runoff Potential	Multi Criteria analysis
Land Resource Development Plan	Slope, soil map, land use, Ground Water Potential, Geomorphology	Multi Criteria analysis

*Source: NRSC*

## **2.7 PHYSICAL FEATURES OF MORAI PANCHAYAT**

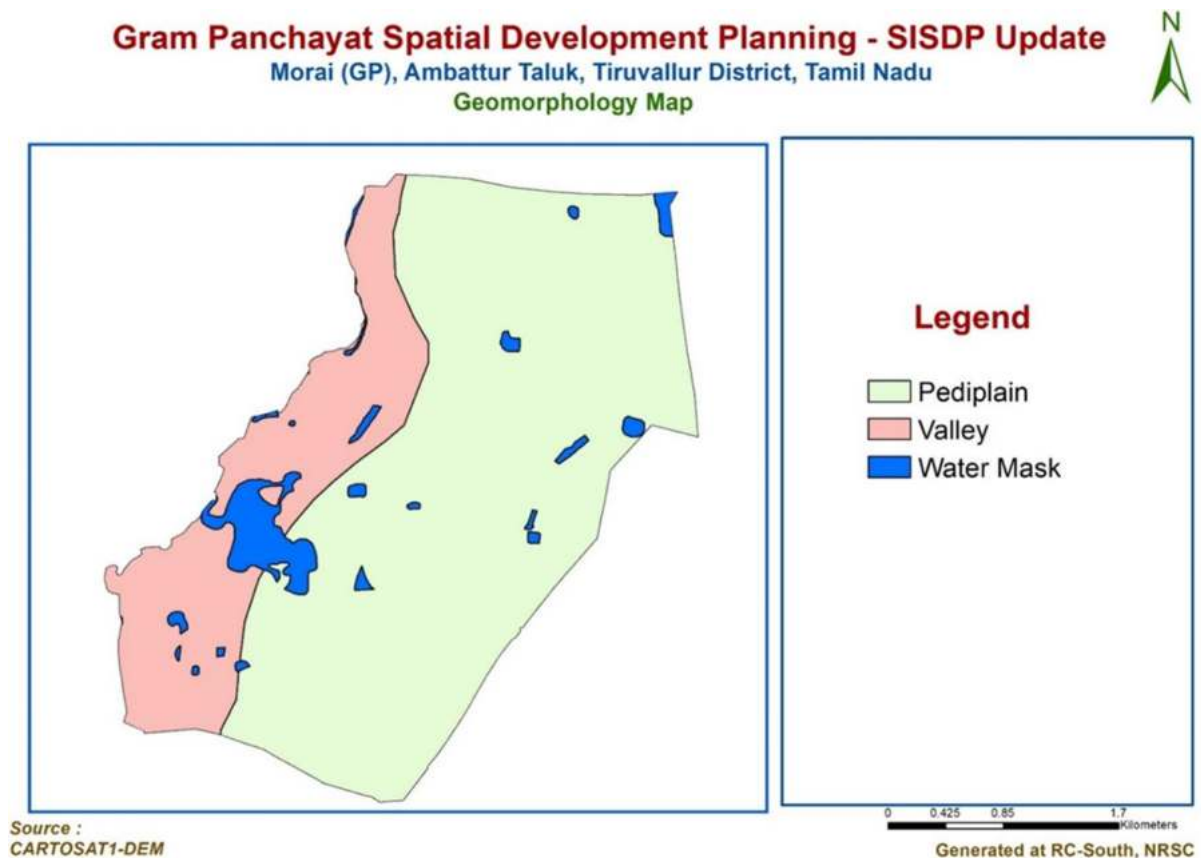
With the help of High-resolution satellite datasets (5.8m and 2.5m) and Digital Elevation Model (DEM) spatial thematic layers for Morai GP were prepared. The Merged product of Cartosat-1 PAN and IRS LISS-IV Mx datasets acquired during 2015-16, in Natural Colour Composite from SIS-DP Phase-II in Natural Colour Composite is shown in *Figure 4: Morai GP as seen through HRS data in NCC mode (2.5m)*. Potential tools such as remote sensing and GIS techniques are utilized for generation of various thematic resource maps in conjunction with collateral data. Data integration and generation of development plans are carried out in Geographic Information System environment.



Figure 4: Morai GP as seen through HRS data in NCC mode (2.5m)

### 2.7.1 HYDRO-GEOMORPHOLOGY

Geomorphology is the study of landforms, their processes, form and sediments at the surface of the Earth, where Hydro-Geomorphology depict major geomorphic units, landforms majorly comprising of Peditain and valley, and also provide an understanding of the processes relating to groundwater occurrence as well as groundwater prospects. Based on the morphological expressions in the satellite data, *Map 9: Hydro-Geomorphology of Morai GP* is prepared at the scale of 1:50000.

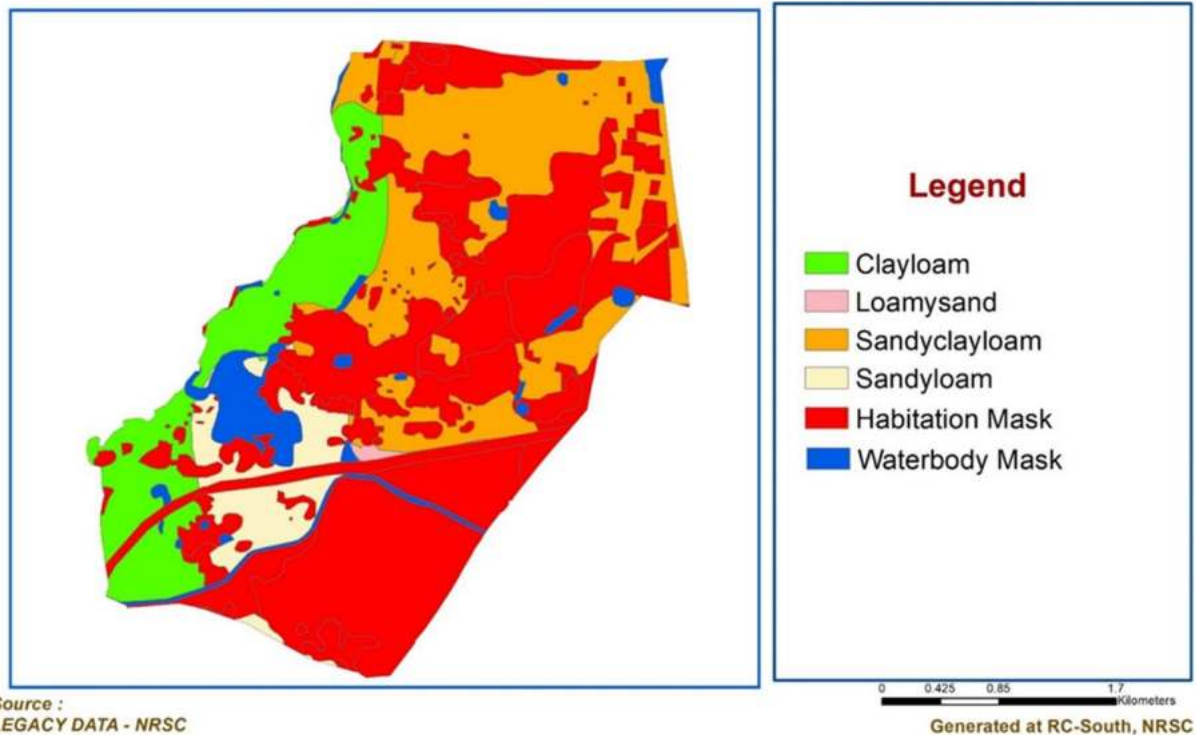


Map 9: Hydro-Geomorphology of Morai GP

### 2.7.2 SOIL TEXTURE

Soil texture (such as loam, sandy loam or clay) refers to the proportion of sand, silt and clay sized particles that make up the mineral fraction of the soil. The Spatial distribution of soil texture in Morai GP is shown in *Map 10: Soil Texture Map of Morai GP*. In Morai Panchayat, it is classified into Loamy Sand, sandy loam (lower half of GP), sandy clay loam (covering majority of GP) and clay loam (mainly towards eastern part of the GP).

**Gram Panchayat Spatial Development Planning - SISDP Update**  
 Morai (GP), Ambattur Taluk, Tiruvallur District, Tamil Nadu  
 Soil Texture Map



Map 10: Soil Texture Map of Morai GP

### 2.7.3 SETTLEMENT AND TRANSPORTATION NETWORK

A settlement is an organized human habitation. There are several ways to classify different types of settlements. For Morai GP, Settlement and Transportation Layer generated using HRS data at 1:10,000 scale (*Map 11: Settlement and Transportation Network of Morai GP*). The statistics of road types and Settlement categories are given in Tables 6 and Table 7 respectively. Rural settlement directional growth is analysed using satellite data more explicitly.

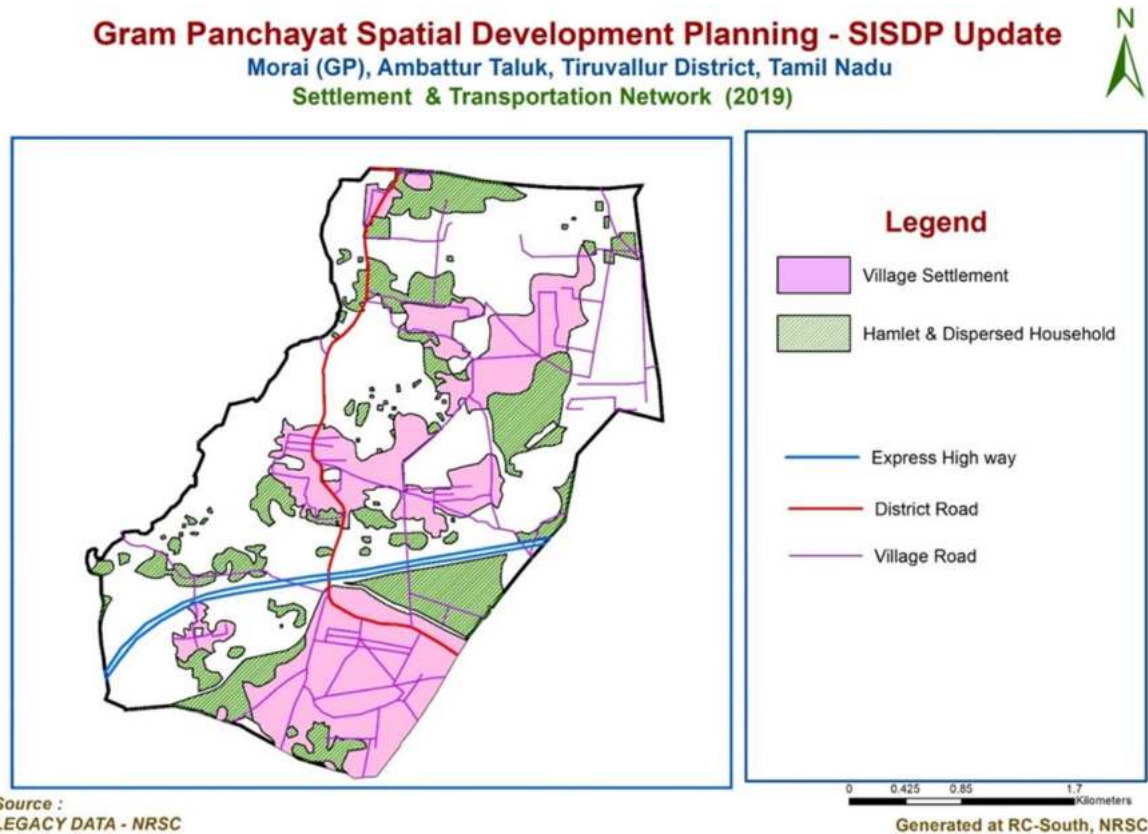
Table 6: Road length for different Road categories in Morai GP

S.No.	Road Category	Road Length (km)
1	Express Highway	4.11
2	District Road	5.94
3	Village Road	56.73
<b>Total</b>		<b>66.78</b>

Table 7: Areal spread of different Settlement categories in Morai GP

S.No.	Settlement Category	Area (ha)
1	Village Settlement (VS)	296.09
2	Hamlet & Dispersed Household (HD)	202.75
<b>Total</b>		<b>498.84</b>





Map 11: Settlement and Transportation Network of Morai GP

#### 2.7.4 LAND USE LAND COVER

High resolution satellite datasets of CARTOSAT-1 PAN and IRS LISS-IV Mx datasets acquired during 2015-16, from SIS-DP Phase-II were merged by data fusion and utilized for preparation of detailed Land Use / Land Cover (LULC) map of Morai GP at 1:10,000 scale (Map 13: Existing Land use and Land Cover 2020 from NRSC). The satellite image was used in Natural Colour Composite (NCC) mode of 2.5m spatial resolution. This LULC map was updated using IRS LISS-IV MX of 5.8m spatial resolution acquired during 2018-19. Onscreen visual interpretation technique was adopted in GIS environment for delineating boundaries of various classes using GIS software. Overall, the GP area was divided into 5 major classes, namely, cropland / agricultural plantations, settlements, wasteland, water and other land use / land cover classes. These classes were further subdivided into sub-classes as indicated in *Table 8: Area estimates of various LULC classes in Morai GP (1:10k map)*. Majority of the area under Morai GP is under Village Settlement (296.09 ha) followed by Hamlet & Dispersed Household (202.75 ha) and Crop Land (199.80 ha).



Table 8: Area estimates of various LULC classes in Morai GP (1:10k map)

S.No.	CLASS CATEGORY / NAME	AREA (Ha)
A.	CROPLAND/AGRICULTURAL PLANTATIONS	
1	Crop Land (CL)	199.80
2	Agriculture Plantation / Orchards (AP)	51.32
<i>Sub-total</i>		<i>251.12</i>
B.	SETTLEMENTS	
3	Village Settlement (VS)	296.09
4	Hamlet & Dispersed Household (HD)	202.75
<i>Sub-total</i>		<i>498.84</i>
C.	WASTELAND	
5	Scrub Land / Scrub Forest	98.52
<i>Sub-total</i>		<i>98.52</i>
D.	WATER	
6	River / Stream / Drain	1.61
7	Lakes / Pond (LP)	13.28
8	Canal	8.52
9	Reservoir / Tanks	38.13
<i>Sub-total</i>		<i>61.54</i>
E.	OTHERS	
10	Transportation	27.27
11	Educational / Training Institution	61.10
12	Industrial / Brick Kiln	27.26
13	Vegetated Area / Open Area	137.29
<i>Sub-total</i>		<i>252.92</i>
<b>TOTAL</b>		<b>1162.94</b>

The settlement / built-up area in the GP covered about 498.84 ha, which was further delineated as village settlement (296.09 ha), and hamlet & dispersed household (202.75 ha). Wastelands occupied 98.52 ha area, comprising of scrub land and scrub forest (98.52 ha). Water bodies covered an area of 61.54 ha. Other LULC classes covered the remaining area of 252.92 ha (*Table 8: Area estimates of various LULC classes in Morai GP (1:10k map)*).

The land use distribution of Morai village is typical of peri urban area marked by distributed development of housing and industries. Morai village has a significant area under agriculture and open spaces in 2011. The other significant land use in terms of area is housing both under village settlement (abadi area) and dispersed households. Water bodies canals and other communal open spaces constitute about 10% of the overall area. Subsequent development was rapid and led to reduction in

the open space area. This was in the form of housing development and marginal increase in industrial land use. The village does not have any significant natural resources. There is no reserve forest or protected areas within the village.

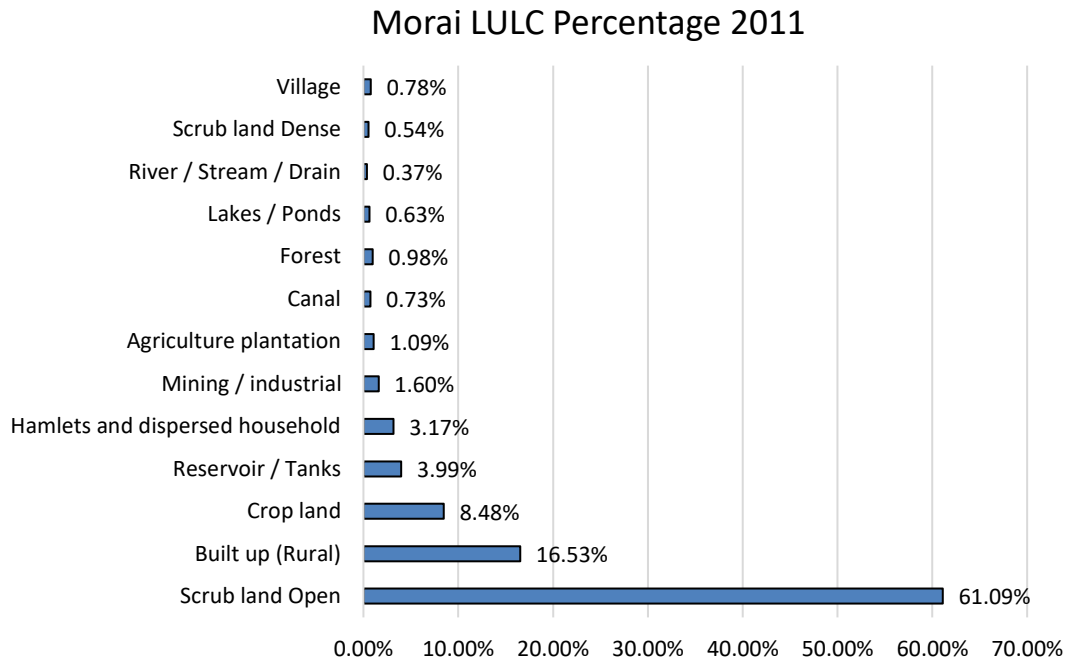


Figure 5: Land use and Land cover percentage of Morai GP in 2011

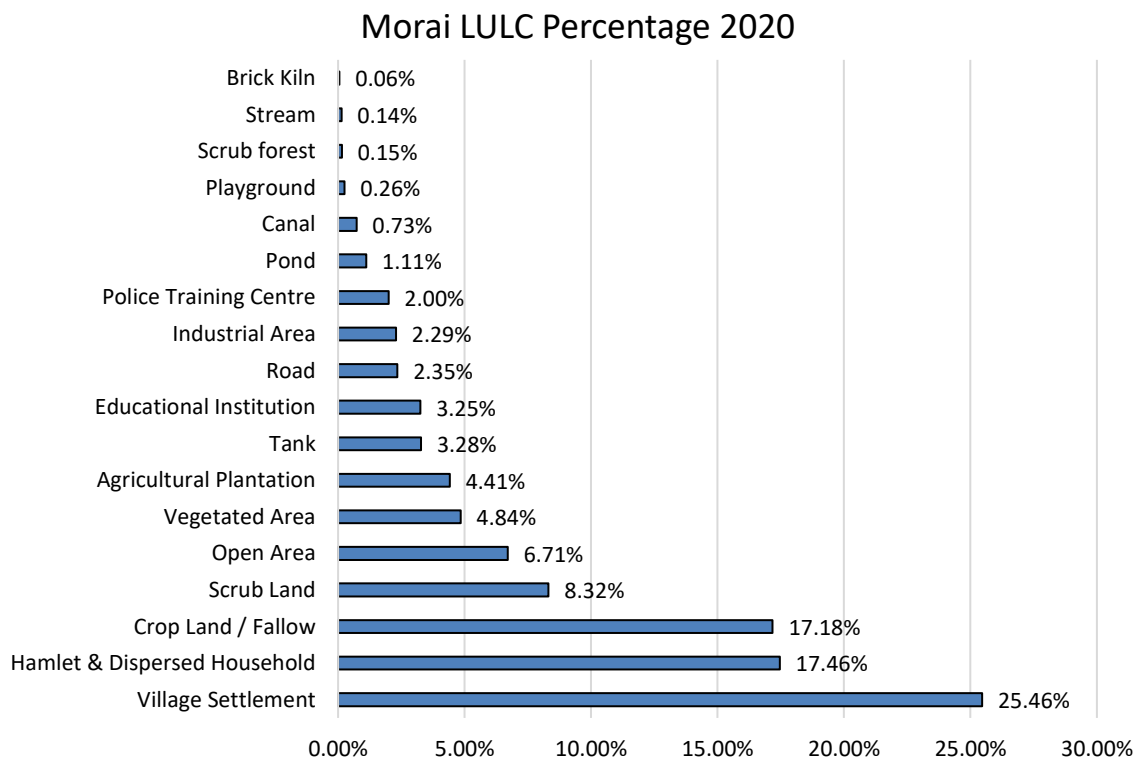
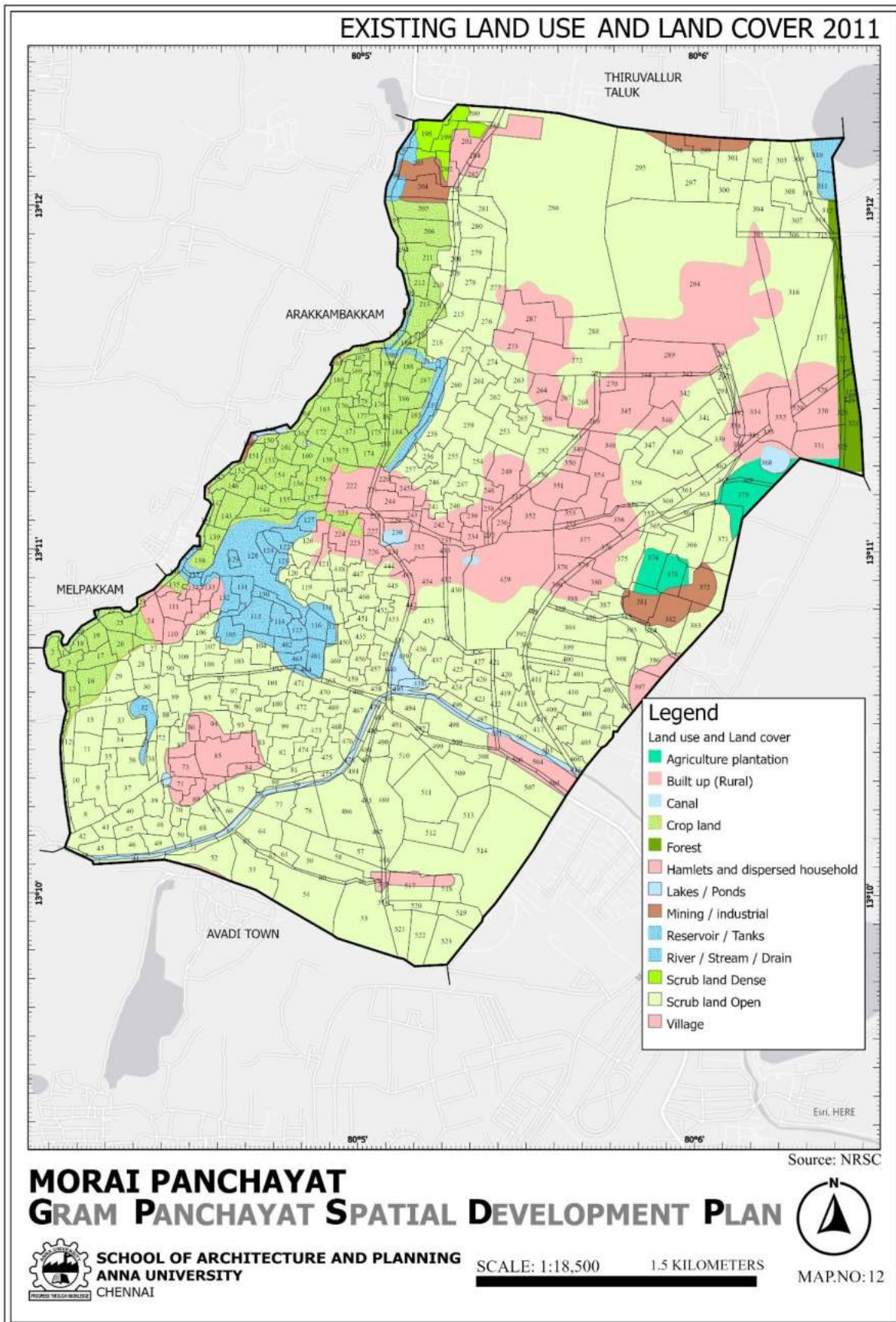
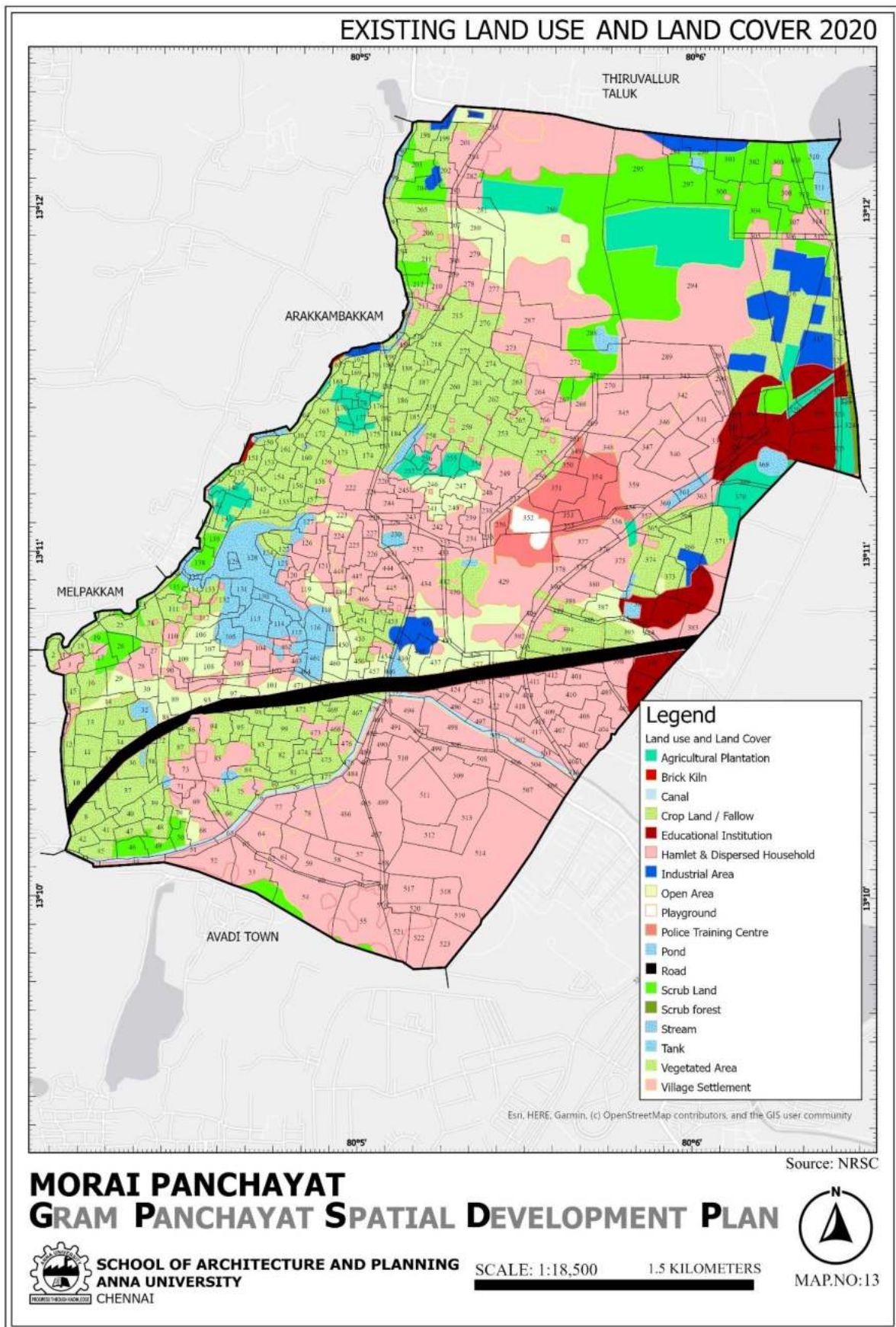


Figure 6: Land use and Land cover percentage of Morai GP in 2020



Map 12: Existing Land use Land cover 2011 from NRSC

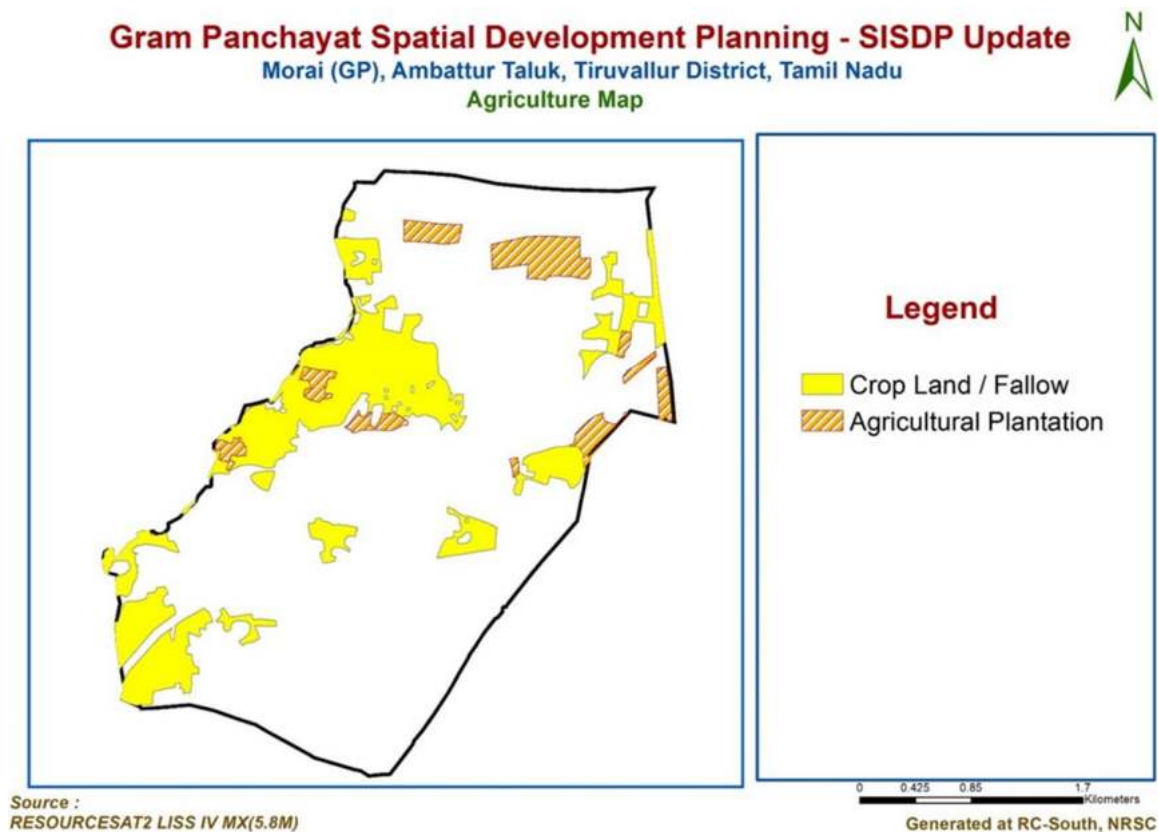




Map 13: Existing Land use and Land Cover 2020 from NRSC

### 2.7.5 AGRICULTURAL USE

Rural settlements are generally sparsely populated and are mostly in agricultural use. To determine the state of rural nature in the GP, Agricultural land use areas is delineated from LULC of Morai GP (Map 14: Agricultural Land-use in Morai GP). The result depicts reversely, like sparsely used agricultural land and mostly in settlement area. From which, the land-use change analysis is recommended to understand the state of change in rural nature.



Map 14: Agricultural Land-use in Morai GP

### 2.7.6 RAINFALL & RUNOFF ESTIMATES

It is located northeast part of Tamil Nadu and lies in the North latitude between 12°15' and 13°15' East longitude between 79°15' and 80°20'. The average rainfall of the district Tiruvallur is 1104 mm. Out of which 52% has been received during Northeast monsoon period and 41% has been received during Southwest monsoon period. The rainfall data for Morai has been obtained from IMD Daily Gridded Rainfall Data Set Over India with grid cell size of (0.25 x 0.25 degree). The annual rainfall of Morai varied between 319.1mm to 2410.4 mm during the period 1980-2010 indicating the temporal variability.

Runoff is a general term to indicate the accumulation of excess rainfall, which traverses over surface/sub surface and occurs when rainfall intensity is greater than the rate at which it is able to infiltrate the soil. In this study, one of the most widely used technique USDA Natural Resources Conservation Service (NRCS) Curve Number (CN) method was used for assessment of runoff potential for GP (USDA-SCS, 1985).

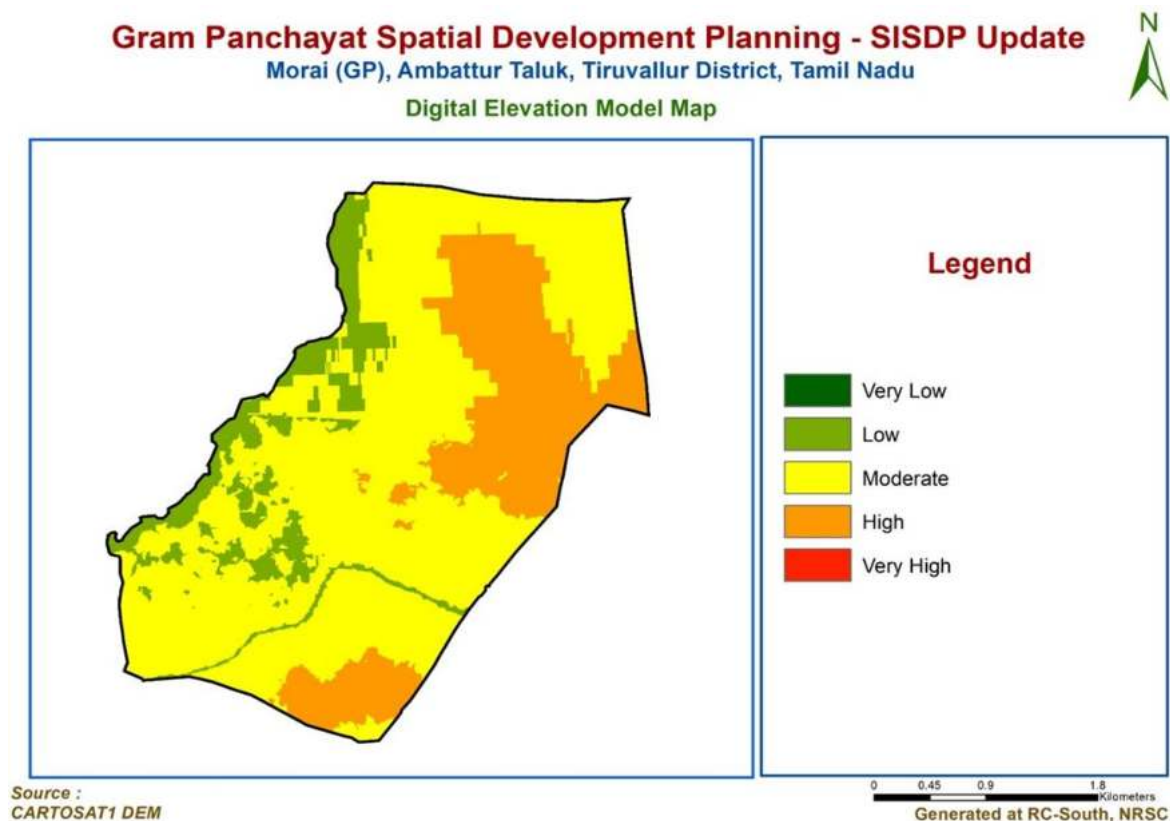
**Table 9: Temporal variability of Rainfall and Runoff estimates for Morai GP**

Year	Rainfall (mm)	Runoff	Rainy Days	Meteorological Year	Runoff coefficient
1980	1328.4	354.8	66	Normal	0.267088
1981	1175.3	178.1	85	Normal	0.151536
1983	1590.4	499.3	86	Normal	0.313946
1984	1897.6	729.4	78	Wet	0.38438
1985	1657.8	526.1	91	Wet	0.317348
1986	1363	325.2	72	Normal	0.238591
1987	1164.3	175.5	83	Normal	0.150734
1988	1230.1	294.9	65	Normal	0.239737
1989	1114.3	198.9	70	Normal	0.178498
1990	1842	567.5	101	Wet	0.308089
1991	1591.9	553.1	79	Normal	0.347446
1992	1056.1	195	63	Normal	0.184642
1994	1439.6	578.8	76	Normal	0.402056
1995	1550.5	280.2	82	Normal	0.180716
1996	1995.9	920.4	73	Wet	0.461145
1997	1594.4	396.3	93	Normal	0.248557
2000	1021.4	163.7	81	Normal	0.16027
2005	2410.4	815.6	96	Wet	0.338367
2006	1213.8	237.7	69	Normal	0.195831
2007	1232	288	75	Normal	0.233766
2008	1378.2	375.5	67	Normal	0.272457
2009	1105.8	263.3	56	Normal	0.238108
2010	1975.2	460.3	96	Wet	0.23304

The spatial distribution of runoff in the study area was computed. Quantitative assessment of runoff serves as basic information for adopting suitable soil and water conservation measures in a watershed/Gram Panchayat. The rainfall and runoff estimates have been given in *Table 9: Temporal variability of Rainfall and Runoff estimates for Morai GP*. From the table it is seen that the runoff coefficient varies between 0.15 to 0.46.

### 2.7.7 DIGITAL ELEVATION MODEL (DEM)

A digital elevation model (DEM) is a representation of elevation data and is the important parameters for developmental activities in an area. The DEM was derived from CARTOSAT stereo data, which is very much essential for generation of slope and contour maps. DEM is used to determine the topography and slope of the study area. The Digital elevation Model of the GP is represented in the *Map 15: Digital Elevation Model of Morai GP*.



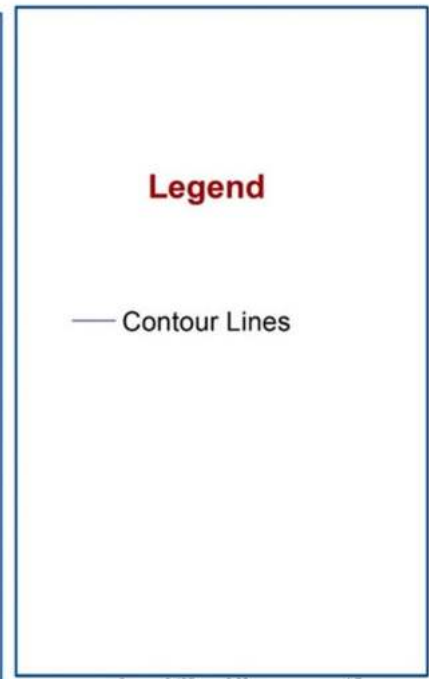
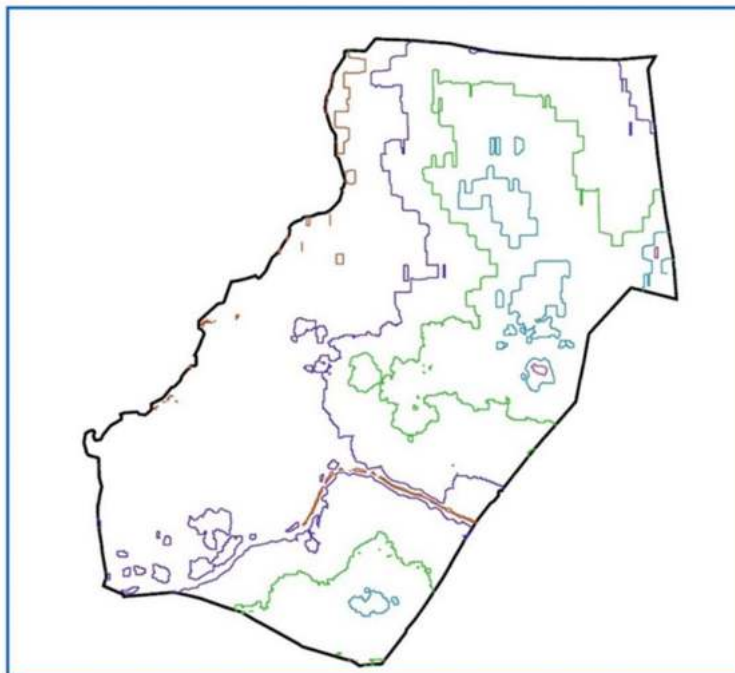
Map 15: Digital Elevation Model of Morai GP

### 2.7.8 TOPOGRAPHY AND SLOPE

Topography is a measurement of elevation, and slope is the percent change in that elevation over a certain distance. The topography is represented with lines that connect points representing the same elevation, called Contours. The Contours at 5m interval and Slope of Gram Panchayat was generated and represented as Map 16: Contour Interval of Morai GP and Map 17: Slope terrain of Morai GP respectively. The contour determines the local runoff which is useful to prepare the Drainage network plan and the slope is utilized to determine the Water resource conservatory locations.



**Gram Panchayat Spatial Development Planning - SISDP Update**  
Morai (GP), Ambattur Taluk, Tiruvallur District, Tamil Nadu  
Contour Map



0 0.425 0.85 1.7 Kilometers

Generated at RC-South, NRSC

Source :  
CARTOSAT1-DEM

Map 16: Contour Interval of Morai GP

**Gram Panchayat Spatial Development Planning - SISDP Update**  
Morai (GP), Ambattur Taluk, Tiruvallur District, Tamil Nadu  
Slope Map



0 0.425 0.85 1.7 Kilometers

Generated at RC-South, NRSC

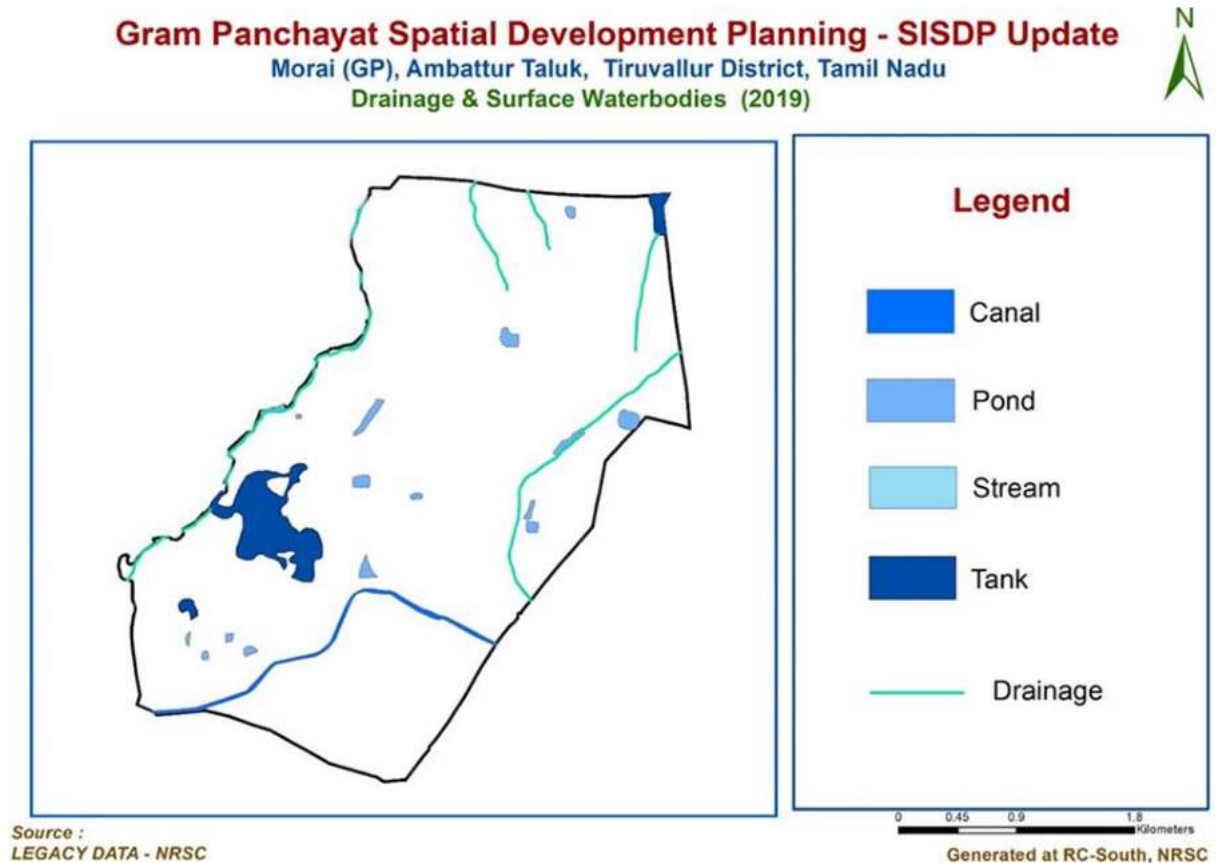
Source :  
CARTOSAT1-DEM

Map 17: Slope terrain of Morai GP



### 2.7.9 DRAINAGE NETWORK & SURFACE WATER BODIES

Rivers/streams are natural course of water flowing on the land surface along a definite channel and its spatial distribution in the GP is shown as *Map 18: Drainage & Surface Waterbodies of Morai GP*. From the Drainage network, the estimates length of the drainage is 11.13 km.



Map 18: Drainage & Surface Waterbodies of Morai GP

### 2.7.10 GROUND WATER QUALITY

Ground water quality well location map is depicted in Map 19: Ground water Quality Locations of Morai GP and the details of pH, Total Dissolved Solids, Hardness, Chemical Constituents like Iron, Chloride, Nitrate and Sulphate content, Alkalinity and Water Quality (Potable, Non-Potable) are given in *Table 10: Ground Water Quality Parameters – Morai GP*.

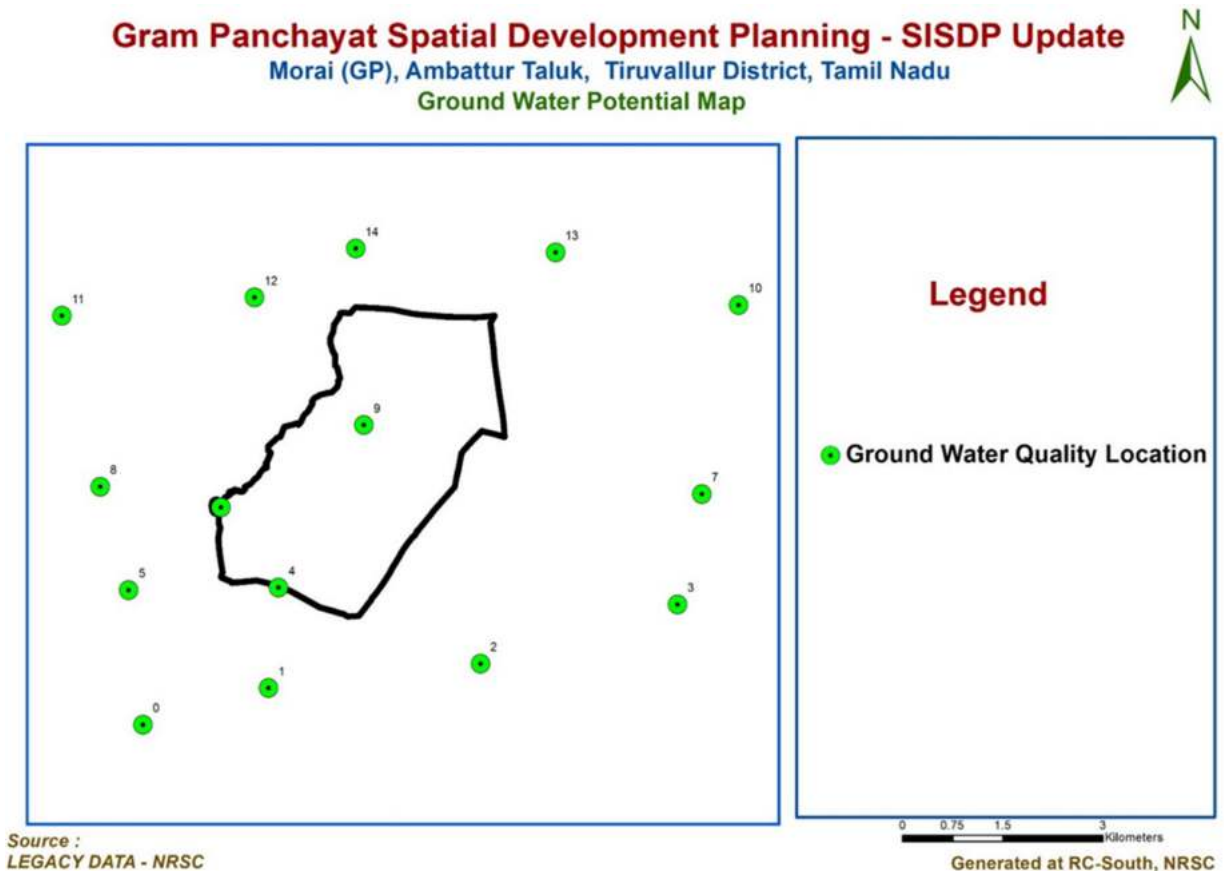
Availability of groundwater cannot be assessed directly from remotely sensed data. Hence, its presence must be inferred from manifestation of surface features which act as an indicator of groundwater. Ground water potential map generated under Rajiv Gandhi Drinking Water Mission carried by NRSC was used for planning

purpose after updating with high resolution satellite data (Map 20: Ground water potential of Morai GP).

Table 10: Ground Water Quality Parameters – Morai GP

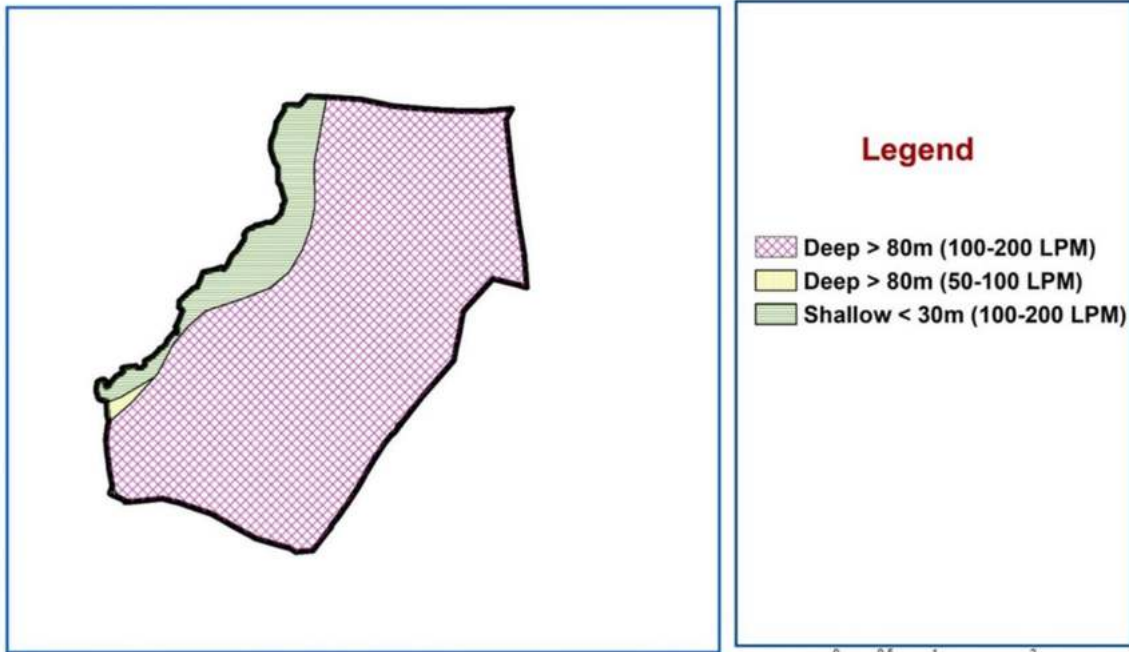
Ln	pH	TDS	Hardness	F <sup>-</sup>	Cl <sup>-</sup>	Fe	NO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	Alkalinity	GWQ
0	6.8	190	87	0.5	32	0	20	15	187	P
1	6.54	570	171	0.3	110	0	15	32	140	P
2	6.95	202	95	0.3	43	0.2	13	30	76	P
3	7.07	403	213	0.3	51	0.2	11	68	40	P
4	6.57	852	65	0.2	210	0	15	142	119	P
5	7.85	810	243	0.5	163	0	28	197	61	P
6	6.96	450	230	0.3	106	0	17	28	180	P
7	7.34	510	255	0.5	29	0	17	202	352	P
8	6.87	643	291	0.3	182	0	2	162	180	P
9	7.7	1386	348	0.5	279	0	35	302	162	P
10	7.5	988	400	0.2	34	2	31	20	155	P
11	7.9	580	558	0.3	40	0	24	267	332	NP
12	7	480	548	0.4	80	0	42	198	353	P
13	6.8	326	132	0.1	115	0	11	3	216	P
14	7.11	428	230	0.4	62	0	15	70	360	P

\*P- Potable, NP – Non-Potable



Map 19: Ground water Quality Locations of Morai GP

**Gram Panchayat Spatial Development Planning - SISDP Update**  
Morai (GP), Ambattur Taluk, Tiruvallur District, Tamil Nadu  
Ground Water Potential Map



Source :  
LEGACY DATA - NRSC

Generated at RC-South, NRSC

Map 20: Ground water potential of Morai GP

## CHAPTER 3

### 3 CHARACTERISTIC ANALYSIS OF THE VILLAGE

#### 3.1 DEMOGRAPHIC CHARACTERISTICS

From the Demographic analysis of the Morai Panchayat its composition, age, sex, and racial character of the village is understood and how it has changed over time. Which is not only limited to its characteristics of the community, but also determines the information about the capacity for future planning and investment.

Table 11: Demographic Statistics of Morai GP

Year	1981	1991	2001	2011	*2020
<b>Population</b>	3098	4059	3373	10873	19850
Population growth rate (Annual)		3.10	-1.69	22.24	8.26
Population Density (Per sq.km)	266	349	290	935	1707
<b>Male</b>	1615	2089	1697	5462	9825
<b>Female</b>	1483	1970	1676	5411	9555
Sex Ratio (Females per 1000 Males)	918	943	988	991	973
<b>Households</b>	639	901	795	2718	5700
<b>Literate</b>	NA	1974	2113	8042	NA
<b>Illiterate</b>	NA	2085	1260	2831	NA
Literacy Rate (Percent)	NA	48.6%	62.6%	74.0%	NA
<b>Worker Population</b>	NA	1346	1120	4249	NA
<b>Non-Worker Population</b>	NA	2713	2253	6624	NA
Employment Rate (Percent)	NA	33.16%	33.20%	39.08%	NA

Source: Census of India and \*Village panchayat estimate, 2020

#### 3.1.1 POPULATION GROWTH

Morai Panchayat has a population of about 19,850<sup>4</sup> in 2020 which has increased rapidly by 78% from 10,873 (census 2011), which is described in the Figure 7: Population Growth over the decade 1981 - 2020. It shows a steep decadal average growth of about 22.23% between the year 2001 and 2011, which is higher

4 - As per Village Panchayat estimate, 2020

NA – Data Not Available

when compared to the Tamilnadu state average of 15.6% but lower than the Tiruvallur district average of 35.33%, during the same period.

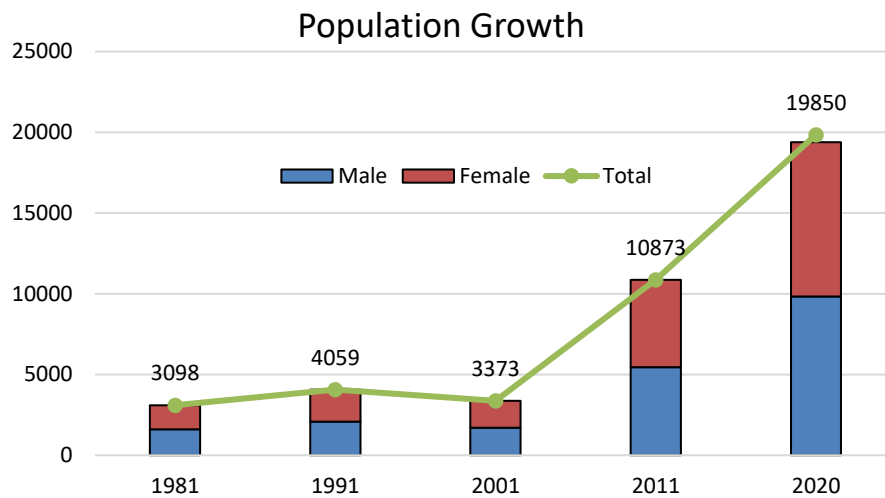


Figure 7: Population Growth over the decade 1981 - 2020  
 Source : Census of India and Village panchayat Estimate, 2020

### 3.1.2 POPULATION DENSITY

Population density is one of the important indices of population concentration. The village is spread across 11.63 sq.km (1163.09 ha). The population density of Morai is 934.91 persons per sq.km in 2011, when compared with Tiruvallur district density of 1095 persons per sq.km, the village shows a marginal increase in density. Population density of Morai has seen a sharp growth after 2011, owing to the developments like construction of outer ring road and social amenities and has increased to 1706.67 persons per sq.km in 2020.

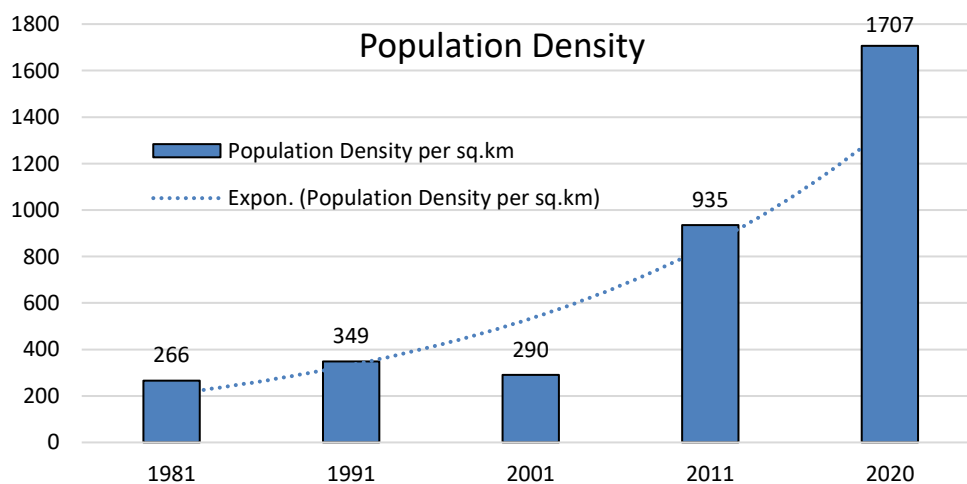


Figure 8: Population Density of Morai GP  
 Source: Census of India and Village panchayat estimate, 2020

### 3.1.3 AGE STRUCTURE

The Age structure plays a major role in Rural planning. It gives an idea about dependent population, working population, jobs to be created, the present and future requirements of facilities and amenities. The Age structure of Morai shows a majority of working age population that is between 16-25 & 26-35 Age group, which is represented in the Figure 9: Age structure of Population in Morai GP.

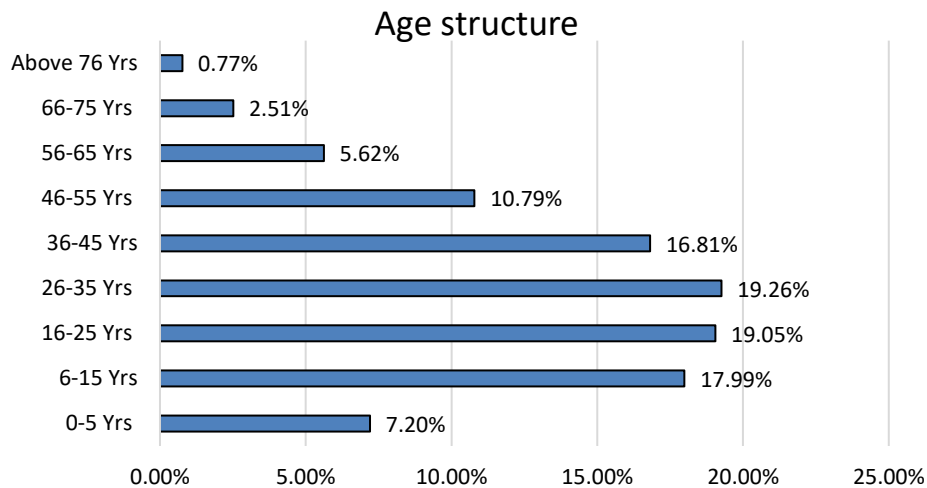


Figure 9: Age structure of Population in Morai GP  
Source: SECC, 2011

### 3.1.4 SEX RATIO

According to Census, the sex ratio of the village has increased over the decade to 991 females per 1000 males by 2011, when compared with the Village panchayat estimate of 2020, the sex ratio dropped to 973 females per 1000 males.

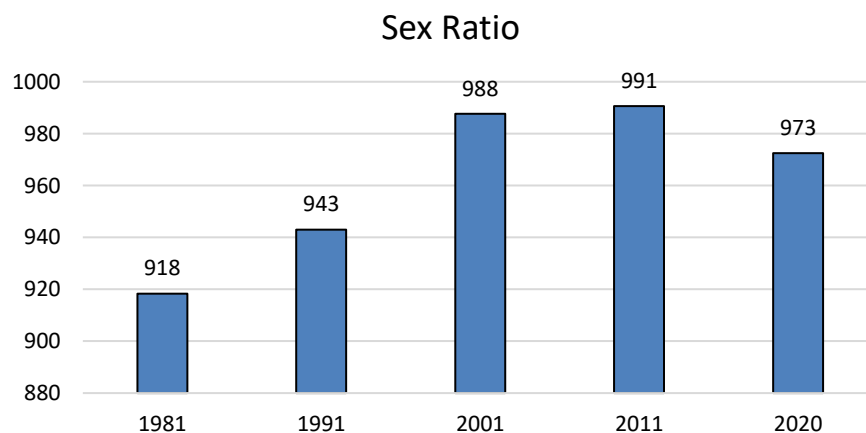


Figure 10: Sex ratio of Population in Morai GP  
Source: Census of India and Village panchayat estimate, 2020

### 3.1.5 HOUSEHOLD GROWTH

A household includes all the persons who occupy a housing unit as their place of residence. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements. According to 2011 census, Morai has 2718 households, but its number has increased twofold to 5700 households<sup>5</sup> in 2020.

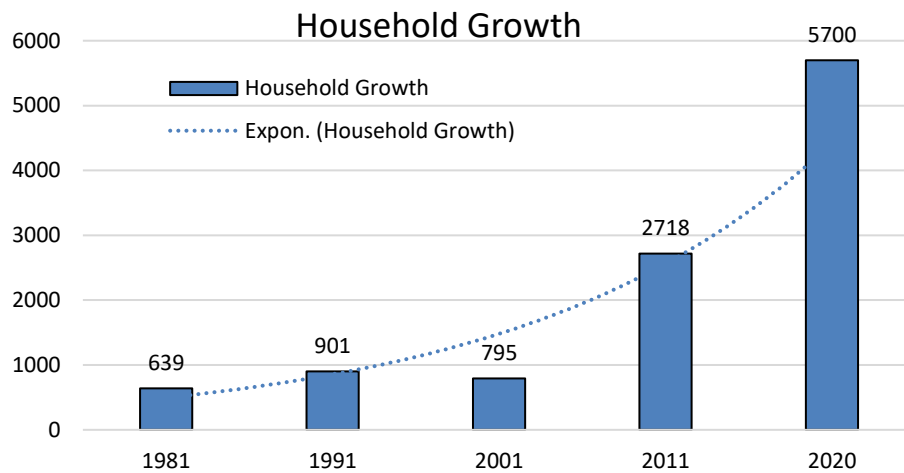


Figure 11: Household Growth over the year 1981 – 2020

Source: Census of India

### 3.1.6 LITERACY RATE

The Literacy rate of Morai has increased from 48.6% in 1991 to 73.96% in 2011, which is still lower than the Tiruvallur district average of 84%.

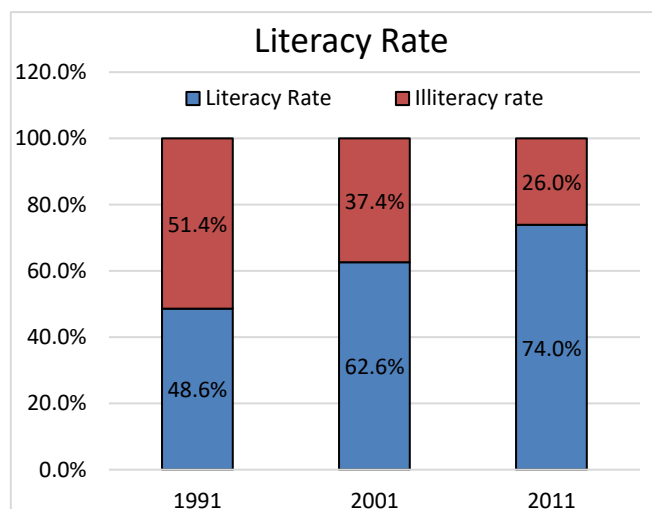


Figure 12: Literacy rate over the year 1991 – 2011

Source: Census of India

<sup>5</sup> - As per Village Panchayat estimate, 2020

On Classification of Literacy rate in Morai shows 26% illiterates, 6.37% of the population has an education below primary level, 61.37% of people are educated upto schooling and 5.35% are graduate and above according to SECC, 2011.

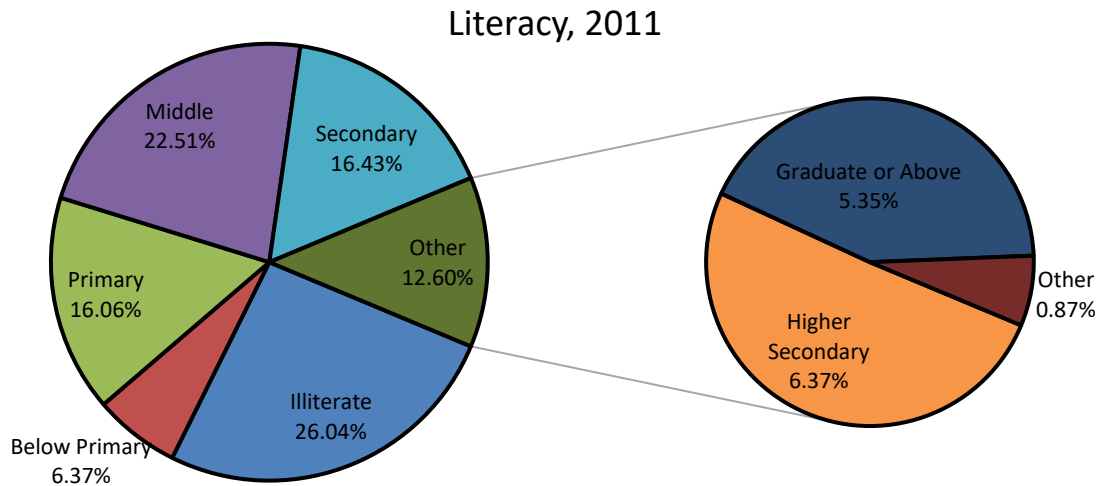


Figure 13: Classification of Literacy rate, 2011  
Source: SECC, 2011

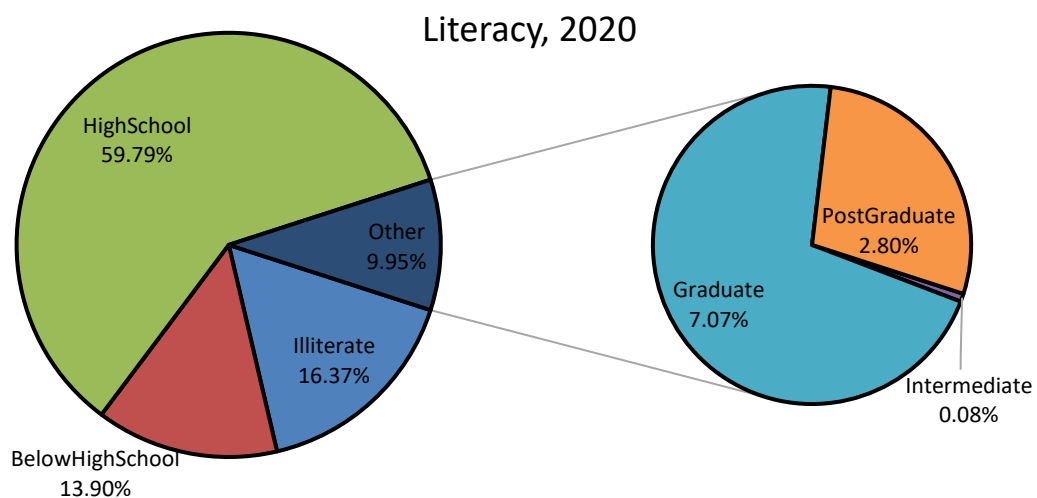


Figure 14: Classification of Literacy rate, 2020  
Source: Primary sample survey, 2020

Based on primary sample survey conducted, about 83.7% are literates of which 44% are male and 40% are female. About 7% of male and 10% of female population are illiterates. From 2011 to 2020, the male literacy rate has improved by 4% from 40% to 44% and the female literacy rate has improved by 6% from 34% to 40%.



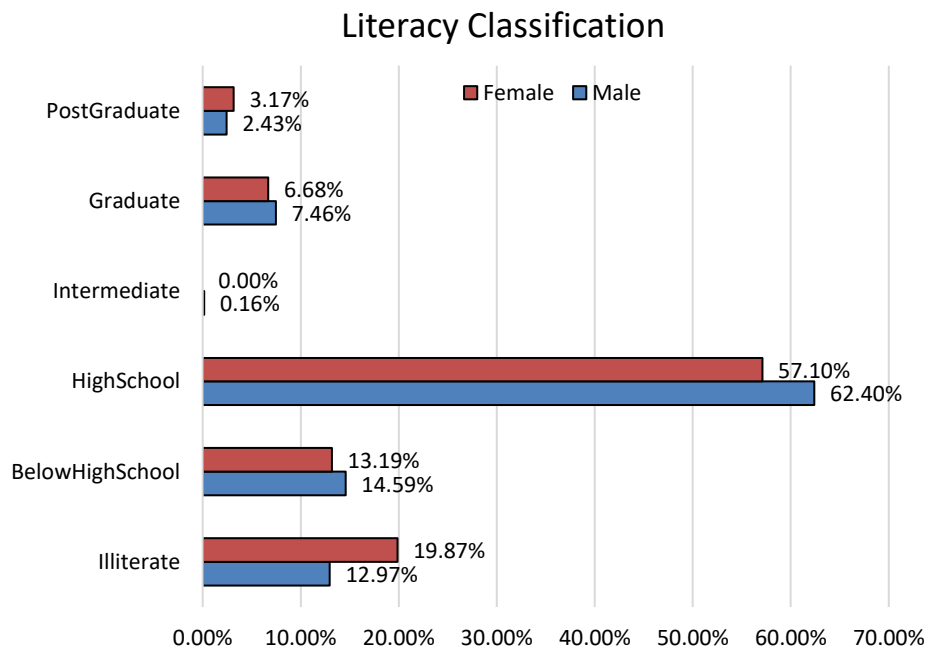


Figure 15: Literacy level of Morai GP in 2020  
 Source: Primary Sample Survey, 2020

### 3.1.7 EMPLOYMENT RATE

The employment rate is the best measure of the health of the economy as it measures the proportion of the working age population that are employed. According to SECC, 2011 working age population of Morai GP is 71.53%, but its employed rate is 39.08%. Which shows the unemployed rate is higher in Morai panchayat, even though there is slight increasing employment level.

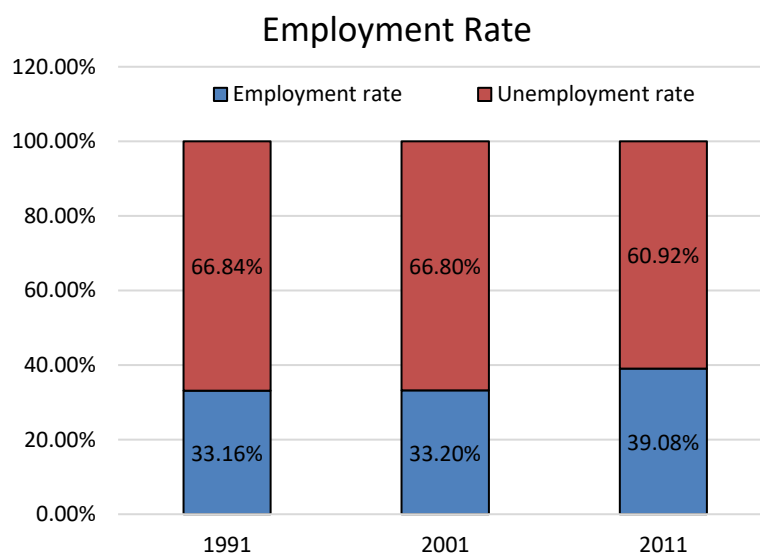


Figure 16: Employment rate over the year 1991 – 2011  
 Source: Census of India

According to the primary sample survey, Morai has 29% of population engaged in main or marginal work with the working composition of 28% male and 1% female. There is an increase of 23% male in the working population and a decrease of 23% in the female working population between the year 2011 and 2020. There is an overall 10% increase in non-working population from 61% to 71% show in the Figure 17: Trends of Employment over the year 2011 - 2020. There is a decrease of 3% in the male non-working population and an increase of 3% in the female non-working population in the last 10 years.

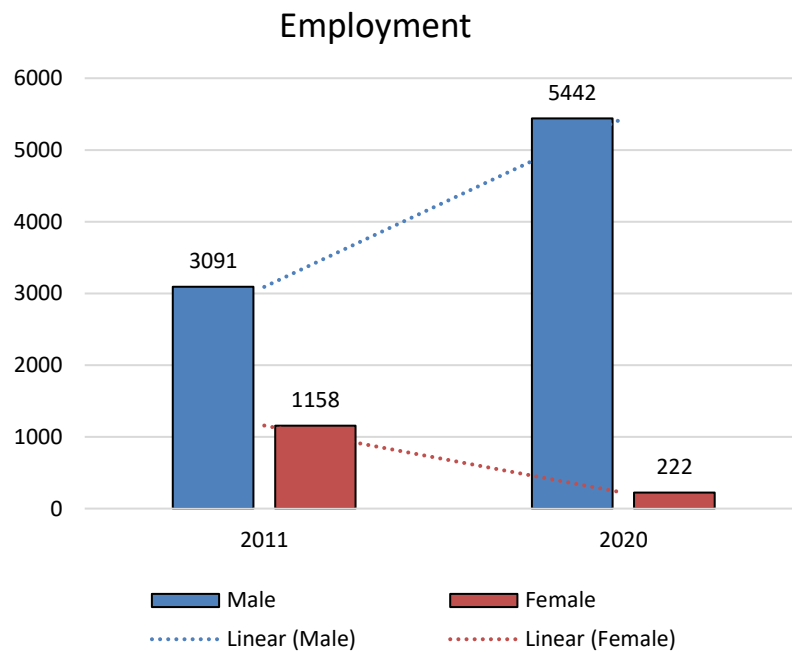


Figure 17: Trends of Employment over the year 2011 - 2020  
Source : Census, 2011 and Village panchayat estimate, 2020

### **3.2 LAND-USE CHANGE ANALYSIS**

Land is a limited resource and has pressure from social, economic and environmental needs, including urbanization, industrialization, mining, transportation, rural development, protection of environmentally sensitive zones and resource areas. Unplanned development in rural, peri-urban areas and that in the vicinity of national and state highways also has adverse social, environmental and health hazards. Spatial planning in rural areas is of paramount importance in order to have well-designed rural communities, as well as scientific and orderly disposition of land resource.

This would in turn, foster economic development and contribute to the ease of living along with improvement in the quality of life. The study of land use and land cover (LULC) changes is very important to have proper planning and utilization of natural resources and their management. Knowledge about land use and land cover has become important to overcome the problem of biogeochemical cycles, loss of productive ecosystems, biodiversity, deterioration of environmental quality, loss of agricultural lands, destruction of wetlands, and loss of fish and wildlife habitat. This analysis was done to determine the land use and land cover status in the Morai Village Panchayat and to identify land use changes, specially to understand the status of agriculture and the socio-economic development in the village.

#### **3.2.1 LAND USE AND LAND COVER**

Identification of land cover establishes the baseline information for thematic mapping and change detection analysis. It plays a significant role in this rural planning by indicating the land utilization aspects, at local, regional and national levels. The present and past land use and land cover information of the Morai panchayat is extracted with the help of high-resolution satellite imagery by the NRSC team. From which the changes that are happening in the environment are determined. The LULC of the Morai panchayat over the period are shown in the *Map 12: Existing Land use Land cover 2011 from NRSC* and the *Map 13: Existing Land use and Land Cover 2020 from NRSC* respectively. The percentage change of land use over 2011 and 2020 is determined and represented in the *Table 12: Morai- Percentage of land*

use change from 2011 - 2020. From the existing LULC (2020), total crop land is 108.8 Hectares, within which the land under miscellaneous tree crops is 251.9 Hectares, fallow land under current fallow is 172.8 Hectares, cultivable waste land available is 241.6 Hectares, and uncultivable land works out to 119.6 Hectares. Total irrigated land is 50.7 Hectares, and un-irrigated is 58.1 Hectares, Land with source of irrigation through canal is 50.7 Hectares, Permanent pastures 87.5 Hectares, and Land under non agriculture use 180.9 Hectares.

Table 12: Morai- Percentage of land use change from 2011 - 2020

Land use /Land cover	Area in sq.m2020		Area in sq.m 2011		% of change
Agricultural Plantation	513222.3927	Agricultural-plantation	126797.6234	386424.77	3.33
Agricultural-Crop Land / Fallow	1998021.655	Agricultural-Crop land	985650.7179	1012370.94	8.71
Scrub forest	17412.30035	Scrub land Dense	62242.35875	-44830.06	-0.39
Scrub Land	967792.1427	Scrub land Open	7096927.001	-6129134.86	-52.76
Vegetated Area	563108.393	Forest	113700.0791	449408.31	3.87
Pond	129566.5012	Lakes / Ponds	73462.66279	56103.84	0.48
Tank	381328.4967	Tanks	463799.6361	-82471.14	-0.71
Canal	85229.08993	Canal	85144.72789	84.36	0.00
Stream	16146.23142	River/ Channels	43494.6847	-27348.45	-0.24
Road	272720.6592			272720.66	2.35
Village Settlement	2960971.066	Village	90995.96705		
		Built up (Rural)	1920976.107		
	2960971.066		2011972.074	948998.99	8.17
Hamlet & Dispersed Household	2030759.289	Hamlets and dispersed household	368660.0203	1662099.27	14.31
Educational Institution	378471.8127			378471.81	3.26
Open Area	779860.6599			779860.66	6.71
Playground	29932.58537			29932.59	0.26
Police Training Centre	232545.1274			232545.13	2.00
Brick Kiln	6711.53899			6711.54	0.06
Industrial Area	265923.9046	Mining / industrial	186235.1949	79688.71	0.69
<b>Total area</b>	<b>11116501.45</b>		<b>11618086.78</b>		

Source: NRSC - Land use and Land cover

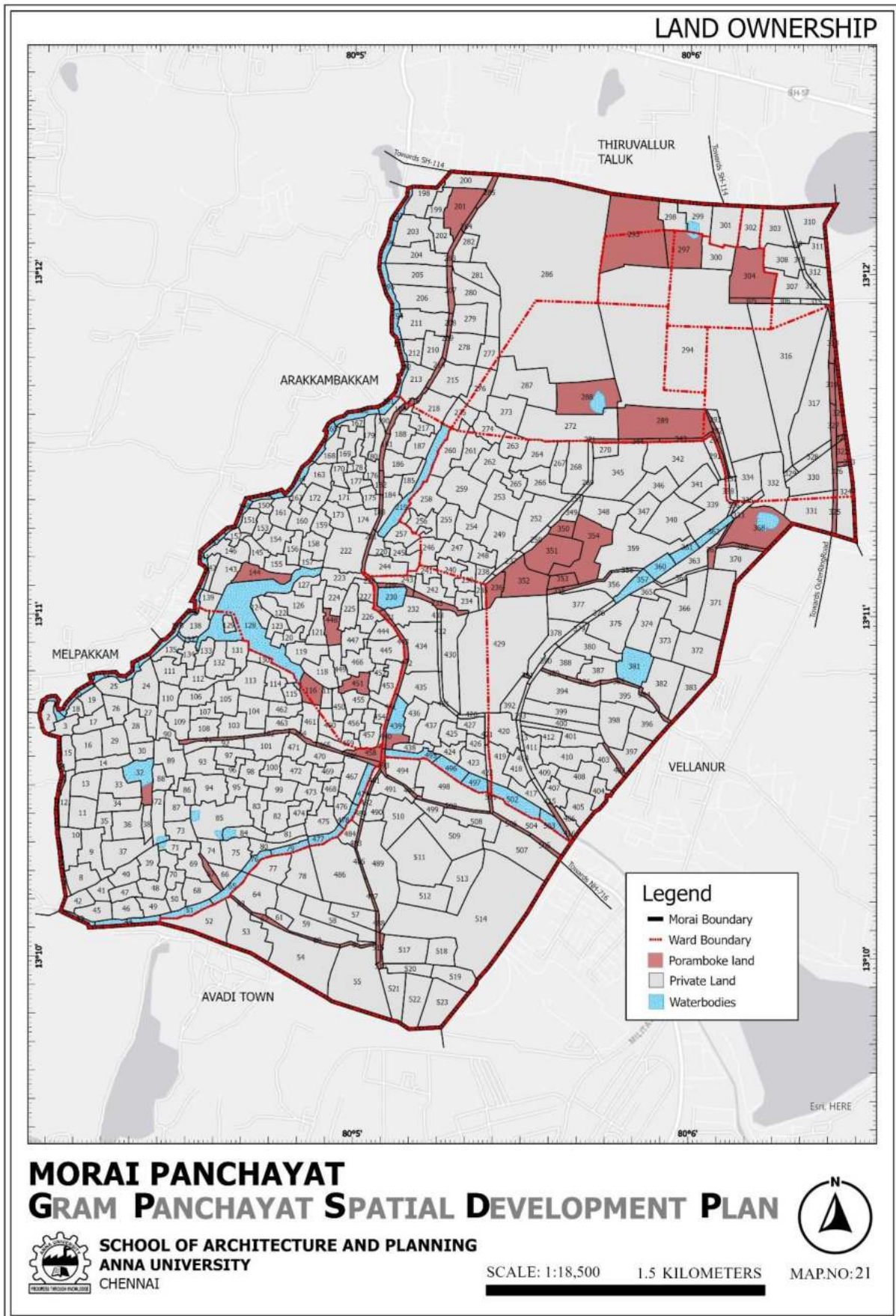
There is significant increase in Housing area (14%) and significant loss in open Scrub land (-53%), in the period between 2011 & 2020. Large scale land use conversion of the village has happened in the decade between 2001 and 2011. Factors that led to this land use change are; Outer ring road construction (2010), which led to land prospecting; Establishment of Police training academy (1994); Settlement of people evacuated from the Chennai city to the village communal grazing land by Tamilnadu state government (Formation of New Kaniyamman nagar); and Vel Tech university started within the village in 1997.

The Second Master Plan of Chennai extends its CMA Limits to the extent of 1189 Sq.km, which includes our study area Morai panchayat. Further land use conversion has been reduced by declaring predominant land within the village into Red Hills Catchment area that is no development zoning (coming under Recharge zone for Puzhal reservoir). An encouraging trend is the increase in land under agriculture (12%). Other than the playground within the Police training Camp, no open spaces exist for recreation, especially active recreation.

### **3.2.2 LAND OWNERSHIP**

The village falls under the Ryotwari system of land administration. The understanding of land ownership generally relies upon two major types of land classification. One is the ryotwari lands which consist of private ownership. These lands are under three categories; the *Nanjai* or traditional wetlands consisting of an area 28 acres and 29 sqm; the *Punjai* or traditional dry lands consisting of a total area of 19 hectares 5 acres and 17 sqm; and *Manavari* lands or traditional rain fed lands consisting of an area of 2 hectares 61 acres and 25 sqm. The second is the village common lands called as poramboke lands, owned by the government. These are the tanks, canals, burial grounds, foreshore of the water bodies, communal grazing grounds and the settlement area. The *Map 21: Land ownership in Morai GP* shows the land poramboke land in Morai Panchayat. The purpose of determining the public and private land in the Morai village is to recognize that public and semi-public facilities provide necessary services to the community and also to propose new facilities without going for land acquisition.





Map 21: Land ownership in Morai GP



### 3.3 HOUSEHOLD SURVEY DATA ANALYSIS

This document presents the social and economic sample survey analysis for the Morai village, Thiruvallur district based on the survey conducted using the GPSDP Survey Application developed by NRSC, ISRO. The findings are purely based on the analysis, evaluation and reviews of primary data collected from 369 House Holds which is approximately 6% of the sample size is represented in the Figure 18: Distribution of Sample Household Survey conducted. This document provides a description of the social and economic conditions within the identified project study area, which provides the social impact assessment.

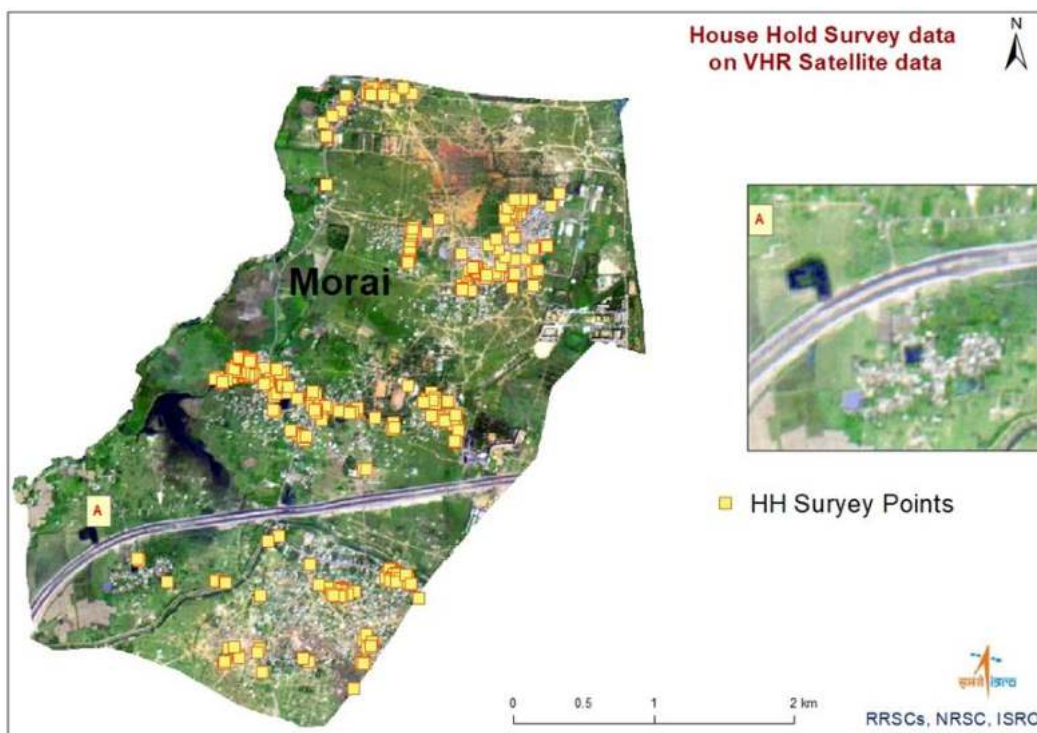


Figure 18: Distribution of Sample Household Survey conducted

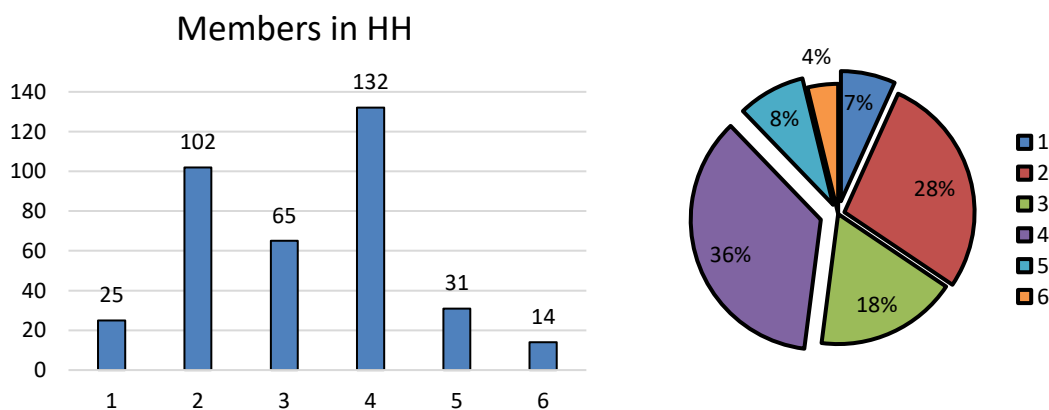


Figure 19: Family member distribution in the Household

### 3.3.1 HOUSING CHARACTERISTICS

#### 3.3.1.1 Housing Ownership

Out of the 42.6% landless households with major income from casual labour, 14.8% of the households has only one room dwelling with kutcha wall and kutcha roof. Morai village had 92% households with own house and 7.9% of households staying in rental accommodation and 0.2% in others. The villagers pay rent in the range of Rs.1,000 - Rs.8,000 with an average of Rs.3,240. Average year of residence in the village is 20.29 years and the most common range of residents is 5 to 15 years. Almost most of the houses are single storied buildings with about 73% houses of good condition and 25.7% as liveable houses. Most of the houses are built 10 -20 years old.

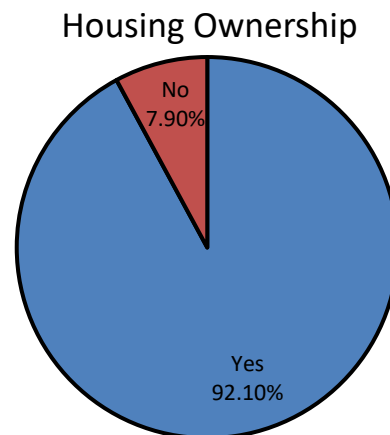


Figure 20: Ownership of houses  
Source : SECC, 2011

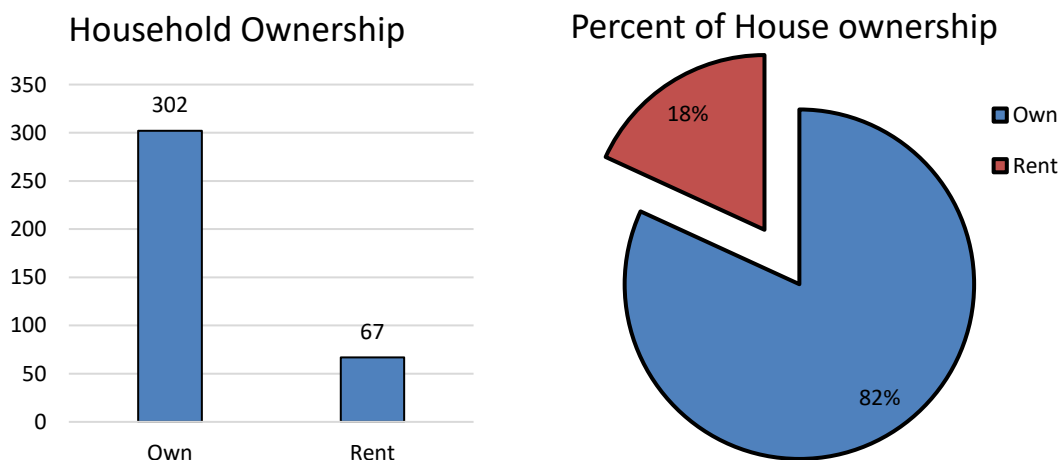


Figure 21: Distribution of Household Ownership  
Source: Primary sample survey, 2020

### 3.3.1.2 Housing Distribution

Morai had about 41% of deprived households with only 3% of the household owning land. It has about 4.1 % of zero deprived households. 51.7% of households are excluded households.

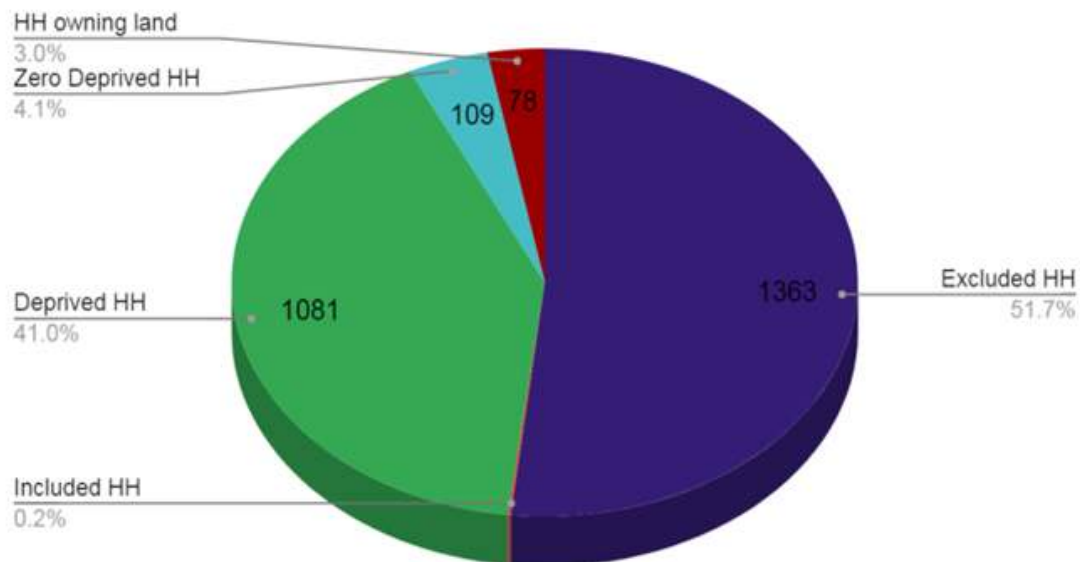


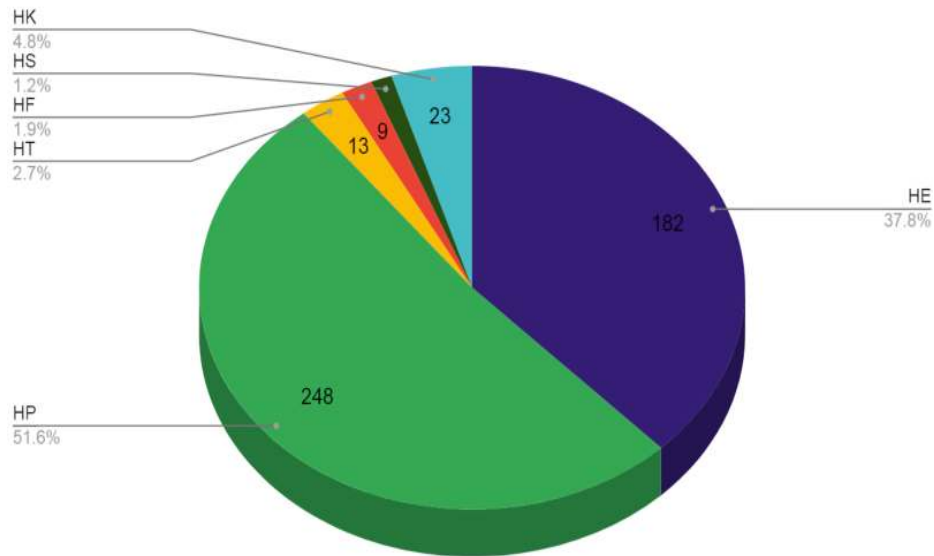
Figure 22: Distribution of Household  
Source: SECC,2011

### 3.3.1.3 Excluded Household

The village has 51.6% of houses with three or more room with pucca walls and pucca roof. The *Figure 23: Distribution of Excluded households* describes the excluded households in Morai GP. 4.8% of households have Kisan credit card with the credit limit of Rs.50,000 and above. 2.7% and 1.2% of households are owning 2.5 acres and 7.5 acres or more irrigated land with at least one irrigation equipment respectively. 1.9% of households with 5 acres or more land cultivates for two or more crop seasons. 37.8% of houses had members earning more than Rs.10,000 per Month.

### 3.3.1.4 Deprived Household

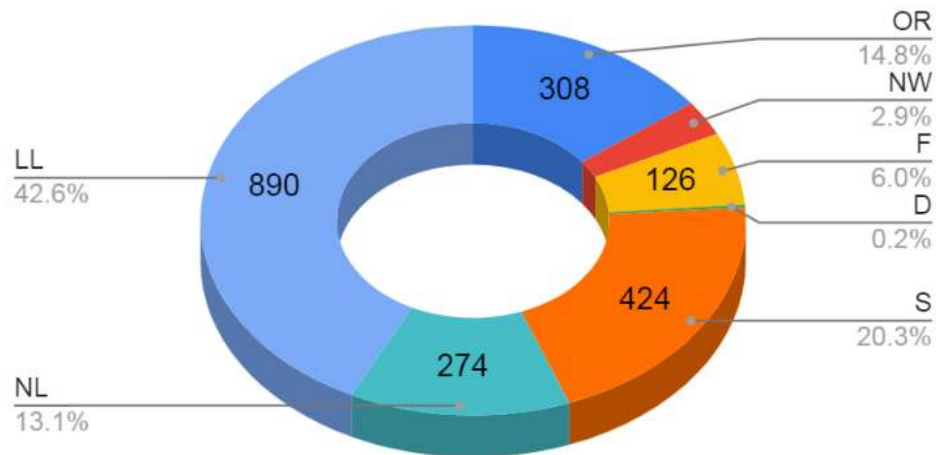
The village had 42.6% landless households with major income from casual labour, and 20.3% of the deprived households belong to the SC/ST category. The *Figure 24: Distribution of Deprived households* describes the deprived households in Morai GP.



- HE** - Households with any member earning more than Rs.10,000 per mon
- HP** - Households with three or more rooms with pucca walls and pucca roof
- HT** - Households owning 2.5 acres or more irrigated land with at least one irrigation equipment
- HF** - Household owning 5 acres or more land irrigated for two or more crop seasons
- HS** - Households owning 7.5 acres or more land with at least one irrigation equipment
- HK** - Households having Kisan credit card with the credit limit of Rs.50,000 and above

Figure 23: Distribution of Excluded households

Source : SECC, 2011



- OR** - Only one room with Kutcha wall & roof
- NW** - No adult member between age 16 to 59
- F** - Female headed households with no adult male member between age 16 to 59
- D** - Disabled member and no able-bodied adult
- S** - SC/ST households
- NL** - No literate adult above 25 years
- LL** - Landless households deriving major part of their income from manual casual labour

Figure 24: Distribution of Deprived households

Source : SECC, 2011



### 3.3.1.5 Housing Tenure Status

In Morai village, 18% are rental Households and 82% constitutes owned houses. Majority of households (about 70%) where the duration of stay falls under less than 20years with the drastic growth happening over the last 10 years.

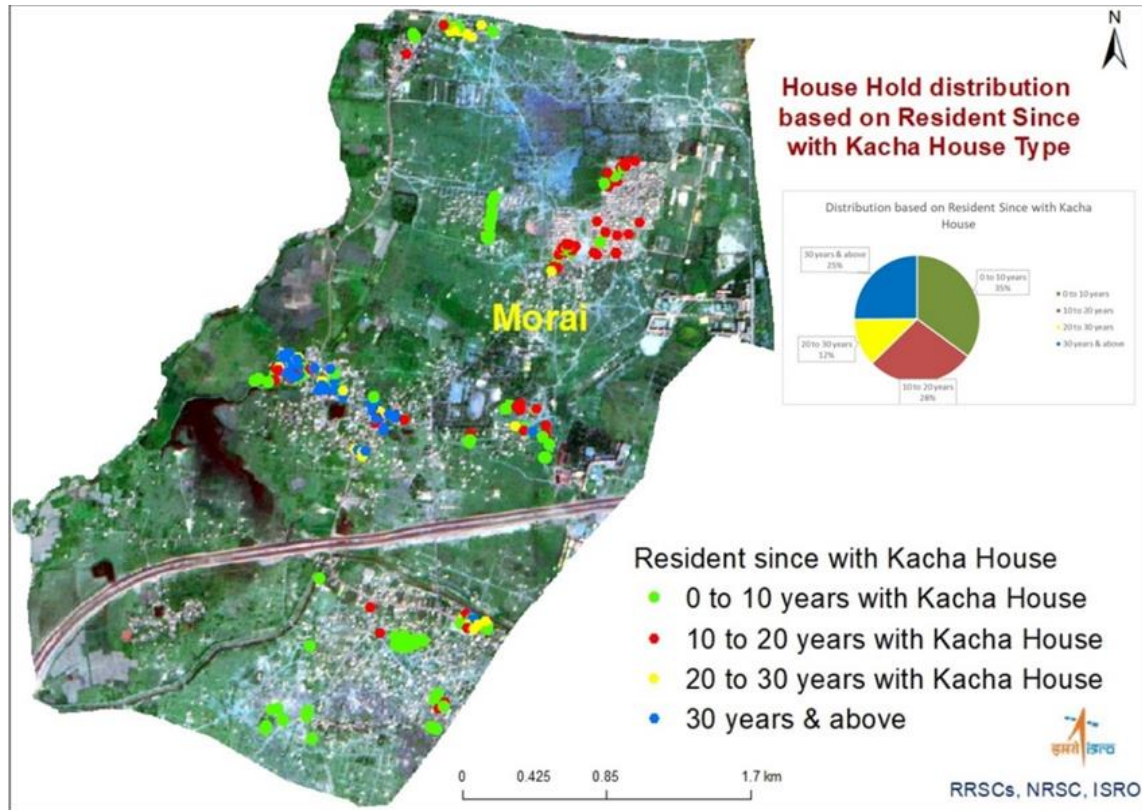


Figure 25: HH Distribution based on Period of Residence

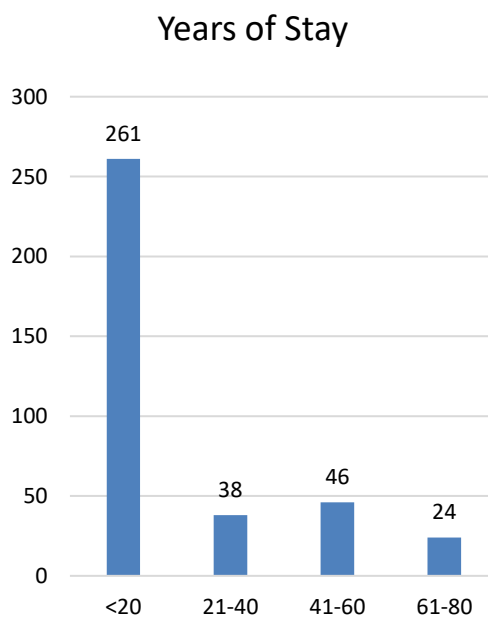


Figure 26: Year of Residence

### 3.3.1.6 House Typology

Around 94% of the houses are of the type Kutcha and 4% being Pucca. Around 41% of the houses have been constructed within 10-year time period and 35% between 10-to-20-year time period. 8% of houses are very old more than 50 years. Around 92% of the roofs and walls are made of unburned bricks and 7% are made of grass.

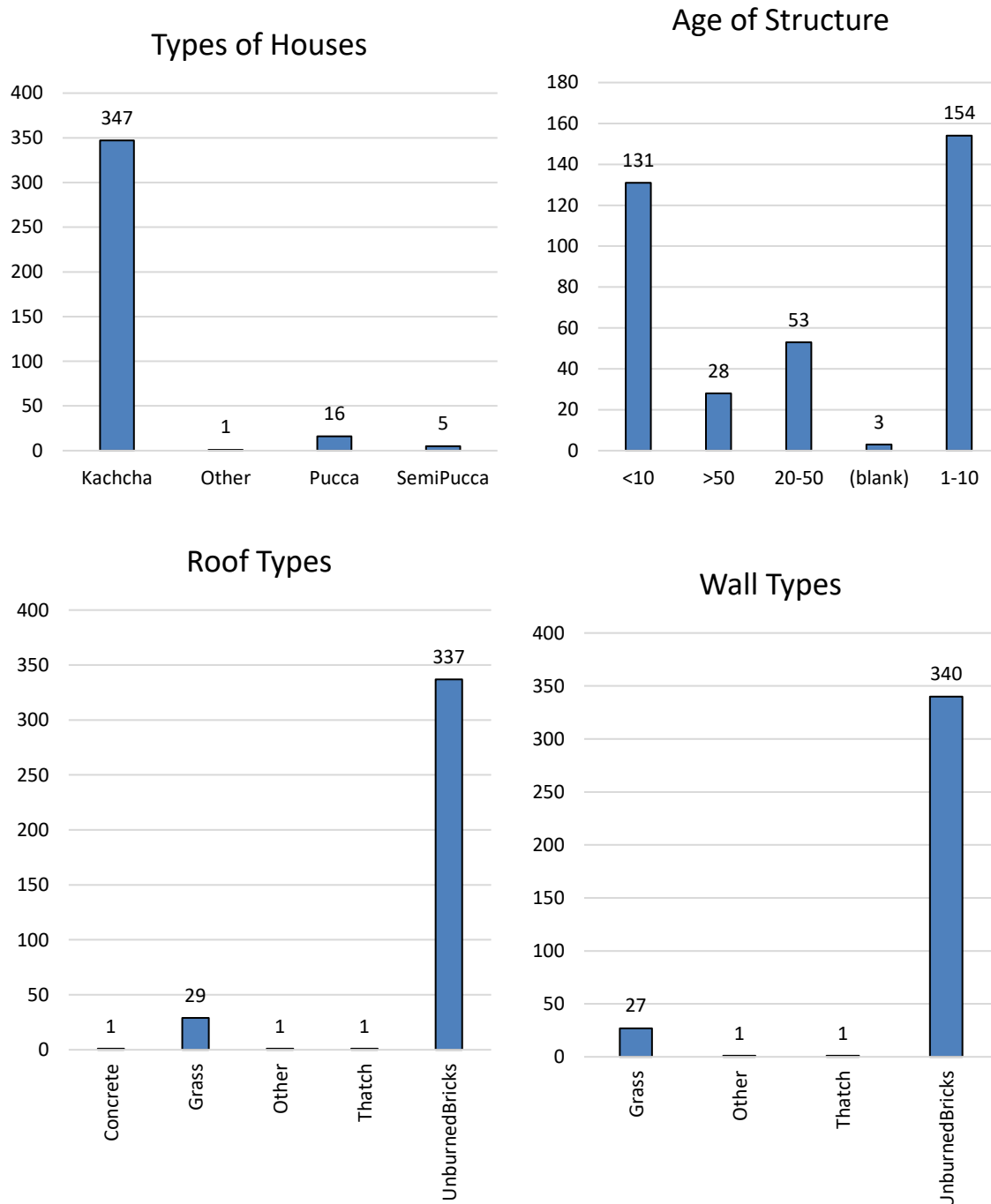


Figure 27: Housing Typology

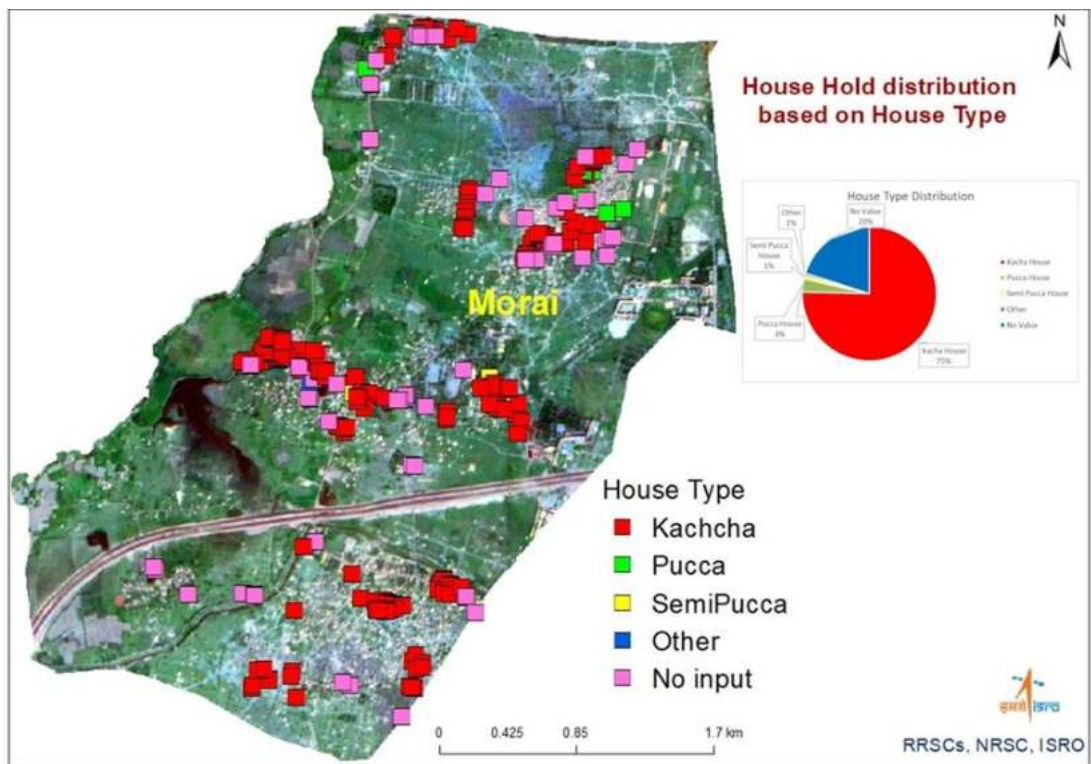


Figure 28: HH Distribution based on Housing Type

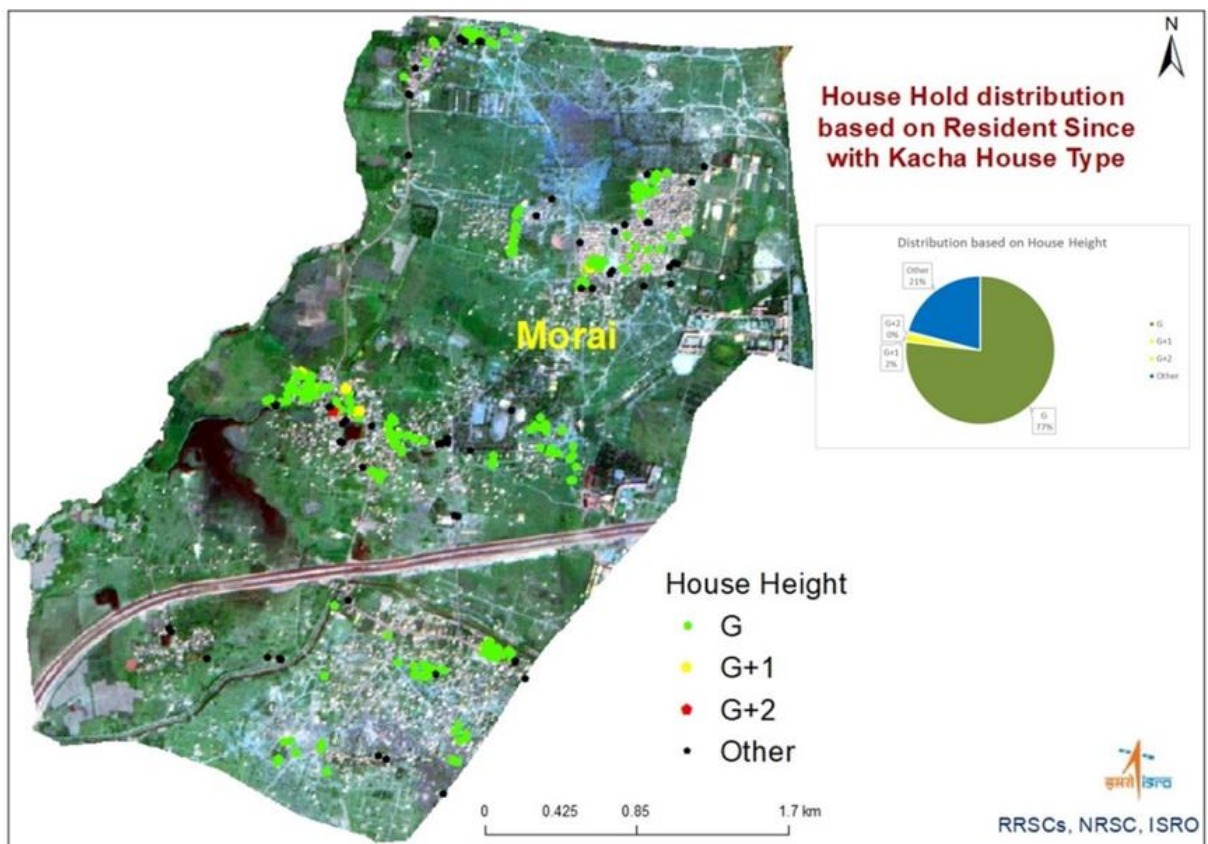


Figure 29: HH Distribution based on Housing Height

3.3.1.7 House Condition

Around 80% of the houses are in good condition and 26% in liveable condition and 1% of the houses are in dilapidated condition. Upon which only 7% of the houses have been built under the scheme sponsored by the central and state government like IAY, PMAY, Green houses.

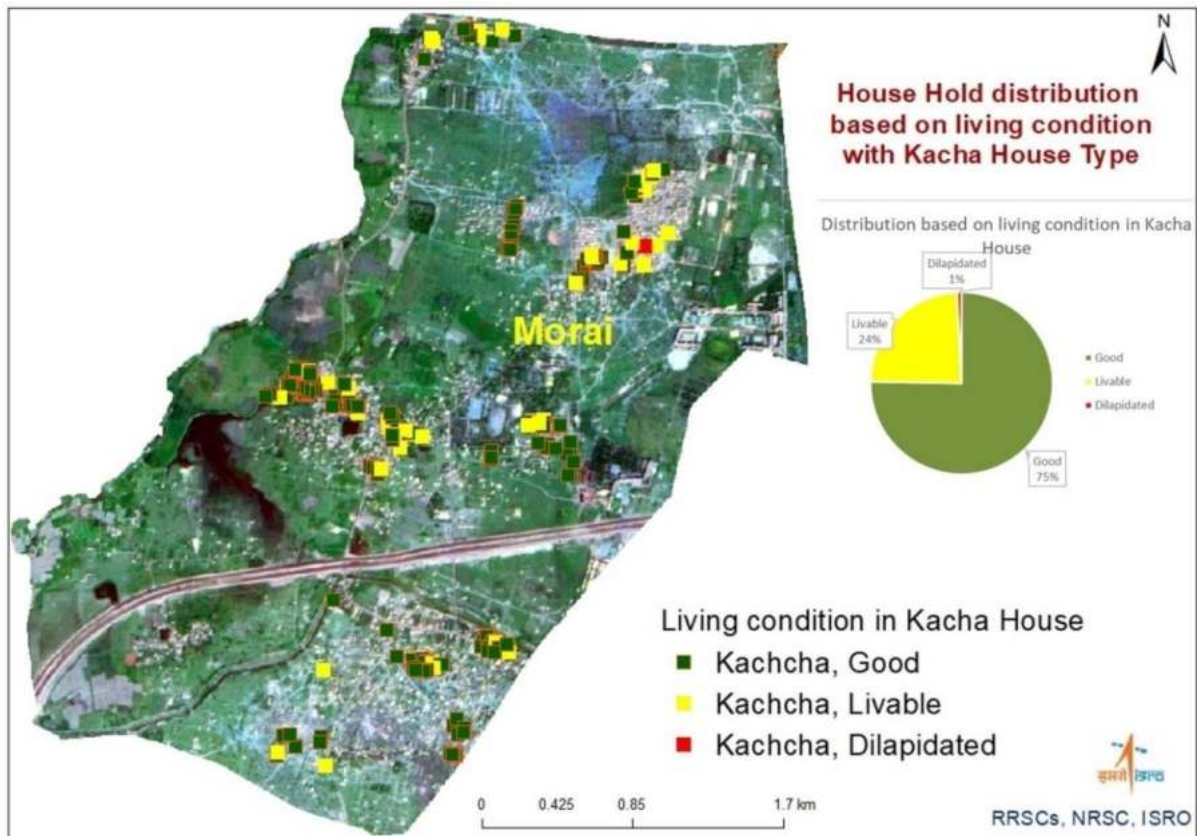
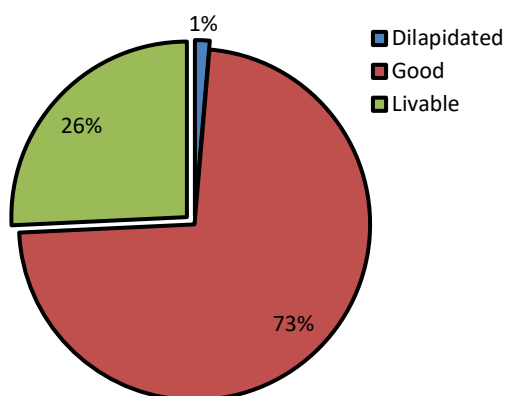


Figure 30: HH Distribution based on liveable condition with Kutcha House

Percentage segregation of House condition



Houses Under Scheme

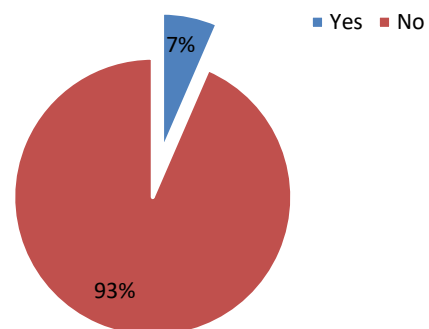


Figure 31: Housing Condition



### 3.3.2 INFRASTRUCTURE AND SERVICES

The data from the household survey regarding the infrastructure services is presented here and the discussion and its inferences have been presented in section 3.6 (Social Infrastructure) and 3.7 (Physical Infrastructure) respectively.

#### 3.3.2.1 Water Supply

For 68% of the household water is through Public Taps. 31% households is using Private Taps. For 56% of the households the duration of water supply is between 16-24hrs. For 35% of the households water supply duration is less than 8 hours.

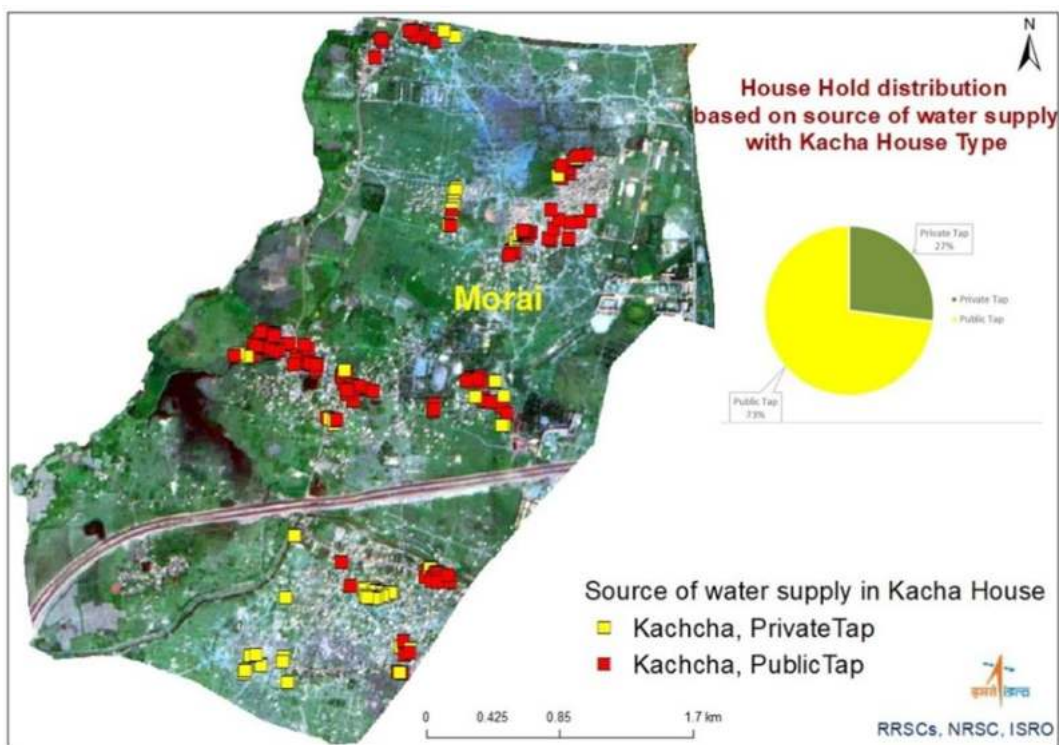


Figure 32: HH Distribution based on source of water supply



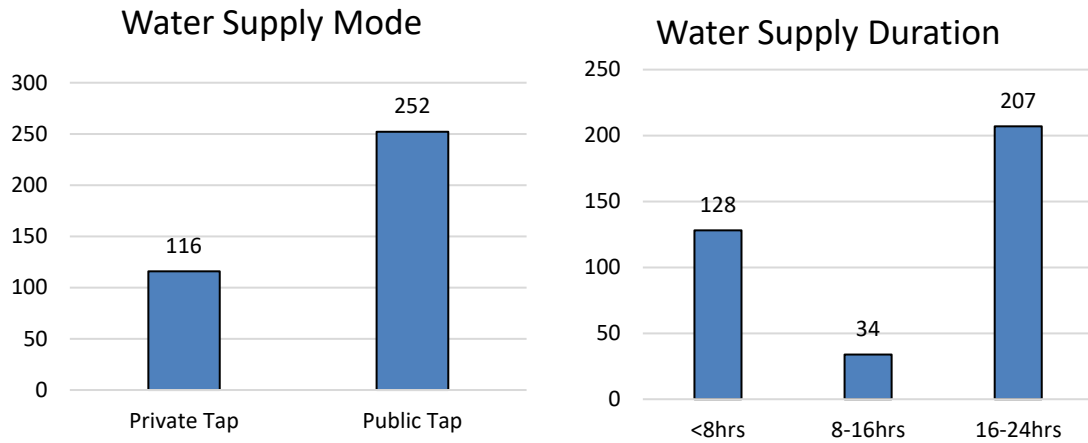


Figure 33: Water supply system in Morai GP

### 3.3.2.2 Toilet

Around 81% of the houses use Private toilets and 16% open defecation. Only 2% use public toilets in the entire village. 25% of the toilets have been constructed under a scheme.

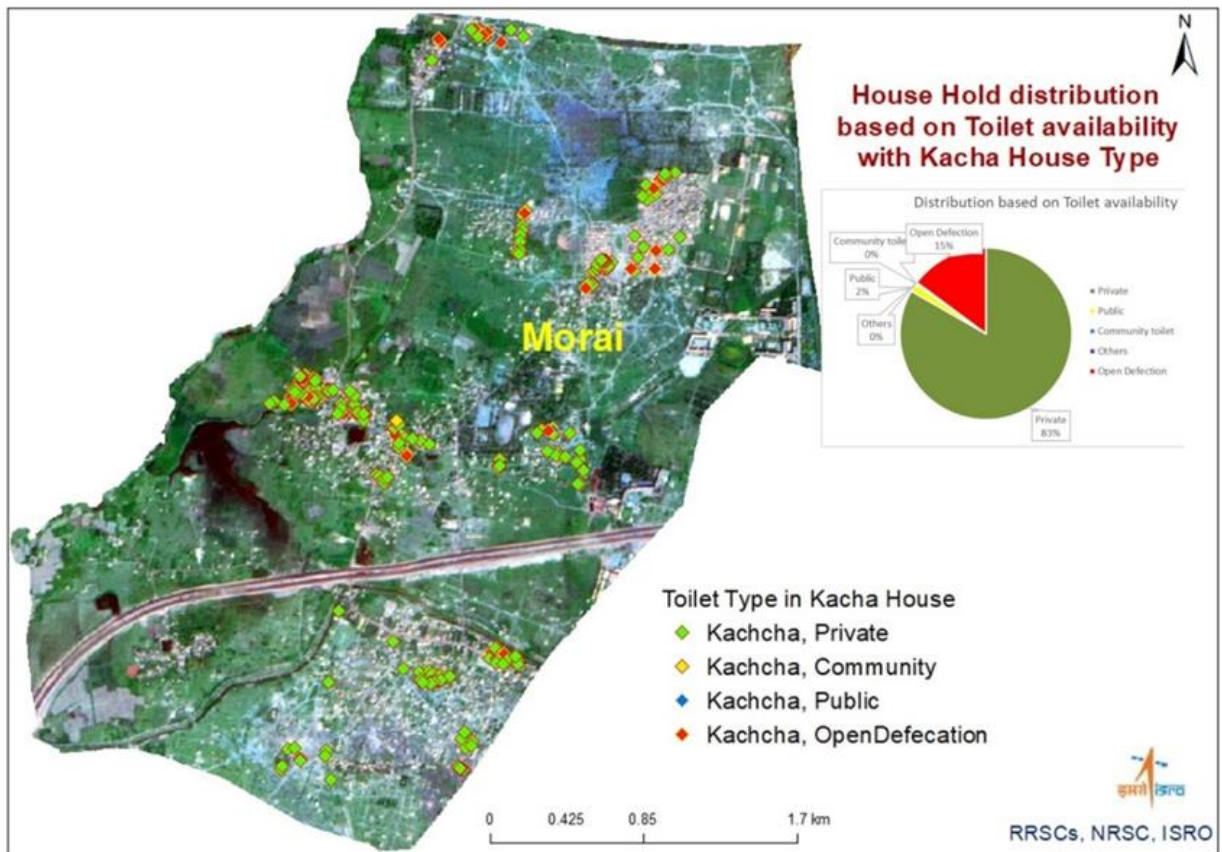


Figure 34: HH Distribution based on Toilet availability with Kutch House

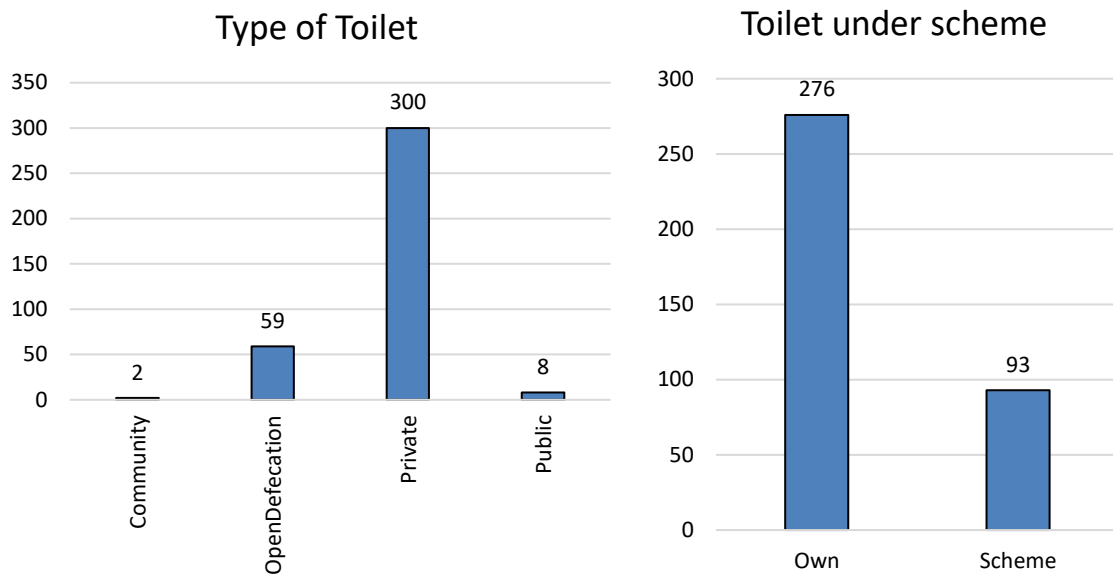


Figure 35: Toilet Facilities available in Morai GP

### 3.3.2.3 Solid Waste management

There is no collection of Solid Waste from 50% of the households. 40% of the households dispose their Solid wastes to Collection Carts. Open dumping is prevalent.

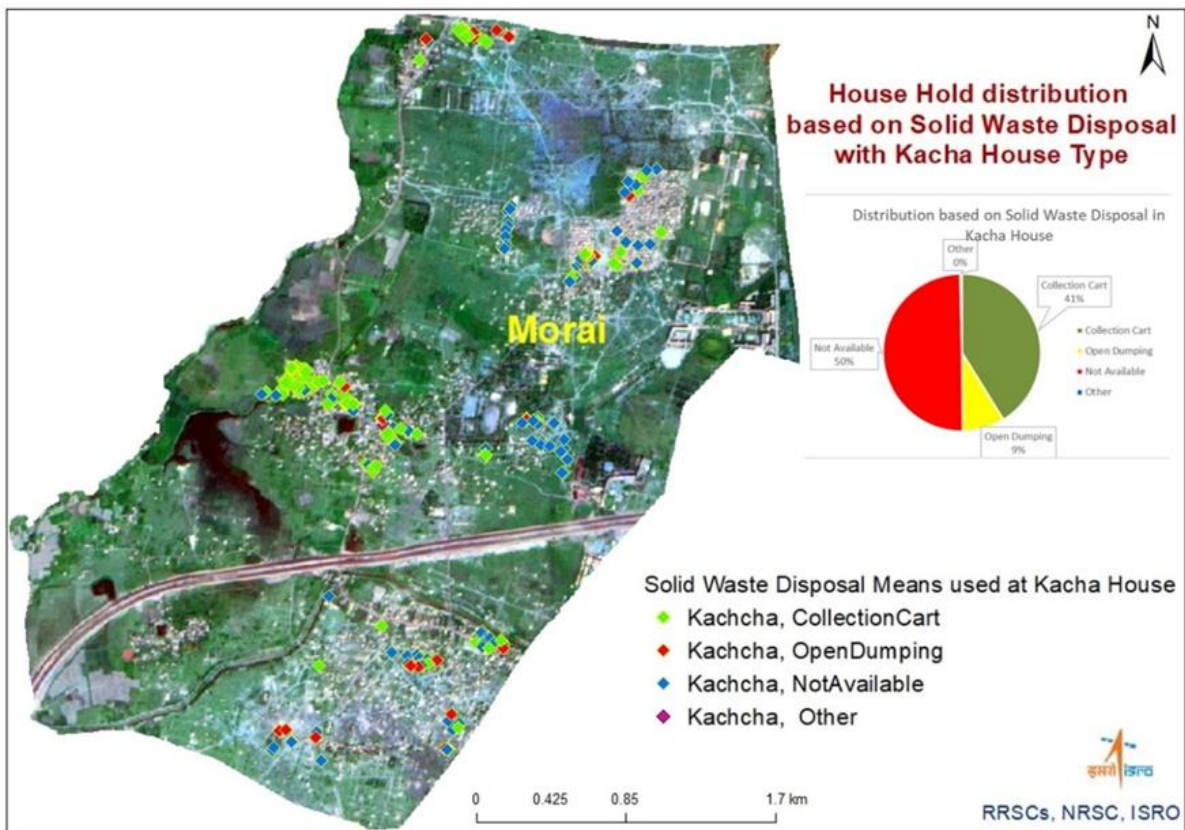


Figure 36: HH Distribution based on Solid Waste Disposal with Kutch House

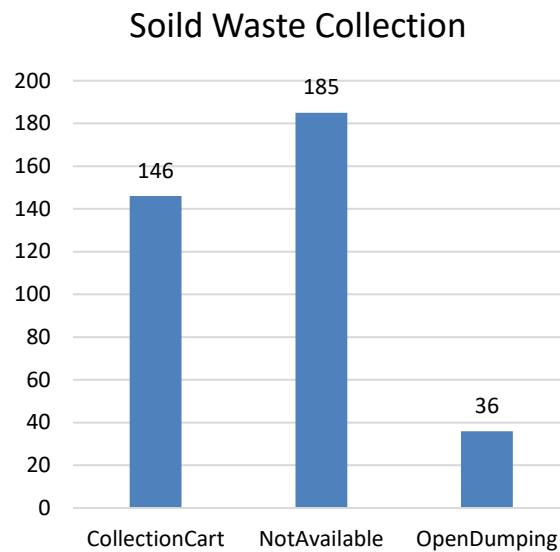


Figure 37: Solid Waste Collection

### 3.3.2.4 Transportation

Two wheelers are the most popular mode of transportation constituting 66%, followed by bus which is 31%.

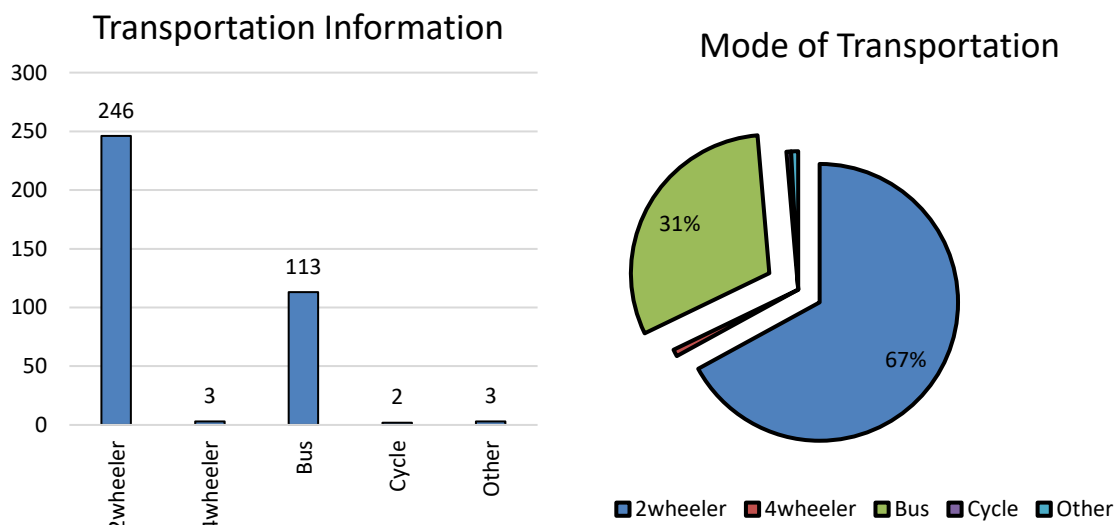


Figure 38: Modal split in the Morai GP

### 3.3.3 HOUSE HOLD UTILITIES AND SERVICES

The Households in Morai village has telephone and television predominantly. Other utilities like radio, solar equipment, computer and vocational training centre are not available or used. About 95% of households possess stove and 97% use LPG cylinder for fuel in Morai village. 35% of the households use fire wood and 24% use Kerosene as well. Other energy sources such as biogas and cow dung are not

prevalent in Morai Gram Panchayat. Almost 99% of the Households electricity connectivity.

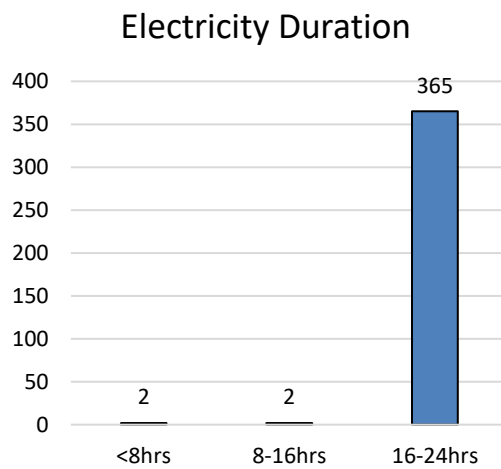


Figure 39: Electricity supply duration in Morai GP

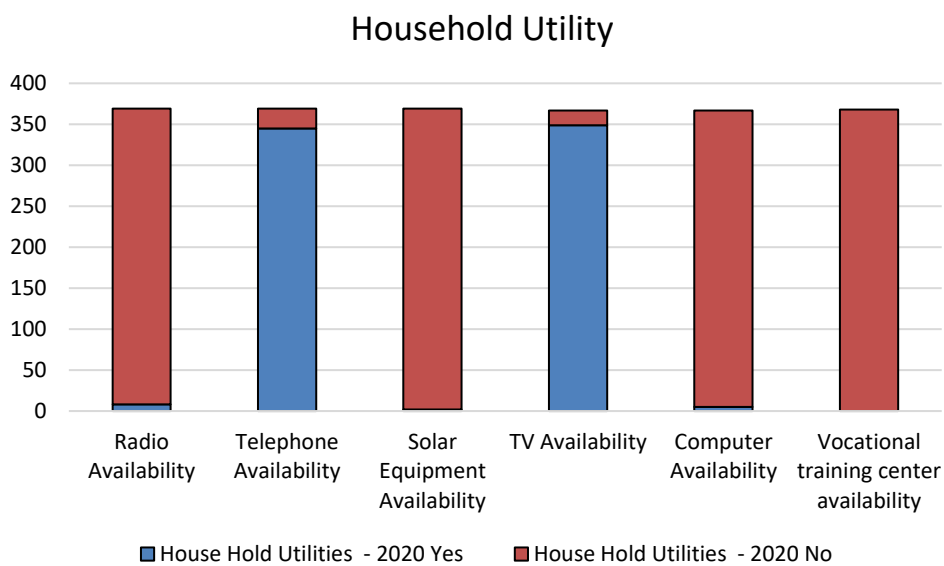


Figure 40: Household Utility

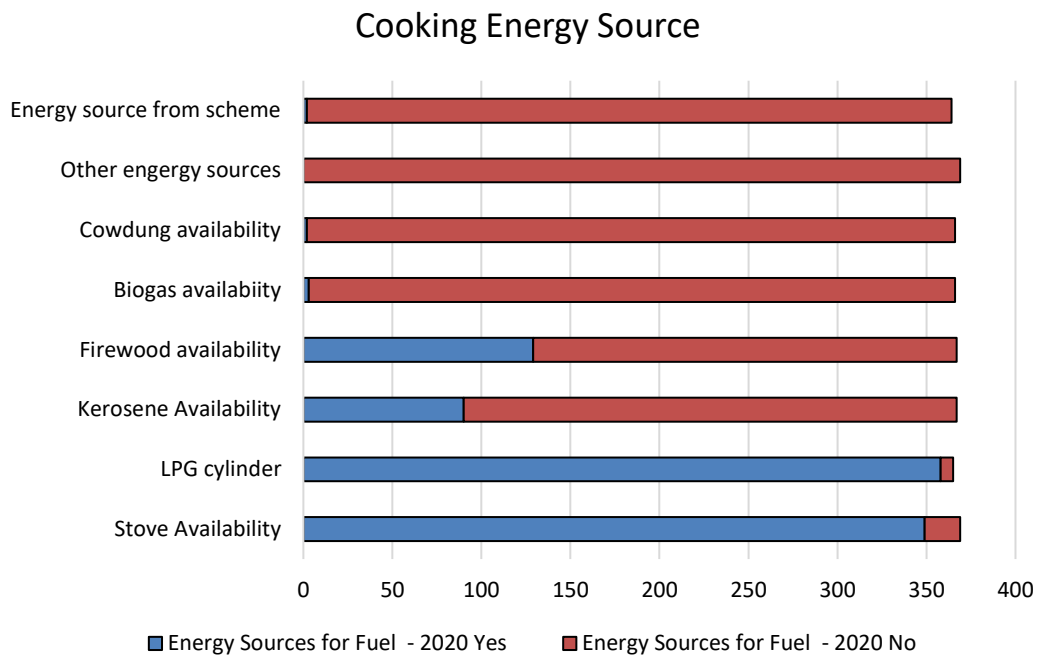


Figure 41: Cooking Energy Source

### 3.3.4 HEALTH CARE

Around 60% of the households pay 2 visits to the hospital per month with 76% of the households paying less than Rs.500/- per visit. 67% of the households use public means of transport and 31% Private means of transportation to visit the Hospital. 82% of the households have no prominent diseases and 94% households have been vaccinated.

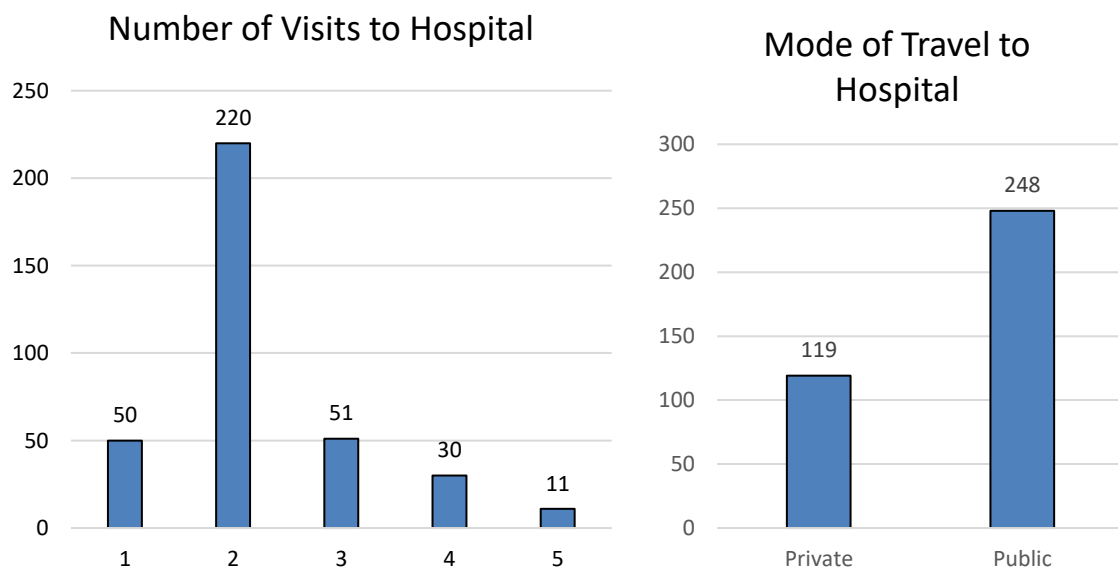


Figure 42: Hospital Care service available in Morai GP



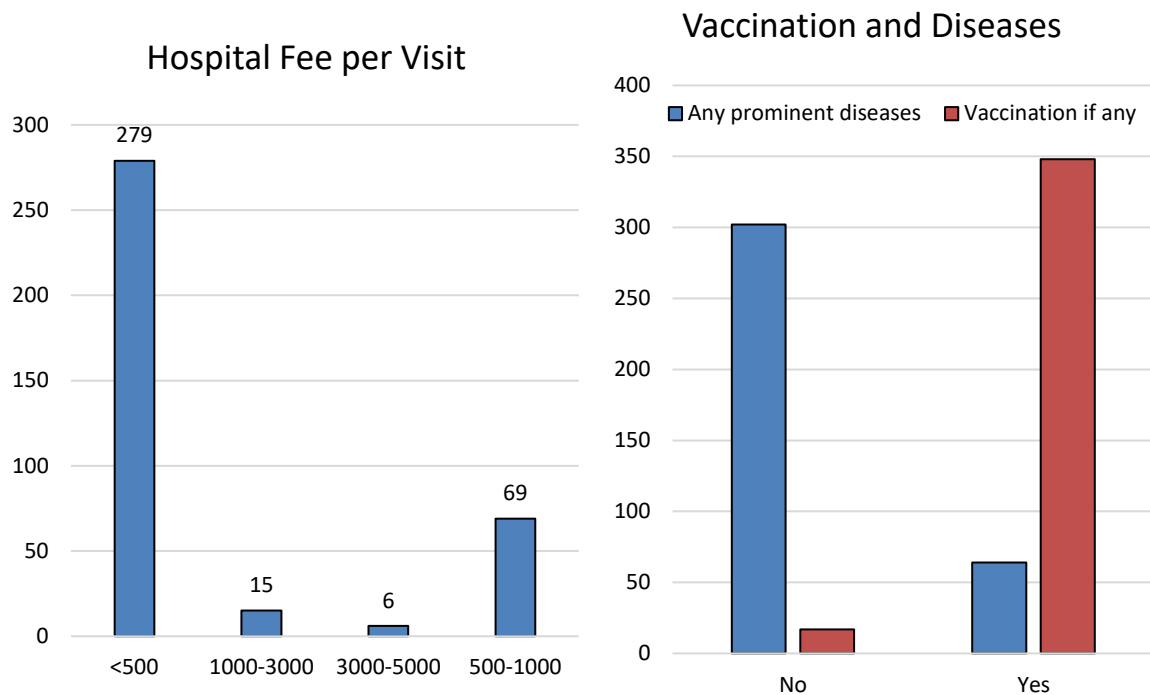


Figure 43: Hospital fee detail and Vaccination

### 3.3.5 FINANCE

#### 3.3.5.1 Expenditure

Households expenditure is ranked from the sample households survey conducted, which determines their maximum preferential spending is on Food, Health and Education and least spending is on the monthly leisure spending.

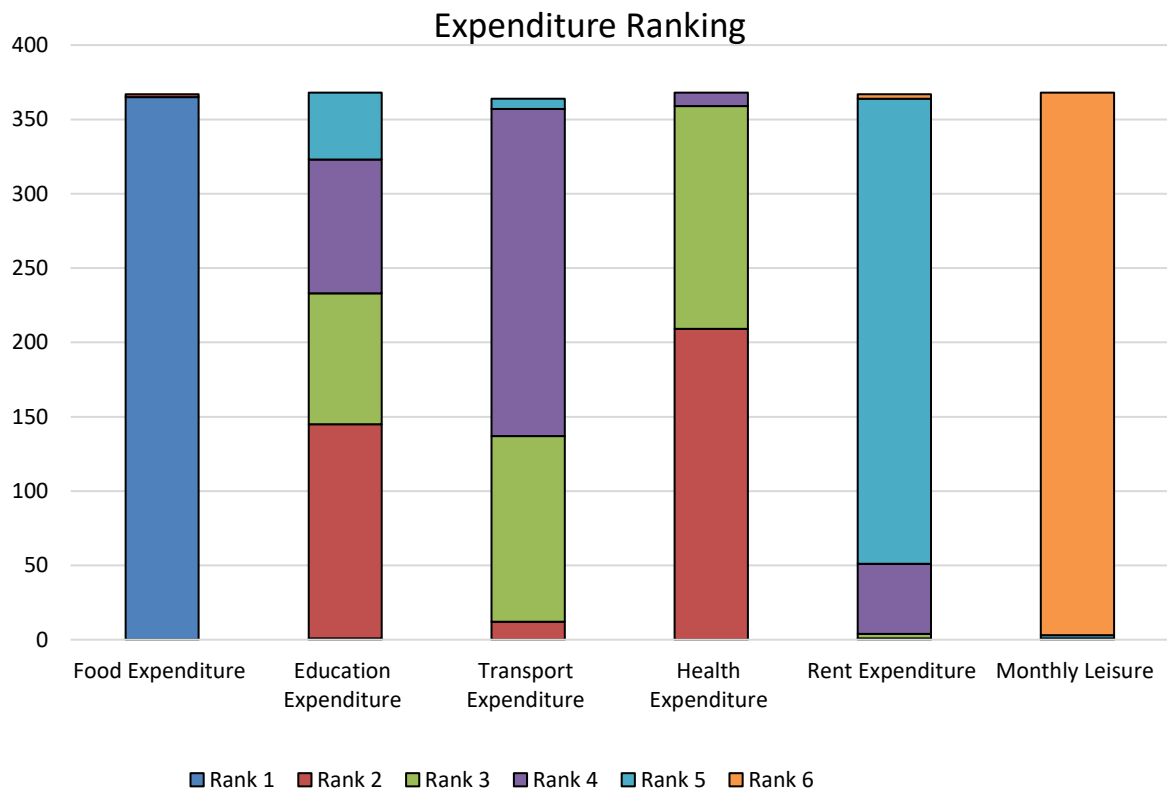


Figure 44: Expenditure Ranking

### 3.3.5.2 Loan

About 14% of the households have taken loan. For 66% of the households the loan repayment duration is less than 3 years. For 18% of the households the loan repayment duration is between 3 to 5 years. For 13% of the households the loan repayment duration is between 5 to 10 years.

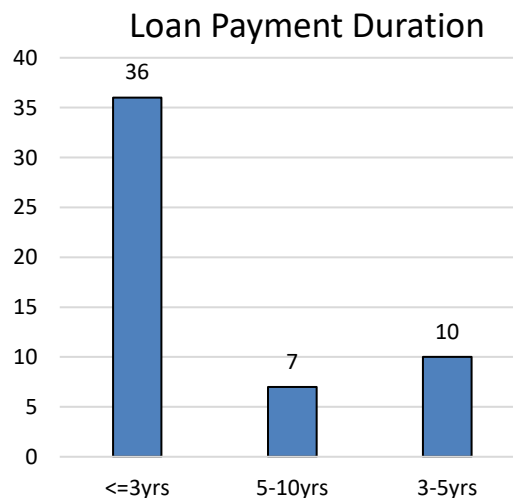


Figure 45: Loan Payments

### 3.3.6 KEY ISSUES AND CONCERNS FROM HOUSE HOLD SURVEY

From the Household survey conducted, the Major concerns of the households are determined and summary of the study is tabulated as *Table 13: Summary - Social Characteristics*, *Table 14: Summary - Housing Characteristics*, *Table 15: Summary - Infrastructure services*, *Table 16: Summary - Fuel Energy*, *Table 17: Summary - Finance*, and the key issues are determined in *Table 18: Key Issues and Concern*.

Table 13: Summary - Social Characteristics

<b>Social Characteristics 2011 Census and 2020 (primary survey GPSDP)</b>		
Category	2011	2020
Total Population of Morai village	10873	19380
Number of Males	5462	9555
Number of Females	5411	9825
Number of Children (0-6 yrs) - Boys	614	301
Number of Children (0-6 yrs) - Girls	544	127
Total male literates	4312	8477
Total female literates	3730	7684
Total male illiterates	1150	1294
Total female illiterates	1681	1925
Number of BC Male	-	3455
Number of BC Female	-	3328
Number of MBC Male	-	2576
Number of MBC Female	-	2657
Number of SC Male	1489	3154
Number of SC Female	1503	3047
Total number of House Holds	2718	5700

Table 14: Summary - Housing Characteristics

<b>Housing – 2020 (primary survey GPSDP)</b>		
Category	Count	Percent
Total number of House Holds	5700	
Owner	4674	82%
Renter	1026	18%
Years of Stay (< 20 yrs)	3990	70%
House Type - Kachacha	5358	94%
Roof Type - Unburned Bricks	5187	91%
Wall Type - Unburned Bricks	5244	92%
House Condition - Good	4560	80%
Age of Structure < 10 yrs	2337	41%
House built using Schemes	399	7%

Table 15: Summary - Infrastructure services

<b>Physical Infrastructure Services – 2020 (primary survey GPSDP)</b>		
Category	Count	Percent
Transportation - 2-Wheeler	3660	66%
Transportation - Bus	1719	31%
Water Supply - Public	3837	68%
Water Supply - Private	1749	31%
Electricity - 24hrs	5643	99%
Toilet - Private	4617	81%
Toilet - Public	114	2%
Toilet - Open	912	16%
Solid Waste Management - Not Practiced	2850	50%
Solid Waste Management -Collection Cart	2280	40%

<b>Health Care – 2020 (primary survey GPSDP)</b>		
Category	Count	Percent
2 Visits / Month to Hospital	3420	60%
Less than Rs 500 per visit	4332	76%
Transportation to Hospital - Public	3819	67%
Transportation to Hospital - Private	1767	31%
House Holds Vaccinated	5358	94%
No Prominent Disease	4674	82%

<b>Livestock - 2020 (primary survey GPSDP)</b>		
Category	Yes	No
Cow Buffalo Info	5	359
Ox Info	-	362
Goat Info	6	358
Chicken Info	4	360
Horse Info	-	364
Donkey info	-	364
Other Livestock Info	-	-

<b>House Hold Utilities - 2020 (primary survey GPSDP)</b>		
Category	Yes	No
Radio Availability	8	361
Telephone Availability	345	24
Solar Equipment Availability	2	367
TV Availability	349	18
Computer Availability	5	362
Vocational training centre availability	-	368

Table 16: Summary - Fuel Energy

<b>Energy Sources for Fuel - 2020 (primary survey GPSDP)</b>		
Category	Yes	No
Stove Availability	349	20
LPG cylinder	358	7
Kerosene Availability	90	277
Firewood availability	129	238
Biogas availability	3	363
Cow dung availability	2	364
Other energy sources	-	369
Energy source from scheme	2	362

Table 17: Summary - Finance

<b>Finance - 2020 (primary survey GPSDP)</b>	
Expenditure	Rank
Food Expenditure	1
Health Expenditure	2
Education Expenditure	3
Transport Expenditure	4
Rent Expenditure	5
Monthly Leisure	6

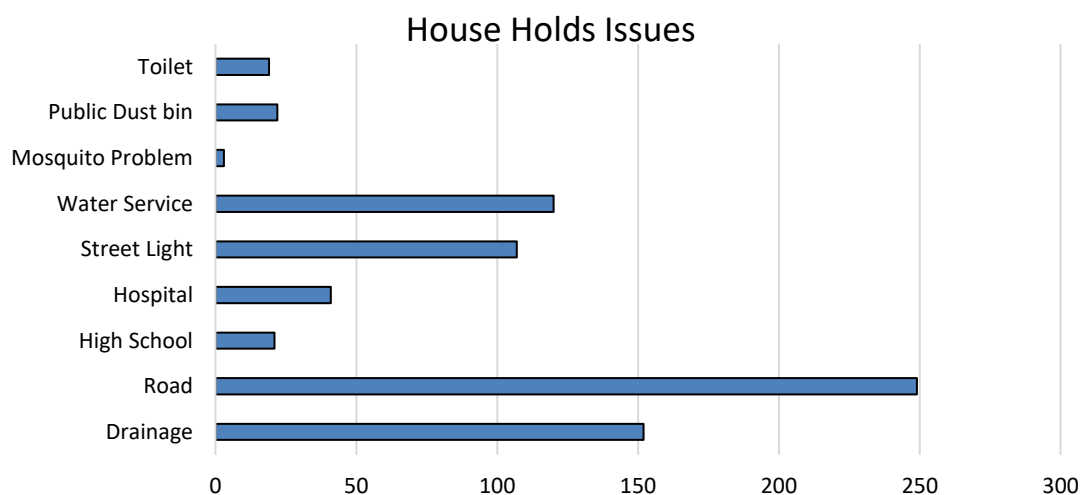


Figure 46: Key Issues inferred from Household survey

Table 18: Key Issues and Concern

<b>Key Issues and Concerns - 2020 (primary survey GPSDP)</b>	
Expenditure	Households
Road	249
Drainage	152
Water Service	120



### 3.3.7 POPULATION AND HOUSING PROJECTION

The following methods are commonly adopted for predicting future population.

#### 3.3.7.1 Arithmetic Progression Method

$P_n$  - The prospective population after n decades

n- Number of years or decades for which population is to be estimated.

c- Yearly or Per decade increase in population or % increase in population for geometric progression

$P_0$ - Latest known population  $P_0$

r – Average of incremental increase.

$$P_n = P_0 + nc$$

#### 3.3.7.2 Geometrical Progression Method

$$P_n = P_0 \{1 + c/100\}^n$$

#### 3.3.7.3 Incremental Increase Method

$$P_n = P_0 + nc + (n+1)/2 * r$$

Based on the above the projected population for 20 years is

Morai village current population  $P_0 = 19380$ , n- 2 decade and c- 8507 or 78%

a) Arithmetic Progression Method :  $P_n = 19380 + 2 * 8507 = 36394$

b) Geometrical Progression Method :  $P_n = 19380 * \{1 + 78/100\}^2 = 61403$

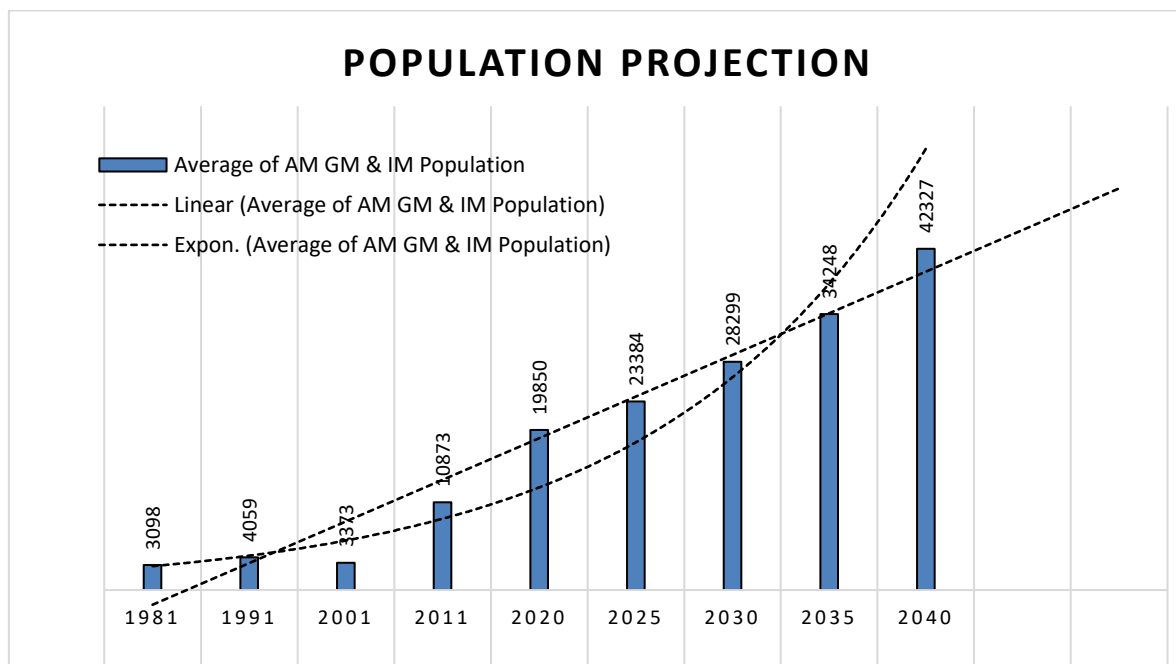


Figure 47: Population Projection

Using the averages, the projected population for Morai in 20 years is 48,898 with 16,299 Households (Average of 3 per Household) in 20 years. There will be an addition of 10,599 new Households.

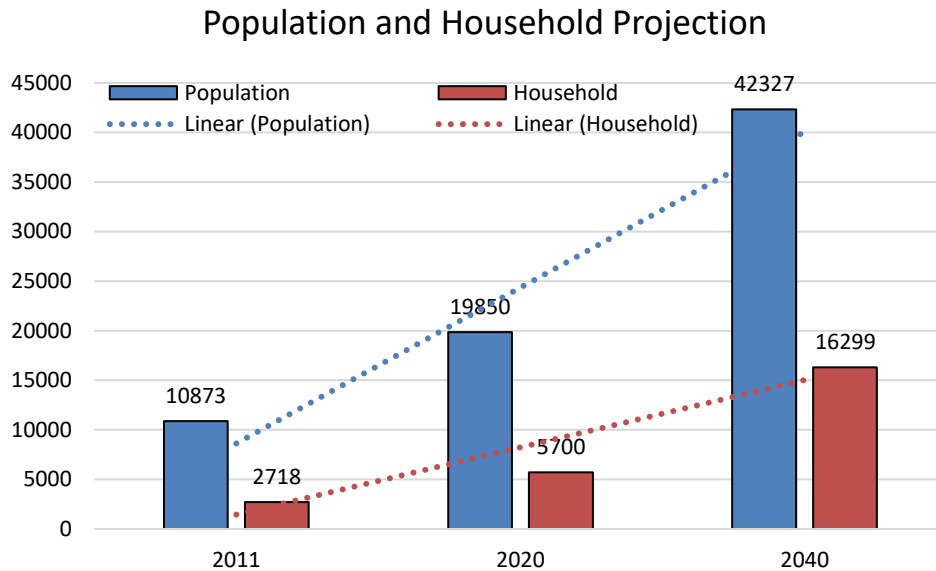


Figure 48: Projected Population comparison

### 3.4 ANIMAL HUSBANDRY

Animal Husbandry and Dairying play an important role in development of rural economy, which indirectly generate revenue and economic growth by creating large self-employment opportunities. But the Livestock population in Morai village is insignificant. Out of 368 household survey conducted only in few countable households have livestock. Hence to promote economic development animal husbandry is to be promoted.

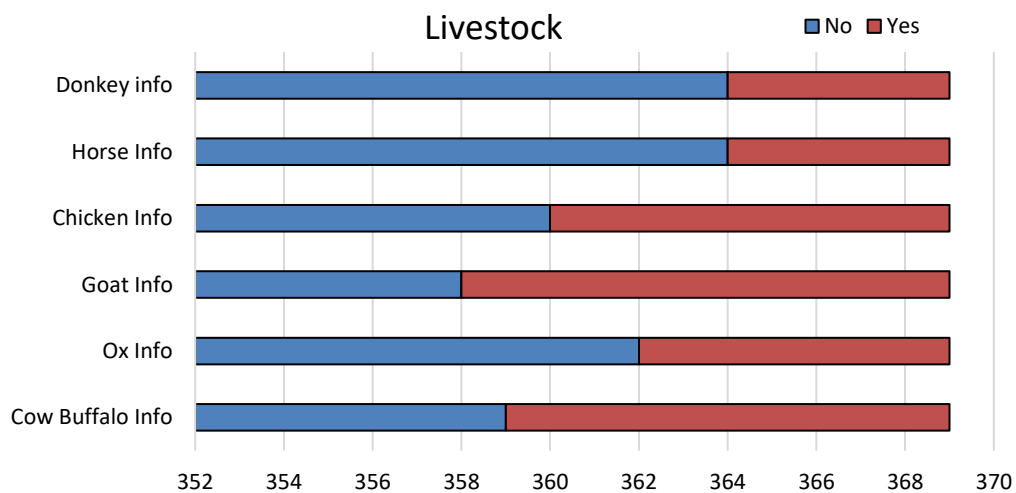


Figure 49: Livestock Population in Morai GP

### 3.5 SOCIAL INFRASTRUCTURE

#### 3.5.1 EDUCATION

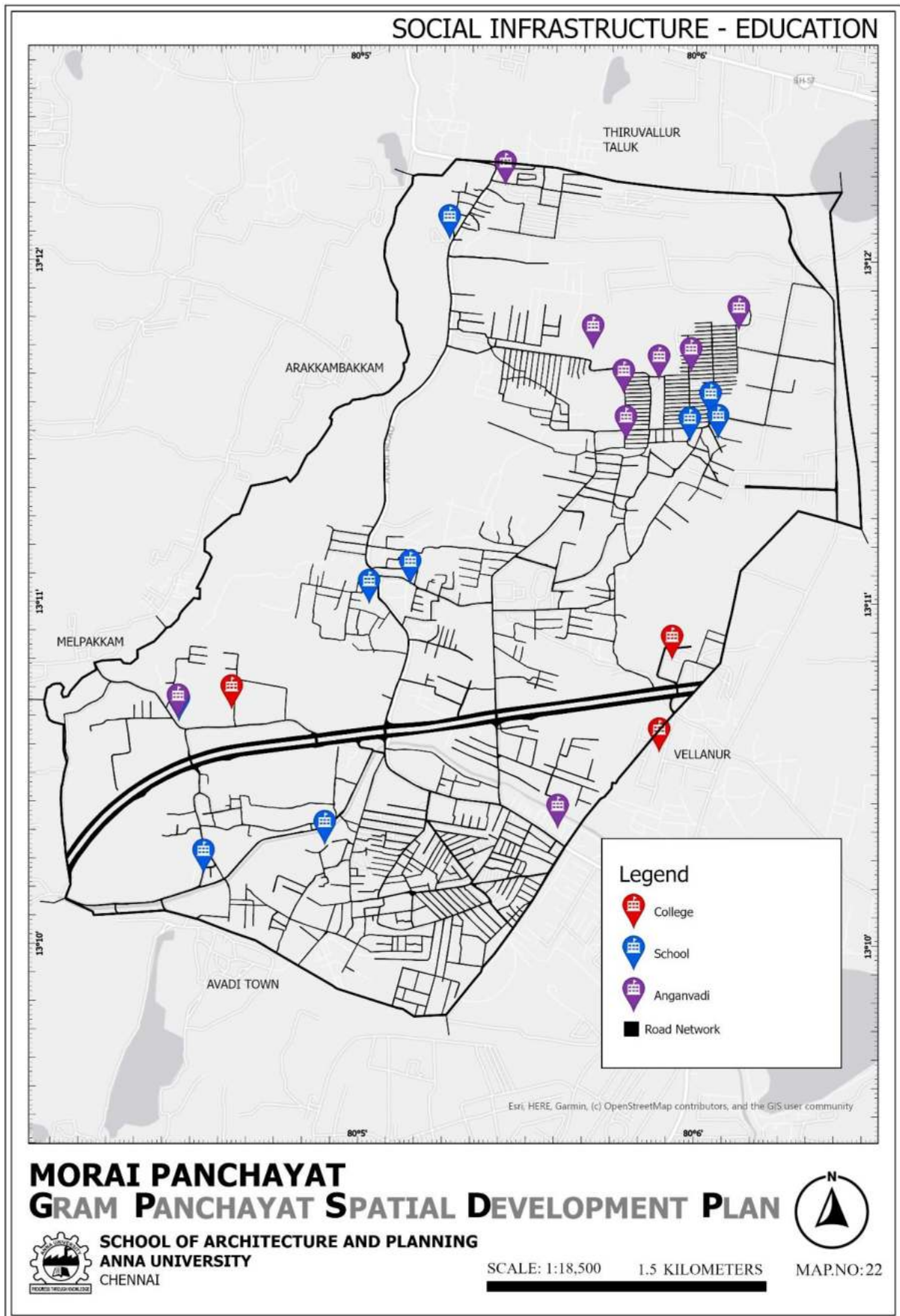
The available educational institutions in the village are shown in *Table 19: Education Infrastructure Facilities in Morai GP*. The location and accessibility of the educational institutions is shown in the *Map 22: Social Infrastructure - Education*. From the primary survey and spatial analysis by creating Voronoi polygon, the village has the required number of Government Anganwadi, Primary and High school as per the guidelines. The village has two Engineering colleges, Dr. Rajalakshmi College of Education and Vel-tech University. As per the primary survey every family in the village sends their children to the schools. The survey further shows that accessibility to the schools in New Kanniamman nagar and a few others needs better quality roads.

Table 19: Education Infrastructure Facilities in Morai GP

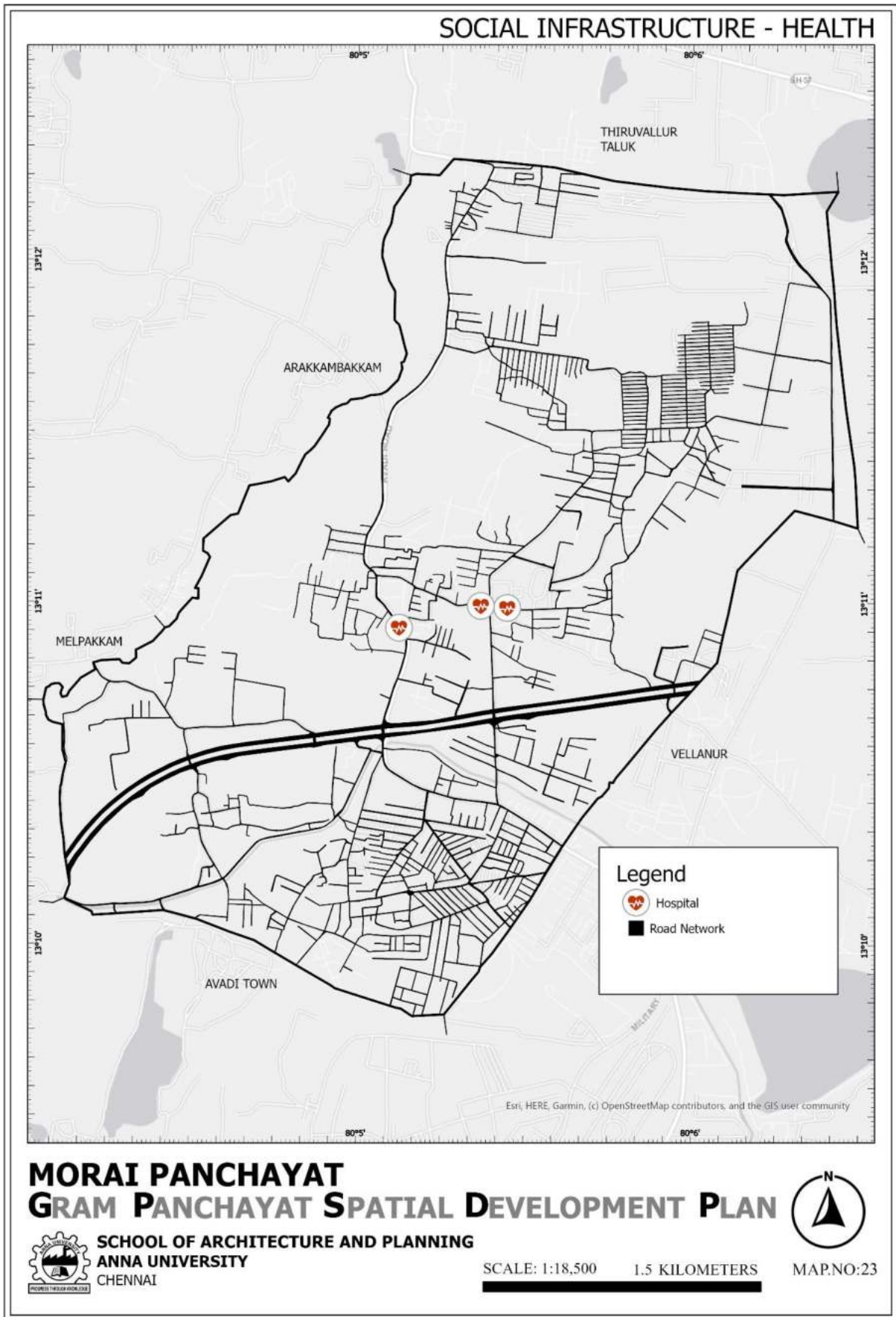
Educational institutions	Norms (RADPFI)	Existing (No.)	Projected population (42327)
Anganwadi	1 for 5000 (0.5 Hectare) – within 500 m	9	9
Primary school	1 for 5000 (0.4 to 0.6 Hectare) – within 500 m	3	9
High school with Primary (1-8)	1 for 15000 (1 Hectare) – within 1 Km	1	3
Higher Secondary with Primary	1 (1 Hectare) – within 500 m	1 (Private)	1
College	0	3	0

(Sources: Derived from RADPFI Guidelines 2016)

The village has only private higher secondary school, the inhabitants have to go to the neighbouring villages Vellanur or Karalapakkam for higher secondary schooling. Since the village has high slum population, provision of Government Higher Secondary school in the village would motivate the parents and the students to complete higher level school education. This further would help the socio-economic status and living condition of the households.



Map 22: Social Infrastructure - Education



Map 23: Social Infrastructure - Health



### 3.5.2 HEALTH

Morai has one government health centre and very few private clinics. The location and accessibility of health facilities situated in the village is shown in Map 23: Social Infrastructure - Health. The health centre is administered by one Doctor and Nurse and. The primary survey enunciated that some of the inhabitants visit the nearby clinics in nearby village for disease like fever and cold people due to their personal convenience. The location and accessibility of health facilities in the village is shown in Figure. The village has nearly 2500 cows, but there is no government veterinary hospital in the village. As per the norms 4 veterinary clinics or one Veterinary centre is needed. The primary survey reveals that, there is a need for appropriate health facilities for the village.

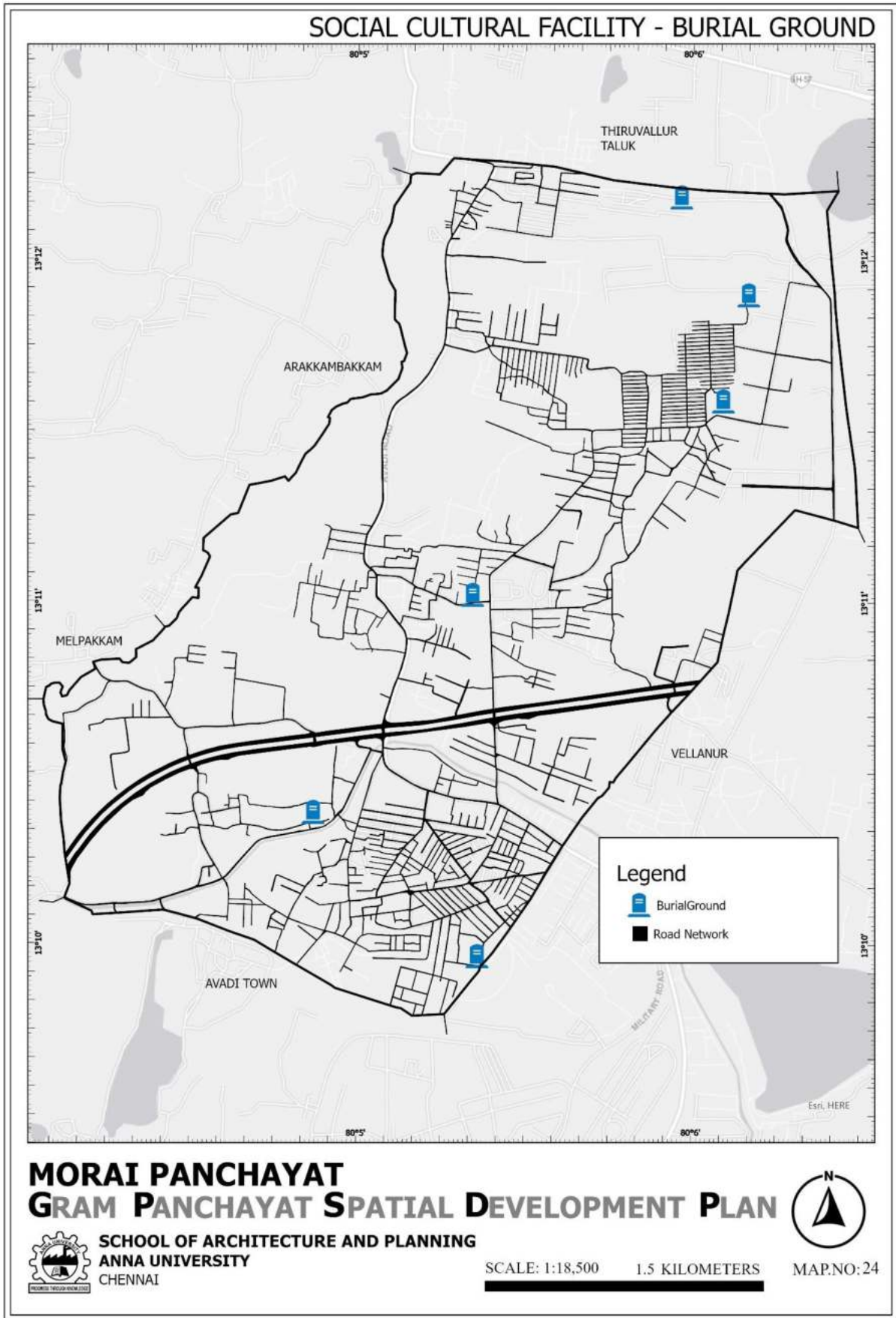
### 3.5.3 SOCIO CULTURAL FACILITIES

The village does not have any public recreation facilities like community spaces for festivals, parks, playground or any other community gathering spaces. It is found from the primary survey that community gathering during the festival season is not performed in any designated space in the village. The village has sufficient number of religious buildings, specifically 3 temples, 3 churches and 1 mosque respectively. There are 8 burial grounds and no electric crematorium in the village.

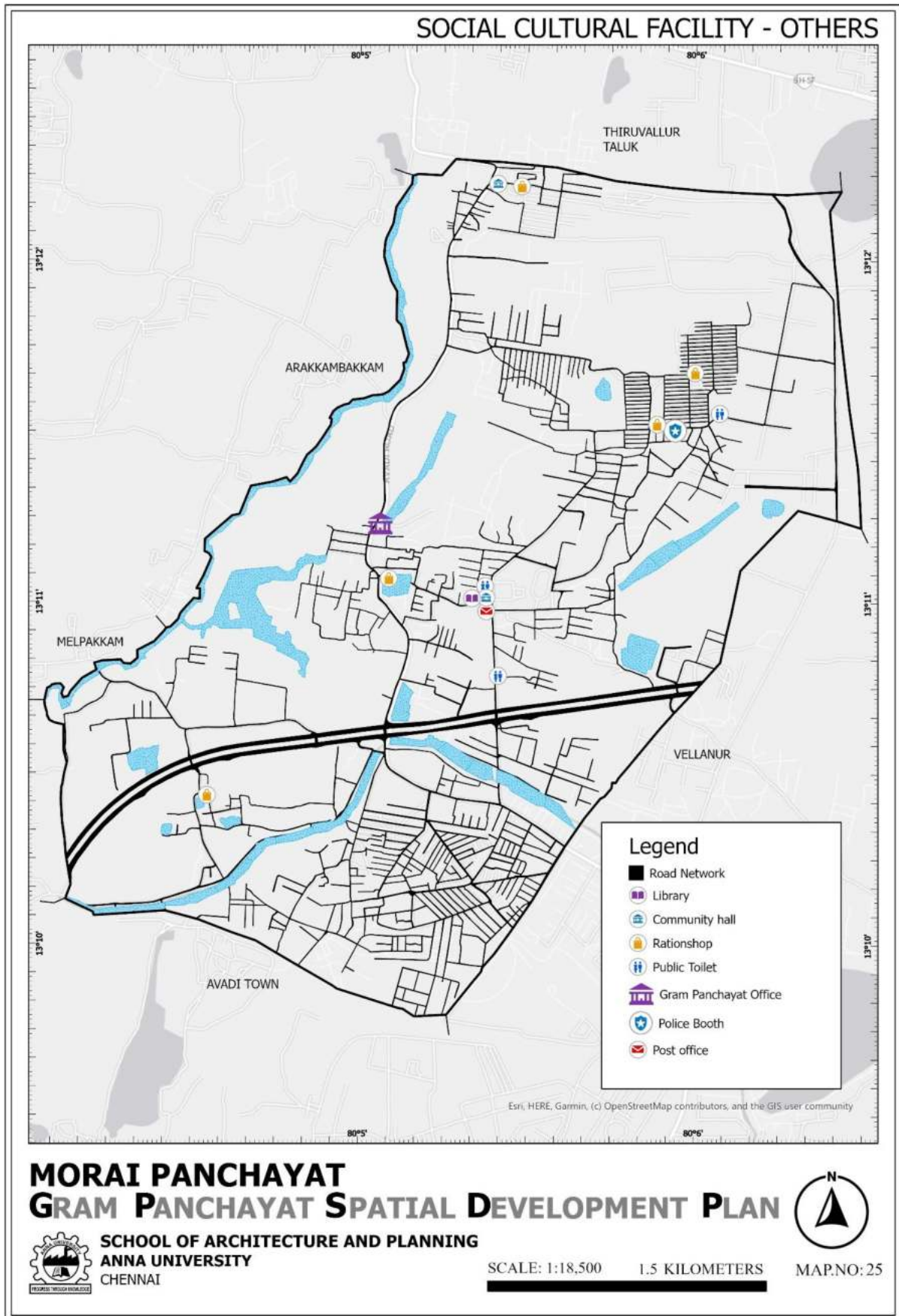
Table 20: Socio-cultural facilities in Morai GP

SI No.	Public facilities	Norms (RADPFI)	Existing (No.)	Projected population (42327)
1.	Parks	One Housing area Park per 5000 population 9 (0.5 Hectare) and Neighbourhood park for 15000 population (1 Hectare)	0	9 housing area parks + 3Neighbourhood park
2.	Playground/Ground for fairs and festivals	one per 5000 population (1 Hectare)	0	9
3.	Religious places	one per 5000 – 4nos	7	9
4.	Burial ground with Crematorium	one per block (0.5 Hectare)	2	1
5.	Burial ground	One for 5000 (500 Sq.m)	6	9

(Sources: Derived from RADPFI Guidelines 2016)



Map 24: Social Infrastructure – Socio-Cultural Facilities



Map 25: Social Infrastructure – Other Public Social Facility

The *Table 20: Socio-cultural facilities in Morai GP*, shows the various other public infrastructure facilities in the village. The library is located in Veerapuram. The primary survey discussions show that nearly 100 villagers use the library. There are 2 community halls with a capacity of 200 in Veerapuram and Bangarampettai. There are 5 Ration shops in the village. Distribution of rice, wheat, dal, oil and kerosene are given 6 days a week. There are no short comings found in the PDS.

The village has 3 Public toilets and the survey show that they are well maintained. One toilet in Veerapuram is inside the community complex and is closed during the night. The residents stated that it needs to be opened 24 hours. There is one police outpost in *Veerapuram*, which is sufficient for the existing population. The village has no Government market. Provision of local markets for selling agriculture products grown in the village in near future would improve the primary sector occupation. The village has one post office and there is no issue found in its functioning. The Gram Panchayat office is located in Veerapuram and is centrally located. Frequent meetings are conducted for the benefit of the villagers. State Government support will enhance the functionality of the Panchayat for improving the important sectors like agriculture, health, education, connectivity etc.

**Table 21: Other Public Social Facilities in Morai GP**

S.No.	Public facilities	Norms (RADPFI)	Existing (No.)	Projected requirement
1.	Library	1 per15000	1	3
2.	Community hall	1 per15000 (0.5Hectares) – within 1 km	2	3
3.	Ration shop	-	5	
4.	Public toilet	-	3	
5.	Police Outpost	-	1	
6.	Gram	-	1	
7.	Post office	-	1	
8.	Government Market	-	0	

*(Sources: Derived from RADPFI Guidelines 2016)*



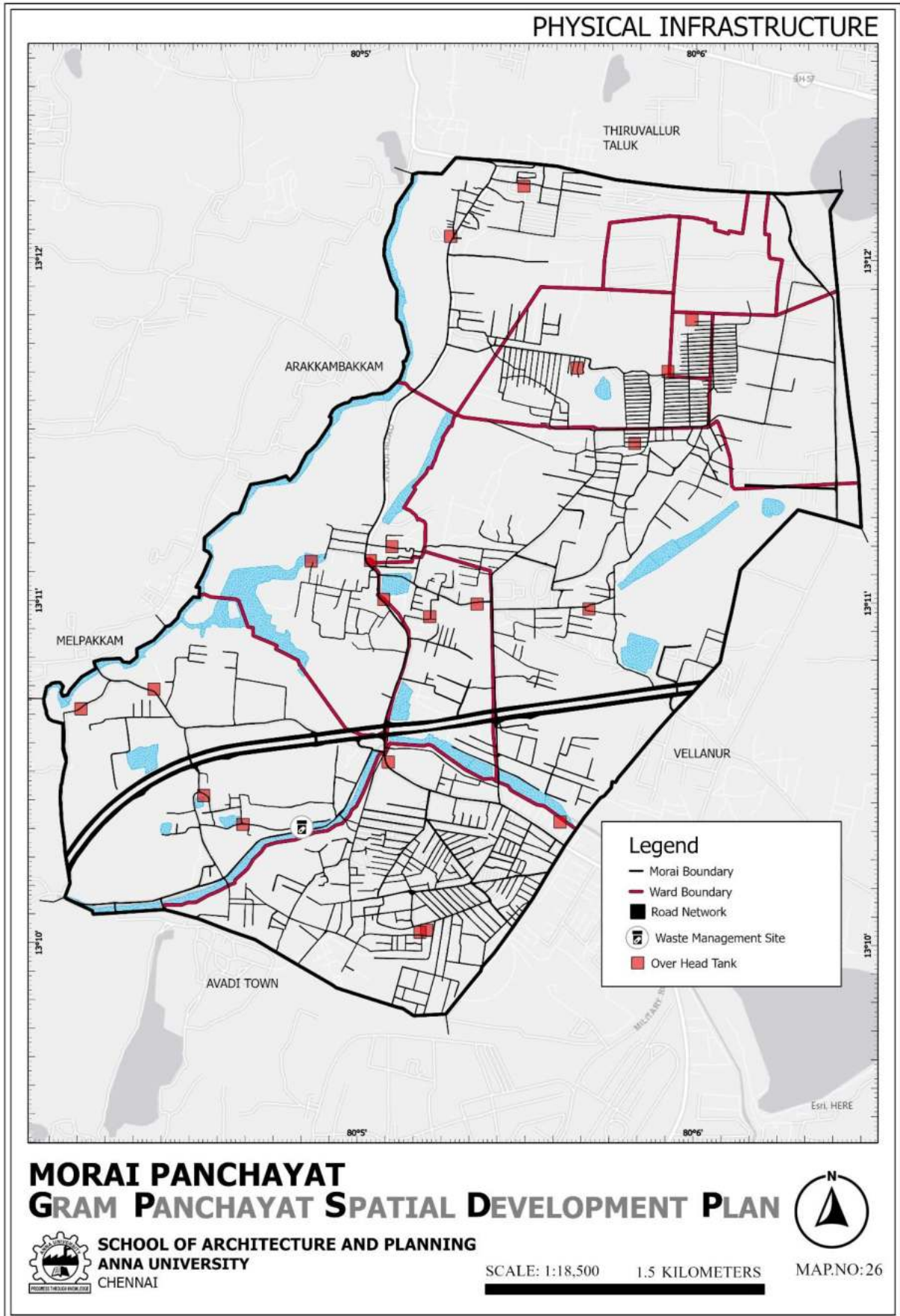
## **3.6 PHYSICAL INFRASTRUCTURE**

### **3.6.1 WATER SUPPLY**

The common sources of water supply in the village are bore wells and hand pumps. However, the major source of water supply in the village is through bore wells. At present, there are nearly twenty-one (21) borewells across the village catering to the needs of the people. These borewells reach up to a depth of 150 m and with the help of mechanized pumping based piped systems, the borewells pump underground water into the Over Head Tanks (OHT) which are located across the villages at various locations. The water capacity of the OHTs across the village varies and the maximum capacity of the OHTs is 30,000 litres. The location of the OHT is shown in the *Map 26: Physical Infrastructure – Water Supply*.

The Ministry of Jal Shakti has commissioned piped water distribution system in the rural areas. The Morai Panchayat is equipped with piped ground water-based supply system. Few households have Functional Household Tap Connections (FHTC). Under the Single Village Scheme, there is sufficient groundwater availability and groundwater is free from chemical contamination. The OHT is filled daily twice - once in the morning and once in the evening to its full capacity. From the OHT, on a regular basis Uninterrupted water supply is supplied through pipe connection to the households. for two hours daily every day, in the morning and two hours daily in the evening. One Common tap serving eight households is provided across the village. Handpumps are also located to serve the needs of the households. Moreover, nearly 10 handpumps are located at various locations across the village providing 24 hours uninterrupted water supply. The village receives 55 litres per capita per day, whereas the service level benchmark focuses on 70 litres per capita per day. The quality of water supplied must have a pH value for 6.5 –8.5. Under the National Jal Jeevan Mission (JJM Scheme) it is proposed to provide safe and adequate drinking water through individual household tap connections to all households in the village. The common Sources of Water Supply for Irrigation are Bore wells and Morai *Eri*. Bore wells is the major source of water supply in the village for Irrigation. There are approximately 12 borewells across the village used for irrigation purpose.





Map 26: Physical Infrastructure – Water Supply

The water from the Morai *Eri* is mostly used after the monsoon for irrigation. Crops mainly paddy, chilli, vegetables such as brinjal and ladies' finger and fruits like water melon are mostly cultivated.

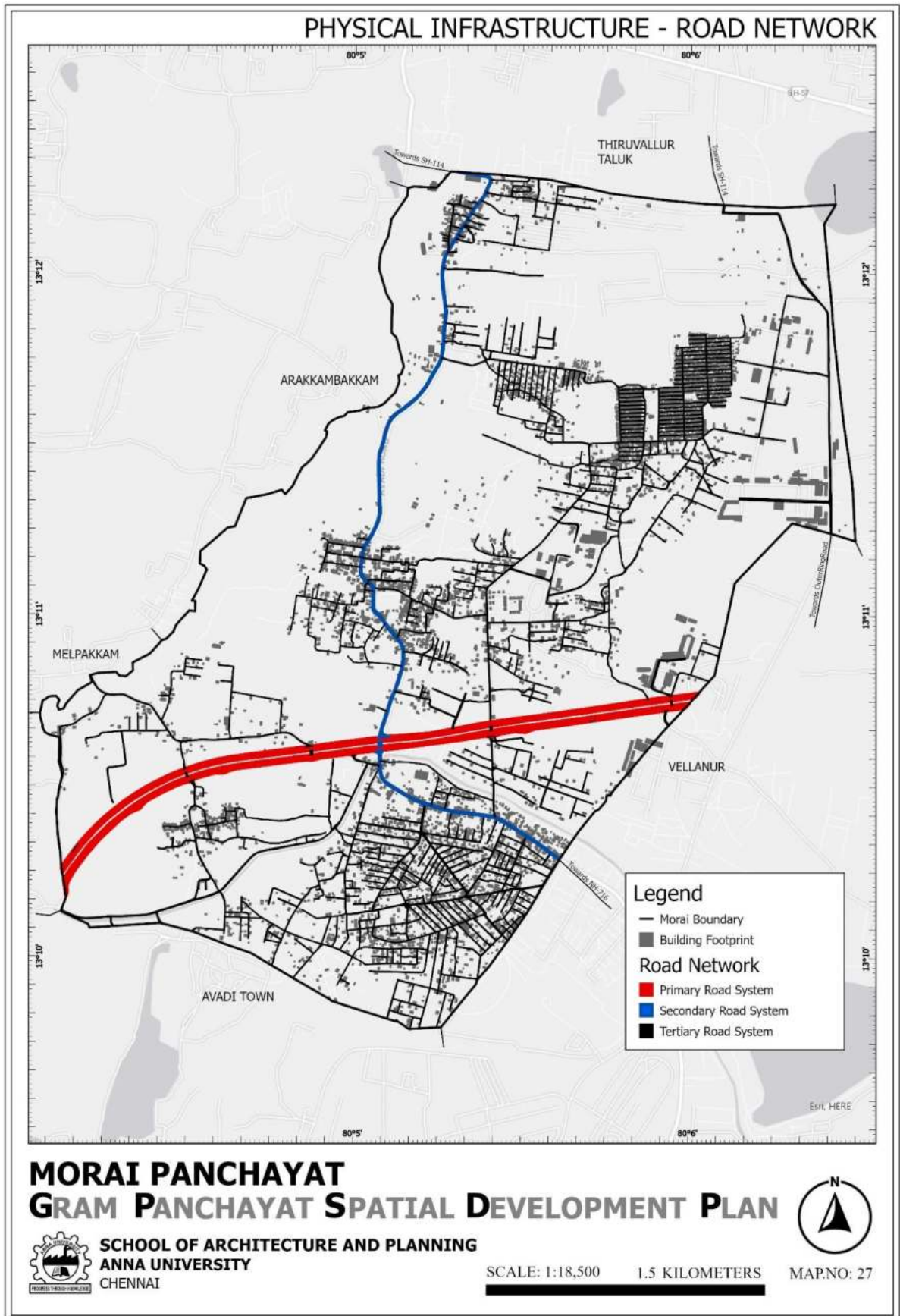
### **3.6.2 ROAD NETWORKS**

The village has a good road connectivity under the Pradhan Mantri Gram Sadak Yojana. 9 meters width all-weather roads are connecting the village with the outer ring road which is constructed. 6 meters wide all-weather roads with open drains on both sides to facilitate drainage system in the village is provided to take major traffic into the village. The 4.5 meters wide cement concrete village roads are provided. 3 meters mud lanes are also provided in some areas of the village. The road network map is shown in the *Map 27: Physical Infrastructure - Road Network*.

### **3.6.3 SOLID WASTE MANAGEMENT**

Door to Door collection of solid waste is being practised in the village on a daily basis. There are nineteen various types of vehicles that collect solid waste from each house hold: There are five Tricycles, thirteen pushcarts and one Tractor collecting solid waste from various households across the village. One sanitation worker is responsible for collecting solid waste from 75 households. Apart from Door-to-Door collection of solid waste, common dustbins are also provided at various locations across the village for the disposal of solid waste. Nearly 430 kg of solid waste per day is being generated by the village. The location of the Solid waste management site is shown in *Map 26: Physical Infrastructure – Water Supply*.

This solid waste collected from the households in the above-mentioned vehicles along with the solid waste from the common dustbins is being dumped at the designated solid waste management yard of 40 sq.m provided towards the southern part of the city below the outer ring road located near the burial ground beside the Krishna canal. A solid waste treatment facility is also provided at the yard. At this facility landfills of 6m X 3m are provided to dump the waste. Dry waste is segregated and the recyclables (Plastics, papers, bottles and other items) is sold to merchants who deal in scrap sales /waste recyclable items periodically.



Map 27: Physical Infrastructure - Road Network



It has been identified that segregation of bio-degradable from non-bio-degradable wastes is not being practised at the source. The common dustbins that are provided at various locations across the village of the village are being underutilized and the solid waste is thrown outside the dustbins. Every day collection of waste from the common dustbins, maintenance of the common dustbins, transportation of the collected solid waste to the dump yard needs to be carried out and segregation at source needed to be implemented.

#### **3.6.4 LIQUID WASTE MANAGEMENT**

Discharge of the Liquid Waste water from the households is discharged onto public streets and also into the storm water drains. The existing storm water drains are open drain system and are mostly either broken or choked. From few houses, the Liquid Waste water flows directly onto the streets which is leading to puddles forming in front of the households. The discharges from the toilets/bathrooms are also let in to the storm water drains in some areas of the village. The Liquid Wastewater gets collected at various points of the village due to non-functioning drains and blockages at different points.

Generation of Liquid Waste water is almost to the tune of 70 to 80 % of the fresh water coming in a household. A lot of empty common spaces and scrub land are available in and around the village. Considering the Geophysical condition of the village including topography, soil structure & ground water conditions, Constructed Wetlands can be used for management of the liquid waste water. The grey water can be directed towards the scrub land to improve greenery in the village. In addition, Kitchen garden and leach pits can also be constructed there by effectively managing the waste water.

#### **3.6.5 SANITATION**

In the past 7 years under the Swachh Bharat Mission - Grameen (SBM) and MGNREGA scheme nearly 1400 toilets have been constructed. There are 3 common toilets located in the village. Most of the toilets in the village have septic tanks. There are few parts in the village that practise Open defecation. For a cluster of houses such

that for every 10 houses, a Pour flush twin leach pit toilet similar to soak pit is built at appropriate places to make the village ODF

### **3.6.6 ELECTRICITY**

The village receives its electricity from Alamatty TNEB. Under the state scheme - Energization of Street Lights with Solar Power, few of the existing street lights in the Village are replaced with solar powered street lights with an objective of reduction in the maintenance expenditure and promote the concept of renewable energy in rural areas. Under the state scheme - Chief Minister Solar Powered Green House Scheme (CMSPGHS) 20 houses with an area of 300 sq. ft with solar powered lighting have been implemented. In some parts of the villages CC cameras have also been installed for security and surveillance purpose.



## CHAPTER 4

### 4 PROPOSAL FOR GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN

*“At the core of Self-Reliant India is a village and agro-based economy”*- Shri Narendra Singh Tomar, Union Minister of Panchayati Raj, Rural Development and Agriculture & Farmers Welfare. The honourable secretary, Ministry of Panchayati Raj, Government of India had expressed the wish at the onset of this project that villages should have a quality-of-life equivalent to that of the cities. Our plan for ‘Morai’ village is along both these lines. Our vision for the project is *‘By 2030 village will be a place, where people like to live and work, people are well-fed, healthy, educated and environmentally responsible’*.

To ensure that the village is self-reliant, has a good quality of life and the people of the village have a sustained income, proposals that improve the physical; social infrastructure and create economic opportunities have been formulated. These have been presented in three sections below.

#### 4.1 CREATING ECONOMIC OPPORTUNITIES IN THE VILLAGE

The average income of the majority of the households is less than Rs.10,000/pm. Most of the population is employed as labourers only. Therefore, to enhance the economic condition of the villagers, the following development schemes are proposed;

1. Local market (*Santhai*)
2. Milk co-operative in cooperation with Aavin
3. Veterinary clinic to promote the wellbeing of the cattle; and
4. A Warehouse for storing agricultural produce.

Considering that notable area is still under agriculture in the village and the presence of significant land under fallow, it is proposed that the water resources in the village be developed to further encourage agriculture. The predominant crop in the village is paddy, which requires sustained irrigation. The current source for irrigation is ground water, which is unsustainable. Therefore, in future dependence on Tanks (*Eri*) should be encouraged. For this desilting of the existing tanks is proposed. For

the lands under plantation and proposed trees (under afforestation scheme) drip irrigation is recommended. A farmer support centre can be created in the panchayat office providing technical guidance to farmers.

## **4.2 IMPROVEMENT OF PHYSICAL INFRASTRUCTURE**

Morai village is relatively well equipped in terms of physical infrastructure, barring waste management. Morai area is on relatively higher land and further growing along the village roads. Colonies/settlements are mostly on communal basis. Internal village roads and few lanes are made of cement concrete but are very narrow. Recent development can be seen that of pucca houses built under government schemes. Morai area has a lot of waste/ vacant land under government ownership. While most of the roads in the village are in a good condition some of the roads has to be converted to all weather roads. The roads that need to be converted had been identified and it is proposed that these be converted to all weather roads in the first two years.

With reference to physical infrastructure the proposal has components related to liquid waste management, solid waste management, sanitation and sewage. The proposal also offers source sustainability for drinking water supply and financial sustainability for solid waste management.,

### **4.2.1 WATER SUPPLY**

Sources of water supply can be considered sustainable when it delivers designed quantity of safe water in all seasons. With increase in demand of water supply, source sustainability is of utmost importance to maintain proper water supply in the village. Bore well recharge structures, Roof Top rainwater harvesting structures installed at institutional buildings, such as, schools, Anganwadis, Health centres, Gram panchayat buildings, Community soak pits , Rejuvenating the existing ponds.

### **4.2.2 LIQUID WASTE MANAGEMENT**

For liquid waste management it is recommended to have Soak pits and leach pits at individual residence. The system for liquid waste management is broadly based on the system of soak pits traditionally adopted for building toilets in rural areas but with certain modifications to allow for disposal of household waste water. The model

envisages clusters of houses such that for every 10 houses, a soak pit is built to allow water only from the 10 houses to flow into. The soak pit being constructed will be 2m in diameter and 10m in depth. The water from the houses flow in to these soak pits via underground channels and fall into the soak pit. The water will gradually soak into the sides of the pit and filter down to the ground water table.

#### **4.2.3 SOLID WASTE MANAGEMENT**

For solid waste management, the village is to a large extent well equipped and there is an existing system of solid waste segregation at the designated solid waste management yard. It is proposed to extend this to the source itself by adapting a two-bin system at the household. Separate bins namely green bins and red bins can be distributed to households and can be asked to segregate the waste at the source before handing it to the sanitation workers. In addition, Simple windrow composting for managing wet waste can be practiced and Vermicomposting can also be adopted. Sanitary landfill for managing the non-recyclables along with hazardous waste can be practised. However, complete thrust on awareness and behavioural change of the people residing in the village is necessary in this regard. This is to be strengthened by awareness, education and training programmes.

However, the existing waste dumping area is close to the Krishna water canal and is not a suitable area. Hence, a land use suitability analysis has been carried out to identify the best suitable land for solid waste management. Based, on five important criteria's namely, buffer from habitation areas, availability of land, buffer from pasture land, buffer from water resources, land suitable for solid waste management is identified. The *Map 33: Proposed Land use- Ward I & II*, shows the land suitable for solid waste management.

To further enhance the solid waste management of the village, a sanitary land fill system is proposed for the disposal of waste after segregation. Inorganic waste can be recycled for revenue generation also. For the Financial sustainability of the solid waste management, Sale of compost to organic markets, farmers and individuals can be undertaken through Direct and/or Online marketing. In addition, User fee

collection towards the residents can also be collected to pay for the sanitation workers and also for the maintenance of the vehicles.

#### **4.2.4 SANITATION**

In regard to sanitation, the village has notable number of houses with toilets, as many houses have received grant for this purpose under Swachh Bharath Mission, green house scheme, PMAY scheme. There are a few existing public toilet blocks in the village, however in the new development of ‘New kanniamman nagar’ the toilet facilities are inadequate and open defecation is observed. Therefore, public toilets are proposed in this area. To increase environmental sustainability of the village, it is proposed to recommend organic toilets.

Storm water management of the village is proposed through the provision of grassed swales on either side of the road. These swales will carry the water to the nearby Tanks or canals. The village is dependent on ground water. To relieve the pressure of extraction of ground water, usage of the water from surface water sources is recommended. For this purpose, it is proposed to desilt and renovate the 18 water tanks in the village. Strengthening of the bunds of these tanks is also proposed.

#### **4.3 IMPROVEMENT OF SOCIAL INFRASTRUCTURE**

The village literacy level is below the district average and the predominant population is educated only till high school. There is no higher secondary school in the village and the existing high school is deficient in terms of infrastructure. Hence the up-gradation to higher secondary school is proposed. Further to increase the employability of the population, vocational training centre is proposed.

Considering the population of the village, the following social and cultural facilities are proposed; Public health care centre; and Community halls (3 nos). There are at present no parks, play spaces for active and passive recreation. Therefore, these are proposed in the village at appropriate locations. The village is at present having some greenery; this is proposed to be enhanced further through afforestation schemes, especially in the foreshore areas of the Tanks; public spaces and road side.

## **4.4 PROPOSED LAND USE PLAN FOR 2030**

### **4.4.1 GENERATION OF COMPREHENSIVE DEVELOPMENT PLAN**

Conservation and sustainable management practices requires the adoption of basic ecological principles in the management of natural resources to ensure the sustainability. To improve the land resources, it is imperative to first improve the water resources of the region. So, both the plans should complement each other.

#### ***4.4.1.1 Water Resources Development Plan***

In the present study, WRDP has been achieved using a decision model that involves the logical combination of thematic maps as well as the ground and field knowledge shared by the Partner institution. The water resource development plan includes identification of suitable zones for taking up locale specific activities in the study area which are generally the areas, where certain type of water resource activity is recommended for implementation. Water conservation measures like check dam, percolation tank, bore wells, dug wells etc. fall under location specific activities. The main purpose of these activities is to improve the ground water condition within the GP area which means measures need to be taken to store the water as well as allow water to percolate in to the ground by holding the water in water harvesting structures as much as possible.

In order to identify the suitable zones for location of recharge structures, different thematic layers viz., drainage network with drainage order buffer map, soil, slope and land use/cover and runoff potential were integrated. Subsequently, zones in which the defined conditions of the different thematic layers were fulfilled are identified for location specific activity. The guidelines for the selection of suitable zones for planning location specific activities are adopted from literature (IMSD,1995) The water resource development is shown in Map 28: Water Resources Development Plan map of Morai GP

Implementation strategies of some of the recommendations for improving water resources are given in detail



#### **4.4.1.1.1 Rainwater harvesting**

Rainwater harvesting in the site has two components viz., harvesting the roof water and the other, harvesting the surface runoff. In addition, treated waste water is one important source of water.

##### **4.4.1.1.1.1 Roof Water Harvesting to meet drinking water requirement of villages**

Roof water from the buildings and other paved areas to be collected and stored in sumps for reuse and also for recharging the bore wells after filtering (using pebble, charcoal, sand beds). It would be advantageous to plan this activity while constructing any new building to collect as much roof water as possible and further for diverting this water to the sumps nearby and to the bore wells, after necessary filtering. Designs in this regard need to be worked out separately, taking into consideration of the roof area, rain fall, slope etc.

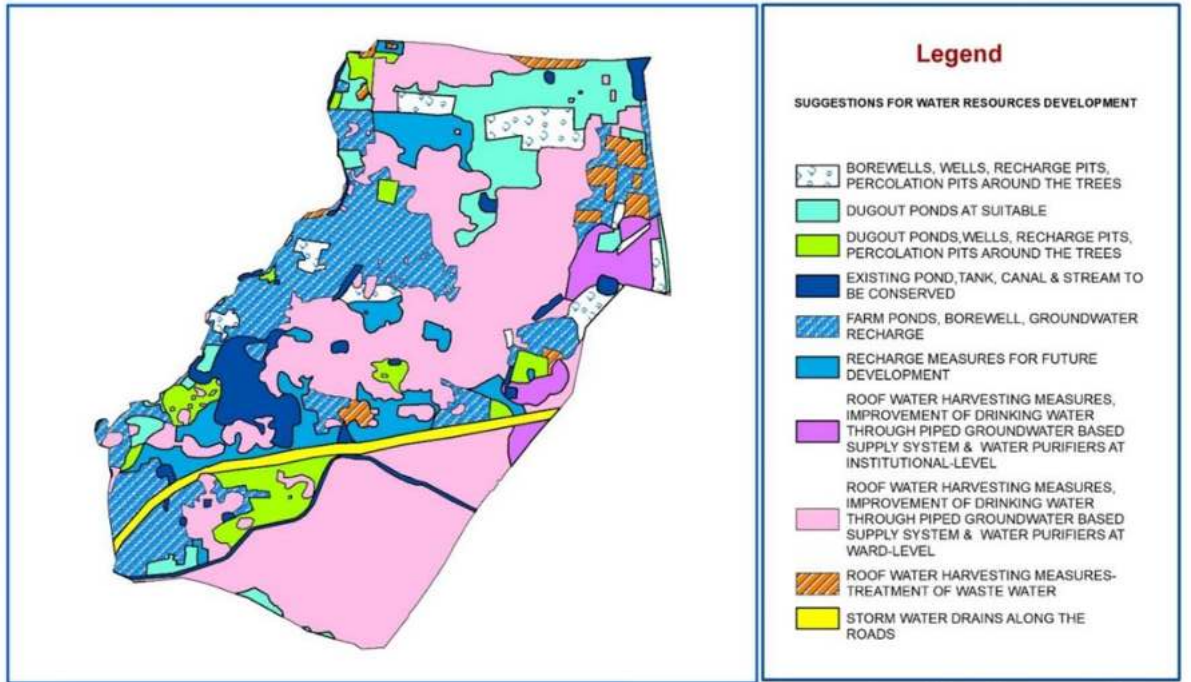
Roof water could be harvested by connecting the pipes and bringing the rainwater to a common pipe and then to sumps (size depends on roof area and requirement) after passing through filter beds. This water can be used for flushing, gardening, washing etc. For the new buildings under construction, harvesting of roof water, through sumps and recharging borewells could be planned.

##### **4.4.1.1.1.2 Groundwater Recharging through rain water harvested**

Some of the common suggestions for ground water recharge and rain water harvesting to be adopted are

- a) Depth to Water levels during pre- & post-rainy seasons of all existing bore wells are to be monitored at regular intervals
- b) All existing bore wells to be directly recharged (after filtering the roof water)
- c) Existing drain / water ways should be cleaned & maintained and linked
- d) Direct recharging of bore wells will help in recharging depleted fractures and fissures to have sustainable yield from bore wells

**Gram Panchayat Spatial Development Planning - SISDP Update**  
 Morai (GP), Villivakkam Block, Tiruvallur District, Tamil Nadu  
 Water Resources Development Plan (2019)

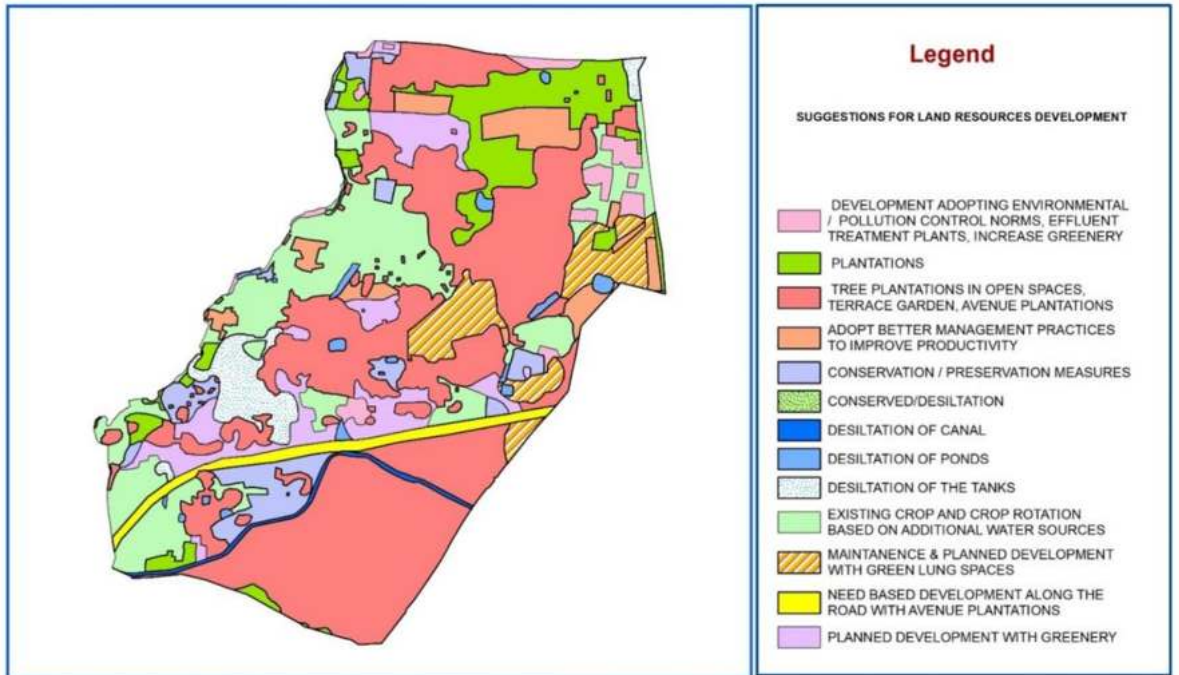


Source :  
 RESOURCESAT2 LISS IV MX (5m)

Generated at RC-South, NRSC

Map 28: Water Resources Development Plan map of Morai GP

**Gram Panchayat Spatial Development Planning - SISDP Update**  
 Morai (GP), Villivakkam Block, Tiruvallur District, Tamil Nadu  
 Land Resources Development Plan (2019)



Source :  
 RESOURCESAT2 LISS IV MX (5m)

Generated at RC-South, NRSC

Map 29: Land Resources Development Plan map of Morai GP

#### **4.4.1.1.2 Surface Water Harvesting**

All pits / percolation ponds, check dams, dugout ponds (existing and the planned new ones) together will be able to hold considerable quantity of rainwater for recharging the ground water. Further, the rain water from the study area could be diverted during rainy season to the large covered under ground / Ground Level Reservoirs/ storage tanks (GLR), located on elevated locations and then transported to overhead tanks through pumping for water distribution in the villages. From these GLRs, water could be used for gardening and other purposes through gravity. Storing water in the GLRs will avoid the loss due to evaporation. For all the tanks, silt filters could be constructed to avoid silting of the tanks. This will also ensure that the water stored in the GLRs is free of silt.

##### **4.4.1.1.2.1 Setting up of STPs**

Setting-up of small STPs to recycle waste water which can be used for secondary uses like gardening, industrial cooling, flushing and other secondary purposes. A dual water supply system can be planned within the GP for potable and non-potable water separately, as a viable option to minimize the pressure on fresh water supply.

##### **4.4.1.1.2.2 Rejuvenation/ Restoration/ Desilting of Tanks**

The Rejuvenation / Restoration / Desilting of tanks is recommended for all bigger tanks which are partially silted up. Lakes are created basically for hydrological reasons for checking floods, recharging and maintaining the ground water table. They also act as sediment traps, prevent clogging up of natural valleys and reduce erosion by regulating runoff. Lakes and Tanks belong to wetland ecosystem and have a larger biological and ecological role. Hence, measures for rejuvenation / restoration / desilting of tanks and lakes in the Gram-Panchayat will definitely build up ground water resources.

##### **4.4.1.1.2.3 Drip irrigation**

Drip irrigation systems deliver water directly to a plant's roots, reducing the evaporation that happens with spray watering systems. Timers can be used to schedule watering for the cooler parts of the day, further reducing water loss. Properly

installed drip irrigation can save up to 80 percent more water than conventional irrigation, and can even contribute to increased crop yields.

#### **4.4.1.1.2.4 Farm Ponds / dug out ponds**

Capturing and Storing Water in small to medium sized Farm Ponds is another method of storing water. Polythene sheets were used to reduce the seepage / infiltration losses. Many farms rely on municipal water or wells (groundwater), while some have built their own ponds to capture and store rainfall for use throughout the year. Properly managed ponds can also help to minimize their impact on the surrounding watershed. This practice may be further encouraged to sustain horticulture, flori-culture & vegetable growing.

#### **4.4.1.2 Land Resources Development Plan (LRDP)**

In the present study, LRDP has been achieved using a decision model that involves the logical combination of thematic maps as well as the ground and field knowledge shared by the Partner institution. For arriving at the suitability of a particular land use activity in the study area, thematic maps viz. land use/cover, soil, slope and groundwater potential maps which were generated using remote sensing and GIS were integrated. Expert's knowledge and the field situation was also considered for formulating the alternate land use plans. Methodology adopted from the GIS based land use planning project initiated in India entitled 'Integrated Mission for Sustainable Development', which generates, analyzes and integrates natural resource thematic data in 1:50000 scale, together with satellite remote sensing data has also been a guiding factor in the development plan formulations (IMSD, 1995). The land resource development is shown in Map 29: Land Resources Development Plan map of Morai GP.

Some of the general recommendations for LRDP are given below.

- a. Improved Agro-horticulture / Agro-forestry practices (Horticulture Forestry plantations with interspaced cultivation) to bring better returns than the field crops.
- b. Intercropping in horticulture plantations with vegetables in both seasons may bring better benefits to farmers. Different drought resistant tree species are recommended for forest nurseries.

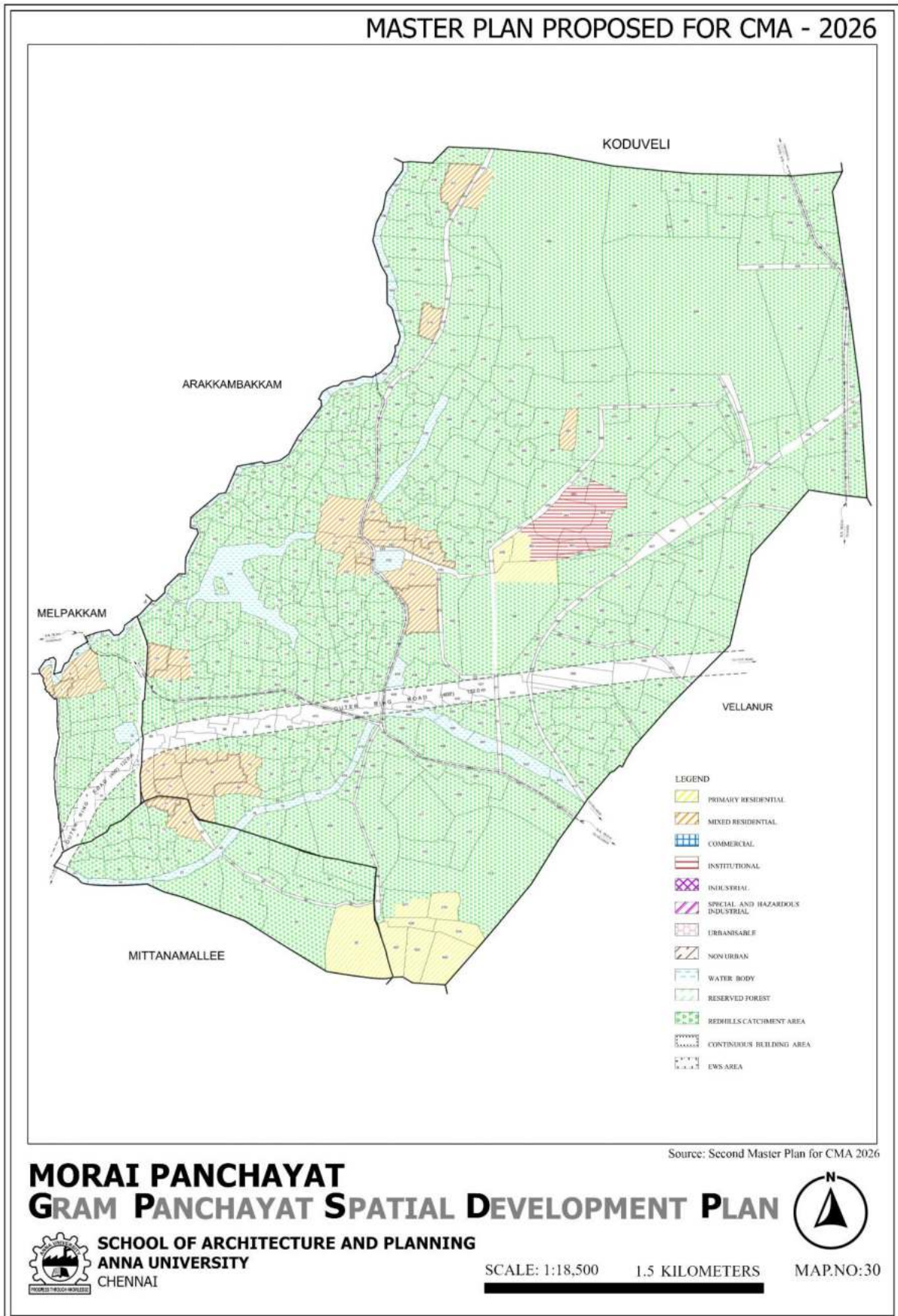
- c. Soil and water conservation measures: The surface run off could be channelized to recharge the existing and failed bore wells after due filtering. Soil conservation measures such as boulder / vegetative checks in the upper reaches, terracing of the sloppy areas; contour trenches; pits around trees could also be taken up in open areas. Vegetation cover to be improved with planting of trees, plants, etc within the open spaces in the village settlement area
- d. Fodder / Tree Plantations: These are suggested in the marginal lands with poor groundwater potential areas and not able to sustain crops. The open forest areas may be converted into grazing lands by over seeding grasses and fuel wood species and these are recommended to meet the demands of local cattle feeding and fuel requirement of local people.
- e. Afforestation: Afforestation is proposed in the forest blanks / open forest areas to increase the density of vegetation. These gaps may have been caused due to several reasons which include grazing in the initial stage and unauthorized tree felling. The economic forest plantations are suggested for compensating forest degradation.
- f. Wasteland development: Land with or without scrub (Scrub Lands) come under this category. Over seeding of grasses and agro-forestry plantation are recommended on upland with or without scrub. Water conservation and harvesting structures like loose boulder check dams / Rock dams using available local stones in middle slopes that will help in raising soil moisture. In higher slopes at higher reaches brushwood dams and rubble dams will arrest soil erosion.
- g. Crop cultivation based on soil texture Sandy soil is not good for plants. However, Melon and Coconut can grow in sandy soil. If water is available for irrigation then crops such as pulses Millets can be grown.

#### **4.4.2 RECOMMENDATIONS & SUGGESTIONS FOR IMPROVING NATURAL RESOURCES**

- a. Morai has a significant proportion of Industrial Area where development is proposed adopting Environmental and Pollution Control norms, establishment of effluent treatment plants and increased greenery in those regions.
- b. In Village Settlement areas, tree plantations in open spaces, terrace gardens and avenue plantations are suggested.



- c. Agricultural plantations mostly coconut plantations are the next major category which requires adoption of better management practices to improve its yield as well as setting up small scale industries for increasing the livelihood of the locals. Here in these areas, farm ponds, recharge pits around the trees, percolation pits have been suggested based on the soil category.
- d. For Cropland, existing crop and crop rotation practices with appropriate water resources planning is suggested.
- e. Maintenance and Planned Development with Green Lung Spaces is suggested for Areas having Educational Institutions.
- f. Conservation and Desiltation measures are proposed for Canals, Ponds and Tanks.
- g. Plantations are suggested for Scrub land and Open Areas and these could be developed with better management practices to improve productivity.
- h. Need based development is suggested along the Outer Ring Road, combined with Avenue Plantations and Storm Water Drains on either side of the Road.
- i. Roof water harvesting measures, improvement of drinking water through piped ground water-based supply system, water purifiers at ward level / institutional level are suggested for the buildings/houses within the settlements / Rural Built-up / Hamlets & dispersed households.
- j. Dug wells / borewells have been suggested within the Valley fills and dissected pediments.
- k. Overall, Groundwater recharge measures are proposed for future development in the study GP.
- l. The strategic planning is defined as the future directions for the development of land and water resources in the GP establishing the long-term objectives and mobilizing the financial resources and government policy to achieve goals. Further, involvement of local people is quite necessary as part of education, awareness and consensus. Implementation, monitoring and maintenance of the schemes and evaluation of implemented schemes for their end benefits are also the part of strategic planning activities.



Map 30: Master Plan Proposed for CMA-2026

#### 4.4.3 PROPOSED LAND USE PLAN- MORAI - 2030

Developmental planning is a complex process of decision making based on the information about the status of resources, socio-economic conditions and institutional constraints. Reliability of the databases, both the spatial and non-spatial, is therefore crucial to the success of the developmental planning. Hence, it is necessary to understand various elements of Gram Panchayat and their interrelationship for ecological planning.

From the study of the existing land use *Map 31: Existing Land use 2020 of Morai Panchayat based on Primary survey* in the Morai panchayat along with the supportive consideration of *Map 28: Water Resources Development Plan map of Morai GP*, and *Map 29: Land Resources Development Plan map of Morai GP*, by NRSC and *Map 30: Master Plan Proposed for CMA-2026* by CMDA, the land use for the Morai Panchayat for the next 10 years that is upto 2030 is proposed in the *Map 32: Proposed Land Use for Morai Panchayat 2030*

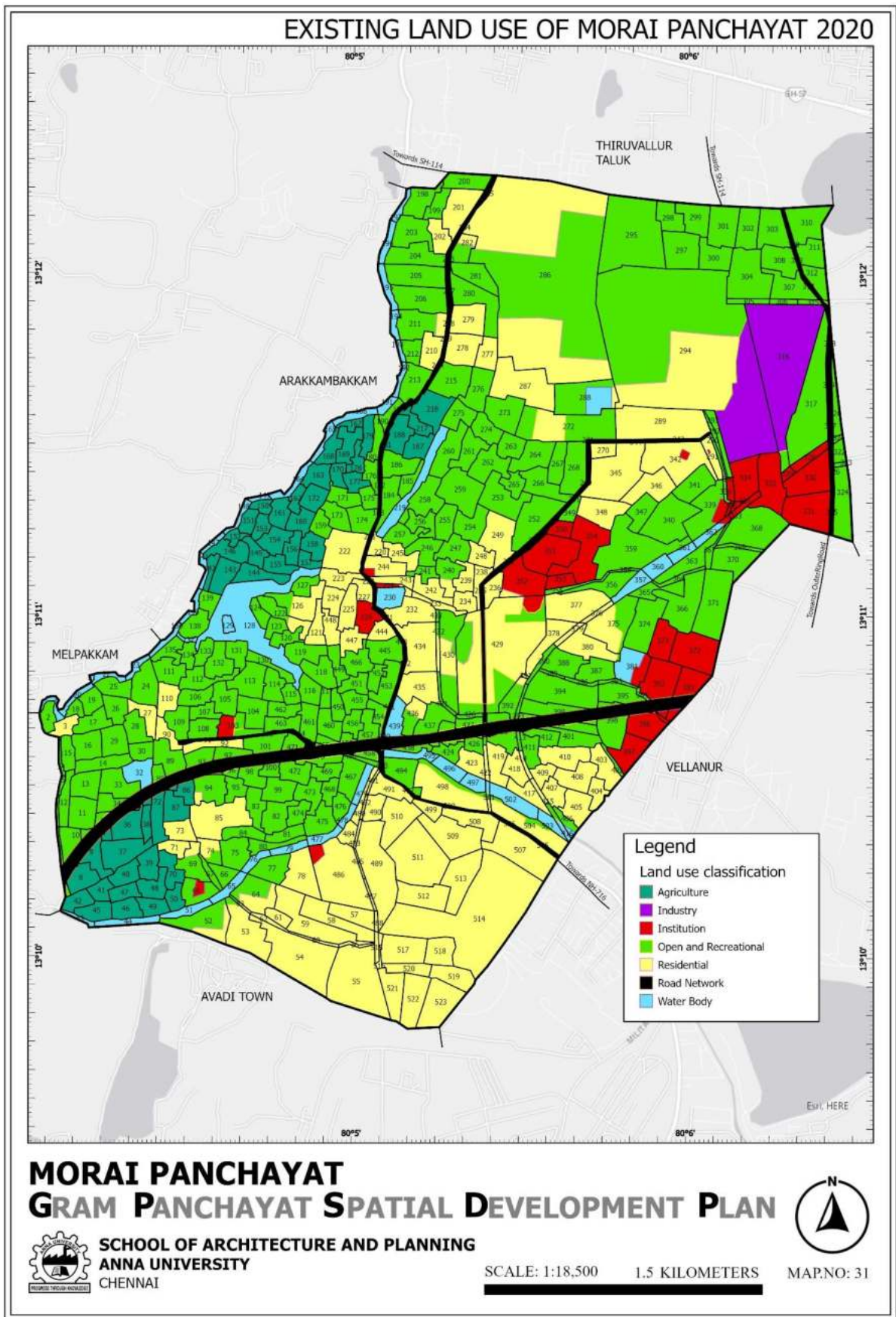
Table 22: Existing Land use based on primary survey

Land use	Percentage
Agriculture	6.3%
Industry	2.7%
Institution	5%
Open and Recreational	44.7%
Residential	32.5%
Road Network	3.9%
Water Body	4.8%

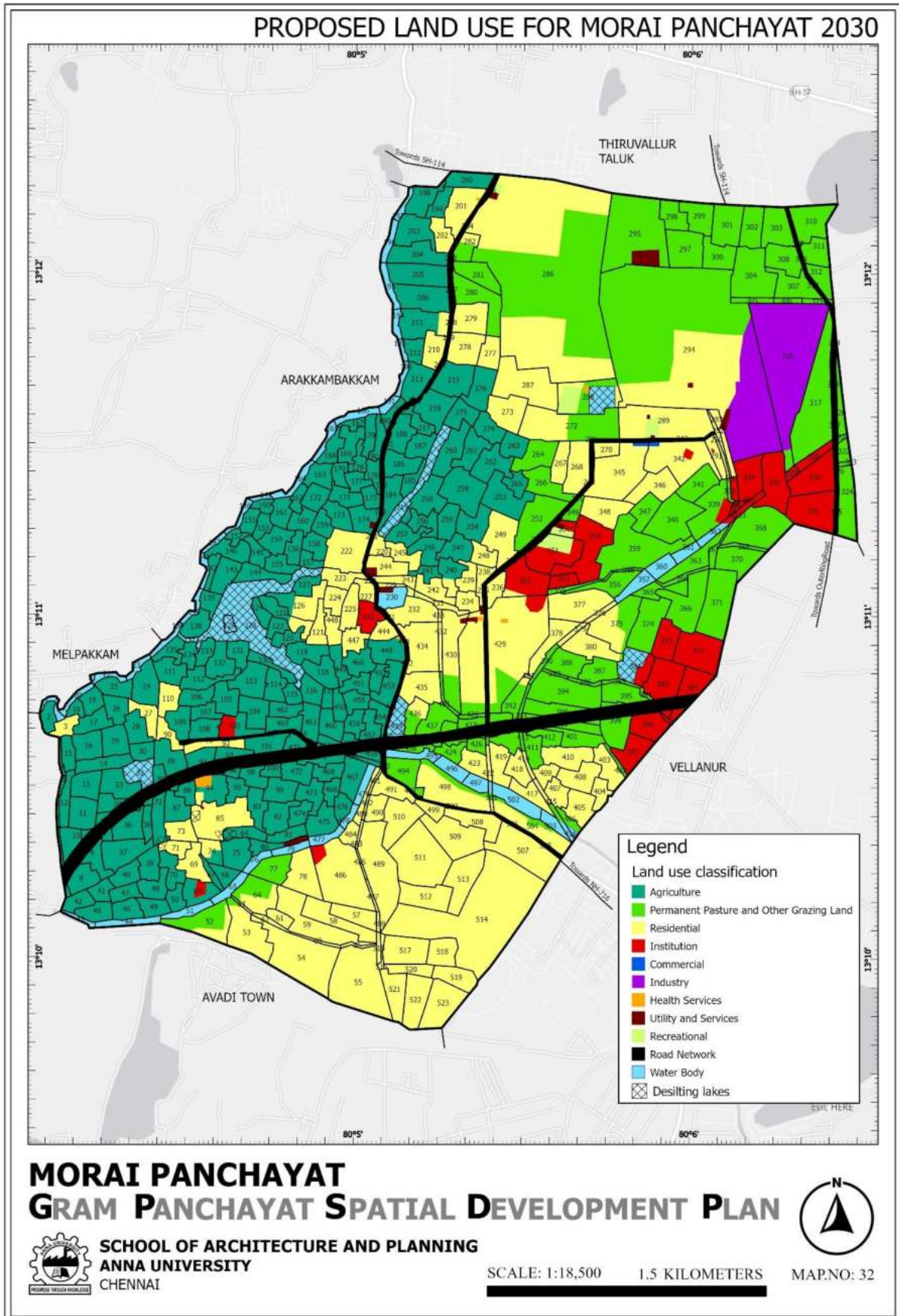
Table 23: Proposed Land use percentage

Land use	Classification	Percentage
<b>Non-Built-up area</b>	Agriculture	22.53%
	Pasture and Other Grazing Land	19.45%
<b>Built-up area</b>	Residential	30.58%
	Institution	4.27%
	Industry	2.31%
	Commercial	0.95%
	Road Network	3.35%
	Health Services	1.95%
	Utility and Services	7.69%
	Recreational	2.85%
	Water Body	4.08%



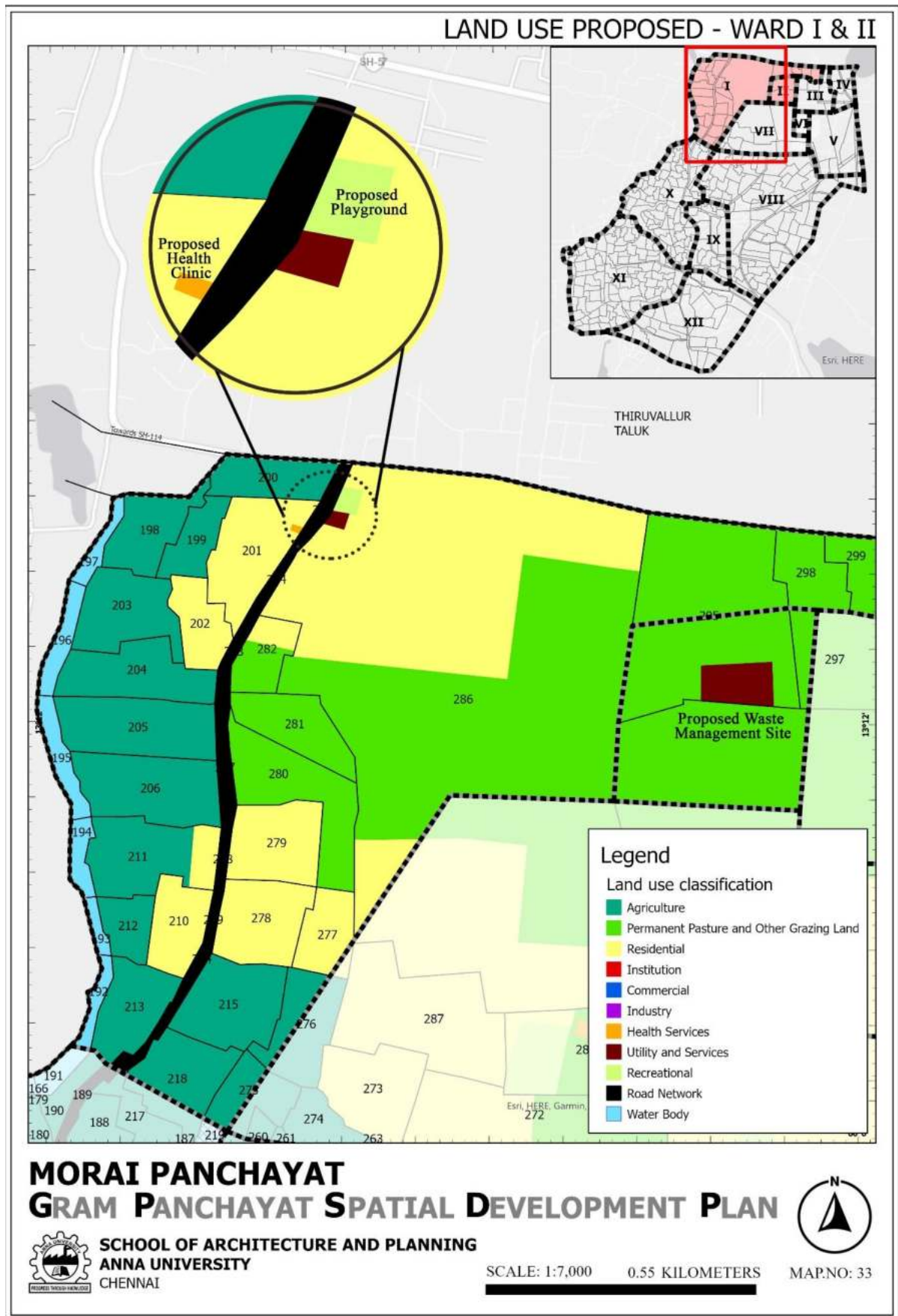


Map 31: Existing Land use 2020 of Morai Panchayat based on Primary survey

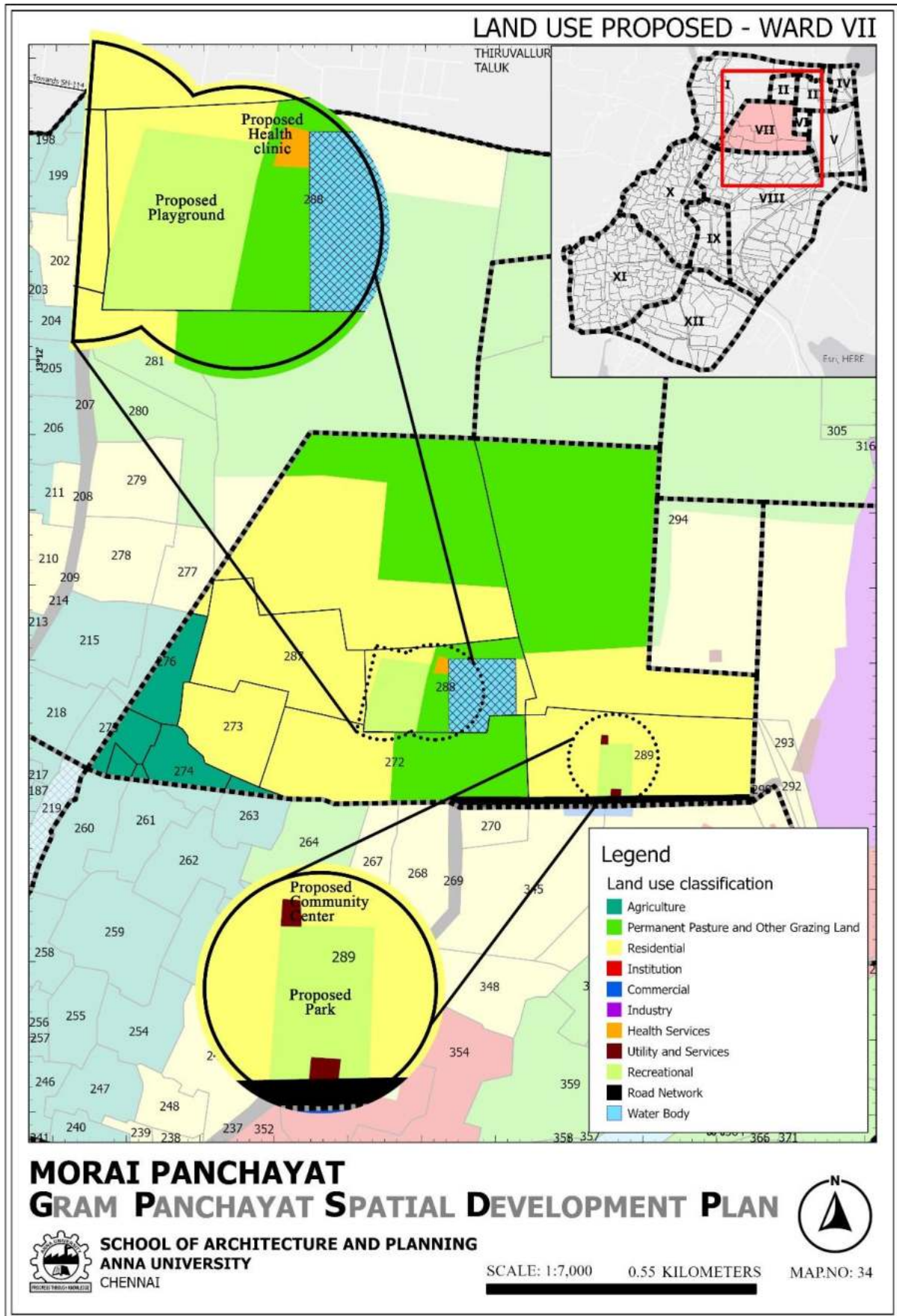


Map 32: Proposed Land Use for Morai Panchayat 2030



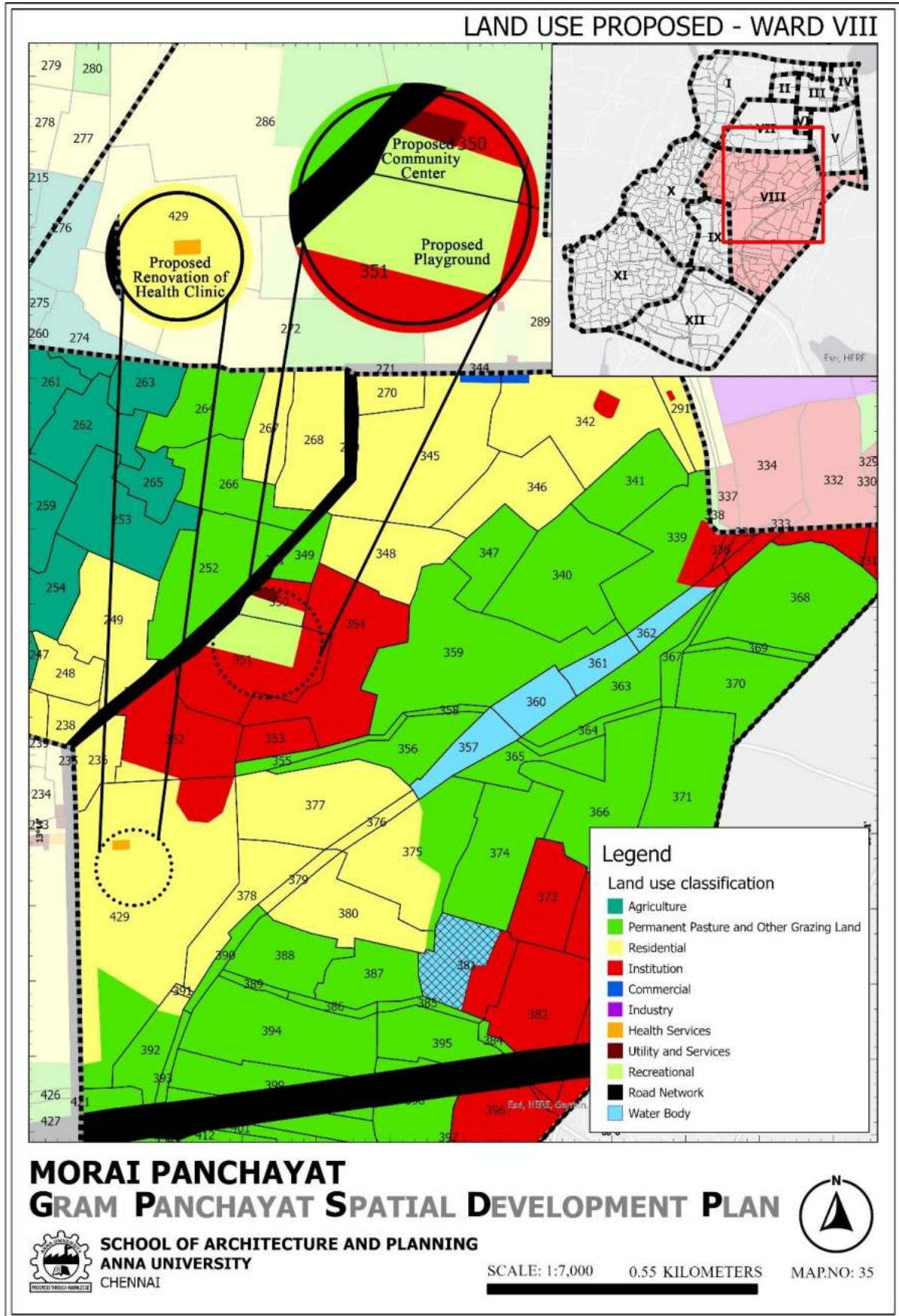


Map 33: Proposed Land use- Ward I & II

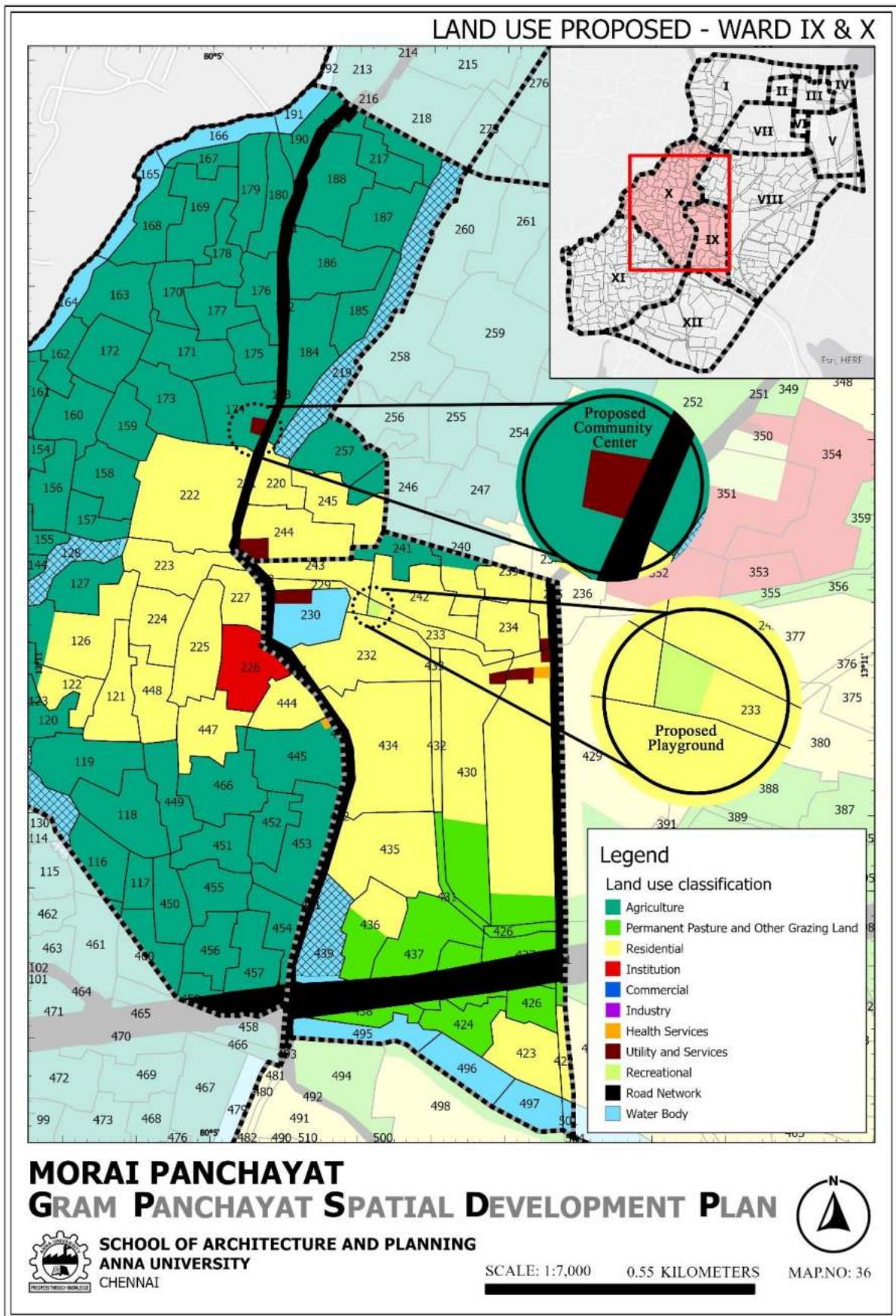


Map 34: Proposed Land use- Ward VII



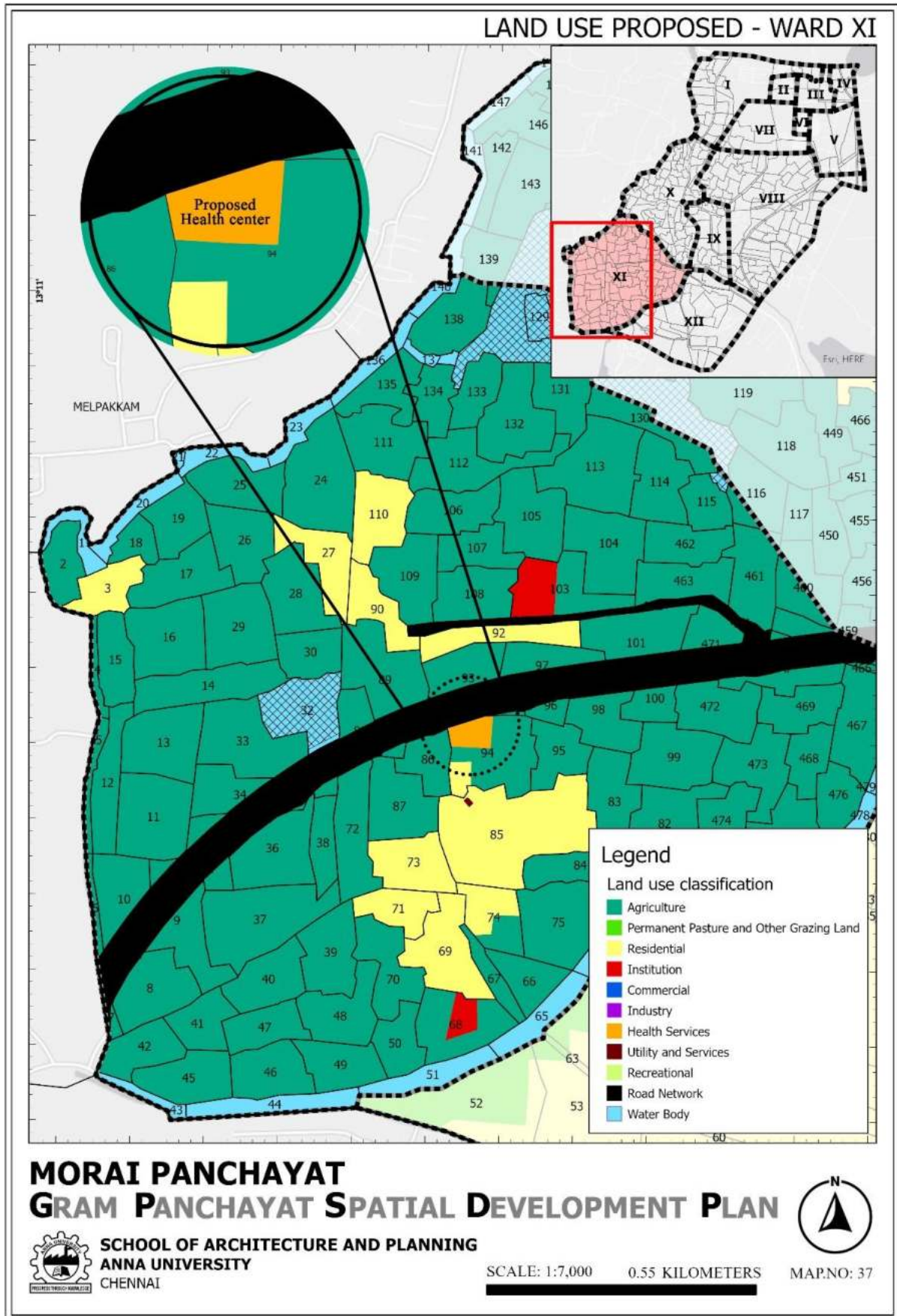


Map 35: Proposed Land use- Ward VIII



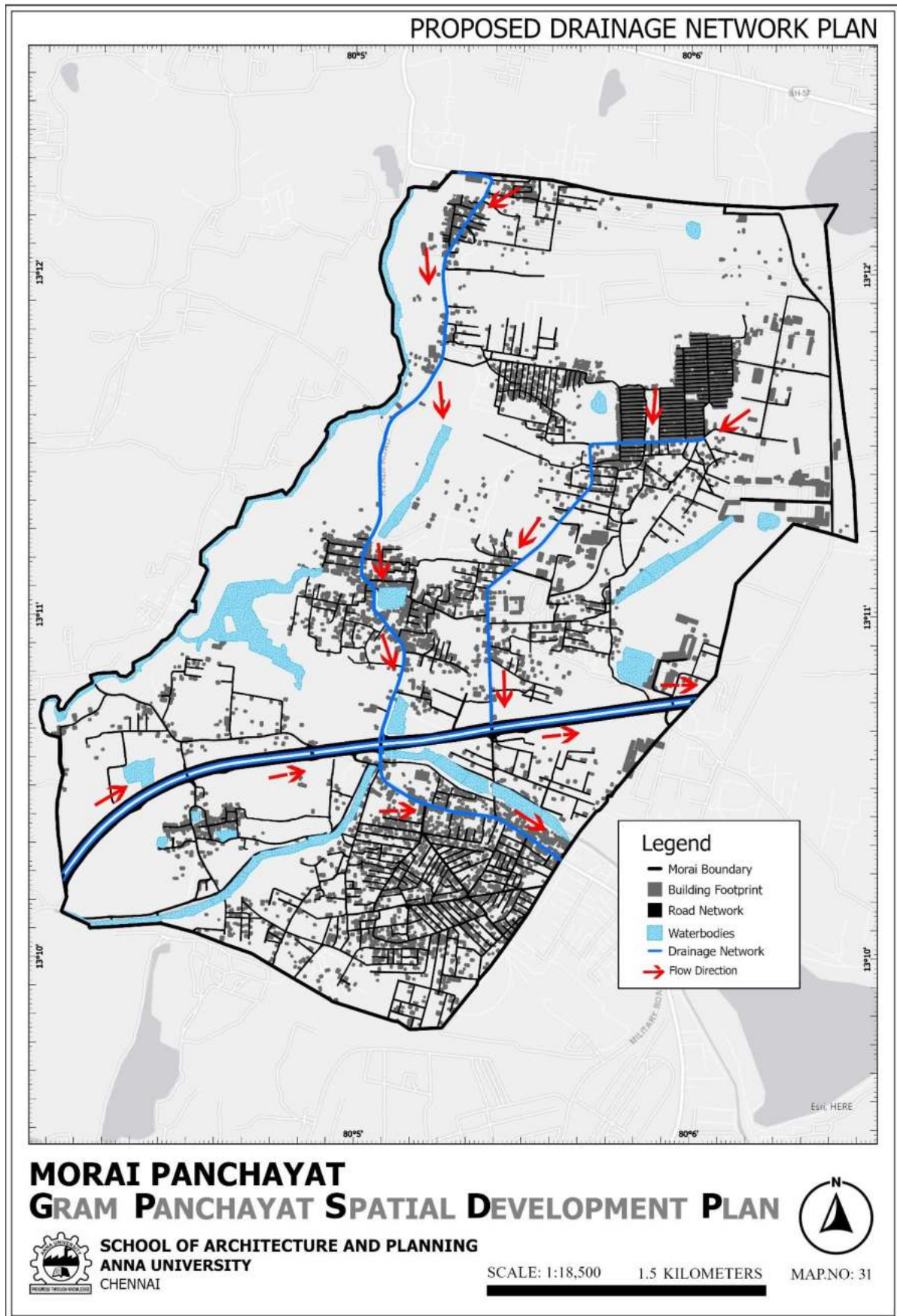
Map 36: Proposed Land use- Ward IX & X





Map 37: Proposed Land use- Ward XI





Map 38: Proposed Drainage Network Plan

The proposed infrastructure facilities for the Morai Panchayat is presented in detailed ward level maps (*Map 33: Proposed Land use- Ward I & II, Map 34: Proposed Land use- Ward VII, Map 35: Proposed Land use- Ward VIII, Map 36: Proposed Land use- Ward IX & X, Map 37: Proposed Land use- Ward XI*) respectively and also drainage plan for the Morai village is devised and represented in the *Map 38: Proposed Drainage Network Plan*, based on the study conducted.

#### **4.5 DETAILS OF BUDGET, IMPLEMENTATION PERIOD AND EXISTING SCHEMES UNDER THE PROPOSALS CAN BE IMPLEMENTED**

This Gram Panchayat has single village scheme and hence these funds allocated under GPDP are considered for phase wise development of the village. We assume village will remain as individual Panchayat. However, considering fast expansion of Chennai and surrounding institutional development this village may undergo transformation and might come in planning area.

Table 24: Overview of Plan proposed

<b>S.no</b>	<b>Proposal</b>	<b>Period of implementation</b>	<b>Budget outlay</b>	<b>Relevant Govt. Scheme</b>
<b>I</b>	<b>PHYSICAL INFRASTRUCTURE</b>			
1.	Existing mud roads to be converted to all weather roads	Year 1-2	2430 lakhs	Tamil Nadu Rural Roads Improvement Scheme (TNRRIS) or NABARD-RIDF or PMGSY
2.	<b>Water conservation and Management</b>			
	a. Rooftop rain water harvesting	Year 3-10	Cost as per design of individual system	Tamil Nadu Water Resources Conservation and Augmentation Mission – <i>Kudimaramathu</i>
	b. Desilting of tanks ( <i>Kulams</i> )			
	c. Strengthening of bunds			
	d. Desilting of Large Tanks used for Irrigation ( <i>Eri</i> )	Year 3-10		To be executed under MGNREGA
3.	Preparation of Storm water Drainage Plan (Grassed	Year 2-10	1.67 lakhs	

	scale)			
4.	<b>Grey water Management</b> Soak pits and leach pits at individual residence level for grey water	Year 1-2	-	Awareness promotion and Technical booklet to be dispersed by panchayat
5.	<b>Provision of public toilets</b> a. Toilet blocks for new kanniyamman nagar b. Provision of organic toilets	Year 1-2	3 lakhs	Swachh Bharat Mission (Gramin)
6.	<b>Solid Waste Management</b> a. Source segregation at HH level (two bin system) b. Sanitary landfill site	Year 1-2	Cost as per design of individual system	Swachh Bharat Mission (Gramin)
7.	<b>Rooftop Solar System</b> Solar energy utilization in new projects	Year 2-3	Cost as per design of individual system	Solar Subsidy under Rooftop Solar projects (RTS)
<b>II</b>	<b>SOCIAL INFRASTRUCTURE</b>			
8.	Establishing public and Child-Mother Health Care Centre – 4 nos	Year 2-3	180 lakhs	-
9.	<b>Educational infrastructure</b> a. Up-gradation to higher secondary school b. Provision of vocational training centre	Year 3-5	700 lakhs	Revamped Comprehensive School Infrastructure Development Scheme
10.	Market - Local market ( <i>Sandai</i> )	Year 1 -2	25 lakhs	-
11.	Community hall – 3 nos	Year 2 – 5	135 lakhs	-
12.	Afforestation	Year 2 – 10	6.65 lakhs	Green Highways Scheme
13.	Playground and parks	Year 1 – 2	Cost as per design of individual system	-
<b>III</b>	<b>UPLIFTMENT OF ECONOMY</b>			
14.	Warehouse for agricultural produce	Year 1 – 2	Cost as per design of individual system	Gramin Bhandaran Yojana

15.	Milk cooperative society	Year 1 – 3	Cost as per design of individual system	NABARD - Dairy Entrepreneurship Development Scheme
16.	Livestock – veterinary clinics	Year 1 – 2	Cost as per design	-



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