

MASTER PLAN FOR CHERPULASSERY TOWN - 2036

CHERPULASSERY MUNICIPALITY
ചെർപ്പുളശ്ശേരി നഗരസഭ

LSGD
തദ്ദേശ സ്വയംഭരണ വകുപ്പ്

GOVERNMENT OF KERALA
സത്യമേവ ജയതേ

MASTER PLAN

FOR

CHERPULASSERY TOWN - 2036

(Draft Report)

Secretary	Town Planner	Chief Town Planner (Planning)	Principal Secretary to Government

GOVERNMENT OF KERALA

Prepared by

CHERPULASSERY MUNICIPALITY,
LOCAL SELF GOVERNMENT DEPARTMENT PLANNING,
GOVERNMENT OF KERALA

OCTOBER 2024

OCTOBER 2024

CHERPULASSERY MUNICIPALITY
LOCAL SELF GOVERNMENT DEPARTMENT PLANNING
GOVERNMENT OF KERALA

MASTER PLAN FOR CHERPULASSERY TOWN

FOREWORD

In the last two decades, our towns have been growing rapidly. The rapid growth of town brings prospers and concern over the future. This leads to the concern on planned growth of the town. A peek into the history of Cherpulassery does show its congruence with urbane nature as well as socio-cultural history. It is well known that a planned growth and a sustainable development requires the input of not only various stakeholders but experienced professionals. Cherpulassery is very much eager in its growth ambitions and surely wishes to grow leap and bounds. In the year's 2018 and 2019 the whole state was hit with un-expected mega flood and landslides. The lack of preparedness in facing such disasters has caused great damage to life and properties which could have been reduced with proper planning and preparation. This brings into light the importance of preparation of a risk informed master plan giving due consideration in minimizing the future risk of natural calamities in the region. Hence, the Master plan of the Municipality is prepared in a risk informed manner including the risk elements of natural disasters and measures to face them.

The LSGD Planning wing has done a fruitful job in assisting us with their expertise as per the mandate G.O. (Rt.) No. 2955/2015/LSGD dated 29.9.2015. The Master plan for Cherpulassery has come out with a slew of innovative ways to solve the current problems especially in addressing the decongestion of central area of the town and spatial allocation for infrastructure facilities. This wonderfully crafted document is an outcome of several iterations of extensive consultations between the LSGD Planning and various stakeholders including the Special committee that was formed within the Municipal council. The Special Committee were able to chip in the ground facts for a better understanding of the problems. The physical infrastructure sector, economic aspects and social infrastructure were scrutinized for its underlying problems and solutions to propel the growth momentum for the next twenty years were formed. Every effort has been taken to tap the maximum potential that this municipality has to offer for the future development course. It is imperative to note that no development can happen in silos, and to realize this document into fruition we need the active participation of all stakeholders. A participative, proactive development of the maximum populace should be our motto. I am sure all the beneficiaries will pitch in to make this a reality.

Cherpulassery
22/11/2024

Office of the Cherpulassery Municipality ★ Cherpulassery ★

P Ramachandran
Chairman
Cherpulassery Municipality

P. RAMACHANDRAN
CHAIRMAN
CHERPULASSERY MUNICIPALITY

PREFACE

Urban areas have been the driving force in economic and social development of the nation. Cities emerged as focal point of transport, trade, business, education, religion and governance. Large resources are spent for the development of various urban settlements but the condition of these towns continues to deteriorate because of piecemeal nature of expenditure and lack of definitive development schemes. Ad-hoc efforts neither result in better environment nor strengthen the economic base. Hence, comprehensive master plans having long term perspective is need of the hour for our urban settlements.

74th Constitution Amendment Act 1992 envisages empowerment of the Urban Local Bodies (ULBs) with planning functions, which is enshrined in the Twelfth Schedule to Article 243–W of 74th Amendment. The first three functions of urban planning include town planning, land-use regulation and construction of buildings, planning for economic and social development related to spatial planning.

Master Plans are expected to give impetus to the development and economic potential of towns. As per The Kerala Town and Country Planning Act 2016 in force in the State, not withstanding anything contained in the Kerala Municipality Act, 1994 or the Kerala Panchayath Raj Act 1994, the Municipal Corporation, Municipal Council, Town Panchayath or Village Panchayath shall "Prepare or get prepared a Master Plan for the Local Planning area". It contributes sufficient statutory backing to the preparation of Master Plan for town. As per G.O. (Rt.) No. 2955/2015/LSGD dated 29.9.2015 Administrative Sanction and Financial Sanction was accorded for the preparation of the third phase of the "Scheme of preparation of Development Plans and Detailed Town Planning Schemes" in which includes Cherpulassery Municipality. The Municipal Council has taken resolution to prepare Master Plan for the town as per resolution No. 8 dated 16.03.2016.

During 2018 and 2019, Kerala State experienced flood and landslides which had severe impacts in all walks of life of the people and damaged livelihood assets throughout the State. The torrential rains triggered a number of landslides that devastated innumerable infrastructure facilities. Growing awareness of these challenges is leading to calls by the Government and the development community for an approach to development that takes account of these complex risks: that is, in other words, risk-informed. Under Rebuild Kerala Development Programme (RKDP), it was aimed to carryout revision of urban planning framework including Act and guidelines for preparing and implementing Master

Plans effectively and to enable risk informed planning and its implementation based on detailed review and assessment of existing planning system. Amendments to the

Kerala Town and Country Planning Act, 2016 have been brought into force vide ordinance no: 42 of 2021 to enable preparation of 'Risk Informed Plans.

The studies carried out in connection with the preparation of Master Plan for Cherpulassery Town comprehensively covered the areas crucial to planning and sustainable development of the region. The master plan was prepared through a systematic process, comprising of extensive data collection and analysis, identification of development issues, setting up of goals and objectives, formulation of development concept and carving out policies & strategies followed by detailed sectoral proposals.

The development framework provided by Integrated District Development Plan for Palakkad District, became a major determinant in formulating the development concept of the Plan. The draft Master Plan is prepared through joint effort of the Cherpulassery Municipality and the LSGD Planning.

I would like to appreciate the leadership provided by the Cherpulassery Municipality for this endeavor under the Chairmanship of **Sri. P Ramachandran**. The contributions of the Special Committee constituted for the preparation of the Master Plan as well as the Working Groups were significant in the task. I take this opportunity to appreciate the officials of the Palakkad District office of the LSGD Planning, especially Sri. Deepa V P, District Town Planner, Sri Sarath Sankar M., Deputy Town Planner and Sri. Subhash A N and Smt. Jagadambika Devi K.V Assistant Town Planners and the entire planning team in the LSGD Planning, Palakkad for their sustained efforts in the time bound preparation of this Plan.

I hope, this Master Plan will provide the desired frame work for planned development of Cherpulaasery Town.

Sheeba Rani Y

Chief Town Planner (Planning)

Local Self Government Department (Planning)

Government of Kerala

Thiruvananthapuram

—-/—-/2024

OFFICE OF THE CHIEF TOWN PLANNER
THIRUVANANTHAPURAM

ACKNOWLEDGEMENTS

The master plan delivers a coordinated strategy to guide future development, transport and public space investments over the next 20 years to ensure our town to be safe, attractive and a continued source of pride. The preparation of the Master Plan for Cherpulassery town was started in May 2016 as per G.O. (Rt.) No. 2955/2015/LSGD dated 29.9.2015 under Phase III of the Scheme of preparation of Master Plans and Detailed Town Planning Schemes.

The process of preparation of this Master plan included extensive data collection, local level and spatial analysis of collected data, identification of problems and potentials, envisaging the future, integrating the results of scientific analysis and the aspirations of people and finally transferring that vision into a Plan. Considering the intricacy of the details involved and multi-disciplinary 'technical knowhow' required, the plan preparation process would not have been realized without the dedicated leadership of the local government and the participation of various stake holders. In this regard, I am sincerely acknowledging the valuable guidance and involvement of Municipal Chairperson **Sri P. Ramachandran** and Deputy Chairperson **Smt Kamalam. C** during the preparation of Cherpulassery Master Plan. The contribution and support put forth by former .**Smt. Sreelaja Vazhakunnath Sri. K. K. A. Azeez** during their tenure is also acknowledged. I gratefully acknowledge the contributions of all councilors of the Municipality for their support.

Further, I am extremely grateful to the encouraging leadership, support and motivation extended by our department head, **Smt. Shiji Chandran E**, Chief Town Planner, and **Smt. Sheeba Rani Y**, Chief Town Planner (Planning) beyond which the plan would not have been realized in time. I would like to thank all those who have participated in the discussions and moulding of the plan to the present stage. In this connection, I am extremely thankful to **Sri Prasanth H, former CTP (Planning), Smt. Asha Ajoy Ghosh** (Senior Town Planner), **Smt. Isha P A** (Town Planner) and the entire planning division of Office of The Chief Town Planner (Planning) for their immense support, creative guidance, valuable assistance and efforts taken for carving and vetting the plan.

The dedicated effort put by Sri. K. M. Gopakumar and Sri. Gopi V.A during the tenure in the capacity of District Town Planner for the successful timely completion of the plan need special acknowledgement.

Special thanks also go to officials of various line departments who shared data and gave their valuable support in this plan preparation exercise without which the compilation of this vital document would have been difficult to realize. The plan has been prepared in a participatory way having several consultations with stake holders at all stages. I offer special thanks to members of Special Committee, members of various

Working Groups and other stake holders for offering their views, comments and recommendations to strengthen the Plan. I would like to extend special thanks to the residents of Cherpulassery Town who provided substantial input that helped to shape the Master Plan.

Preparation of Master Plan for Cherpulassery Town is the culmination of several months of dedicated work by the members of the planning team constituted for the purpose in this office. I sincerely appreciate the dedicated efforts of **Sri. Sarath Sankar M,** Deputy Town Planner for heading the planning team. I express my gratitude for the efforts put by **Sri. Subhash A. N, Smt. Jagadambika K. V, Smt Jeshna C.C and Smt. Radhika.R,** Assistant Town Planners in completing the preparation of this plan and also extend my sincere gratitude to all members of planning team with special mention to **Kum. Ally Paul, Kum. Keerthy M and Smt Chithranjali C V** former Planning Assistants**, Smt. Syamini C ,** former GIS Assistant who were involved in the earlier stages of plan preparation. Special thanks also to all other staff of District office for their tireless efforts without which this plan would not have been completed.

I once again express my gratitude to all those who were associated for the successful completion of this plan and I believe that the plan will contribute to the orderly, planned and sustainable development of Cherpulassery Town.

Smt. Deepa V P
Town Planner
LSGD Planning, Palakkad

Palakkad
21/11/2024

CONTENTS

CHAPTER 1 INTRODUCTION

1.1	INTRODUCTION	1 - 1
1.2	EARLIER PLANNING EFFORTS AND STUDIES	1 - 2
1.2.1	District Level	1 - 2
1.2.2	Town Level	1 - 3
1.3	NEED FOR MASTER PLAN	1 - 3
1.4	LEGAL FRAMEWORK FOR MASTER PLAN	1 - 3
1.5	METHODOLOGY	1 - 3
1.5.1	Preliminary Efforts	1 - 4
1.5.2	Data collection and Compilation	1 - 4
1.5.3	Analysis	1 - 4
1.5.4	Envisioning Process	1 - 4
1.5.5	Detailing	1 - 5
1.6	COMMUNITY INVOLVEMENT	1 - 7

CHAPTER 2 PROFILE OF TOWN

2.1	GENERAL	2 - 1
2.2	AREA,ADMINISTRATIVE DIVISIONS	2 - 2
2.3	CLIMATE AND RAINFALL	2 - 2
2.4	PHYSIOGRAPHY AND RELIEF	2 - 4
2.5	SOIL	2 - 7
2.6	GEOMORPHOLOGY	2 - 8
2.7	GEOLOGY	2 - 10
2.8	LITHOLOGY	2 - 11
2.9	BIODIVERSITY	2 - 12
2.10	HISTORY/EVOLUTION AND GROWTH	2 - 12
2.10.1	History of Governance	2 - 12
2.10.2	History of Development	2 - 13
2.10.3	Socio-Cultural History	2 - 15
2.11	REGIONAL SETTING	2 - 18
2.11.1	Regional Connectivity	2 - 19
2.11.2	Hierarchy of Settlements based on Integrated District	

Development Plan (IDDP) 2 - 21
2.11.3 Functional character 2 - 22
2.11.4 Future Urban Profile 2 - 23
2.11.5 Activity Pattern 2 - 24
2.11.6 Development Concept 2 - 25
2.12 SERVICE AREA OF CHERPULASSERY TOWN 2 - 26
2.13 CHERPULASSERY TOWN AND ITS IMMEDIATE INFLUENCE ZONE 2 - 27
2.14 INFERENCE 2 - 27

CHAPTER 3 DEMOGRAPHY

3.1 PROFILE OF KERALA 3 - 1
3.2 DISTRICT PROFILE AND STATE OF CHERPULASSERY TOWN 3 - 2
3.3 COMPARISON WITH OTHER MUNICIPALITIES 3 - 3
3.4 SPATIAL DISTRIBUTION OF POPULATION 3 - 5
3.5 POPULATION DENSITY 3 - 7
3.6 POPULATION GROWTH RATE 3 - 11
3.7 POPULATION CONCENTRATION 3 - 13
3.8 SEX RATIO 3 - 14
3.9 AGE STRUCTURE 3 - 17
3.10 LITERACY 3 - 18
3.11 SIZE OF HOUSEHOLDS 3 - 19
3.12 SOCIAL COMPOSITION 3 - 21
3.13 MIGRATION 3 - 21
3.14 INFERENCE 3 - 22

CHAPTER 4 OCCUPATIONAL STRUCTURE

4.1 WORKERS 4 - 1
4.2 WORK PARTICIPATION RATE 4 - 3
4.3 OCCUPATIONAL STRUCTURE 4 - 5
4.4 SPATIAL DISTRIBUTION OF WORKERS 4 - 7
4.5 DEPENDENCY RATIO 4 - 11
4.6 INFERENCE 4 - 11

CHAPTER 5 LAND USE

5.1 EXISTING LAND USE OF CHERPULASSERY TOWN 5 - 1
5.2 WARD WISE LAND USE ANALYSIS 5 - 2
5.2.1 Residential Land Use 5 - 4

5.2.2 Commercial Land Use 5 - 5
5.2.3 Industrial Land Use 5 - 7
5.2.4 Public & Semi-Public Land Use 5 - 8
5.2.5 Agricultural Land Use 5 - 10
5.2.6 Transportation Land Use 5 - 12
5.2.7 Forest 5 - 13
5.2.8 Water Bodies 5 - 14
5.2.9 Other Land Uses 5 - 15
5.2.10 Ward Wise Distribution Of Land Use 5 - 16
5.3 INFERENCE 5 - 18

CHAPTER 6 AGRICULTURE

6.1 EXISTING SCENARIO 6 - 1
6.2 CROPPING PATTERN 6 - 1
6.2.1 Paddy 6 - 2
6.2.2 Elephant foot yam 6 - 6
6.2.3 Banana 6 - 6
6.2.4 Tapioca 6 - 6
6.2.5 Ginger 6 - 6
6.2.6 Pepper 6 - 6
6.2.7 Arecanut 6 - 7
6.2.8 Coconut 6 - 7
6.2.9 Rubber 6 - 7
6.2.10 Production and Productivity of Major Crops 6 - 7
6.3 WATERSHEDS 6 - 8
6.4 INFERENCE 6 - 9

CHAPTER 7 ANIMAL HUSBANDRY

7.1 LIVE STOCK POPULATION 7 - 1
7.1.1 Cattle 7 - 1
7.1.2 Poultry 7 - 2
7.2 PHYSICAL INFRASTRUCTURE 7 - 3
7.3 ONGOING PROJECTS 7 - 3
7.4 INFERENCE 7 - 3

CHAPTER 8 INDUSTRY

8.1 EXISTING SCENARIO 8 - 1
8.2 TEMPORAL VARIATION OF INDUSTRIAL UNITS 8 - 5
8.3 EMPLOYMENT PATTERN 8 - 5
8.4 POLLUTION ASPECTS 8 - 5
8.5 TRADITIONAL INDUSTRIES 8 - 6
8.6 PROBLEMS AND POTENTIALS 8 - 9

CHAPTER 9 TRADE AND COMMERCE

9.1 EXISTING SCENARIO 9 - 1
9.2 SPATIAL DISPENSATION OF TRADE & COMMERCE ACTIVITIES 9 - 2
9.3 HIERARCHY OF NODES 9 - 3
9.4 STREET VENDORS/ INFORMAL SECTOR 9 - 5
9.5 FINANCIAL INSTITUTIONS 9 - 9
9.6 INFERENCE 9 - 9

CHAPTER 10 TOURISM AND HERITAGE

10.1 EXISTING SCENARIO 10 - 1
10.1.1 Ayyappankavu 10 - 1
10.1.2 Puthanalkkal Temple 10 - 2
10.1.3 Thirumullappulli Mahadeva Temple, Karalmanna 10 - 2
10.1.4 Sree Mangode Bhagavathi Temple 10 - 2
10.1.5 Thootha Pooram 10 - 2
10.1.6 Thiyyattu 10 - 3
10.1.7 Tholpavakoothu (Puppetry) 10 - 3
10.1.8 Kaalavela 10 - 4
10.1.9 Nagakalam 10 - 4
10.1.10 Vazhakkada kunchu Nair Smaraka Trust 10 - 4
10.2 ADJACENT HERITAGES/TOURISM SPOTS 10 - 5
10.2.1 Vellinezhi Kalagramam 10 - 5
10.2.2 Olappamanna mana 10 - 5
10.2.3 Vayillakunnillappan Temple 10 - 6
10.2.4 Naranathu Mangalathu Mana 10 - 6
10.2.5 Pathirikunnathu Mana 10 - 6

10.3 PROMINENT PERSONALITIES 10 - 7
10.4 NATURAL RESOURCES 10 - 8
10.4.1 Thootha River 10 - 8
10.4.2 Cheenikapara 10 - 9
10.4.3 Farm Tourism and River Front Tourism 10 - 9
10.5 AVAILABILITY OF TOURISM INFRASTRUCTURE 10 - 10

CHAPTER 11 PHYSICAL INFRASTRUCTURE

11.1 WATER SUPPLY 11 - 1
11.1.1 Major Sources of Water 11 - 1
11.1.2 Ground Water Table & Quality 11 - 2
11.1.3 Existing Water Supply System 11 - 3
11.1.4 Accessibility of Water Sources 11 - 7
11.1.5 Frequency of Water availability 11 - 7
11.1.6 Water Scarcity 11 - 8
11.1.7 Water Demand 11 - 9
11.1.8 The comprehensive WSS to Cherpulassery Municipality and adjoining Panchayaths 11 - 10
11.1.9 Inference 11 - 10
11.2 DRAINAGE 11 - 11
11.2.1 Existing Scenario 11 - 11
11.2.2 Inference 11 - 13
11.3 SANITATION AND SEWERAGE SYSTEM 11 - 13
11.3.1 Existing Sanitation System 11 - 14
11.3.2 Inference 11 - 14
11.4 SOLID WASTE MANAGEMENT 11 - 15
11.4.1 Existing Solid Waste Management System 11 - 15
11.4.2 Inference 11 - 16
11.5 ENERGY 11 - 17
11.5.1. Existing Scenario 11 - 17
11.5.2 Street Lights 11 - 20
11.5.3 Inference 11 - 20

CHAPTER 12 EDUCATION

12.1 EXISTING SCENARIO OF SCHOOLS 12 - 1

12.1.1 Primary Schools 12 - 1
12.1.2 Upper primary schools 12 - 6
12.1.3 Higher secondary Schools 12 - 9
12.1.4 Details of Student teacher ratio in Cherpulassery town 12 - 11
12.1.5 Infrastructure Facilities in Schools 12 - 12
12.2 COLLEGES 12 - 13
12.3 PROFESSIONAL COLLEGES 12 - 13
12.4 ASSESSMENT OF EXISITING INFRASTRUCTURE WITH PLANNING STANDARD 12 - 14
12.5 PROBLEMS AND POTENTIALS 12 - 15
12.6 INFERENCE 12 - 15

CHAPTER 13 HEALTH

13.1 EXISTING SCENARIO 13 - 1
13.1.1 Health institutions based on ownership 13 - 1
13.1.1.1 Institutions under Government sector 13 - 1
13.1.1.2 Health institutions under co-operative sector 13 - 3
13.1.1.3 Health institutions under private sector 13 - 4
13.1.2 Health institutions with type of treatment 13 - 5
13.1.2.1 Allopathic institutions 13 - 5
13.1.2.2 Ayurvedic institutions 13 - 7
13.1.2.3 Homeopathic institutions 13 - 8
13.1.3 Health institutions under functionary status 13 - 9
13.1.4 Overview of health institutions 13 - 9
13.2 EPIDEMIC WITHIN CHERPULASSERY 13 - 10
13.3 PALLIATIVE CARE UNITS 13 - 11
13.4 COMPARISON WITH PLANNING STANDARDS 13 - 12
13.5 INFERENCE 13 - 12

CHAPTER 14 HOUSING

14.1 HOUSEHOLDS & HOUSEHOLD SIZE 14 - 1
14.2 EXISTING HOUSING STOCKS 14 - 1
14.3 LAND HOLDINGS AND HOUSING TENURE STATUS 14 - 4
14.4 SLUMS/SCHEDULED CASTE COLONIES 14 - 6
14.5 SCHEMES AND PROGRAMMES 14 - 8
14.6 INFERENCE 14 - 9

CHAPTER 15 RECREATIONAL AND CULTURAL FACILITIES

15.1 RECREATION - EXISITING FACILITIES 15 - 1
15.1.1 Playground 15 - 1
15.1.2 Indoor stadium 15 - 1
15.1.3 Theatres and Auditorium 15 - 2
15.2 EXISTING CULTURAL FACILITIES 15 - 3
15.2.1 Libraries 15 - 5
15.2.2 Cultural Clubs 15 - 6
15.3 PLANNING STANDARDS ANALYSIS 15 - 7
15.4 INFERENCE 15 - 7

CHAPTER 16 OTHER CIVIC AMENITIES

16.1 EXISTING FACILITIES 16 - 1
16.1.1 Police station 16 - 1
16.1.2 Communication Facilities 16 - 1
16.1.3 Fuel stations & Gas Godowns 16 - 2
16.1.4 Fire station 16 - 3
16.1.5 Crematorium and Burial Ground 16 - 3
16.1.6 Financial institutions 16 - 4
16.2 PLANNING STANDARDS 16 - 5
16.3 INFERENCE 16 - 5

CHAPTER 17 TRAFFIC AND TRANSPORTATION

17.1 EXISTING SCENARIO 17 - 1
17.2 VEHICLE POPULATION 17 - 1
17.3 EXISTING ROAD NETWORK 17 - 3
17.4 ROAD INTERSECTIONS 17 - 6
17.5 CHARACTERISTIC STUDIES OF TRANSPORTATION NETWORK 17 - 22
17.5.1 Traffic Volume Survey 17 - 22
17.5.2 Public Transport Operations 17 - 37
17.5.3 Base year Intercity Travel Characteristics 17 - 41
17.5.4 Characteristics of Inter City Passenger Traffic 17 - 44
17.5.5 Inter-city Goods Traffic 17 - 48
17.5.6 Inter-city Vehicular Movements 17 - 52
17.6 TRAFFIC PROJECTION 17 - 54

17.6.1 Method of Traffic Projection 17 - 54
17.6.2 Techniques Adopted for Projection 17 - 55
17.6.3 Projected Link Volume on Existing Network 17 - 56
17.7 INFERENCE 17 - 57

CHAPTER 18 SPECIAL CONCERN AREA

18.1 SOCIAL BACKWARDNESS & POVERTY 18 - 1
18.1.1 BPL Index 18 - 1
18.1.2 SC/ST Population Index 18 - 2
18.1.3 General condition of SC population 18 - 3
18.1.4 Scheduled Caste Colonies 18 - 4
18.2 POVERTY ALLEVIATION PROGRAMMES 18 - 5
18.2.1 Urban Poor programs in Cherpulassery 18 - 5
18.2.2 Major Poverty Alleviation Interventions 18 - 6
18.3 SOCIAL SECURITY & WELFARE, WOMEN AND CHILD DEVELOPMENT 18 - 7
18.3.1 Social welfare Programmes and infrastructures 18 - 9
18.3.2 Status of Anganawadi 18 - 11
18.4 INFERENCE 18 - 13

CHAPTER 19 ENVIRONMENT & ECOLOGICALLY SENSITIVE AREAS

19.1 EXISTING SCENARIO 19 - 1
19.1.1 Forest 19 - 1
19.1.2 Paddy Fields 19 - 1
19.1.3 Sacred Groves 19 - 3
19.1.4 Surface Water Sources 19 - 4
19.1.5 Ground Water 19 - 4
19.1.6 Ground Water Table & Quality 19 - 4
19.2 POLLUTION 19 - 5
19.2.1 Water Pollution 19 - 5
19.3 INFERENCE 19 - 6

CHAPTER 20 DISASTER MANAGEMENT

20.1 INTRODUCTION 20 - 1
20.2 NATURAL HAZARD PROFILE OF PALAKKAD DISTRICT 20 - 2
20.2.1 Flood 20 - 2
20.2.2 Drought 20 - 5
20.2.3 Landslide 20 - 5

20.2.4 Earthquake 20- 7
20.2.5 Lightning 20- 8
20.3 INPUTS FROM THE REPORT 'MODIFICATION STRATEGY OF SETTLEMENT PATTERN IN THE CONTEXT OF FLOODS 2018: PALAKKAD DISTRICT 20 - 9
20.4 IMPACT ANALYSIS OF MEGA FLOOD 2018 & 2019 20 -11
20.4.1 Population Affected 20 -13
20.4.2 Housing 20 -13
20.4.3 Damages to Connectivity 20 -15
20.4.4 Other Sectors 20 -16
20.4.5 Critical Infrastructure 20-18
20.4.5.1 Relief Camp Location and Guidelines 20 -19
20.4.5.2 Safe Routes 20- 19
20.5 DISASTER MANAGEMENT 20 -20
20.5.1 Disaster Mitigation 20- 20
20.5.1.1 Flood 20- 21
20.5.1.1.1 Flood Susceptibility Mapping 20- 21
20.5.1.1.2 Flood Conditioning Factors 20- 22
20.5.1.1.3 Approach for Flood Susceptibility Mapping 20- 28
20.5.1.2 Landslide 20- 36
20.5.1.2.1 Landslide Susceptibility Mapping 20- 36
20.5.1.2.2 Landslide Conditioning Factors 20- 37
20.5.2 Disaster Preparedness 20- 51
20.5.2.1 Strategies 20- 52
20.5.2.1.1 State Interventions 20- 52
20.5.2.1.2 District Interventions 20- 52
20.5.2.1.3 Local Interventions 20- 52
20.5.2.2 Activity Plan For Landslide 20- 53
20.5.2.3 Activity Plan For Flood 20 -53
20.5.3 Disaster Response 20- 54
20.5.3.1 Operation Section 20 - 54
20.5.3.2 Planning Section 20- 55
20.5.3.3 Logistics Section 20- 55
20.5.4 Recovery 20- 55
20.6 INFERENCES 20 -57

CHAPTER 21 ADMINISTRATION AND FINANCE

21.1 DEVELOPMENT ADMINISTRATION 21 - 1
21.2 MUNICIPAL FINANCE 21 - 1
21.3 GOVERNANCE 21 - 7
21.4 EXISTING SOURCE OF FUND 21 - 7
21.5 ASSET MANAGEMENT PLAN 21 - 8
21.5.1 Municipal Assets 21 - 8
21.6 INFERENCE 21 -12

CHAPTER 22 SECTORAL LINKAGES

22.1 PRIMARY SECTORS - EFFECT ON INDUSTRIES, TRADE AND COMMERCE 22 - 1
22.2 PRIMARY SECTORS - EFFECT ON TOURISM, TRADE AND COMMERCE 22 - 1
22.3 TRANSPORTATION EFFECT ON TRADE & COMMERCE AND INDUSTRIES 22 - 2
22.4 TRANSPORTATION EFFECT ON ENVIRONMENT 22 - 2
22.5 TOURISM EFFECT ON CULTURE AND ENVIRONMENT 22 - 2
22.6 EFFECT OF VARIOUS SECTORS ON EMPLOYMENT 22 - 3
22.7 ENVIRONMENTAL SECTOR WITH VARIOUS SECTORS 22 - 3
22.8 INFERENCE 22 - 3

CHAPTER 23 SPATIAL STRUCTURE

23.1 FUNCTIONAL CHARACTER OF TOWN 23 - 1
23.2 ACTIVITY PATTERN 23 - 2
23.3 CONNECTIVITY PATTERN 23 - 5
23.4 EXISTING HIERARCHY OF NODES 23 - 5
23.5 EXISTING SPATIAL STRUCTURE 23 - 6
23.6 INFERENCE 23 - 6

CHAPTER 24 SUMMARY OF FINDINGS

24.1 FINDINGS AS PER INTEGRATED DISTRICT DEVELOPMENT PLAN FOR PALAKKAD 24 - 1

24.2 REGIONAL SETTINGS 24 - 1

24.3 POPULATION 24 - 2

24.4 EMPLOYMENT 24 - 2

24.5 LAND USE 24 - 3

24.6 ECONOMIC ASPECTS 24 - 4

- 24.6.1 Agriculture 24 - 4
- 24.6.2 Animal Husbandry 24 - 5
- 24.6.3 Industries 24 - 5
- 24.6.4 Trade and Commerce 24 - 5
- 24.6.5 Tourism, Heritage and Culture 24 - 6

24.7 WATER SUPPLY 24 - 7

24.8 DRAINAGE, SEWERAGE, SANITATION & SOLID WASTE MANAGEMENT 24 - 7

24.9 ENERGY 24 - 8

24.10 EDUCATION 24 - 8

24.11 HEALTH 24 - 9

24.12 HOUSING 24 - 9

24.13 RECREATION AND OTHER CIVIC AMENITIES 24 - 10

24.14 TRAFFIC AND TRANSPORTATION 24 - 10

24.15 SOCIAL BACKWARDNESS 24 - 12

24.16 ENVIRONMENT 24 - 12

24.17 DISASTER MANAGEMENT 24 - 13

24.18 MUNICIPAL FINANCE 24 - 13

24.19 SWOT ANALYSIS 24 - 14

CHAPTER 25 VISION,GOALS AND OBJECTIVES

25.1 DEVELOPMENT GOALS 25 - 1

CHAPTER 26 DEVELOPMENT CONCEPT

26.1	FORMULATION OF DEVELOPMENT CONCEPT		26 - 1
26.2	ENVIRONMENT AND TOPOGRAPHY		26 - 2
26.3	EXISTING SPATIAL STRUCTURE AND DEMOGRAPHY		26 - 3
26.4	FUTURE TRANSPORTATION PATTERN		26 - 3
26.5	PROPOSED HIERARCHY OF NODES		26 - 5
26.6	FUTURE ACTIVITY PATTERN		26 - 6
	26.6.1	Residential Activity	26 - 7
	26.6.2	Commercial Activity And Its Growth	26 - 8
	26.6.3	Urban Development Area	26 - 9
	26.6.4	Industrial Uses	26- 10
	26.6.5	Public –Semi Public Activity	26-1 0
	26.6.6	Recreation,Heritage &Tourism Concept	26- 11
	26.6.7	Agricultural Activity	26- 12
	26.6.8	Providing Information on Risk and Disaster Management	26- 13
	26.6.9	Special Proposals For Specific Infrastructure Development	26- 14
26.7	FINAL DEVELOPMENT CONCEPT		26- 15

CHAPTER 27 DEVELOPMENT POLICIES AND STRATEGIES

27.1	TRADE AND COMMERCE	27 - 1
27.2	INDUSTRY	27 - 1
27.3	AGRICULTURE	27 - 2
27.4	ANIMAL HUSBANDRY	27 - 2
27.5	TOURISM & HERITGE	27 - 3
27.6	INFRASTRUCTURE	27 - 3
27.7	HEALTH	27 - 4
27.8	EDUCATION	27 - 4
27.9	IRRIGATION	27 - 4
27.10	DISASTER MANAGEMENT	27 - 5
27.11	ENVIRONMENT	27 - 5

CHAPTER 28 FUTURE PROJECTIONS

28.1	POPULATION PROJECTION	28 - 1

28.2 WORK FORCE PROJECTION 28 - 2
28.3 INFRASTRUCTURE PROJECTION 28 - 2
28.3.1 Physical Infrastructure 28 - 3
28.3.2 Social Infrastructure 28 - 8
28.3.3 Utility Services 28 - 11

CHAPTER 29 PROPOSED LAND USE

29.1 PROPOSED LAND USE 29 - 1
29.1.1 Residential Zone 29 - 3
29.1.2 Commercial Zone 29 - 3
29.1.3 Future Urban Zone 29 - 4
29.1.4 Industrial Zone 29 - 5
29.1.5 Industrial Mix Zone 29 - 5
29.1.6 Public & Semi public Zone 29 - 6
29.1.7 Tourism Development Zone 29 - 6
29.1.8 Recreational Zone 29 - 6
29.1.9 Traffic and Transportation Zone 29 - 6
29.1.10 Land Reserved for Roads 29 - 6
29.1.11 Dry Agriculture Zone 29 - 8
29.1.12 Wet Agriculture Zone 29 - 8
29.1.13 Forest 29 - 9
29.1.14 Crematorium and Burial Ground 29 - 9
29.1.15 Water body 29 - 9
29.1.16 Flood Prone Area (Overlay) 29 - 10
29.1.17 Landslide Prone Area (Overlay) 29 - 10
29.1.18 Special Zones 29 - 10

CHAPTER 30 TRAFFIC & TRANSPORTATION PLAN

30.1 Traffic Problem faced by Cherpulassery town 30 - 1
30.2 Development Strategy for Cherpulassery town 30 - 1
30.3 Proposed Road Development Plan for Cherpulassery town 30 - 3
30.3.1 Proposed Hierarchy of road network 30 - 3
30.3.2 Primary Distributor Road 30 - 3
30.3.3 Secondary Distributor Road 30 - 4
30.3.4 Tertiary Distributor Road 30 - 6
30.3.5 Local Roads 30 - 7

30.4 Road Hierarchy 30 - 7
30.5 Junction Improvement 30 - 7
30.6 Bus Terminal 30 - 10
30.7 Bus Bay and Parking Plaza 30 - 10
30.8 Truck lay by and Amenity centre 30 - 12
30.9 Non Motorised transport facilities 30 - 12
30.10 Intelligent Transport System Applications 30 - 13
30.11 Proposed Bridge 30 - 14

CHAPTER 31 SECTORAL PROPOSALS

31.1 Sectoral Proposals 31 - 1
31.1.1 Trade and Commerce 31 - 1
31.1.2 Industry 31 - 3
31.1.3 Tourism and Recreation 31 - 4
31.1.4 Other Civic Amenities 31 - 8
31.1.5 Agriculture 31 - 11
31.1.6 Animal Husbandry 31 - 13
31.1.7 Housing 31 - 14
31.1.8 Water Supply 31 - 15
31.1.9 Drainage and Sanitation 31 - 16
31.1.10 Solid Waste Management 31 - 17
31.1.11 Energy 31 - 19
31.1.12 Education 31 - 19
31.1.13 Health 31 - 20
31.1.14 Sports and wellness 31 - 21
31.1.15 Environment 31 - 22
31.1.16 Governance 31 - 22
31.1.17 Disaster Preparedness and mitigation measures 31 - 23

CHAPTER 32 PRIORITY PROJECTS, ACTION PLAN AND PHASING

32.1 Feasibility of Implementation through Public-Private Partnerships 32 - 1
32.2 Integrated Waste Management Unit 32 - 4
32.2.1 Location Details 32 - 4
32.2.2 Project Brief 32 - 4
32.2.3 Need for the Project 32 - 5
32.2.4 Suggested Implementation Mechanism 32 - 6
32.2.5 Other Associated issues to be addressed 32 - 6

	32.2.6	Approximate project cost and funding	32 - 6
32.3	Sewage Treatment Plant (STP/FSTP)		32 - 7
	32.3.1	Location Details	32 - 7
	32.3.2	Project Brief	32 - 7
	32.3.3	Need for the Project	32 - 7
	32.3.4	Suggested Implementation Mechanism	32 - 8
	32.3.5	Other Associated issues to be addressed	32 - 9
	32.3.6	Approximate project cost and funding	32 - 9
32.4	Cherpulassery By Pass		32 - 11
	32.4.1	Location Details	32 - 11
	32.4.2	Project Brief	32 - 11
	32.4.3	Need for the Project	32 - 12
	32.4.4	Suggested Implementation Mechanism	32 - 12
	32.4.5	Other Associated issues to be addressed	32 - 12
	32.4.6	Approximate project cost and funding	32 - 13
32.5	Bus Terminal		32 - 14
	32.5.1	Location Details	32 - 14
	32.5.2	Project Brief	32 - 14
	32.5.3	Need for the Project	32 - 14
	32.5.4	Suggested Implementation Mechanism and approximate project cost	32 - 15
32.6	Shopping Centre		32 - 16
	32.6.1	Location and ownership Details	32 - 16
	32.6.2	Project Brief	32 - 16
	32.6.3	Responsible Agencies	32 - 16
	32.6.4	Need for the Project	32 - 17
	32.6.5	Suggested Implementation Mechanism	32 - 17
	32.6.6	Approximate project cost and funding	32 - 17
32.7	Cheenikkapara Tourism Center		32 - 19
	32.7.1	Location and ownership Details	32 - 19
	32.7.2	Project Brief	32 - 19
	32.7.3	Need for the Project	32 - 19
	32.7.4	Suggested Implementation Mechanism	32 - 20
	32.7.5	Approximate project cost and funding	32 - 20

32.8 Town Park and Congregation 32 - 21
32.8.1 Location Details 32 - 21
32.8.2 Project Brief 32 - 21
32.8.3 Need for the Project, implementation 32 - 21
32.8.4 Suggested Implementation Mechanism 32 - 22
32.8.5 Approximate project cost and funding 32 - 22
32.9 Community Hall and Mini Civil Station 32 - 23
32.9.1 Location and ownership Details 32 - 23
32.9.2 Project Brief 32 - 23
32.9.3 Need for the Project 32 - 23
32.9.4 Suggested Implementation Mechanism, Project Cost and Priority 32 - 24
32.10 Valluvanad Cultural Centre 32 - 25
32.10.1 Location and ownership Details 32 - 25
32.10.2 Project Brief 32 - 25
32.10.3 Need for the Project 32 - 26
32.10.4 Suggested Implementation Mechanism 32 - 26
32.11 Truck Lay By and Amenity Centre 32 - 27
32.11.1 Location and ownership Details 32 - 27
32.11.2 Project Brief 32 - 27
32.11.3 Need for the Project 32 - 27
32.11.4 Suggested Implementation Mechanism 32 - 28
32.11.5 Approximate project cost and funding 32 - 28

CHAPTER 33 ZONING REGULATIONS

33.1 ZONING REGULATIONS 33 - 1

ANNEXURE I

Type of Non - Obnoxious and Non - Nuisance type of service or light industries

ANNEXURE II

List of obnoxious or nuisance industries subject to objectionable odours, fumes, effluents or processes, located in hazardous zones.

ANNEXURE III

Existing Land Use Map

Proposed Land Use Map

Proposed Road Net Work Map

LIST OF FIGURES

Fig. 1.1	Stages and Responsibilities of Master Plan Preparation	1 - 6
Fig. 2.1	Connectivity of Cherpulassery Town with other Towns in District	2 - 1
Fig. 2.2	Boundaries of Cherpulassery Municipality	2 - 2
Fig. 2.3	Political Wards with 33 Wards	2 - 3
Fig. 2.4	Physiography of Palakkad district showing Cherpulassery town	2 - 4
Fig. 2.5	Relief of District showing Cherpulassery town	2 - 5
Fig. 2.6	DEM of Cherpulassery Town	2 - 6
Fig. 2.7	Slope map of Cherpulassery Town	2 - 6
Fig. 2.8	Major soil series of Palakkad District showing Cherpulassery Town	2 - 7
Fig. 2.9	Soil types of Cherpulassery Town	2 - 8
Fig. 2.10	Geomorphology of Cherpulassery Town	2 - 9
Fig. 2.11	Geology of Cherpulassery Town	2 - 10
Fig. 2.12	Lithology of Cherpulassery Town	2 - 11
Fig. 2.13	Regional Linkage	2 - 18
Fig. 2.14	Regional Connectivity	2 - 19
Fig. 2.15	Existing Transportation Network	2 - 20
Fig. 2.16	Hierarchy of Settlements in Palakkad District	2 - 21
Fig. 2.17	Functional Character Settlements in Palakkad District	2 - 22
Fig. 2.18	Future Urban Profile of Palakkad District	2 - 23
Fig. 2.19	Activity Pattern of Settlements in Palakkad District	2 - 24
Fig. 2.20	Development Concept	2 - 25
Fig. 2.21	Service area of third order settlements as per IDDP	2 - 26
Fig. 2.22	Activity Pattern of Cherpulassery and Surrounding LSGI's	2 - 28
Fig. 3.1	Population growth rate 2001-2011 all Districts and Kerala state	3 - 1
Fig. 3.2	Decadal variation of total population of Palakkad District	3 - 2
Fig. 3.3	Temporal variation of total decadal and gender wise Population of Cherpulassery (M)	3 - 3
Fig. 3.4	Comparison of temporal variation of total decadal Population of Cherpulassery (M) with other Municipalities in District	3 - 4
Fig. 3.5	Population Comparison with Nearby LSGIs	3 - 5
Fig. 3.6	Population Comparison with Similar Towns	3 - 5
Fig. 3.7	Spatial Distribution of Population in Cherpulassery Town	3 - 6
Fig. 3.8	Ward wise Gross Population Density	3 - 8
Fig. 3.9	Ward wise Net Population Density	3 - 8

Fig. 3.10	Comparison of Gross Population Density with Other Towns in the District	3 - 9
Fig. 3.11	Gross Population Density Comparison with Similar Towns	3 - 10
Fig. 3.12	Gross Population Density Comparison with Nearby LSGI's	3 - 10
Fig. 3.13	Comparison of population growth rate of Cherpulassery town with other towns in the district	3 - 11
Fig. 3.14	Comparison of Population Growth Rate with Nearby LSG's	3 - 12
Fig. 3.15	Comparison of Population Growth Rate with Similar towns	3 - 12
Fig. 3.16	1/3rd Population concentration of Cherpulassery Municipality	3 - 13
Fig. 3.17	Half Population concentration of Cherpulassery Municipality	3 - 13
Fig. 3.18	2/3rd Population concentration of Cherpulassery Municipality	3 - 14
Fig. 3.19	Temporal variation of sex ratio of Cherpulassery Town, Palakkad District and Kerala State	3 - 15
Fig. 3.20	Temporal variation of sex ratio of Cherpulassery Town, comparison with other municipalities in Palakkad District	3 - 15
Fig. 3.21	Temporal Variation of Child sex ratio of Cherpulassery Town, comparison with other towns in Palakkad District	3 - 16
Fig. 3.22	Temporal Variation of sex ratio of Cherpulassery Town, Comparison with neighbouring LSGs	3 - 16
Fig. 3.23	Temporal variation of sex ratio of Cherpulassery Town, comparison with similar towns	3 - 17
Fig. 3.24	Age-Sex Pyramid	3 - 17
Fig. 3.25	Temporal variation of literacy rate in the municipality	3 - 18
Fig. 3.26	Comparison of Literacy rate of Cherpulassery Town with other towns in District	3 - 18
Fig. 3.27	Comparison of literacy rate with neighbouring LSGI's	3 - 19
Fig. 3.28	Comparison of literacy rate with similar towns	3 - 19
Fig. 3.29	Comparison of house hold size with other towns in District	3 - 20
Fig. 3.30	Comparison of house hold size with nearby LSGI	3 - 20
Fig. 3.31	Temporal variation of household size in Cherpulassery Town	3 - 20
Fig. 3.32	Comparison of house hold size with similar towns	3 - 21
Fig. 3.33	SC/ST composition of Cherpulassery Town	3 - 21
Fig. 3.34	Religion wise population break up	3 - 21
Fig. 4.1	Share of Main, Marginal and non-workers in Cherpulassery Town.	4 - 1
Fig. 4.2	Decadal Variation of Total workers, Marginal workers, Main workers and Non- workers	4 - 2

Fig. 4.3	Decadal variation of Total, Male, Female WPR of Cherpulassery Town	4 - 3
Fig. 4.4	Comparison of WPR with State,District & other urban local bodies within District	4 - 4
Fig. 4.5	WPR Comparison with similar towns	4 - 4
Fig. 4.6	WPR Comparison with adjacent LSGs	4 - 4
Fig 4.7	Decadal variation of Four fold classification of main workers in percentage	4 - 6
Fig. 4.8	Share of workers (%)	4 - 7
Fig. 4.9	Employment Pattern	4 - 8
Fig. 4.10	Cultivators Concentration Index	4 - 8
Fig 4.11	Agricultural Workers Concentration Index	4 - 9
Fig 4.12	Household Industrial Workers Concentration Index	4 - 9
Fig 4.13	Other Workers Concentration Index	4 - 10
Fig 4.14	Percentage Share of workers in each category	4 - 10
Fig. 5.1	Land use breakup of Cherpulassery Town	5 - 1
Fig. 5.2	Existing land Use Map of Cherpulassery Town	5 - 3
Fig. 5.3	Spatial Distribution of Residential Land Use	5 - 4
Fig. 5.4	Ward wise Concentration of Residential Land Use	5 - 5
Fig. 5.5	Spatial Distribution of Commercial Land Use	5 - 6
Fig. 5.6	Ward wise Concentration of Commercial Land Use	5 - 6
Fig. 5.7	Spatial Distribution of Industrial Land Use	5 - 7
Fig. 5.8	Ward wise Concentration of Industrial Land Use	5 - 8
Fig. 5.9	Spatial Distribution of Public & Semi-public Land Use	5 - 9
Fig. 5.10	Ward wise Concentration of Public & Semi-public Land Use	5 - 9
Fig. 5.11	Spatial Distribution of Dry Agriculture Land Use	5 - 10
Fig. 5.12	Spatial Distribution of Paddy Land Use	5 - 11
Fig. 5.13	Ward wise Concentration of Agricultural Land Use	5 - 11
Fig. 5.14	Spatial Distribution of Transportation Land Use	5 - 12
Fig. 5.15	Ward wise Concentration of Transportation Land Use	5 - 13
Fig. 5.16	Spatial Distribution of Forest	5 - 14
Fig. 5.17	Spatial Distribution of Water Courses	5 - 14
Fig. 5.18	Spatial Distribution of Other Land Uses	5 - 15
Fig. 5.19	Ward wise Land Use Split-up	5 - 16
Fig. 5.20	Ward wise Concentration of Urban Land Use	5 - 18
Fig. 6.1	Share of dry and wet agriculture w. r. to total Agriculture Area	6 - 1
Fig. 6.2	Percentage share of various crops cultivated in wet land	6 - 3

Fig. 6.3	Distribution of uncultivated paddy	6 - 3
Fig. 6.4	Irrigation Source of each Padasekaram	6 - 4
Fig. 6.5	Locations of Watershed	6 - 8
Fig. 7.1	Percentage share of each livestock	7 - 1
Fig. 8.1	Classification of Industries in Cherpulassery Town	8 - 1
Fig. 8.2	Spatial distribution of industrial Units	8 - 2
Fig. 8.3	Ward wise distribution of industrial Units	8 - 2
Fig. 8.4	Details of product wise industrial units	8 - 3
Fig. 8.5	Details of land ownership of the industrial units	8 - 3
Fig. 8.6	Spatial distribution of land ownership wise industrial units	8 - 4
Fig. 8.7	Spatial distribution of industrial units classified according to turn over	8 - 4
Fig. 8.8	The temporal variation of industrial units	8 - 5
Fig. 8.9	Industrial employment pattern	8 - 6
Fig. 8.10	Classifications of industries units based on PI score	8 - 6
Fig. 8.11	Spatial distribution of industrial units with respect to their Pollution Index	8 - 7
Fig. 9.1	Area comparison with similar Municipalities	9 - 1
Fig. 9.2	Comparison with municipalities with in Palakkad District	9 - 2
Fig. 9.3	Existing Market Area	9 - 2
Fig. 9.4	Spatial distribution of Commercial Land Use in Cherpulassery	9 - 3
Fig. 9.5	Commercial Areas in Cherpulassery Town	9 - 3
Fig. 9.6	Hierarchy of Nodes	9 - 4
Fig. 9.7	Street Vendors near Hospital Junction	9 – 5
Fig. 9.8	Spatial Distribution of Street Vendors	9 - 5
Fig. 9.9	Details of Street Vending items in Cherpulassery Muncipality	9 - 7
Fig. 9.10	Daily Income Status of Street Vendors	9 - 8
Fig.9.11	Regular modes of vending in Cherpulassery Muncipality	9 - 8
Fig.10.1	Heritage and Tourism Location in and around Cherpulassery	10 - 9
Fig.11.1	Sources of Water in Cherpulassery Town	11 - 2
Fig.11.2	Hydrograph of Observation Well Located at Puthanalkkal Bhagavathy Temple premises	11 - 2
Fig.11.3	Existing water supply distribution network in Cherpulassery Town	11 - 4
Fig.11.4	Water distribution network coverage of the Municipality	11 - 6
Fig 11.5	Ward wise percentage of population not covered under any water distribution network	11 - 6
Fig.11.6	Accessibility of water source	11 - 7

Fig.11.7	Frequency of Water Availability	11 - 8
Fig.11.8	Details of Water Scarcity	11 - 8
Fig 11.9	Water Scarcity– Ward wise	11 - 9
Fig 11.10	DEM model of the Municipal Area	11 - 12
Fig 11.11	Existing Drainage System	11 - 13
Fig. 11.12	Types of sanitation facility	11 - 14
Fig. 11.13	Ward wise Sanitation System	11 - 15
Fig. 11.14	KSEB Distribution Network of Cherpulassery Town	11 - 18
Fig.11.15	Percentage shares of Category wise connection	11 - 19
Fig. 12.1	Spatial Distribution of Pre-primary schools in Cherpulassery Municipality	12 - 3
Fig. 12.2	Spatial Distribution of Primary Schools	12 - 3
Fig. 12.3	Share of Primary Schools by Ownership	12 - 4
Fig. 12.4	Percentage Share of Students enrolled in different category of primary schools	12 - 5
Fig. 12.5	Service area of existing LP schools	12 - 5
Fig. 12.6	Service area of schools in Neighboring Local body	12 - 6
Fig. 12.7	Percentage Share of upper primary schools by ownership	12 - 6
Fig. 12.8	Share of upper primary students in school ownership wise	12 - 7
Fig. 12.9	Spatial distribution of Upper Primary schools in Cherpulassery Municipality	12 - 8
Fig. 12.10	Service area of upper primary schools in Cherpulassery town	12 - 8
Fig. 12.11	Spatial Coverage of Schools in nearby local bodies	12 - 9
Fig. 12.12	Spatial distribution of higher secondary schools in Cherpulassery municipality	12 - 10
Fig. 12.13	Service Coverage of Higher secondary schools in Cherpulassery Town	12 - 11
Fig. 12.14	Malabar Polytechnic College	12 - 14
Fig. 13.1	Spatial distribution of Health Institutions under Government sector	13 - 3
Fig. 13.2	Spatial distribution of Health Institutions under Private sector	13 - 4
Fig. 13.3	Spatial distribution of Health Institutions in Allopathic sector	13 - 7
Fig. 13.4	Spatial distribution of Health Institutions in Ayurvedic sector	13 - 8
Fig. 13.5	Spatial distribution of Health Institutions in Homoeopathic sector	13 - 9
Fig 13.6	Overview of Spatial Distribution of Health Infrastructure in Cherpulassery	13 - 10
Fig. 14.1	Percentage Variation for each category of building type	14 - 2

Fig. 14.2	Ward wise housing type	14 - 2
Fig. 14.3	Percentage Variation in different range of Plinth area	14 - 3
Fig. 14.4	Percentage Variation in types of floor in Cherpulassery town	14 - 3
Fig. 14.5	Percentage Variation in types of wall in Cherpulassery town	14 - 4
Fig. 14.6	Percentage Variation in types of roofing materials in Cherpulassery town	14 - 4
Fig. 14.7	Land Tenure Status of Households in Cherpulassery	14 - 5
Fig. 14.8	Percentage Variation in Different Plot Area in Cherpulassery Town	14 - 5
Fig. 14.9	Percentage Variation in Housing Tenure Status in Cherpulassery Town	14 - 6
Fig. 14.10	Spatial distribution of SC colonies in Cherpulassery Town	14 - 6
Fig. 15.1	Spatial Distribution of Indoor Stadium ,School Ground, Club and Theatre	15 - 4
Fig. 15.2	Spatial Distribution of Auditoriums	15 - 4
Fig. 15.3	Spatial Distribution of Libraries	15 - 5
Fig. 15.4	Spatial Distribution of Cultural Clubs	15 - 6
Fig. 16.1	Spatial Distribution of Police Station and Communication Facilities	16 - 2
Fig. 16.2	Spatial Distribution of Petrol Pump and Gas Godown	16 - 3
Fig. 17.1	Temporal Variation of Growth Index of Vehicles in Palakkad District	17 - 2
Fig. 17.2	Percentage of Registered Motor Vehicles in Palakkad District in 2015	17 - 3
Fig. 17.3	Existing Road Network in Cherpulassery Town	17 - 4
Fig. 17.4	Location of Major Road Intersections in Cherpulassery Town	17 - 9
Fig. 17.5	Peak Hour Traffic flow at Madathiparambu Junction in Cherpulassery Town	17 - 11
Fig. 17.6	Peak Hour Traffic flow at Hospital junction in Cherpulassery Town	17 - 11
Fig. 17.7	Peak Hour Traffic flow at Bypass junction in Cherpulassery Town	17 - 13
Fig. 17.8	Peak Hour Traffic flow at E.M.S. Road junction in Cherpulassery Town	17 - 14
Fig. 17.9	Peak Hour Traffic flow at Central junction in Cherpulassery Town	17 - 15
Fig. 17.10	Peak Hour Traffic flow at Puthanalkal junction in Cherpulassery Town	17 - 16
Fig. 17.11	Peak Hour Traffic flow at Kacherikunnu junction in Cherpulassery Town	17 - 17
Fig. 17.12	Peak hour Traffic flow at Kuzhalumpadi junction in	

	Cherpulassery Town	17 - 18
Fig. 17.13	Peak hour Traffic flow at Karalmanna college junction in Cherpulassery Town	17 - 19
Fig. 17.14	Peak hour Traffic flow at Thootha junction in Cherpulassery Town	17 - 20
Fig. 17.15	Peak hour Traffic flow at Eliyapetta junction in Cherpulassery Town	17 - 21
Fig. 17.16	Peak Hour Traffic Volume on Major Road Stretches in Cherpulassery Town	17 - 23
Fig. 17.17	Traffic flow Through Outer Cordon Locations in Cherpulassery Town	17 - 27
Fig. 17.18	Over Utilized Roads in Cherpulassery Town	17 - 30
Fig. 17.19	Locations of Parking Survey in Cherpulassery	17 - 32
Fig. 17.20	Location Selected for Pedestrian Survey in Cherpulassery Town	17 - 36
Fig. 17.21	Bus Routes and Parking Accumulation in Cherpulassery Town	17 - 38
Fig. 17.22	Accident Prone Locations in Cherpulassery Town	17 - 41
Fig. 17.23	Zoning Pattern Adopted for the Study in Cherpulassery Town	17 - 44
Fig. 17.24	Modal Split of Intercity Passenger Traffic in Cherpulassery Town	17 - 45
Fig. 17.25	Purpose wise Trip Distribution in Cherpulassery Town	17 - 45
Fig. 17.26	Desire Lines of Inter-City Passenger Traffic	17 - 46
Fig. 17.27	Desire Lines of Inter-city Goods Traffic	17 - 51
Fig. 17.28	Inter-city Vehicular Movements in Cherpulassery Town	17 - 52
Fig. 17.29	Over Utilized Roads in Cherpulassery Town in 2037	17 - 57
Fig. 18.1	Temporal Variation of SC Population	18 - 2
Fig. 18.2	Ward wise SC Population Concentration	18 - 3
Fig. 18.3	Temporal Variation of SC Sex Ratio	18 - 3
Fig. 18.4	Spatial Distribution of Anganwadis	18 - 13
Fig. 19.1	Spatial Distribution of forest	19 - 2
Fig. 19.2	Spatial Distribution of paddy fields	19 - 2
Fig. 19.3	Spatial Distribution of water sources	19 - 3
Fig. 19.4	Hydrograph of Observation Well Located at Puthanalkkal Bhagavathy Temple Premises	19 - 4
Fig. 20.1	Flood affected areas of Palakkad	20 - 4
Fig. 20.2	Drought prone areas of Palakkad	20 - 5
Fig. 20.3	Landslide susceptibility map of Palakkad	20 - 6
Fig. 20.4	Earthquake prone areas of Palakkad	20 - 7
Fig. 20.5	Lightning prone areas of Palakkad	20 - 8
Fig. 20.6	Spatial Demarcation of damages Occurred in During 2018 Mega Flood	20 - 9

Fig. 20.7	Spatial Depiction of Flood damages in Ottapalam Taluk	20 - 10
Fig. 20.8	Spatial Extend of Flood Damages (Loal body wise) in Ottapalam Taluk	20 - 11
Fig. 20.9	Spatial Demarcation of damages Occurred in Cherpulassery During 2018 Mega Flood	20 - 12
Fig. 20.10	Location of Damaged Houses 2018	20 - 13
Fig. 20.11	Population Density vs Flooded areas of Cherpulassery Muncipality	20 - 14
Fig. 20.12	Spatial Location of Relief Camps and Flooded areas of Cherpulassery Muncipality	20 - 19
Fig. 20.13	Disaster Management Cycle	20 - 20
Fig. 20.14	Details of 2018 southwest monsoon for Palakkad District	20 - 22
Fig. 20.15	Rainfall Map of Cherpulassery	20 - 23
Fig. 20.16	Slope map of Cherpulassery	20 - 23
Fig. 20.17	Elevation map of Cherpulassery	20 - 24
Fig. 20.18	Flow Accumulation map of Cherpulassery	20- 25
Fig. 20.19	Geomorphology map of Cherpulassery	20 - 26
Fig. 20.20	Soil map of Cherpulassery	20 - 26
Fig. 20.21	Drainage density map of Cherpulassery	20 - 27
Fig. 20.22	Land use map of Cherpulassery	20 - 28
Fig. 20.23	General representation of Procedure for Flood Susceptibility processed in model builder	20 - 31
Fig. 20.24	Flood susceptibility map of Cherpulassery	20 - 33
Fig. 20.25	Flooded area overlained Flood susceptibility map of Cherpulassery	20 - 33
Fig. 20.26	KSDMA 100 year Flood probability overlained Flood susceptibility map of Cherpulassery	20 - 34
Fig. 20.27	Flooded area overlained existing land use map of Cherpulassery	20 - 34
Fig. 20.28	Google Earth Image of Flooded regions of Cherpulassery Muncipality	20 - 35
Fig. 20.29	Geology map of Cherpulassery	20 - 40
Fig. 20.30	Aspect map of Cherpulassery	20 - 40
Fig. 20.31	NDVI map of Cherpulassery	20 - 41
Fig. 20.32	Proximity to road network of Cherpulassery	20 - 41
Fig. 20.33	Landslide susceptibility mapping procedure as displayed in ArcMap Model builder	20 - 46
Fig. 20.34	Landslide susceptibility map of Cherpulassery	20 - 46
Fig. 20.35	Landslide region overlained Landslide susceptibility map of Cherpulassery	20 - 47
Fig. 20.36	Landslide region overlained existing land use map of Cherpulassery	20 - 47

Fig. 20.37	Institutional structure of DDMA	20 - 51
Fig. 20.38	Incident response System of Palakkad	20 - 55
Fig 21.1	Hierarchy of Muncipal Finance in Cherpulassery Town	21 - 2
Fig. 21.2	Temporal Variation of Total Income and Total Expenditure	21 - 7
Fig. 21.3	Asset map of Cherpulassery Muncipality	21 - 12
Fig. 23.1	Functional Character of The Town	23 - 2
Fig. 23.2	Ward wise Land Use Concentration	23 - 3
Fig. 23.3	Activity Pattern of the Town	23 - 4
Fig. 23.4	Hierarchy of Existing Nodes and Road Network	23 - 5
Fig. 23.5	Existing Spatial Structure	23 - 6
Fig. 26.1	Guiding Factors to Formulate Development Concept	26 - 1
Fig. 26.2	Environmentally Sensitive Areas	26 - 2
Fig. 26.3	Contour Pattern of Town	26 - 2
Fig. 26.4	Existing Spatial Structure	26 - 3
Fig . 26.5	Existing population Distribution	26 -3
Fig. 26.6	Conceptual Road Development Plan	26 - 4
Fig. 26.7	Proposed Hierarchy of Nodes	26 - 5
Fig. 26.8	Residential Activity Area	26 - 7
Fig. 26.9	Commercial Activity Areas	26 - 8
Fig. 26.10	Urban Development Area	26 - 9
Fig. 26.11	Areas suitable for Industrial Activity	26 - 10
Fig .26.12	Tourism Activity and Concept od heritage circuit	26 -11
Fig. 26.13	Agriculture Activity Zoning	26 - 13
Fig. 26.14	Concept of risk Information Zoning	26 -14
Fig. 26.15	Spaces for Special Zones	26 -14
Fig. 26.16	Financial Development Concept	26 -15
Fig. 26. 17	Derivation of Development Concept	26 -16
Fig. 29.1	Proposed Land Use 2036	29 - 1
Fig. 29.2	Residential Zone	29 - 3
Fig. 29.3	Commercial Zone and future Urban Zone	29 - 4
Fig. 29.4	Industrial Zone, Industrial Mix Zone and Public and semi public zone	29 - 5
Fig. 29.5	Tourism development and recreational zone	29 - 7
Fig. 29.6	Traffic and transportation zone and land reserved for roads	29 - 7
Fig. 29.7	Dry Agriculture Zone and Wet Agriculture Zone	29 - 8
Fig. 29.8	Forest, Crematorium and Burial Ground and Water body	29 - 9

Fig. 29.9	Flood prone area and landslide prone area	29 - 11
Fig. 29.10	Special Zone	29 - 11
Fig. 30.1	Junction Improvement Plan for Kacherikunnu Jn	30 - 8
Fig. 30.2	Junction Improvement Plan for Central Jn	30 - 8
Fig. 30.3	Model for Major Bus Bays	30 - 11
Fig. 30.4	Model for other Bus Bays	30 - 12
Fig. 30.5	Model of MLCP	30 - 12
Fig. 30.6	Typical Truck Terminal layout and loading/unloading bays	30 - 12
Fig. 30.7	Model of grade separated pedestrian path and braille block	30 - 13
Fig. 30.8	Proposed Road Development Plan	30 - 14
Fig. 31.1	Location of Proposed Street vending Zone	31 - 2
Fig. 31.2	Proposed promenade at Papparambu	31 - 7
Fig. 31.3	Proposed safe routes and relief camp location mapped for Cherpulassery Municipality	31 - 28
Fig. 32.1	Location of Proposed Integrated Waste Management Unit	32 - 4
Fig. 32.2	Location of Proposed Sewage Treatment Plant	32 - 7
Fig. 32.3	Location of Proposed Cherpulassery By Pass	32 - 11
Fig. 32.4	Location of Proposed Bus Terminal and Market	32 - 14
Fig. 32.5	Location of Proposed Park and Open Air Auditorium	32 - 19
Fig. 32.6	Location of Proposed Town Park	32 - 21
Fig. 32.7	Location of Proposed Municipal Town Hall and Park	32 - 23
Fig. 32.8	Location of Proposed Municipal Valluvanad Cultural Centre	32 - 25
Fig. 32.9	Location of Proposed Truck lay by and Amenity Centre	32 - 27

LIST OF TABLES

Table 2.1	Number and Name of Wards in Cherpulassery Municipality	2 - 3
Table 2.2	Area and population of LSGs included in Service area of Cherpulassery Town	2 - 26
Table 2.3	Demographic Details of Immediate Influence Zone	2 - 27
Table 3.1	Decadal total and Gender Wise Population of Cherpulassery Municipality	3 - 2
Table 3.2	Decadal Population of Urban LSGIs in Palakkad District	3 - 3
Table 3.3	Comparison of Temporal variation of Total Population of Cherpulassery Municipality with near by LSGIs	3 - 4
Table 3.4	Ward wise Population of Cherpulassery Town-2018	3 - 6
Table 3.5	Ward wise Gross and Net Population Density	3 - 7
Table 3.6	Gross Population Density of Municipalities in Palakkad District and Comparison to District and State	3 - 9
Table 3.7	Decadal variation of Population growth rate	3 - 11
Table 3.8	Percentage of families migrated within the last five years (Origin wise)	3 - 22
Table 3.9	Percentage of Families Migrated within the Last Five Years (Reason wise)	3 - 22
Table 3.10	No of Pravasis (Destination wise)	3 - 22
Table 4.1	Decadal Variation in Percentage of Workers Cherpulassery Town	4 - 2
Table 4.2	Share of Main workers, marginal workers, and non-workers (2011) in % across urban local bodies in Palakkad District	4 - 3
Table 4.3	Occupational Structure of Main Workers 1981, 1991, 2001, 2011	4 - 6
Table 4.4	Dependency ratio of the town in Comparison with other Municipalities, with the District and the State	4 - 11
Table 5.1	Land use breakup of Cherpulassery Town	5 - 2
Table 5.2	Ward wise Land use Split-up	5 - 17
Table 6.1	Season of Crop wise Cultivation	6 - 3
Table 6.2	Details of irrigation sources of each Padasekharams	6 - 5
Table 6.3	Details of Area, Production & Productivity of Major Crops	6 - 7
Table 6.4	Details of Watersheds	6 - 8
Table 7.1	Temporal variation of live Stock Population	7 - 1
Table 7.2	Details of Existing Dairy Farms	7 - 2
Table 7.3	Details of Milk Societies	7 - 2

Table 7.4	Backyard poultry in Cherpulassery	7 - 2
Table 8.1	Temporal variation of Small Scale Industries in Town	8 - 5
Table 9.1	Hierarchy of Nodes	9 - 4
Table 9.2	List of Street Vendors (location wise)	9 - 6
Table 10.1	Prominent Personalities	10 - 7
Table 10.2	Lodging Facilities Available in Cherpulassery Muncipality	10 - 10
Table 11.1	Quality Details Ground Water	11 - 3
Table 11.2	Details of Water Source and Intake Structure	11 - 3
Table 11.3	Details of Service Connections & Street Taps of KWA	11 - 4
Table 11.4	Details of Small Scale Water Projects	11 - 5
Table 11.5	Water Demand for the Municipality	11 - 9
Table 11.6	Water Demand Gap for the Municipality	11 - 10
Table 11.7	Details of Storm Drains in the Municipality	11 - 12
Table 11.8	Calculated Quantum of Waste Generation	11 - 16
Table 11.9	Details of Substation in Cherpulassery Town	11 - 17
Table 11.10	Details of Transformers in Cherpulassery Town	11 - 18
Table 11.11	Details of Category wise Connections in Cherpulassery Town `	11 - 19
Table 11.12	Details of Street Lighting in Cherpulassery Town	11 - 20
Table 12.1	Details of School Infrastructure in Cherpulassery Municipality	12 - 2
Table 12.2	Details of Pre-primary Schools and Students	12 - 2
Table 12.3	Details of Primary Schools and Students Enrolled	12 - 4
Table 12.4	Details of Upper Primary School and Enrollments	12 - 7
Table 12.5	Details of HS Schools in Cherpulassery	12 - 9
Table 12.6	Student Teacher Ratio Across Each Section of School	12 - 11
Table 12.7	Status of Infrastructural Facilities in Schools	12 - 12
Table 12.8	Details of Arts and Science Colleges in Cherpulassery Municipality	12 - 13
Table 12.9	Details of Professional Colleges	12 - 14
Table 12.10	Comparison of Educational Institutions with Planning Standards	12 - 14
Table 13.1	Details of Health Institutions under Government Sector	13 - 2
Table 13.2	Health Institutions under Co-operative Sector	13 - 4
Table 13.3	Health Institutions under Private Sector	13 - 5
Table 13.4	Health Institutions in Allopathic Sector	13 - 6
Table 13.5	Health Institutions in Ayurvedic Sector	13 - 7
Table 13.6	Health Institutions in Homeo Sector	13 - 8
Table 13.7	Major Epidemic within Cherpulassery	13 - 11
Table 13.8	Details of Patients having Continuous Medical Care	13 - 11

Table 13.9	Details of Bedridden Patients	13 - 11
Table 13.10	Comparison with Planning Standards	13 - 12
Table 14.1	Decadal variation of Population and HH size in Cherpulassery Town	14 - 1
Table 14.2	Details of Scheduled Caste Colonies within Cherpulassery Town	14 - 7
Table 14.3	Details of Beneficiaries through IAY	14 - 8
Table 14.4	Details of Beneficiaries through Janakeeyasoothranam	14 - 8
Table 15.1	Details of Indoor Stadium	15 - 2
Table 15.2	Details of Theatres	15 - 2
Table 15.3	Details of Private Auditoriums	15 - 3
Table 15.4	Details of Libraries	15 - 5
Table 15.5	Details of Cultural clubs	15 - 6
Table 16.1	Details of Police Station	16 - 1
Table 16.2	Details of Communication Facilities	16 - 1
Table 16.3	Details of Petrol Pumps	16 - 2
Table 16.4	Details of Gas godowns	16 - 3
Table 16.5	Details of Crematorium in Cherpulassery	16 - 4
Table 16.6	Details of Financial Institutions in Cherpulassery	16 - 4
Table 17.1	Temporal variation of Growth index of Vehicles in Palakkad District	17 - 2
Table 17.2	Types of Vehicles in Palakkad district	17 - 3
Table 17.3	Details of Major Roads in Cherpulassery	17 - 4
Table 17.4	Inventory of Major Roads in Cherpulassery town	17 - 7
Table 17.5	Details of Major Roads Intersections in Cherpulassery town	17 - 9
Table 17.6	Peak Hour Traffic flow at Madathiparambu junction in Cherpulassery	17 - 10
Table 17.7	Peak Hour Traffic flow at Hospital Junction in Cherpulassery	17 - 12
Table 17.8	Peak Hour Traffic flow at Bypass Junction in Cherpulassery	17 - 13
Table 17.9	Peak Hour Traffic flow at E.M.S. road Junction in Cherpulassery	17 - 14
Table 17.10	Peak Hour Traffic flow at Central Junction in Cherpulassery	17- 15
Table 17.11	Peak Hour Traffic flow at Puthanalkal Junction in Cherpulassery	17 - 16
Table 17.12	Peak Hour Traffic flow at Kacherikunnu Junction in Cherpulassery	17 - 18
Table 17.13	Peak Hour Traffic flow at Kuzhalumpadi Junction in Cherpulassery	17– 19
Table 17.14	Peak Hour Traffic flow at Karalmanna College Junction in Cherpulassery	17 – 20
Table 17.15	Peak Hour Traffic Flow at Thootha Junction in Cherpulassery	17 - 21
Table 17.16	Peak Hour Traffic flow at Eliyapetta Junction in Cherpulassery	17 - 22
Table 17.17	Peak Hour Traffic volume on Major Road Stretches in	

	Cherpulassery Town	17 - 24
Table 17.18	Distribution of 16 hour Inbound Outbound Traffic at Outer Cordon Points in Cherpulassery Town	17 - 26
Table 17.19	Peak Hour Traffic volume at Major Road Intersections in Cherpulassery Town	17 - 28
Table 17.20	Volume Capacity Ratio of Major Road Stretches in Cherpulassery Town	17 - 29
Table 17.21	Speed and Delay Characteristics on Major Road in Cherpulassery Town	17 - 31
Table 17.22	Parking Accumulation of Vehicles Observed at Various Location in Cherpulassery Town	17 - 33
Table 17.23	Duration of Parking of different Types of Vehicles at Selected Areas of the Cherpulassery Town	17 - 34
Table 17.24	Peak Hour Pedestrian Cross Movement at Cherpulassery town	17 - 35
Table 17.25	Pedestrian Vehicle Conflict Observed at various Locations	17 - 36
Table 17.26	Details of Bus Routes and Services in Cherpulassery town	17 - 37
Table 17.27	Ingress and Egress of Buses at Cherpulassery Bus Station	17 - 38
Table 17.28	Peak Hour Bus Passengers on Road Streches in Cherpulassery Town	17 - 39
Table 17.29	Growth in Accidents in Cherpulassery town	17 - 40
Table 17.30	Major Accident Prone Areas in Cherpulassery Town	17 - 40
Table 17.31	Sample Size of vehicle Interviewed at Outer Cordon Survey Location in Cherpulassery Town	17 - 42
Table 17.32	Zoning Pattern Adopted for the Study in Cherpulassery Town	17 - 43
Table 17.33	Modal Split of Intercity Passenger Traffic in Cherpulassery Town	17 - 44
Table 17.34	Modal Split of Intercity Passenger Traffic in Cherpulassery Town-based on Purpose of Trip	17 - 45
Table 17.35	Distribution of Inter-city Passengers Traffic in Cherpulassery Town	17 - 47
Table 17.36	Pattern of Inter-city Passenger Trips in Cherpulassery Town	17 - 48
Table 17.37	Modal Split of Inter-city Goods Traffic in Cherpulassery Town	17 - 48
Table 17.38	Commodity wise Distribution of Goods Traffic in Cherpulassery Town	17 - 49
Table 17.39	Distribution of Inter-city Goods Movements in Cherpulassery Town	17 - 50
Table 17.40	Pattern of Inter-city Goods Movements in Cherpulassery Town	17 - 51
Table 17.41	Inter-city Vehicular Movements in Cherpulassery Town	17 - 52
Table 17.42	Extend of IPT Operations in Cherpulassery Town	17 - 53
Table 17.43	Estimated Growth Rate	17 - 55
Table 17.44	Growth Rate Adopted for Traffic Projection in Cherpulassery Town	17 - 55

Table 17.45	Projected volume Capacity Ratio in Cherpulassery town	17 - 56
Table 18.1	List of Parameters for Classification of BPL	18 - 1
Table 18.2	Details of SC Colonies	18 - 4
Table 18.3	Details of Kudumbasree Enterprises	18 - 5
Table 18.4	Ward wise Details of Self Helps Group	18 - 6
Table 18.5	Expenditure and Details of PMAY	18 - 7
Table 18.6	Ward wise Details of Land / House less Families	18 - 8
Table 18.7	Accidents & Crimes Data in Cherpulassery Municipality	18 - 9
Table 18.8	Pension Schemes and Number of Pensioners	18 - 9
Table 18.9	Details of Expenditure of Pension Funds	18 - 9
Table 18.10	Details of Anganwadi	18 - 12
Table 19.1	Details of Quality of Ground Water	19 - 5
Table 19.2	Quality of Water Obtained from Thootha	19 - 6
Table 20.1	Hazard Seasonality of Palakkad District	20 – 2
Table 20.2	Matrix of Past Disasters in Palakkad District	20 – 2
Table 20.3	Taluk wise details of past flood events in Palakkad District	20 – 3
Table 20.4	Review of recent landslides in Palakkad on the 12th, 13th of June 2018	20 – 6
Table 20.5	Historical Earthquakes reported from Palakkad	20 – 8
Table 20.6	Families Affected 2019	20 – 13
Table 20.7	Details of Crop Loss in Cherpulassery Town 2018	20 – 16
Table 20.8	Details of Crop Loss in Cherpulassery Town 2019	20 – 17
Table 20.9	Weightage of flood factors	20 – 30
Table 20.10	Weightage of the factors through frequency ratio model	20 – 32
Table 20.11	Weightage and rank details of each theme and its sub classes	20 – 43
Table 20.12	Pair-wise comparison matrix table of ten thematic layers	20 – 44
Table 20.13	Results of consistency ratio	20 – 45
Table 20.14	Saaty's Ratio index for different values of N	20 – 45
Table 20.15	Landslide region over layed Landslide Susceptibility Map of Cherpulassery	20 – 48
Table 20.16	Activity plan for Landslide	20 – 53
Table 20.17	Activity plan for Flood	20 – 53
Table 20.18	Major steps of the recovery process and the key processes involved	20 – 56
Table 21.1	Detailed Annual Financial Statements of Cherpulasserty Town	21 - 3
Table 21.2	Details of Revenue and Capital Accounts of Cherpulassery Town	21 - 6
Table 21.3	Municipal Assets - Lands	21 - 9

Table 21.4	Municipal Assets - Buildings	21 - 10
Table 23.1	Ward Wise Functional Character	23 - 1
Table 23.2	Ward Wise Land use Concentration	23 - 3
Table 23.3	Ward Wise Activity Pattern of Cherpulassery Town	23 - 4
Table 28.1	Projected Population of Cherpulassery Town	28 - 1
Table 28.2	Total Projected Work force of Cherpulassery Town and WPR	28 - 2
Table 28.3	Category wise Projected Work Force of town	28 - 2
Table 28.4	Estimated Water Demand	28 - 3
Table 28.5	Projection and Requirements of Sewerage System	28 - 4
Table 28.6	Projection of Solid Waste	28 - 5
Table 28.7	Projected Housing requirements	28 – 5
Table 28.8	Projections of Traffic and Transportation Requirements, Street Lights	28 - 6
Table 28.9	Projected Daily Volume-Capacity ratios for Different Horizon years in Cherupulassery Study Area	28 - 7
Table 28.10	Power Requirement for Horizon Years	28 - 9
Table 28.11	Projection of Educational Facilities	28 - 10
Table 28.12	Projection of Health Infrastructure	28 - 10
Table 28.13	Projection of Community Facilities	28 - 11
Table 28.14	Projection for Utility Services	28 - 12
Table 29.1	Proposed Land use Split-up	29 - 2
Table 29.2	Details of Special Zone	29 - 12
Table 30.1	Cross Sectional Details of Proposed Roads	30 - 9
Table 30.2	Details of Proposed Roads	30 - 15
Table 31.1	Details of Sectoral proposals	31 - 29
Table 32.1	Priority/Action Plan, Phasing and Costing	32 - 2
Table 32.2	Responsible Agencies for the project	32 - 5
Table 32.3	Approximate project cost for the project	32 - 6
Table 32.4	Responsible Agencies for the construction of sewage treatment plant	32 - 8
Table 32.5	Approximate project cost for the construction of STP/FSTP	32 - 10
Table 32.6	Responsible Agencies for the construction of Bye pass	32 - 12
Table 32.7	Approximate project cost for the project	32 - 13
Table 32.8	Agencies responsible for the construction of interstate Bus Terminal	32 - 15
Table 32.9	Approximate project cost for the construction of Bus Terminal	32 - 15
Table 32.10	Agencies responsible for the implementation of market complex	32 - 16

Table 32.11	Approximate project cost for the development of shopping Centre	32 - 18
Table 32.12	Approximate project cost for the development of Tourism Centre	32 - 20
Table 32.13	Agencies responsible for the implementation of Town Park	32 - 22
Table 32.14	Agencies responsible for the implementation of Municipal Town Hall and Park	32 - 24
Table 32.15	Approximate project cost for the implementation of Municipal Town Hall and Park	32 - 24
Table 32.16	Agencies responsible for the implementation of the Project	32 - 25
Table 32.17	Approximate project cost for the cultural centre	32 - 26
Table 32.18	Agencies responsible for the construction of truck terminal	32 - 28
Table 32.19	Approximate project cost for the implementation of the project	32 - 28
Table 33.1	Zoning Regulations	33 - 4

ABBREVIATIONS

ACMA	-	Automotive Component Manufactures Association
AD	-	Anno Domini
ADS	-	Area Development Society
AM	-	Ante Meridiem
APCOS	-	Anand Pattern Co-op Societies
ATM		Automated Teller Machine
B.ed		Bachelor of Education
BOD	-	Biological Oxygen Demand
BOT	-	Build, Operate and Transfer
BPL	-	Below Poverty Line
BRGF	-	Backward Regions Grant Fund
BSNL		Bharat Sanchar Nigam Limited
BSY	-	Balika Samridhi Yojana
CAA	-	Constitution Amendment Act
CAGR	-	Compounded Annual Growth Rate
CBD	-	Central Business District
CBO	-	Community Based Organization
CC	-	Cement Concrete
CDP	-	City Development Plan
CDS	-	Community Development Supervisor
CEC		Cation Exchange Capacity
CESS	-	Centre for Earth Science Studies
CFL	-	Compact Fluorescent Lamp
CHC	-	Community Health Centre
CI	-	Concentration Index
CNC	-	Computer Numerical Control
COPP	-	Committee on Plan Projects for Industrial Townships
CPHEEO	-	Central Public Health Environmental Engineering Organization
CREDAI		Confederation of Real Estate Developers' Associations of India
CT	-	Computerized Tomography
DDMP	-	District Disaster Management Plan
DEM		Digital Elevation Model
DIC	-	District Integration Committee Organization
D&O Trade	-	Dangerous and Offensive Trade
DPR	-	Detailed Project Report
DRM		digital rights management
DRW	-	Drought Relief Work
DTP	-	Detailed Town Planning
DTPC	-	District Tourism Promotion Council
DWCUA	-	Development of Women and Children in Urban Areas
DYSP	-	Deputy Superintendent of Police
E-Coli	-	Escherichia coli

ECG	-	Electro Cardio Gram
EEG	-	Electro Encephalon Gram
EIUS	-	Environmental Improvement in Urban Slums
EOC		Emergency Operation Centre
ESA	-	Environmental Sensitive Areas
ESI	-	Employees State Insurance
EWS	-	Economically Weaker Section
FFDA	-	Fish Farmers Development Agency
FOP	-	Financial Operating Plan
FY	-	Financial Year
GLSR	-	Ground Level Storage Reservoir
gm	-	Grams
GO	-	Government Order
GOI	-	Govt. of India
GOI-UNDP	-	Govt. of India- United Nations Development Programme
GOK	-	Government of Kerala
gpcd	-	Grams per Capita per Day
GIS	-	geographic information system
GP	-	Grama Panchayat
GPF	-	General Provident Fund
GPS	-	Global Positioning System
H_2S	-	Hydrogen Sulphide
Ha	-	Hectares
HH	-	Households
HP	-	Horse Power
HS	-	High School
HS	-	Health Supervisor
HSC	-	House Service Connection
HSS	-	Higher Secondary school
HUDCO	-	Housing and Urban Development Corporation
ICDP		Integrated Cattle Development Programme
ICDS	-	Integrated Child Development Scheme
ICTC		Integrated Counseling and Testing Centre
ICU	-	Intensive Care Unit
IDDP	-	Integrated District Development Plan
IDSMT	-	Integrated Development for Small and Medium town
IGMSY	-	Indira Gandhi Mathruthva Sahayog Yogana
IHSDP	-	Integrated Housing and Slum Development Project
ILFS	-	Infrastructure Leasing & Financing Society
IMAGE	-	Indian Medical association Goes Eco friendly

IP	-	In Patient
IPM	-	Integrated Pest Management
IPSASB	-	International Public Sector Accounting Standards Board
IPT	-	Intermediate Public Transport
IRC	-	Indian Roads Congress
IRCTC	-	Indian Railway Catering and Tourism Corporation
IRTC	-	Integrated Rural Technology Centre
ISP	-	Integrated Sanitation Program
ITC	-	Industrial Training Centre
Jn.	-	Junction
JNNURM	-	Jawaharlal Nehru National Urban Renewal Mission
JSSK	-	Janani-Shishu Suraksha Karyakram
JSY	-	Janani Suraksha Yojana
kg	-	Kilograms
KILA	-	Kerala Institute of Local Administration
KMBR	-	Kerala Municipal Building Rules
KSBC	-	Kerala State Bamboo Corporation
KSEB	-	Kerala State Electricity Board
KSFE	-	Kerala State Financial Enterprises
KSPCB	-	Kerala State Pollution Control Board
KSRTC	-	Kerala State Road Transport Corporation
KSTP	-	Kerala State Transport Project
KSWDC	-	Kerala State Women's Development Corporation
KSY	-	Kishori Sakthi Yojana
KUDFC	-	Kerala Urban Development Finance Corporation
KVA	-	Kilo Volt Ampere
KWA	-	Kerala Water Authority
KWH	-	Kilo Watt Hour
LCS	-	Low Cost Sanitation
LDP	-	Local Development Plan
LED	-	Light-Emitting Diode
LHS	-	Left Hand Side
LIC	-	Life Insurance Corporation
LIFE	-	Livelihood Inclusion and Financial Empowerment
LIG	-	Low Income Group
Lit	-	Liters
LL	-	Lakh Liters
LP	-	Lower Primary
lpcd	-	Liters Per Capita Per Day
LPG	-	Liquefied Petroleum Gas
LSG	-	Local Self Government
LSGD	-	Local Self Government Department

LSGI	-	Local Self Government Institution
(M)	-	Municipality
m	-	Meters
mbgl	-	Meters Below ground level
MCW	-	Maternity and Child Welfare
MDR	-	Major District Road
METIND	-	Metal Industries Limited
mg/L		Milligrams per Litre
ML	-	Million Liters
MLA	-	Member of Legislative Assembly
MLD	-	Million Liters per Day
mm		Milli Meters
MoUD	-	Ministry of Urban Development
MP	-	Member of Parliament
MSL	-	Mean Sea Level
MSME	-	Micro, Small & Medium Enterprises
MSW	-	Municipal Solid Waste
MT	-	Metric Tonne
NABARD	-	National Bank for Agricultural and Rural Development
NATPAC	-	National Transportation Planning and Research Centre
NCD	-	Non Communicable Disease
NGO	-	Non-Governmental Organizations
NH	-	National Highway
NHAI	-	National Highway Authority of India
NHED	-	Nutrition and Health Education
NHG	-	Neighborhood Group
NMAM	-	Model National Municipal Accounting Manual
NNM		National Nutrition Mission
Nos.	-	Numbers
NPA		Nutrition Programme for Adolescent Girls
NRW	-	Non-Revenue water
NSDP	-	National Slum Development Program
NUIA	-	National Institute of Urban Affairs
ODR		Other District Roads
O&M	-	Operation & Maintenance
O-D	-	Origin & Destination
OG	-	Out Growth
OH	-	Over Head
OHSR	-	Overhead Service Reservoir
OHT	-	Overhead Tank
OP	-	Out Patient
PCU	-	Passenger Car Unit
pH	-	Potential of Hydrogen
PHC	-	Primary Health Centre

PI		Pollution Index
PM		Post Meridiem
PMAY		Pradhan Mantri Awas Yojana
PMRY	-	Prime Minister's Rozgar Yojana
PO	-	Post office
PPH	-	Persons Per Hectare
PPP	-	Private Public Participation
PSP	-	Public Stand Post
PSU	-	Public Sector Undertaking
PTA	-	Parent Teacher Association
PWD	-	Public Works Department
R&D	-	Research and Development
R-APDRP	-	Restructured Accelerated Power Development & Reforms Program
RCC	-	Reinforced Cement Concrete
RGGVY	-	Rajiv Gandhi Grameen Vidyutikaran Yojana
RHS	-	Right Hand Side
RNCTP		Revised National Tuberculosis Control Program
ROB	-	Road Over Bridge
SC	-	Scheduled Caste
SFC	-	State Finance Commission
SH	-	State Highway
SHG	-	Self Help Group
SIC	-	Spatial Integration Committee
SIDCO	-	Small Industries Development Corporation
SIFL	-	Steel Industrial Forgings Ltd
SILK	-	Steel Industrials Limited Kerala
SIMCO	-	South India Metal Company
SIPC	-	Small Industries Promotion Centre
SISI	-	Small Industries Service Institute
SJSRY	-	Swarna Jayanti Shahari Rozgar Yojana
SLBP		Special Livestock Breeding Program
SNP		Supplementary Nutrition Programme
SPAC	-	State Plan of Action for the Child
SPM	-	Suspended Particulate Matter
SPEM	-	State Poverty Eradication Mission
sq. km	-	Square Kilometers
SSA	-	Sarva Siksha Abhiyan
ST	-	Scheduled Tribe
STP	-	Sewage Treatment Plant
SVL	-	Sodium Vapour Lamp
SWM	-	Solid Waste Management
TB	-	Tuberculosis
T&CS	-	Thrift & Credit Societies

TDS		Total Dissolved Solids
THRS	-	Take Home Ration Scheme
TPD	-	Tonnes per day
TTC		Teachers Training Centre
TTI		Teachers Training Institute
TWSS	-	Town Water Supply Scheme
UA	-	Urban Agglomeration
URDPFI	-	Urban and Regional Development Plan Formulation and Implementation
UGD	-	Underground Drainage
UIDSSMT	-	Urban Infrastructural Development Scheme for Small & Medium Towns
UK	-	United Kingdom
ULB	-	Urban Local Body
UNESCO	-	United Nations Educational, Scientific and Cultural
UP	-	Upper Primary
USEP	-	Urban Self Employment Program
USS		Ultra Sound Scan
UST	-	Urban Skill Training
UWEP	-	Urban Wage Employment Program
V/C	-	Volume to Capacity
VAMBAY	-	Valmiki Ambedkar Awas Yojana
VHSS		Vocational Higher Secondary School
W	-	Watts
WBM	-	Water Bound Macadam
WHO		World Health Organization
WPR	-	Work Participation Rate
w.r.to		With Respect To
WSS	-	Water Supply Scheme
W/S	-	Watershed
WTP	-	Water Treatment Plant

1. INTRODUCTION

1.1. INTRODUCTION

Urban, city, or town planning is the discipline of land use planning which explores several aspects of the built and social environments of municipalities and communities. It is a method of development that contributes to the development and evolution of urban areas and their urbanizing environs based on economic, social, legal and aesthetic concepts and conditions in order to promote the welfare of public & quality of environment. In contemporary world, it becomes more important to guide the development of a city or town so that it furthers the welfare of its current and future residents by creating convenient, equitable, healthful, efficient and attractive environments – "Sustainable Development".

To realise this, a documentation of well thought out plans and practices would be prudent. Master plan of an urban area delivers on this note precisely. Master Plan is thus a long term perspective plan for guiding the sustainable planned development of the city. This document lays down the planning guidelines, policies, development code and space requirements for various socio-economic activities and civic amenities supporting the city population during the plan period. It is also the basis for all infrastructure requirements.

Master Plan involves estimation of future population, socio-economic conditions and infrastructural needs along with land use plan (present and proposed) and development control restrictions for ensuring that the necessary facilities are in place when the development takes place. Master Plan is a statutory document that is approved, enforced and implemented for controlling, directing and promoting sound and rational development or redevelopment of an urban area with a view to achieving maximum economic, social and aesthetic benefits.

Master Plan of Cherpulassery largely aligns and proposes to deliver on this objective. Cherpulassery being a part of largest district in Kerala has both the advantages as well as disadvantages. It has the advantage of being connected to large network of connectivity infrastructure at the same time the distribution of resource over a larger base would reduce the concentration of resource allocation. It would be pertinent to direct our attention towards geographical aspects of Palakkad district which would offer us a glimpse of this scenario.

The district is bounded on the North by Malappuram District, in the East by Coimbatore District of Tamil Nadu, in the south by Thrissur District and in the west by Thrissur and Malappuram districts. The geographical area of the district is 4,480km^2 which is 11.21% of the state's area. There are five Taluks, 163 villages, 88 Panchayats and 7 Mu-

nicipalities namely Palakkad, Shoranur, Ottappalam, Chittur – Thathamangalam, Pattambi, Cherpulassery and Mannarkkad. The 32 to 40 kms wide natural gap in the Western Ghats is perhaps the most influential factor for the unique characteristics of the district such as climate, commercial as well as cultural exchanges between the state and the rest of the country.

Palakkad or Palghat is also known as the land of Palmyrahs and Paddy fields. Along with Kuttanadu, Palakkad are major Paddy growing areas of the state. The district is one of the main granaries of Kerala often called as "rice bowl of Kerala" and its economy is primarily agricultural. The proximity and easy approach to Tamil Nadu have caused the blend of Malayalam and Tamil cultures here.

Cherpulassery is situated on the shores of Thootha river occupying the fringes of northern boundary of Palakkad District. Cherpulassery as a municipal town in Palakkad District is included in Ottappalam Taluk and Ottappalam Sub Division. Cherpulassery is also one of the newly formed Municipalities in Palakkad District. Cherpulassery also host a cultural rendezvous of Malappuram, Thrissur and Palakkad thus placing it as a unique area from other places of Palakkad.

1.2 EARLIER PLANNING EFFORTS AND STUDIES

The earlier planning effort in this area can be addressed in two levels viz., district level and town level.

1.2.1 District Level

The decentralized planning system was implemented in India through the 73rd, 74th constitutional Act of India on December 1992. Accordingly, the Kerala State L egislative assembly enacted the Kerala Panchayat Raj Act 1994 and the Kerala Municipality Act 1994 repealing the previous Acts. The 74th Amendment Act of the constitution of India mandated District Planning Committee to prepare a Development Plan for the district. As per the Article 243 ZD of the constitution; the District Planning Committee shall consolidate Panchayat/Municipality Plans in the district and prepare a Development Plan for the district as a whole.

By realizing the above fact, Government have accorded sanction to prepare an Integrated District Development Plan (IDDP) and Local Development Plan (LDP) for Palakkad district vide Order No.354/07/LSGD dated 01.02.2007. The District Planning Committee of Palakkad decided vide decision dated 26.05.2007 to prepare an Integrated District Development Plan (IDDP) Palakkad along with local development plan (LDP) for each and every local Governments in the district in an integrated manner. The District Planning Committee in its meeting held on 31.12.12 approved IDDP Palakkad.

1.2.2 Town Level

There were no spatial planning efforts done at Town level.

1.3 NEED FOR MASTER PLAN

- Cherpulassery municipality acts as a regional centre for nearby LSGIs in the surrounding rural areas and thus provides facilities to support them. In fact, IDDP Palakkad places Cherpulassery as a third order multi-functional zone.
- Unchecked ribbon development along major transport corridors, unorganised market space hindering the expansion of trade and commerce.
- Immense scope for Agriculture based industries and cultural tourism & its integration into District network. It can also arrest the migration of educated youth.

On an overall preview, the district is in direct need of growth and investment. It becomes imperative to plan such growth initiatives and chart out a development course that would meet not just the growth aspirations of people residing within the municipality but also the dependent populace in neighbouring LSGs.

1.4 LEGAL FRAMEWORK FOR MASTER PLAN

As per The Kerala Town and Country Planning Act 2016, that is in force in the state, not withstanding anything contained in the Kerala Municipality Act, 1994 or the Kerala Panchayat Raj Act 1994, the Municipal Corporation, Municipal Council, Town Panchayat or Village Panchayat shall have the following additional function **"Prepare or get prepared a Master Plan for the Local Planning area"**.

It contributes sufficient statutory backing to the preparation of Master Plan for town. As per G.O. (Rt.) No.2955/2015/LSGD dated: 29.9.2015 Administrative Sanction and Financial Sanction was accorded for the implementation of the Third phase of the Scheme of preparation of Development Plans and Detailed Town Planning Schemes which includes Cherpulassery Municipality. The Municipal Council has taken resolution to prepare Master Plan for the town as per resolution No.8 dated 16.03.2016 .

1.5 METHODOLOGY

With the help of guidelines issued by the government of Kerala in the title "Scheme of preparation of Development Plans" the master plan preparation process can be divided into many steps listed as follows:

As the first step, existing town planning schemes are to be evaluated to justify the need for a new master plan. A seminar on development can help to analyse stakeholder's context on the plan.

1.5.1 Preliminary Efforts

- Constitution of SIC.
- Delineation of planning area.
- Collection of cadastral maps.
- Global Position System (GPS) Survey.
- Preparation of Digitized maps.

1.5.2 Data Collection and Compilation

Two types of data collections are involved.

- **Primary data:** Primary data collection involves land use survey, socio economic survey and traffic survey.
- **Secondary data**: Secondary data collection involves sectoral data collection by SIC through working groups.

Data Compilation: Collected data is compiled in specified format so as to make the analysis easy.

The responsibility of secondary data collection and compilation vest with the SIC. The process of data collection and compilation may be enriched and monitored by conducting a series of workshops. The District Town Planner shall ensure that the data collection and compilation are completed within the stipulated time frame even if the SIC fails to accomplish the task within the said time frame.

1.5.3 Analysis

Two types of analysis are done:

Local analysis: The objective of Local Analysis is to analyse the development trend of each sector, its potential and development problems associated with each sector. It also includes a study on people's development aspirations from the earlier development reports. SIC has the responsibility of local level analysis. The process of local analysis may be enriched and monitored by conducting series of workshops.

Spatial analysis: The spatial analysis focuses upon regional setting of the settlement as well as the distribution pattern of activities & population, land use and infrastructure network within the local body. The findings of both the analysis and findings from the urbanization study of the district are then integrated to facilitate the envisioning process.

1.5.4 Envisioning Process

The outcome of the envisioning process comprise of setting up a vision for the

town, goals and objectives, formulation of development concept and formulation of policies and strategies within the integrated development vision of the planning area.

Setting up of goals and objectives

The major development problems and potentials of planning area will be clear from the consolidated findings of the analysis. Accordingly, the development goals and objectives will be formulated.

Formulation of Development concept.

A Master Plan has to look in to the development perspective of the area for a future period. This is accomplished through the formulation of development concept of the area.

Formulation of Policies and Strategies

General Development Policy based on the development concept is formulated. Then sectoral policies and strategies are framed in conformity with the general policy. The development concept and sectoral policies are presented in the council which is then finalized by taking the feasible suggestions of the council into account.

1.5.5 Detailing

Projected Requirements

The future requirements in each sector are assessed in this step. Inter-sectoral integration is also ensured while assessing the future requirements in each development sector.

Sectoral Detailing, Land Use Planning

Sectoral development suggestions are formulated to achieve the projected requirements. Detailing is a joint activity of both Town and Country Planning Department and SIC. A proposed land use plan is also prepared with zoning regulations.

Draft Plan and its legal processing

The following statutory steps have been enjoined in the Kerala Town and Country Planning Act 2016 with regards to the preparation, publication and regulation aspect of a Master Plan.

Section 36 (1) of the Kerala Town and Country Planning Act 2016 envisages that the Municipal Council may, by a resolution decide to prepare a Master Plan in respect of the area under its jurisdiction or part thereof.

As per section 36(2), the Municipal council should prepare or get prepared a draft Master Plan. Draft Master Plan has to be forwarded along with Council resolution to government. As per section 36(3) Government on receipt of Master Plan in consultation

with Chief Town Planner accord approval for publication within a period of 60 days from the date of receipt of draft Master Plan.

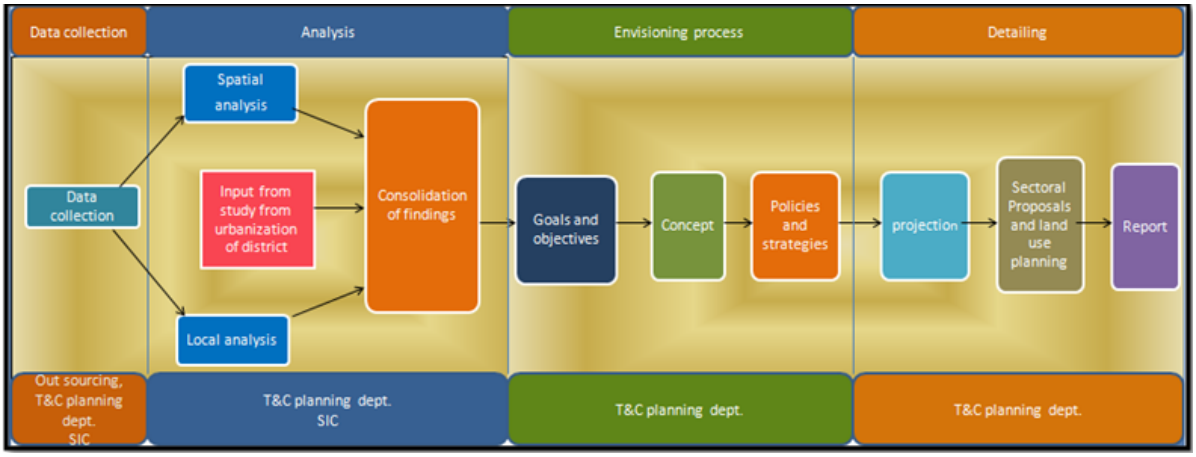


Fig 1.1 Stages and Responsibilities of Master Plan Preparation.

As per section 36(4), Municipal Council within a period of 60 days from the date of receipt of approval for publication, publish the same in the website and a notice of publication in the official Gazette and in at least two newspapers having wide circulation within Municipality (one must be Malayalam newspaper) inviting objections and suggestions to be submitted within 60 days from the date of publication of notice specifying the place or places where a copy shall be available for inspection by the public.

Immediately after publication of the Master Plan, a copy of Master Plan should be forwarded to District Planning Committee for their remarks as per section 36(5). As per section 36(6), Municipal Council shall appoint a special committee formed under section 32. Special committee shall process the objections and suggestions and hear all such persons who have made request in writing or being so heard and submit report in prescribed format to Municipal Council.

As per section 36(7), Municipal Council within a period of 60 days from the date of receipt of report of Special Committee approve the Master Plan with or without modifications as may be considered necessary and shall forward master plan together with objections and suggestions, report of special Committee and the recommendations to Government for Sanction.

As per section 36(8) within a period of 60 days from the date of receipt of Master Plan, government may accord sanction to the plan after ensuring compliance with the provisions of perspective plans or any other plans prepared under the Act and publish a notice in the official Gazette intimating the fact of sanction of Master Plan. Government may obtain technical remarks from Chief Town Planner to ensure compliance with plans under the Act. If the Master Plan is returned for incorporating modifications suggested by Government, the same shall be resubmitted within 90 days to Government for sanction as if the plan is submitted afresh.

As soon as Master Plan has been sanctioned by the Government, Municipal Council shall forward a copy to District Planning Committee and shall publish a notice regarding sanction of Master Plan by Government and in at least one newspaper specifying the place or places where a copy shall be available for reference or sale. Sanctioned Master Plan or its extract shall be published in the website of Municipality.

1.6 COMMUNITY INVOLVEMENT

There can be no meaningful development in any society, if the people themselves are kept out of the planning process. People's participation, therefore, is essential and must be introduced at relevant stages in the planning process.

To "listen to the people" both to understand their needs and to assess how their lives are actually being affected by development projects and policies are important. The suggested indirect participation of the people is ensured through elected representatives in the Municipal Council / Corporation and Ward Committees (74th CAA). This kind of participation has appropriately been provided in the plan formulation process. The direct participation can be through individuals, citizen groups, neighbourhood groups, business groups, consumer groups, and such other groups. NGOs and CBOs can also play a vital role as an intermediate link between the people and the government.

It should be mandatory to present the salient features of a Master Plan in a public meeting, organized by the local authority just after the public notice inviting their comments and suggestion before its approval. All land pooling schemes should be formulated with direct active participation of the people.

The method adopted for the preparation of Master Plan ensured community involvement at various stages of preparation of the plan. In the meeting conducted on 30/01/2018, the Spatial Integration Committee was formed with Municipal Chairman as the Chairman of the committee. Municipal Secretary and Municipal Engineer were appointed as Convenor and Joint Convenor respectively. Other members of the Committee were working group Chairman and District Town Planner.

Separate planning team was created in the District Town and Country Planning Office under the leadership of Deputy Town Planner. As per the discussions conducted with the Spatial Integration Committee, various surveys and data collection were carried out. Development seminar was conducted on 26/02/2019. Land use and socio-economic surveys were completed while traffic and transportation survey and study work was undertaken with the technical support of NATPAC, Trivandrum. The Municipal Council made various suggestions to incorporate in the Master Plan of Cherpulassery town. The draft master plan was discussed with Municipal Chairman and Councillors prior to the submission to Chief Town Planner for vetting.

Following the formation of a new council, the master plan committee was re-constituted as per council decision number 7 on 24/01/2022. A detailed presentation was given to the new councillors, during which their aspirations were gathered for inclusion in the plan. Ward maps were distributed for them to review existing land use. At the first meeting of the newly elected master plan committee on 06/06/2022, it was decided to conduct another seminar with stakeholders on 21/07/2022. This seminar actively involved representatives from various community sectors who provided suggestions for the plan.

Subsequent site visits were conducted on 08/02/2023 and 03/03/2023. The suggestions from master plan committee meetings, council meetings, and stakeholder consultations were thoroughly reviewed and incorporated into the proposals. As a result, this draft Master Plan is a comprehensive product of extensive community participation, reflecting the aspirations of the entire community.



Stake holder consultation held on 21/07/2022.

2. PROFILE OF TOWN

2.1 GENERAL

Cherpulassery Municipality is situated in the Ottapalam Taluk of Palakkad district. It is located close to 50 km west of District headquarters, Palakkad. On a co-ordinate scale, the municipality finds itself at 10°52'35.58" North of Equator and 76°18'33.55" East of Prime meridian, while the altitude is approximately 73 m above Mean Sea Level.

Cherpulassery is bounded by Thootha River in the North followed by a neighbouring Aliparambu Grama panchayat (Malappuram District) in the Northern region, Chalavara Grama Panchayat on the South, Nellaya Grama Panchayat on the west and south west region, Vellinezhi Grama Panchayat and Thrikkadeeri Grama Panchayat on the Eastern region.

On a clockwise note, other proximate municipalities in the district viz., Mannarkkad lies 30 km north east of Cherpulassery followed by Ottapalam, Shoranur and Pattambi respectively lies 18 km to the south east, 20 km and 17 km to the south west of Cherpulassery Town.

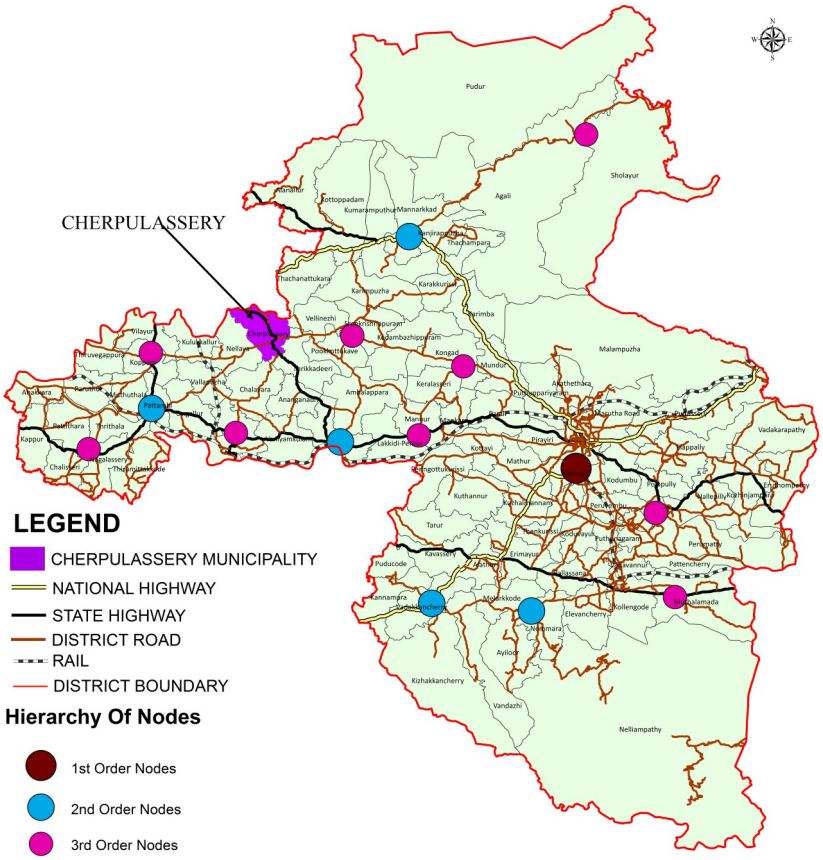


Fig. 2.1 Connectivity of Cherpulassery Town with Other Towns in District

Source: IDDP, Palakkad, 2013



Fig. 2.2 Boundaries of Cherpulassery Municipality

2.2 AREA, ADMINISTRATIVE DIVISIONS

The geographical area of the Cherpulassery municipality is 31.88 sq.km which is approximately 0.71% of the total area of the district. According to 2011 census, there were 18 wards in the Cherpulassery town, however after the formation of Cherpulassery Municipality in 2015; thirty-three wards came into being. The spatial location of thirty-three wards of Cherpulassery Municipality is shown in Fig 2.3. Ward details viz., names and number of wards are shown in Table 2.1.

As per 2011 census report, the total population of Cherpulassery town was 39,241 which makes it ~1.39 % of the total population of Palakkad District. It includes 18,656 males and 20,585 females. The population density of town is 1231/ Km2 which is less compared to proximate municipalities.

2.3 CLIMATE AND RAINFALL

Cherpulassery has a tropical climate with moderately hot humid conditions. The climate is classified as 'Am– Tropical Monsoon Climate ' according to Köppen-Geiger system. It gets copious amount of rainfall from South-West monsoon during June to September followed by the rains from North East monsoon during September to the middle of November. The average annual rainfall is 2,836 mm.

Generally, February to May marks the hottest months in these areas. While winds are generally gentle in nature except in December and January where it climbs in the range of 35 - 45 km/hr. The wind is predominantly from West to East during morning as well as in the evening hours. The humidity is higher during the monsoon period i.e., from June to September. It generally peaks to 90% during this period while the temperature of the Town hovers from 29°c to a maximum of 42°c.

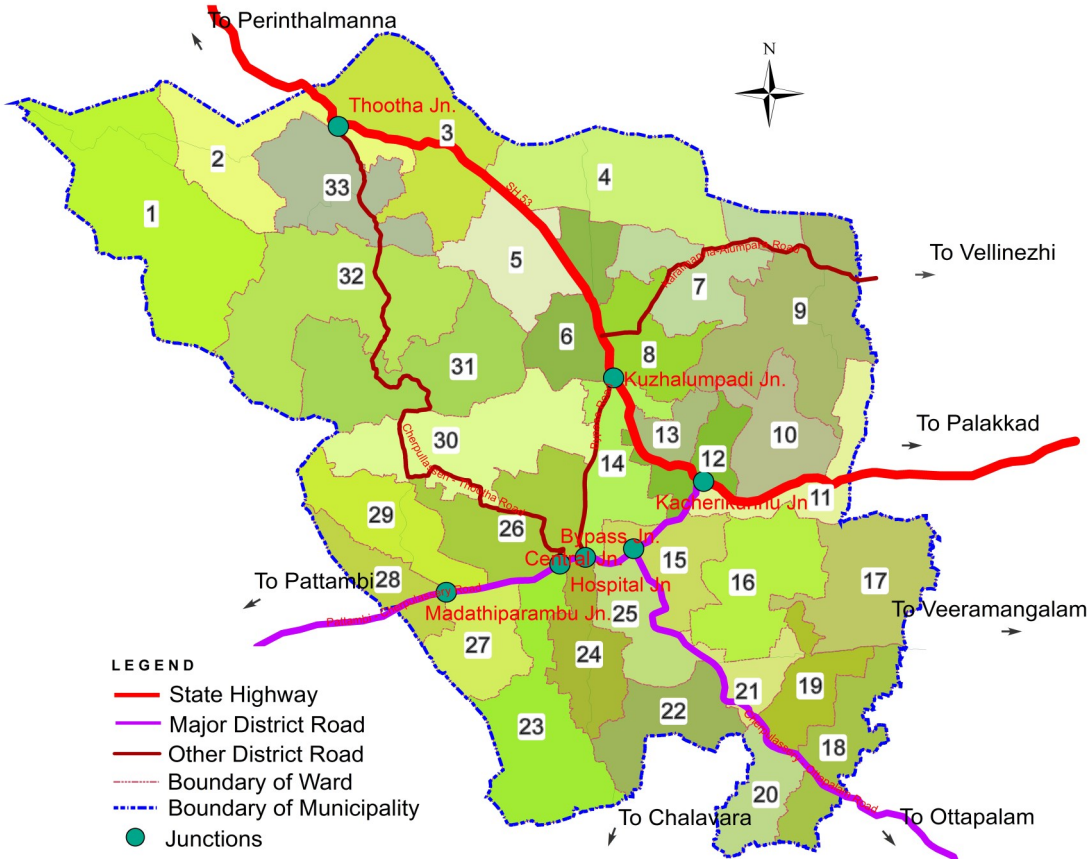


Fig. 2.3 Political wards with 33 Wards

Table 2.1 Number and name of wards in Cherpulassery Municipality

Ward No:	Ward Name	Ward No:	Ward Name	Ward No:	Ward Name
1	Padinjattumuri	12	Kacherikunnu	23	Kottakunnu
2	Thootha	13	Mandakkari	24	Secretary Padi
3	Health Centre	14	Illikottukurissi	25	Cherpulassery Town
4	Papparambu	15	Puthanalkkal	26	Kavuvattom
5	Naduvattom	16	Niraparambu	27	Malmalakunnu
6	Karalmanna	17	Unginthara	28	Manjakkal
7	Alumpara	18	Unginthara South	29	Vellottukurissi
8	Ambalavattom	19	Kuttikodu	30	Panniyamkurissi
9	Karumanamkurissi	20	Kuttikkodu South	31	Chenthrathparambu
10	Kunnumpuram	21	Kooliyadu	32	Veettikkad

2.4 PHYSIOGRAPHY AND RELIEF

Palakkad District falls in the Central Kerala Coast micro region as per regional classifications designed by the Census Organisation. Each Micro Region is further divided into Sub-Micro Regions on the basis of topography, geology, soils, climate and natural vegetation. Thus Palakkad consists of four such Sub-Micro Regions viz. (i) Pattambi Undulating Plain (ii) Mannarkad-Palakkad Forested Hills (iii) Palakkad Gap and (iv) Chittur Forested Hills.

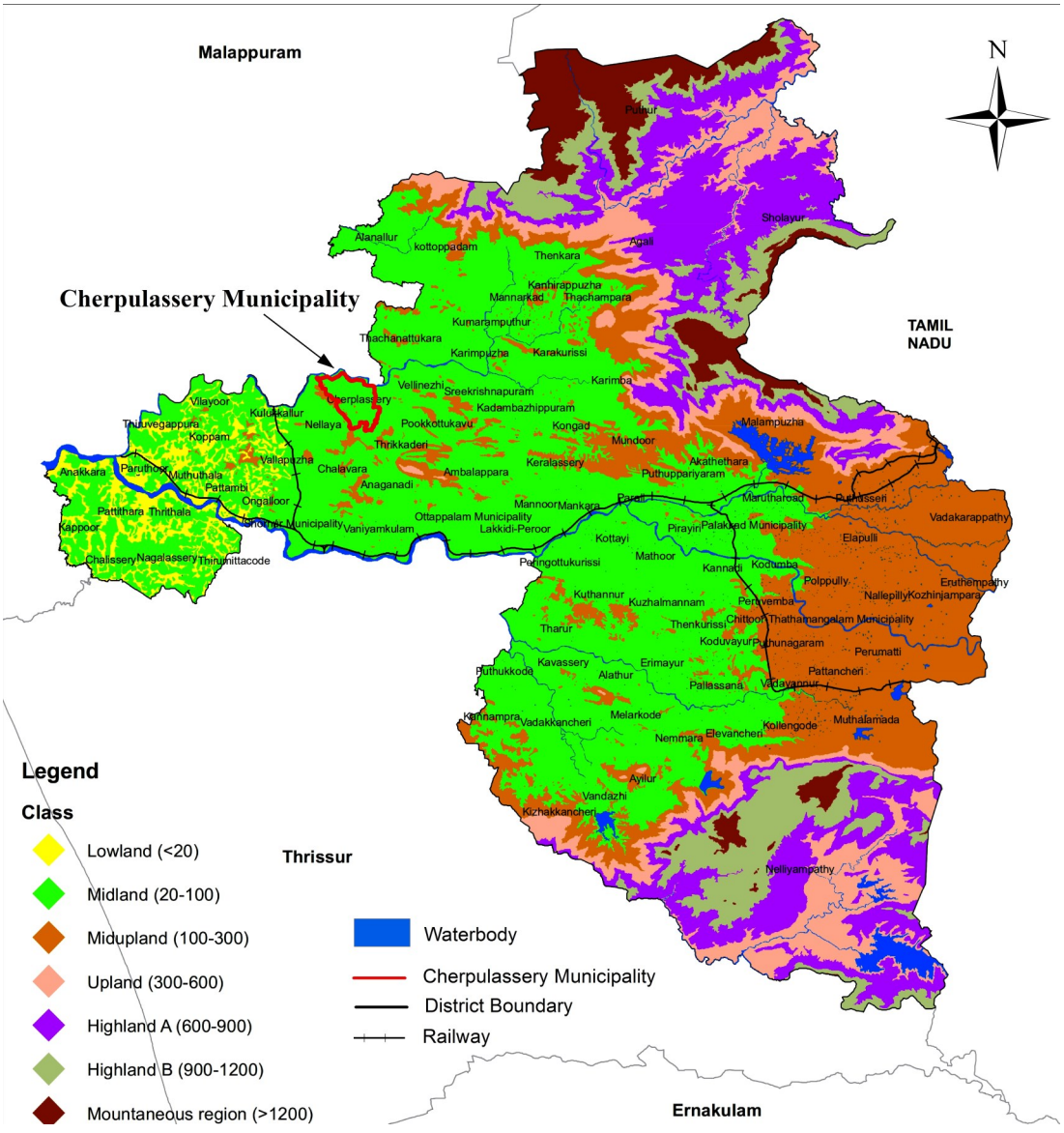


Fig. 2.4 Physiography of Palakkad District showing Cherpulassery town

Source: IDDP, Palakkad, 2013

Cherpulassery Town lies in Palakkad Gap region comprising parts of Ottappalam, Mannarkad, Chittur and Alathur Taluks. The municipality region is bounded by Mannarkad-Palakkad Forested Hills in the North, Tamil Nadu in the East, Chittur Forested Hills in the South and Pattambi Undulating Plain in the West. This region is an undulating upland with an average height of 1,500 m. The maximum height (394 m) is located

in the central portion of this region and the minimum height (61 m) is located in the western portion of Keralassery Village of Palakkad Taluk. This region is mainly drained by the Bharathapuzha and its tributaries. Thoothapuzha also drains the region and joins the Bharathapuzha at its down course.

Based on the physical features, the district is divided into two natural divisions – mid land and high land. The mid land consists of valleys and plains. The municipality comes within the mid land region. Fig 2.4 shows physiography of the district showing Cherpulassery town. Cherpulassery Town is having less extensive valleys and the slopes are having mild gradients. The peripheral areas of the town are agricultural lands and paddy. Thootha river flows along northern boundary of town.

Cherpulassery Town has a relief between 10 m and 50 m (Fig 2.5) and comes under moderately sloping to steeply sloping areas. Contour map and Digital Elevation Mode (DEM) of Cherpulassery Town are shown in Fig 2.6, Fig 2.7 respectively. Cherpulassery Town is having slope of 1 to 5% and comes under gently sloping category (Fig 2.8).

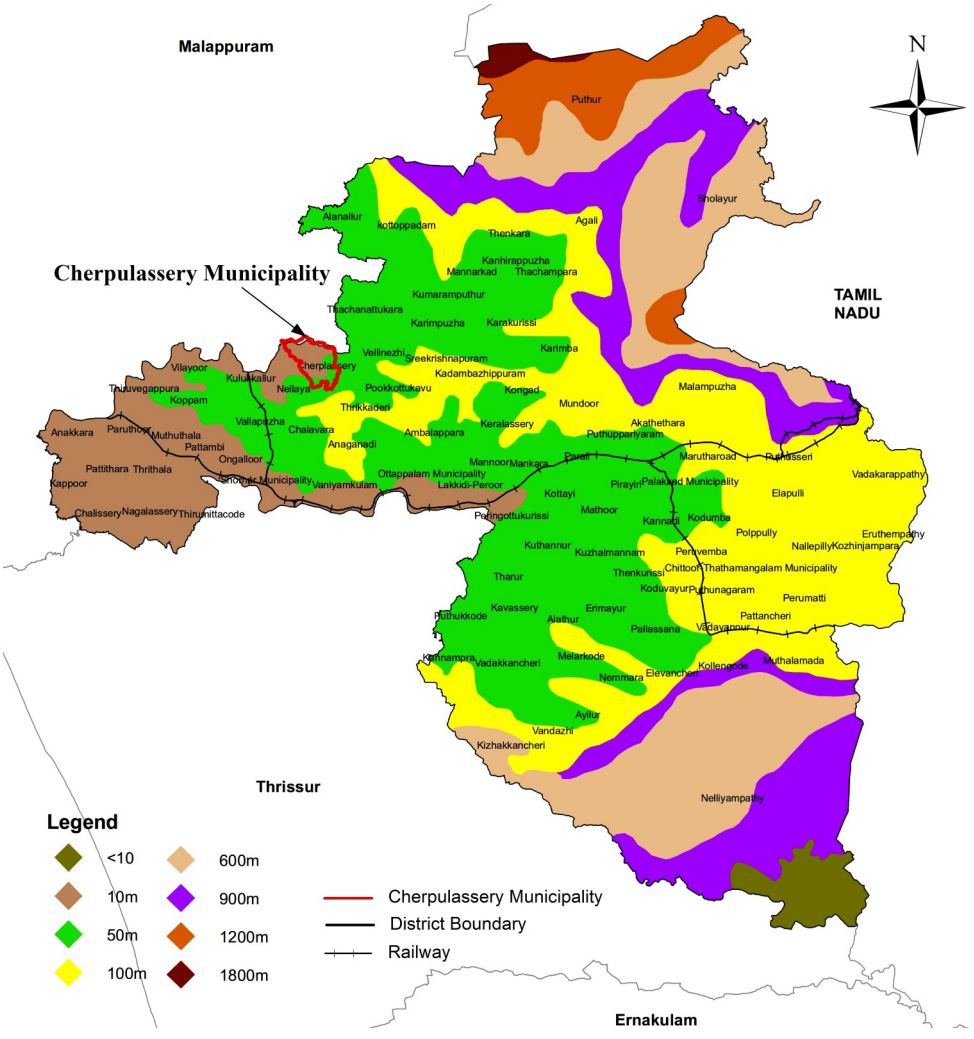


Fig. 2.5 Relief of District showing Cherpulassery Town

Source: IDDP, Palakkad, 2013

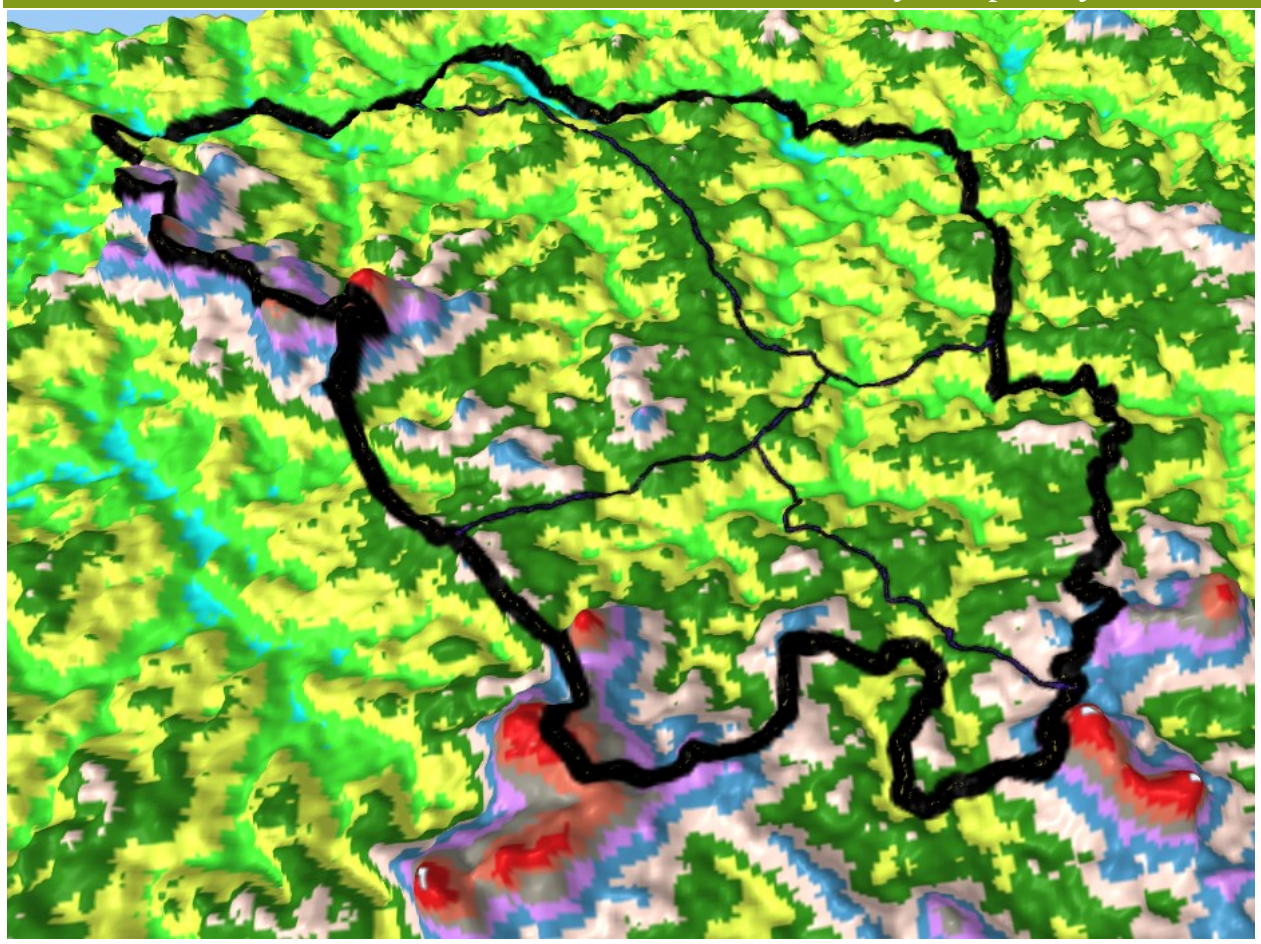


Fig. 2.6 DEM of Cherpulassery Town

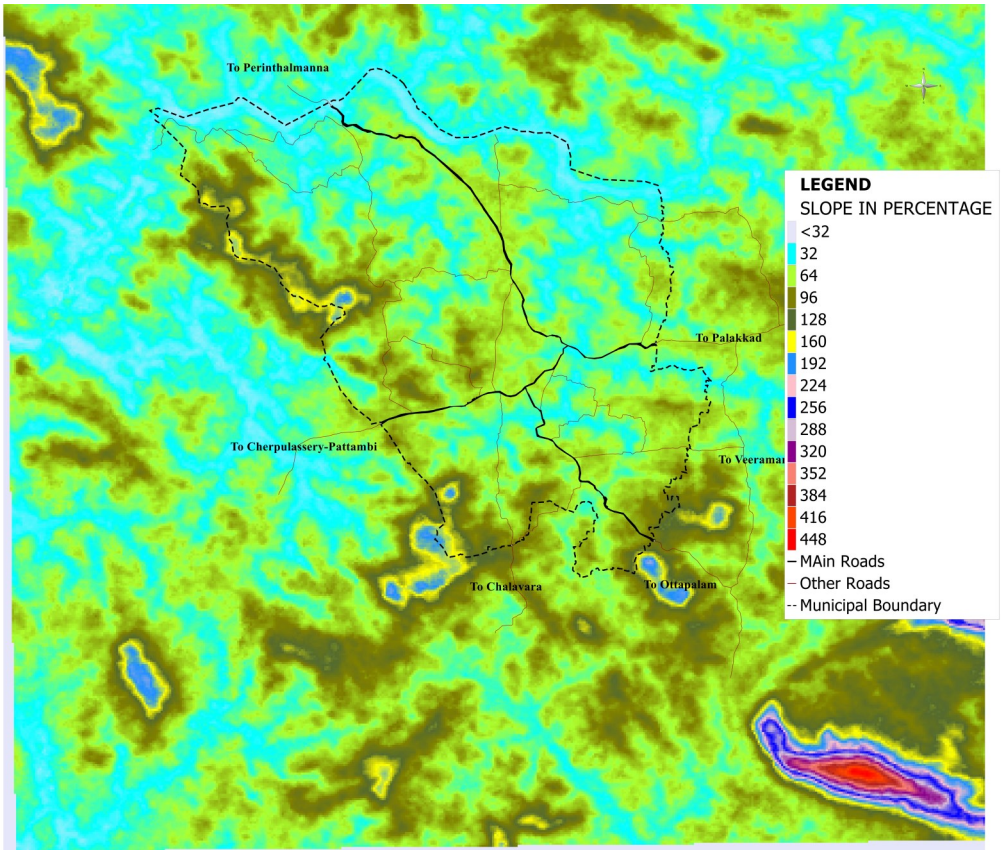


Fig. 2.7 Slope map of Cherpulassery Town

2.5 SOIL

Soil type of Cherpulassery Town is mainly Laterite in nature. According to a study by Soil Survey Department, there are eight major soil series in the district. Cherpulassery town area has Vadanamkurissi series, Kanjikulam series and Kottamala series. Among these, the largest tracts are observed to fall in Kanjikulam series while the Vadanamkurissi series occupies the least. The Vadanamkurissi series consists of deep loamy soils developed over alluvium deposited by meandering river sedimentation on nearly level to gently sloping lands. They are moderately well drained and has moderately low permeability.

According to Soil Survey Department's detailed study of soils of Cherpulassery, eleven soil series were identified. Out of these, three soil series namely Periyarampatta, Thanikunnu and Ramanpalliyal are the series in low lying lands which are mainly under paddy cultivation. The rest eight soil series namely Kinasseri, Pookottukavu, Arumangod, Kinarpalam, Oruvumada, Chalavara, Veettikkad and Veettikadmala are identified in uplands which are mainly cultivated with rubber, coconut, banana and vegetables.

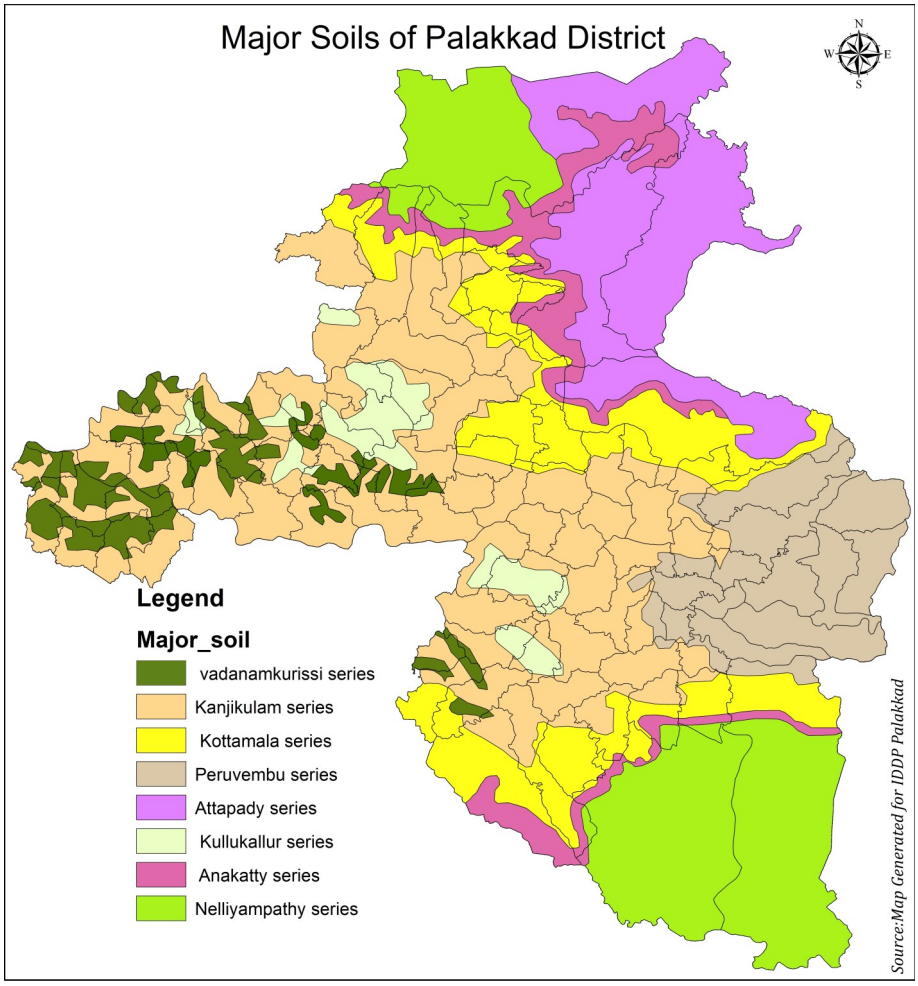


Fig. 2.8 Major soil series of Palakkad District showing Cherpulassery Town

Source: Soil survey office , Palakkad

Alluvium soil is found on the riverside and it is suitable for the cultivation of rice. In plains the soil is fertile and muddy. In high lands, the soil is gravel mixed with 75% fertility. Major types of soil in the town include sandy clay and sandy clayey loam, Gravelly sandy loam, Gravelly clay loam, Gravelly sandy clay. Predominant soil found in the region is Gravelly clay loam. However, sandy clay loam is also quite prevalent in this town. Different types of soil present in municipality is shown in Fig 2.9.

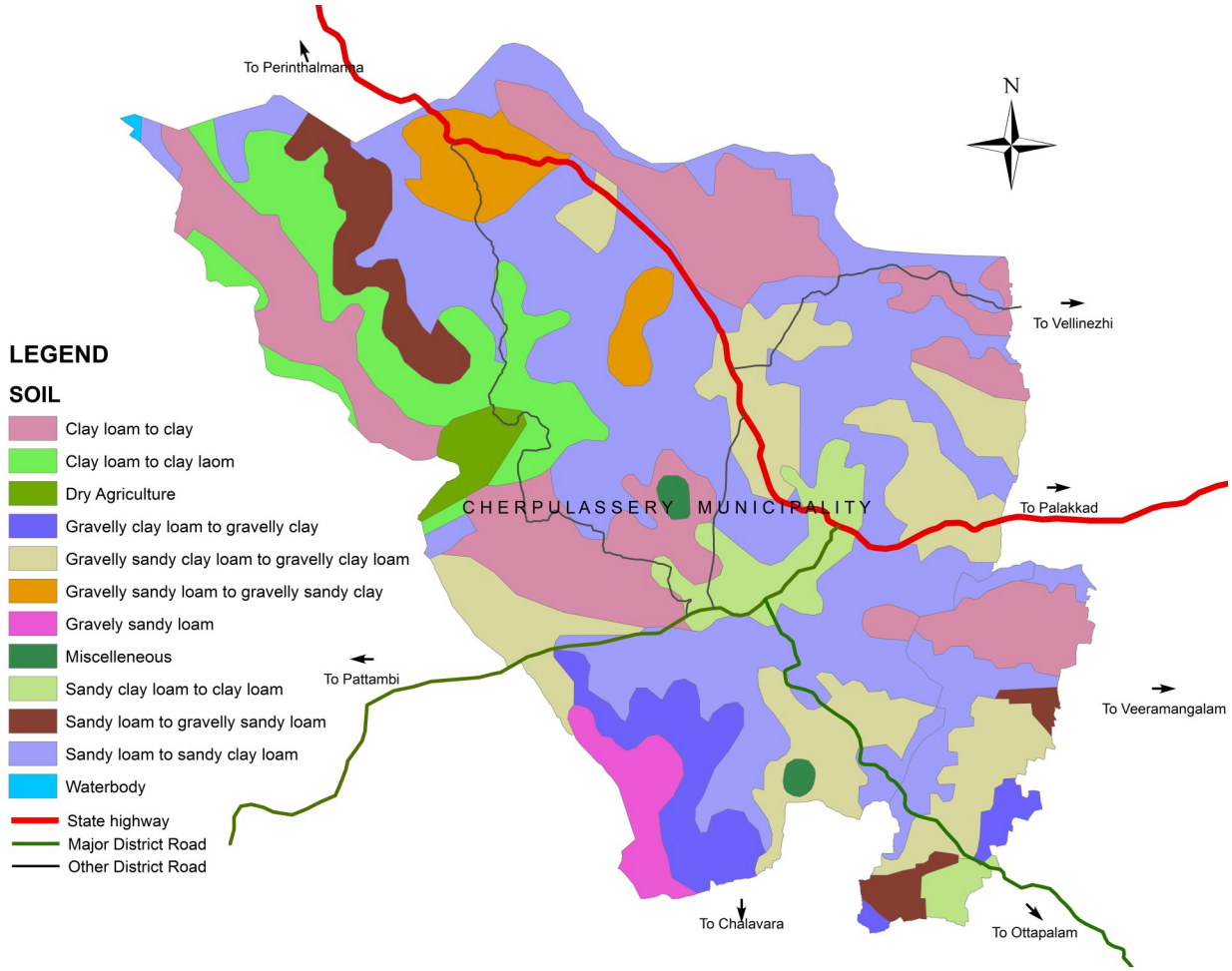


Fig. 2.9 Soil Types of Cherpulassery Town

2.6 GEOMORPHOLOGY

Geomorphology means a "discourse of earth landforms" and it is generally defined as a Science of Landforms" which are the products of various exogenetic and endogenetic forces. Pediment and Denudational hills are the most prominent Geomorphological features occurring in study area, also Pediplain and Residual hills are also found in study area.

Denudation hills are formed by denudation process which involves the wearing away of the earth's surface by moving water / wind / ice / waves leading to a reduction in elevation and relief of land forms and of landscapes

Pediment is a very gentle sloping (0.5 - 7 degrees) surface that includes bed rock

surface. It typically slopes down from the base of a steeper retreating escarpment, but may continue to exist. It is typically a concave surface gently sloping away from the mountainous desert area.

Pedi plain is an extensive plain formed by the coalescence of pediments. In Pedi plains they ought to have the same steepness as the slopes in the early stages of erosion leading to Pedi planation.

When the process of erosion take place gigantic waves of flow on the mountains and other highlands areas causes boulders and solid materials are washed away and these rock re-situated in large size on other parts of land then called residual hills.

Fig 2.10 shows the geomorphology of the town. It is very important that the geomorphologies of an area are directly affected by the agricultural practices and land uses. Agricultural practices vary from one Geomorphological unit to another, due to Geomorphological significances (slope, structure, stage, soil characteristics, and human content) of each unit.

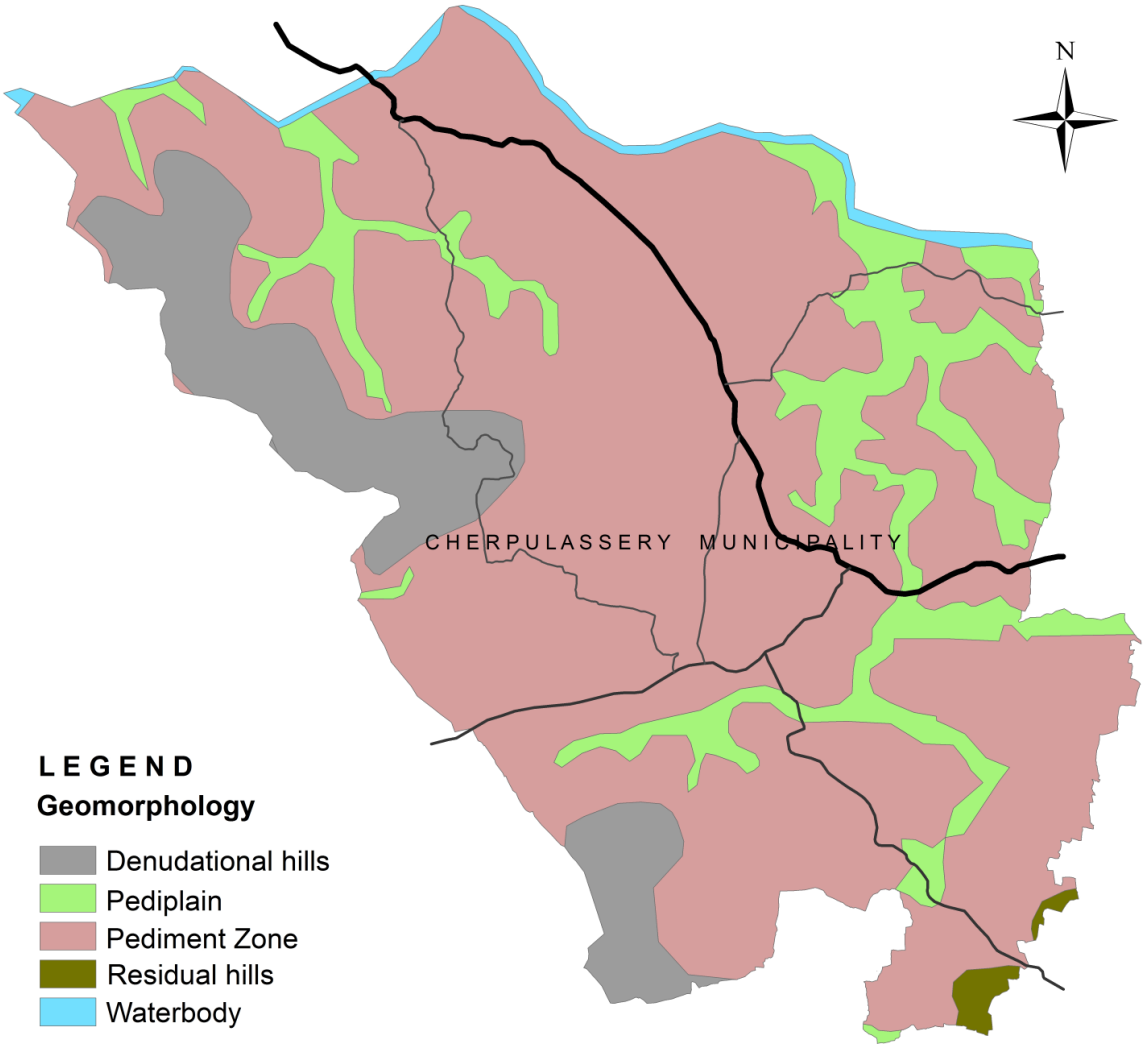


Fig. 2.10 Geomorphology of Cherpulassery Town

Source: http://www.kslublris.com, 2018

2.7 GEOLOGY

The district can be broadly divided into five geological terrains 1) Low land Charnockite group, 2) Migmatite complex, 3) Khondalite group, 4) Wayanad group, 5) peninsular gneissic complex. The Municipal area is covered with Charnockite group of rocks and migmatite complex rocks and basic rocks. About 80% of the area is underlain by Charnockite group of rocks and remaining area is covered with the migmatite complex.

The Charnockite group comprises massive charnockite gneissic, pyroxene granite, pyroxinite and norite and magnetite quartzite amongst which massive charnockite gneissic charnockite is the most widely distributed. The charnockite group is succeeded by the migmatite complex represented by hornblende biotite gneiss and quartzofeldspathic gneiss. They are melanocratic and foliated. These rocks are intruded by pegmatites, quartz veins and gabbro and dolerite dykes.

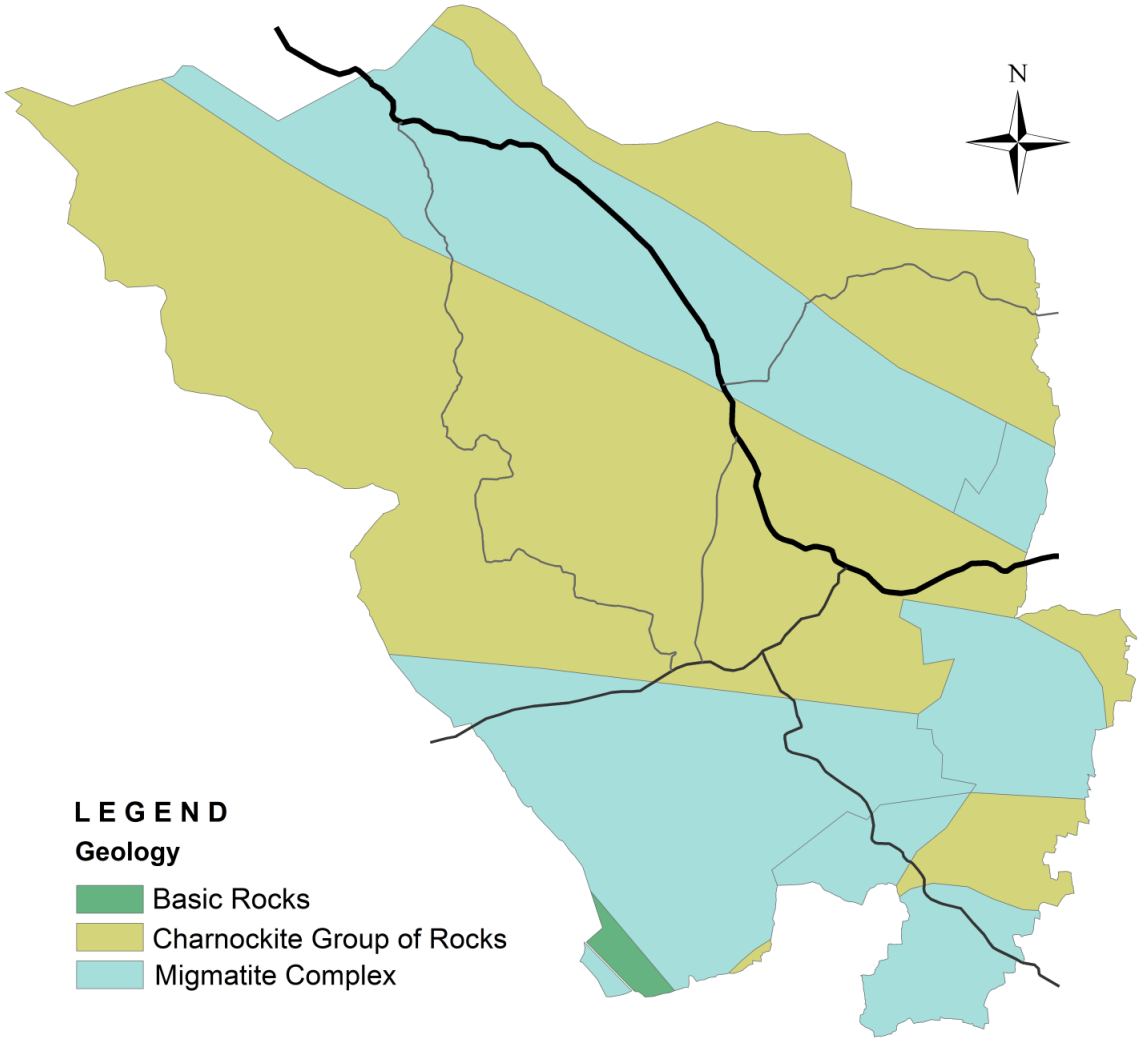


Fig. 2.11 Geology of Cherpulassery Town

Source: http://www.kslublris.com, 2018

2.8 LITHOLOGY

The lithology of a rock unit is a description of its physical characteristics visible at outcrop, in hand or core samples or with low magnification microscopy, such as colour, texture, grain size, or composition. In the study area lithology of rock units covers Charnockite and Hornblende gneiss. The major portion of the area covered with charnakite rocks. The remaining west parts are covered with Horn Blend gneiss.

Charnockite composed mainly of quartz, pertheite or anitperthite and orthopyroxene formed at high temperature and pressure. These are commonly found in granulite facies metamorphic regions as an end member of charnockite series. Hornblende gneiss is a widespread metamorphic rock that is medium to coarse grained and often contains significant amount of quarts and feldspar. (Fig 2.12).

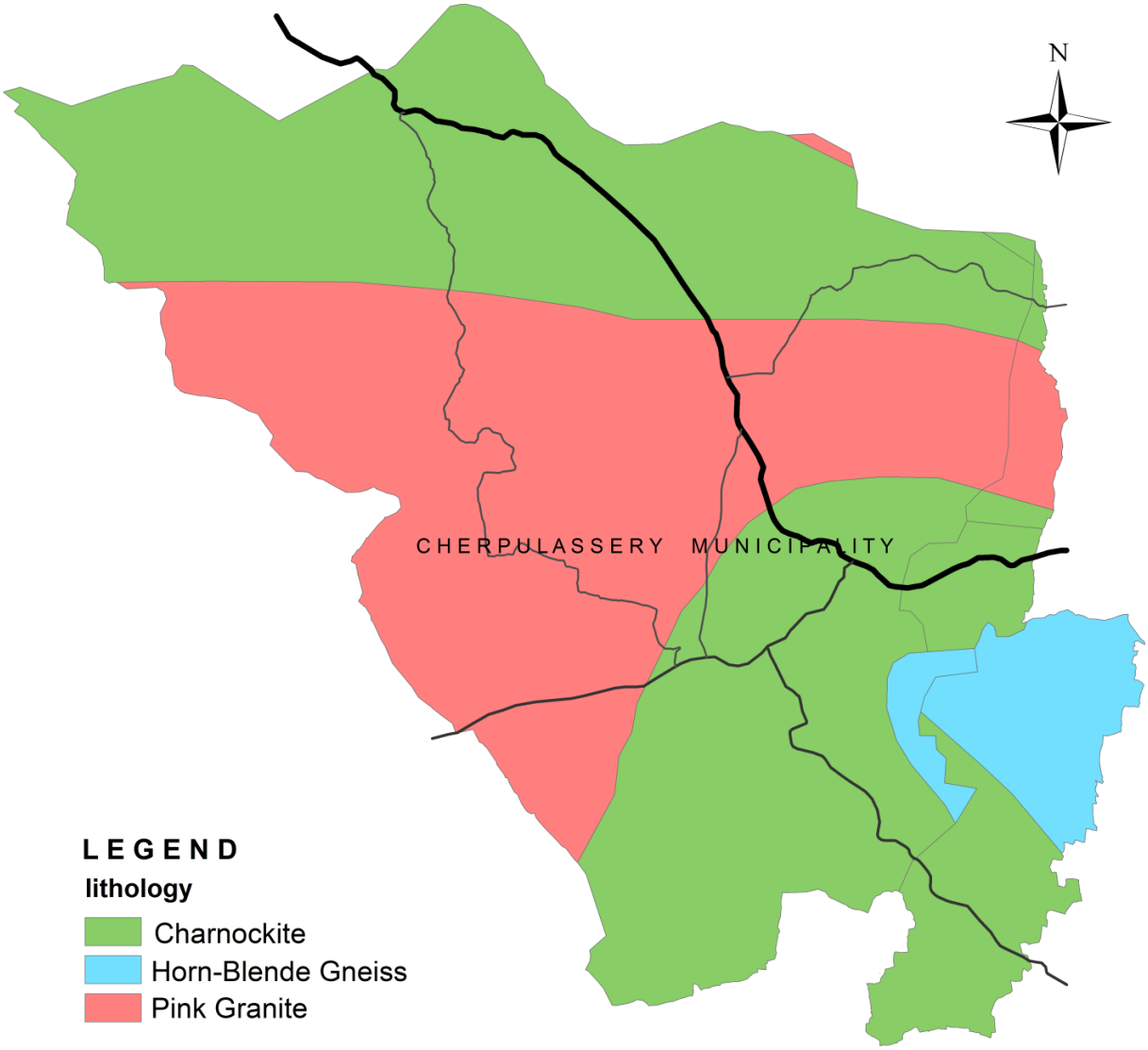


Fig. 2.12. Lithology of Cherpulassery Town

Source: http://www.kslublris.com, 2018

2.9 BIODIVERSITY

The flora of Cherpulassery is characteristically tropical, owing to the seasonal rain-fall and moderate temperature. Some of the dominant trees in the region are Coconut Tree (Cocos Nucifera), Plaintain (Musa Paradisiaca), Mango Tree (Mangifera Indica), Cashew Nut Tree (Anacardium Occidentale), Jackfruit Tree (Artocarpus Heterophyllus) and Bamboo Palm (Rhapis excelsa). Plain lands are utilised for Paddy cultivation. No animal can be mentioned peculiar to this area. Birds like Crows, Pigeons, Sparrows, Woodpeckers, Kingfishers, Parrots, Myna, etc. are seen in all areas.

2.10 HISTORY/EVOLUTION AND GROWTH

2.10.1 History of Governance

The name Cherpulassery came from "Chera Pulla Cherry" which means the place where the sons of Cheras lived. Cherpulassery was part of Valluvanad dynasty having an ancient history going back to the days of the Second Chera Empire. At one point of time, the Valluvakonathiri exercised sovereign powers over a considerable portion of South Malabar. Valluvanad comprised the whole of the Perinthalmanna and Ottapalam taluks and also parts of Ponnani, Tirur and Eranad taluks. When Zamorins (Samoothiri) of Calicut became a major force on the western coast, they captured a large portion of Valluvanad. Till then Valluvakonathiri was the strongest of the kings and had the right of presiding over the Mamankam Festival held once in 12 years at Thirunavaya. This right was usurped by Samoothiri, when he captured the town in the latter half of the 13th century.

The severe and frequent wars on Valluvanad by the Zamorin continued. Even after the loss of his ally Kochi Raja, Vellaattiri did not submit to Samoothiri. By now all that was left to Vellaattiri were Attappadi valley, parts of Mannarkkad, Ottapalam and Perinthalmanna. Zamorin invaded these territories but could not make much progress, because these regions were sparsely populated and most parts were dense forests and hills. It was impossible for Zamorins's large army to march forth through these areas. The fights with Vellaattiri's men became more and more difficult for Zamorin. Vellaattiri's smaller army in turn made the most of the landscape and successfully kept the armies of Zamorin at bay.

Meanwhile Tippu Sultan, Mysore King planned to expand his territories and set his eyes upon Travancore, which according to the Treaty of Mangalore, was an ally of the British East India Company. He launched an attack on the lines of Travancore in December 1789 but was met with resistance from the army of the Maharajah of Travancore. This marked the beginning of the Third Anglo–Mysore War. Later during the Mysore invasion, Valluvakonathiri sought asylum in Travancore. The Maharajah of Travancore appealed to the East India Company for help, and in response, Lord Cornwallis

formed alliances with the Marathas and the Nizam of Hyderabad to oppose Tipu and built a strong military force. The company forces attacked Tipu Sultan in 1790 and soon took control over much of the Coimbatore district. Tipu counterattacked, but was not much successful in his campaigns.

The conflicts continued for over two years and ended only after he signed the Treaty of Seringapatam in 1792 which resulted in his losing a number of territories, including Malabar and Mangalore. On the cessation of Malabar to the British by Tipu Sultan, Vellaattiri entered into an agreement with the British, and Malabar District became a part of British India. On the 21st May 1800 Malabar became a part of Madras Presidency under the administration of Principal Collector as District Administrator and under his control two sub collectors were appointed with their administrative headquarters at Cherpulassery and Thalasseri. Malabar district was subdivided into Taluks, Cherpulassery became Head quarter of Valluvanad Taluk and later taluk head quarter changed to Perinthalmanna (3km from Angadipuram).

Even though District could achieve significant progress in various fields under British Administration, the period also witnessed some of the violent disturbances known as 'Mappila Riots'. Those outbreaks took place in various parts of Valluvanad and Eranad taluks. The formation of Congress organisation and the first Malabar district conference held at Ottappalam on 23rd April 1921, was an important turning point in the political movement of the country. The active participation of people of Cherpulassery in freedom struggle carried on till the achievement of Indian independence on the 15 th August 1947. Consequent to the formation of the states on the linguistic basis under the State Reorganisation Act, 1956, On 1st January 1957, Malabar District trifurcated into three districts viz. Kannur, Kozhikode and Palakkad. Palakkad District thus formed consisted of old Valluvanad Taluk, Palakkad taluk, portion of Ponnani taluk of Malabar District and Chittur taluk of erst while Travancore Cochin state. On the same day Valluvanad Taluk was bifurcated into Perinthalmanna and Ottappaam Taluk. In 1960 Kerala Municipality Act came into effect.

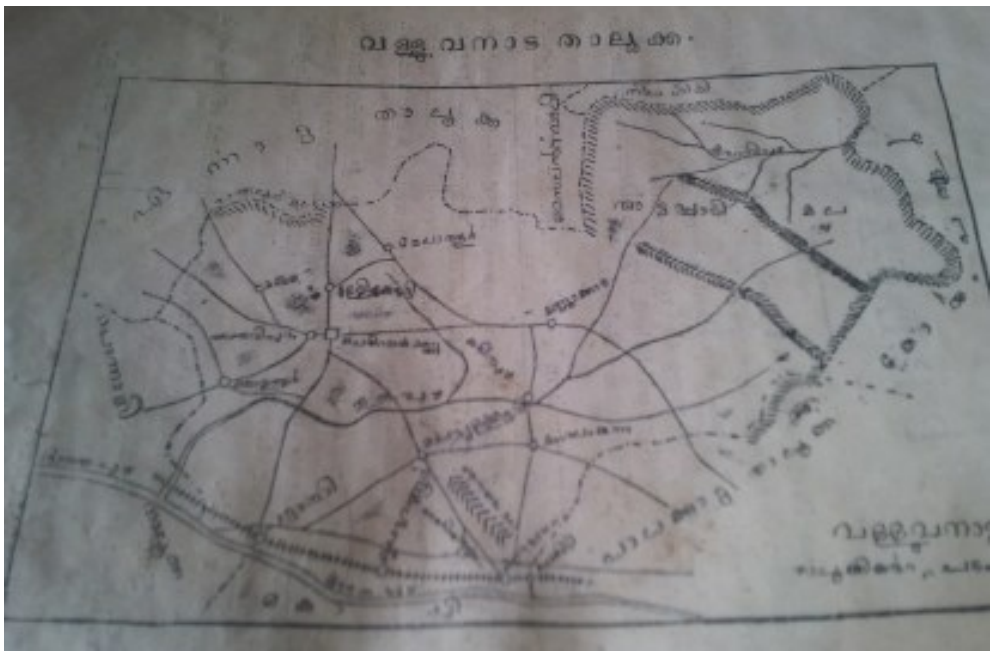
The history of governance of Cherpulassery town begins with the formation of the erstwhile Cherpulassery Panchayat in 1964. Panchayat was divided into 8 wards in 1964 and increased to 10 wards in 1991, 14wards in 2001 and 18 wards in 2005. Cherpulassery Municipality was formed vide GO(P) No 152/2015/LSGD dt 30/1/2015 comprising Cherpulassery Grama Panchayat and wards 14,15,16 of Thrikkadeeri Grama Panchayat. First Municipal electoral body in Municipality took charge in 2015 and there are 33 numbers of Municipal wards.

2.10.2 History of Development

Eight middle schools were established by Malabar District Board during 1870 - 75

period. One among them was in Cherpulassery which was later upgraded to High school in 1921 and later shifted to new building in the valley of Adikunnu. One "Dharmasupathri" was started in 1938 in a rented building along the side of Ottapalam road and later shifted to old school building. First Post office started functioning in 1938. In 1948, Service of a Veterinary doctor made available to Cherpulassery. Panangattu Bhavanam was electrified in 1959, first electrified building in Cherpulassery. First bus service was started in 1922 from Thoothakadavu to Palakkad and from Kacherikunnu to Ottapalam. Bridge across Thootha river was constructed in 1939.





2.10.3 Socio-Cultural History

When Valluvanad Taluk was constituted, Cherpulassery was its head quarter with Taluk Kacheri and Mussavari bungalow buildings amongst the prominent social structures and that area came to be known as "Kacherikunnu "which also happened to be the old trade centre of Cherpulassery.

The socio-cultural landscape becomes clearer on delving upon the Nationalist movement aspect. Malabar was the nerve centre of national movement in Kerala. The people of Cherpulassery was not averse to such movements and their support and participation attracted father of our nation Mahatma Gandhiji. One such prominent figure who had to undergo great pain for conspiring against British government was Sri Mozhikunnam Brahmadathan Namboodirippad. Born to a vedic scholar, Brahmadathan Namboodirippad was well versed with Sanskrit and Vedas and had the recognition of contemporary vedic scholars. Brahmadathan was strongly attracted to the youth movement that directed its efforts against social evils and advocated for social reforms. He went onto become the president of Cherpulassery unit, Indian National congress.

However, his rebellious path against the government made him a symbol of annoyance. As Khilafat movement endorsed the national movement by INC, government efforts were keen to brand this as a Mappila rebellion and its supporters as traitors. Taking cognisance of this, government arrested Brahmadathan and dragged him behind a horse carriage for 14km from his house to Kulam market. Later he had to undergo severe torture at the Coimbatore and Bellary Jails after which he was exonerated. However, he faced excommunication upon returning to his native place which pushed him to settle down in Pattambi.

Another instance of Cherpulassery stamping its signature in the annals of history was when the first conference of Kerala Provincial Congress Committee took place at Ottapalam on April 23, 1921. This gave inspiration to freedom fighters of Cherpulassery also. On August 23,1921 rebellions crossed Thootha River, entered Cherpulassery. They attacked and took control of Kacherikunnu police station, and Hajoor Kacheri. Kakkathodu bridge was destroyed to check the entry of British army. Soon Malabar also plunged in to the vortex of an active movement inspired and led by Mahatma Gandhi that included agitation against untouchability and the task of Harijan upliftment. Gandhiji visited Cherpulassery and people of Cherpulassery gave him a warm welcome in High school premises.

Some of the other luminous instances where Cherpulassery bore a punctuation includes:

Guruvayur Satyagraha, a temple entry movement for the lower castes was an important nationalist campaign against untouchability in Malabar. As part of its campaign work,

Comrade E K Gopalan delivered a speech in Cherpulassery.

In 1932, silver jubilee celebration of Namboothiri Yogakshema sabha organised by KNS Namboothiri in Karalamanna. Reform movement of Namboothiri community and Namboothiri women emancipation movement were the highlights.

Visit by social reformer Vinobha Bave who initiated Bhoodan movement had its reflections in Cherpulassery. A few wealthy landowners voluntarily gave a certain percentage of their land to the landless people.

- **Art and Literature**

There is significant number of artistes in Cherpulassery who are known for their contributions to the traditional classical art forms of Kerala. Cherpulassery has given birth to several Kathakali artists, in earlier times they were supported by the ten art-patronising Namboodiri Manas. Famous celebrities in Kathakali are Vazhengada Kunju Nair, Kottakkal Sivaraman, Sadanam Krishnankutty Narippara Narayanan Namboothiri, Sadanam Basi, Kalamandalam Rajendran etc.

Karalamanna was also the birthplace of the late actor-dancer Thekkinkattil Ramunni Nair, a disciple of Pattikkamthodi Ravunni Menon who rewrote the grammar of the Kalluvazhi style of Kathakali and refined its aesthetics. Among the Kathakali artistes of today from Karalmanna are Narippatta Narayanan Namboodiri and Sadanam Bhasi, besides Narippatta Raju, more known for his expertise in lighting theatre stages.

Karalmanna hosts several seminars and workshops on Kathakali and allied classical arts, hosted by local cultural forum called Vazhenkada Kunchu Nair Memorial Trust. The contributions of Sri Cherpulassery Sivan as a Maddalam exponent and an artiste who helped advance classicism and the aesthetics of the traditional musical ensemble, panchavadyam is also remarkable. He had inherited his talent for percussion from his maternal grandfather Vaalparambil Kunhan Nair and uncle Aalukkal Govindan Nair who were also residents of Cherpulassery.

Artists Smt Bhargavi amma, Sri Gopalakrishnan, Sri Sreedharanunni, Sri Narayanaswami, Smt Sadanam Lakshmikutty, Smt Kalamandalam Suseela had contributed greatly in various art forms like music, dance and drama. Karalmanna was the native village of the late artist Athippatta Sivaraman, simply known as A.S. Nair or A.S., whose illustrations in the Mathrubhumi azchchappathippu, a reputed Malayalam weekly, during the 1980s and 1990s won him wide acclaim. Sri Ramanunni is also renowned person in art and sculpture work.

Smt Rajalakshmi was a Malayalam writer and poet. She was born at Amyottu Kurissikalam Cherpulassery. As a notable writer she won the Kerala Sahithya Academy Award in 1960 for her work *Oru Vazhiyum Kure Nizhalukalum* Scholar and Poet Sri

Avinashi Ezhuthachan was also born and lived in Cherpulassery.

Other art forms of this area are Pulluvan pattu, Sarpam thullal of Pulluvar community Thuyilunarthupattu by Panan Committee during Onam season, Poothan and Thira by Mannan community. Other important items in connection with Vela are Bhagavathy pattu using "Nanthurnni", Kalamezhuthu pattu, Theeyattu, Pana Andinayadi, Chappila bhootham, Kaivela, Kuravan and Kurathi, Kali etc.

- **Cultural institutions and Festivals**

Festivals of Devi temples of this area, Thootha, Puthanalikkal, Panniyamkurissi Kavu, Aramkunnath kavu, Arekkavu are main celebration of local people. Valluvanadan art forms like Poothan and Thira is a ritualistic art form found in the South Malabar region of Kerala are related to the festivals of these temples, in which people dance in costumes representing Poothan, Shiva's lieutenant, and Thira, the goddess Kali, to the accompaniment of drummers.

Kalevala, Kalakali and other similar names, Kalakettu is performed coinciding with the Bhagavathy Kavu festivals, a festival of the farming community. Huge idols of bulls made of cloth and hay, decorated exquisitely and adorned with garlands the huge bulls are supported by many on their backs and taken to the grove (Kavu); to the accompaniment of screams of joys and rhythm the bulls are taken out in a procession. Depending upon the location of a performance, the shape and decorations differ. The decorated bull is taken out in a procession by the people. This is known as kettukazhcha.

The 'kazhcha' is taken to functions associated with the temple and neighbouring areas. Athirvela is another ritual associated with farming performed here. All these rituals reflect man's admiration and submission to nature and Earth.

Kavu festivals of Valluvanad begins with "Ucharal Vela" of Puthalakkal Kavu, Cherpulassery. Tholpavakoothu or shadow puppetry is also a speciality to this temple festival. Cherpulassery Ayyapankavu is often referred to as the **Sabarimala of Malabar**. The Ettam (eight) Vilakku festival at the temple is well known and usually attracts pilgrims from across the region.

Karal Manna Siva Temple is another important temple of this area. Temple art forms like Kathakali, Koodiyattom, Chakyarkoothu are performed here in festival season. Mariyamman kovil of Karumanamkurissi Muthaliyar theruvu, Panniyamkurissi Murukan kovil Mariyamman pooja, Thaippoya theru are celebrated here.

Sree Thootha Bhagavathi Temple is one of the main Bhadra Kaali temples of Old Malabar and is located by the side of the Thootha river which serves as the boundary between the districts of Palakkad and Malappuram. The temples and sacred groves are known for its unique festivals. Two major festivals at each end of the river are

namely kalavela and Thootha pooram. The festival season of Valluvanad concludes with the pooram of the Thootha Bhagavathy Temple, which attracts hordes of devotees. This pooram falls on April on every year. The festival will see 50 caparisoned elephants paraded in grand procession.

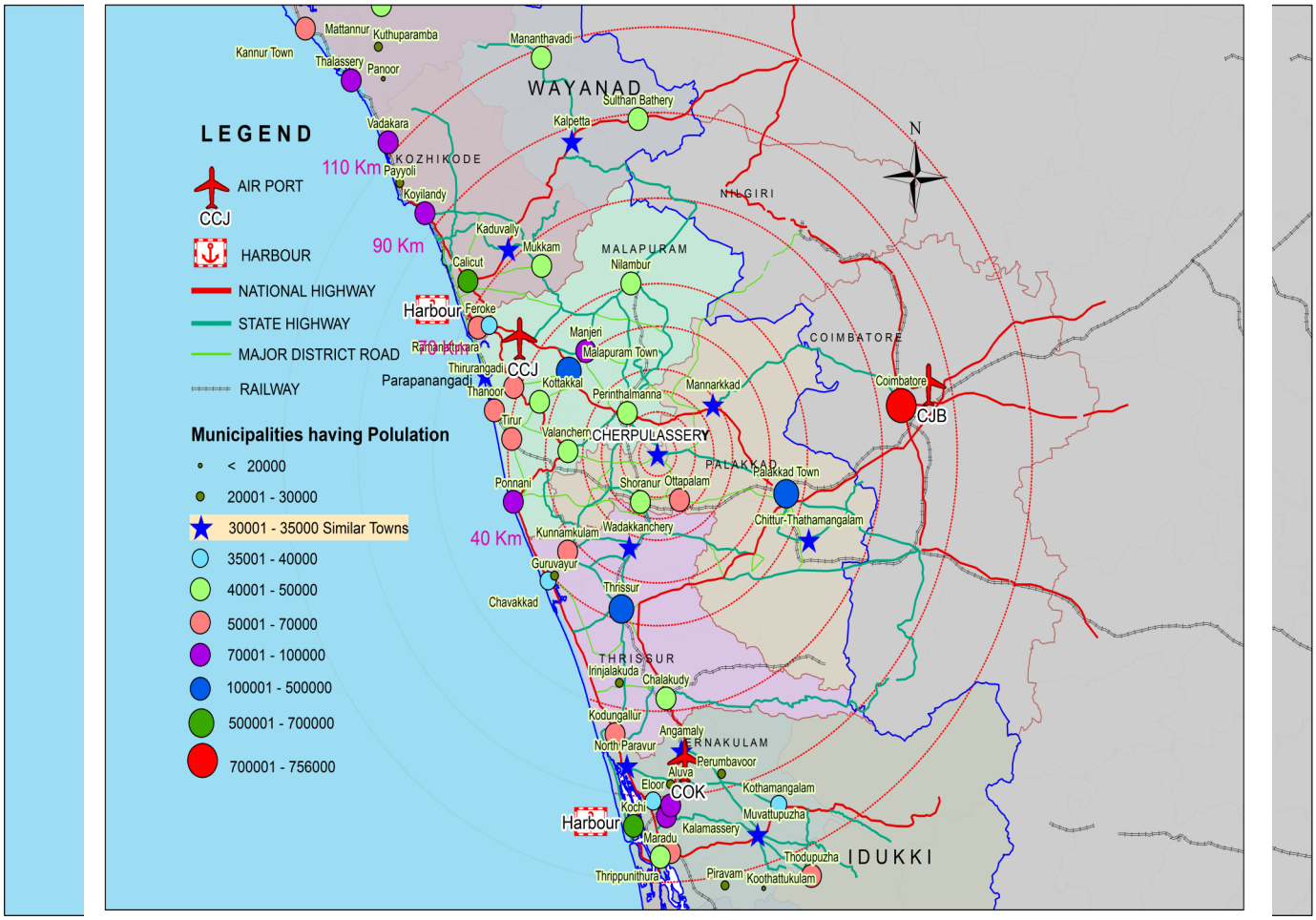
Major Muslim mosques are Cherpulassery Kacherikunnu palli, Karalmanna Juma Masjid, Eliyapetta Mayyathumkara Palli, Puthiyappali at Cherpulassery Town. Andunercha of Arabithangal Uppappa of Kacherikunnu Mosque and Andunercha of Mayyathumkara mosque are important festivals related to these religious institutions.

- **Natural Resources**

The Thoothapuzha, otherwise known as, Pilanthol River, starts from the Silent Valley Hills and joins the main river about two kilometres of Pallipuram Railway Station. The important streams which feed this tributary are Kunthipuzha, Kanhirapuzha, Ambankadavu and Thuppanadipuzha.

2.11 REGIONAL SETTING

The regional setting of a Town can be arrived from the Regional Plan which spells out hierarchy of the town in the District Scenario, the activity of the town has to per-



form and its connectivity with different settlements. In Palakkad district, there are a total of 7 statutory urban bodies namely Palakkad, Shoranur, Ottapalam, Chittur-Thathamangalam, Pattambi, Mannarkad and Cherpulassery. Regional linkage of the Cherpulassery town with surrounding district/ state and its regional setting within the district are detailed below. Fig. 2.13 shows regional linkage of Cherpulassery town.

2.11.1 Regional Connectivity

While Thrissur, the cultural capital of Kerala is located at about 50 km south of Cherpulassery town, Palakkad district head quarter is located at about 55 km east of the town. Kochi - the queen of the Arabian sea is seated at a distance of 140 km and Kozhikode is 85 km far from the town. It also has Coimbatore, the industrial metropolitan city located at a radius of 100 km east of town.

The location of the town in the district has strategic importance as it is a major transit centre between Malappuram and Palakkad. Cherpulassery municipality is having a good connectivity to neighbouring LSGIs and other parts of the state. The State highway (SH53) Perinthalmanna-Palakkad connects NH966 at Mundur and SH23 or SH39 at Perinthalmanna. Perinthalmanna town being one of the 1st order municipality in Malappuram district. Fig. 2.14 shows regional connectivity of Cherpulassery town.

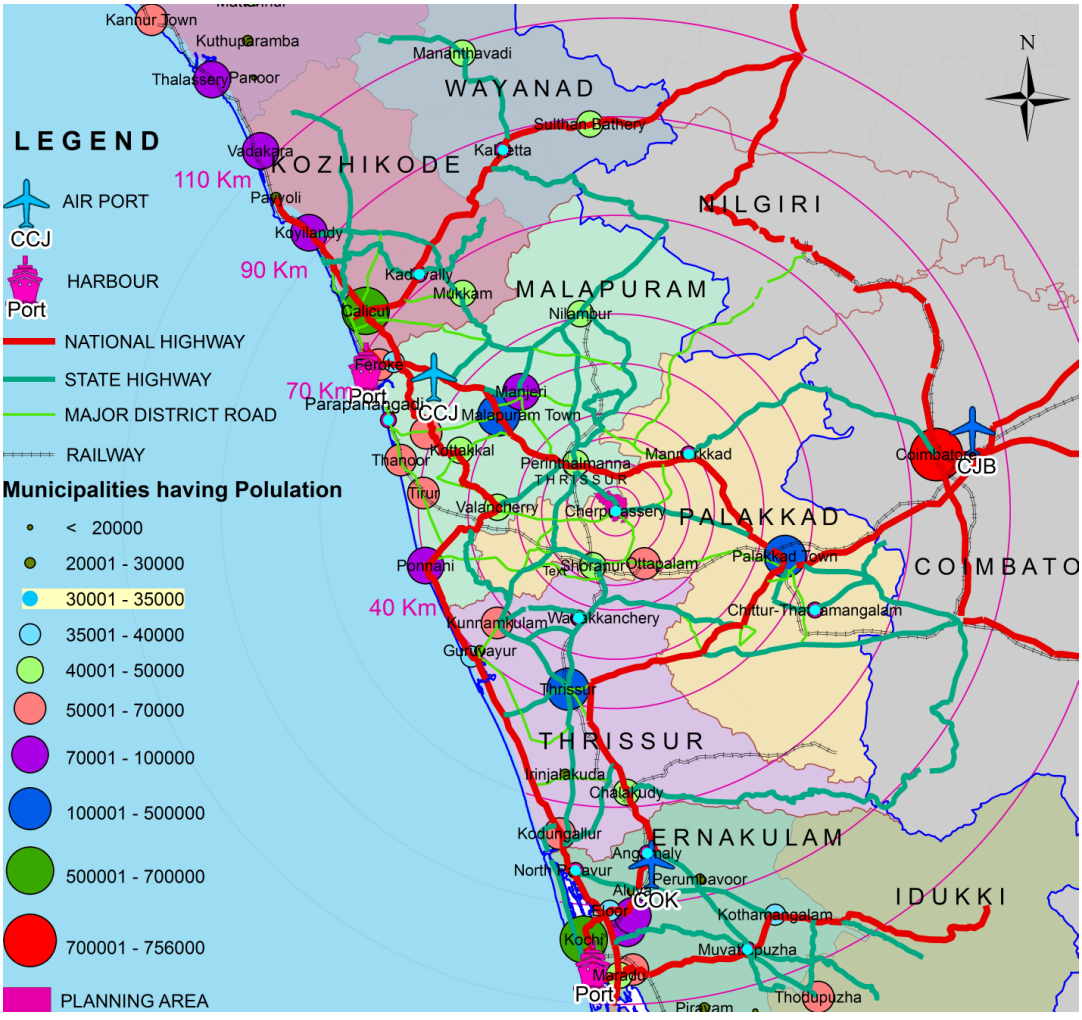


Fig. 2.14 Regional Connectivity

The Cherpulassery town is at a distance of 16 km from Perinthalamanna town, taluk head quarter and major town in Malappuram District. Ponnani harbour is located at a distance of 50km west of town. Other towns of district Pattambi, Shoranur and Ottappalam are within 20km radius of town. Nearest railway stations are at Pattambi, Shoranur and Ottappalam. The nearest airport is Kozhikode international airport situated at a distance of 60 km from the town.

The state highway 53 from Palakkad to Perinthalmanna and the major District Road Cherpulassery - Pattambi meets at Kacherikunnu junction. The Cherpulassery-Pattambi road meets other Major District Road Ottapalam-Cherpulassery at Central junction. These roads are dividing the town in to four Quadrants at the centre of the town.

The Town act as an important trade centre for surrounding local bodies. Pattambi -Cherpulassery road, Ottapalam–Cherpulassery road are the major district roads connecting Cherpulassery town to nearby municipalities. Cherpulassery – Karalman (Bypass), Cherpulassery – Panniyamkurissi – Thootha Puzha road, Eliyapetta (Ottapalam road) - Chalavara passing through the municipality helps to improve connectivity to nearby local bodies Fig. 2.15 shows the existing road network.

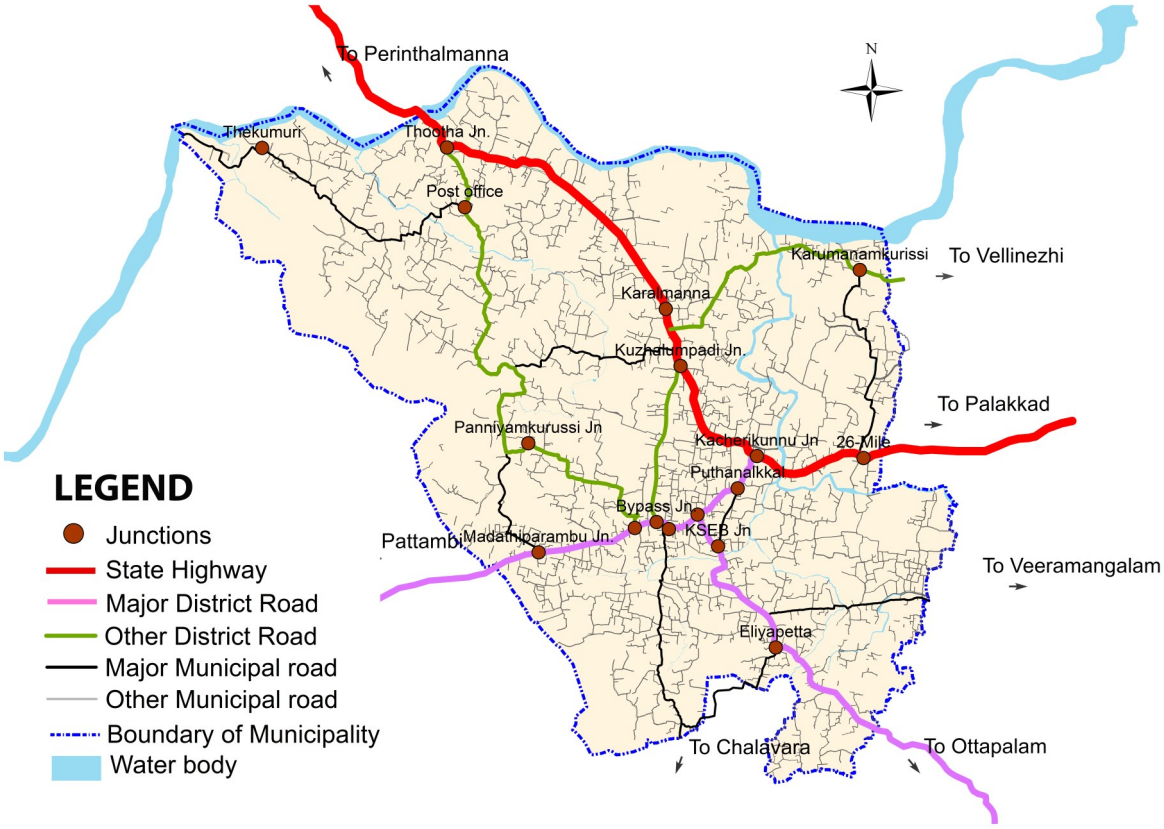


Fig. 2.15 Existing Transportation Network

2.11.2 Hierarchy of Settlements based on Integrated District Development Plan (IDDP)

The hierarchy of settlement in the district, the activity pattern of the town and its connectivity with different nearby settlements are the major factors that determines the regional settings of the municipal town. The District Spatial Plan 2011 prepared by the Town and Country Planning Department, details the functional importance and specific role of every local body in the district. After studying the various aspects and urban parameters, it focus in on the concentration pattern, functional character, hierarchy of settlement and urban profile of local bodies.

As per the settlement analysis of IDDP, the settlements of the district are grouped in to four hierarchies. The Palakkad Municipality is the first order settlement. Alathur, Shoranur (M), Mannarkkad, Chittur-Thathamangalam (M) are proposed second order settlements. Cherpulassery was suggested as a third order Settlement (service centre) and supposed to provide higher order facilities to the LSGIs in the respective service areas (Vellinezhi, Thachanattukara, Thrikkadeeri, Nellaya, Kulukkallur). Fig 2.16 shows the hierarchy of settlements.

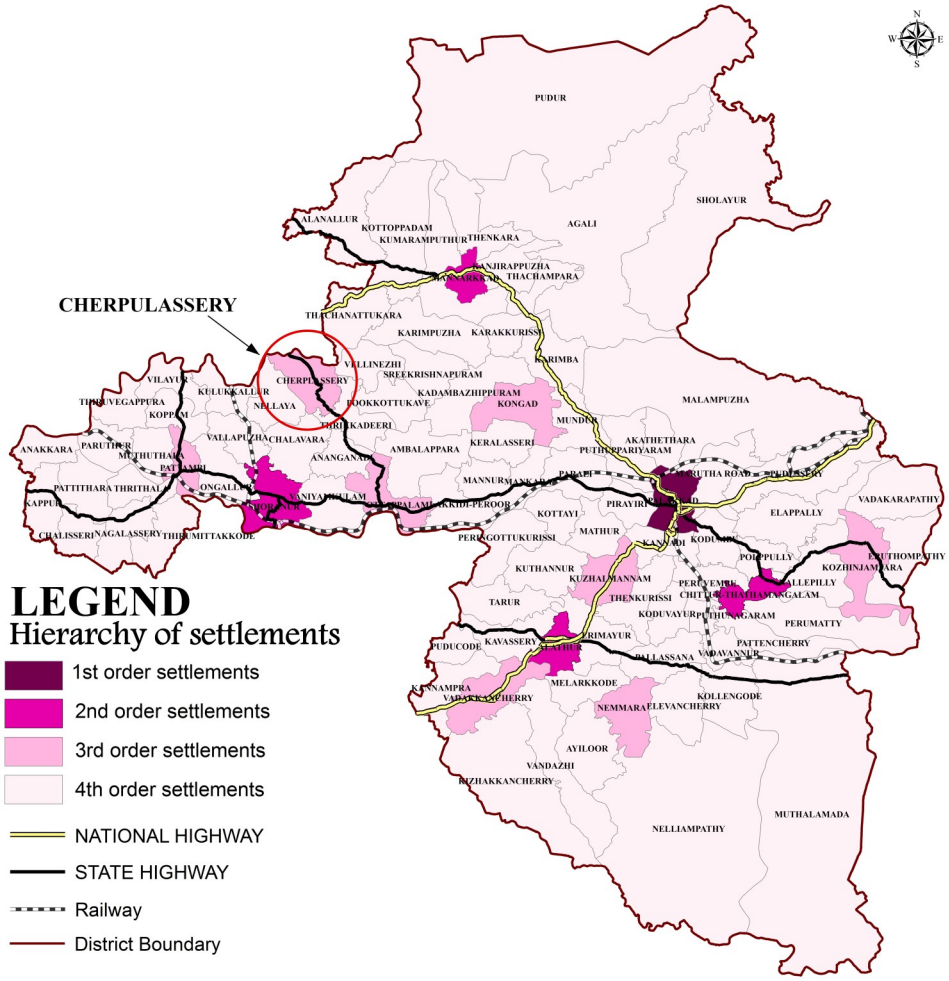


Fig. 2.16 Hierarchy of Settlements in Palakkad District

Source: IDDP, Palakkad ,2013

2.11.3 Functional Character

The spatial distribution of the settlements based on its character shows a clear demarcation in the pattern of the settlements into Urban, Semi Urban, Semi Rural and Rural. Cherpulassery municipality falls under rural settlement. But in the District Plan 2018, a study conducted by Town and Country Planning Department, the character was changed as urban settlement. (Fig 2.17)

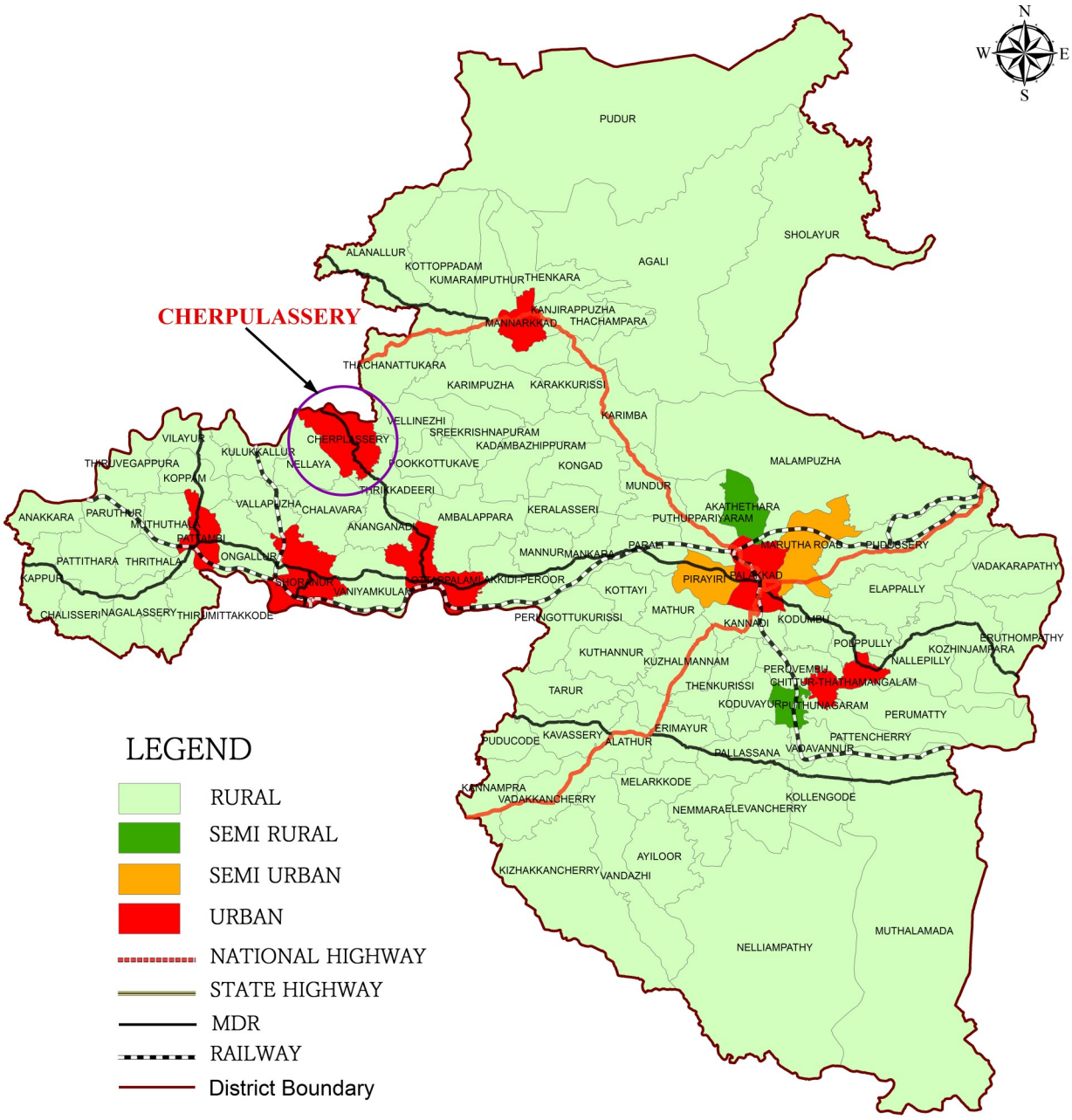


Fig. 2.17 Functional Character of Settlements In Palakkad District

Source: IDDP, Palakkad,2013

2.11.4 Future Urban Profile

In IDDP (Integrated District Development Plan) Palakkad-2013 report, the future urban profile of the district is derived through sequential analysis through four criteria viz. Census urban, existing physical and economic development, perspectives in urban development and finally proposed hierarchy of settlements. The study reveals that the Cherpulassery municipality is having an urban profile and suggested as third order settlement within the district. Hence the municipality has to be upgraded and developed as third order settlement for serving the local region. (Fig. 2.18)

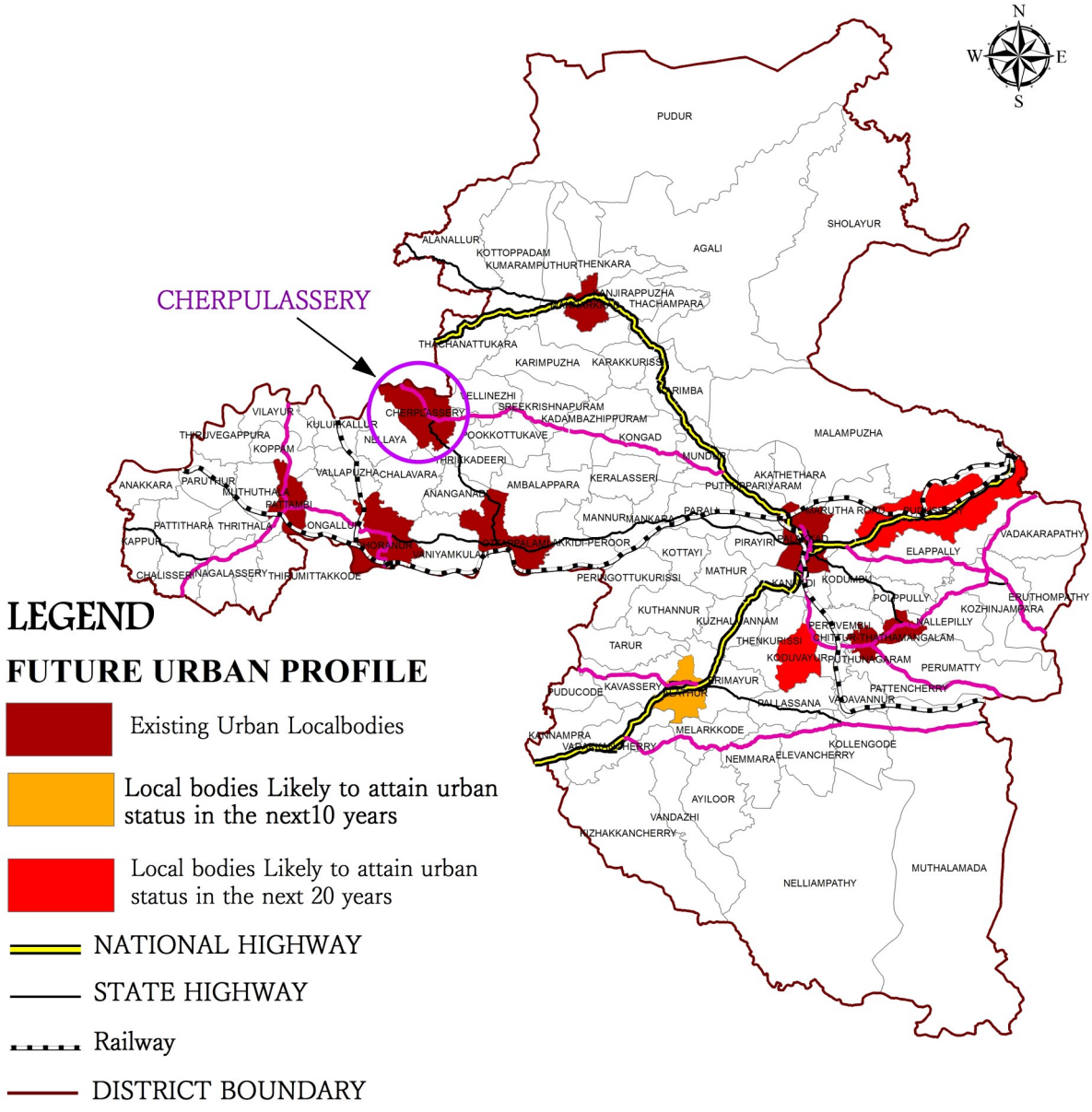


Fig. 2.18 Future Urban Profile of Palakkad District

Source: IDDP, Palakkad,2013

2.11.5 Activity Pattern

The Activity Pattern of the district is analysed based on the land use concentration pattern, functional character and future urban profile. Accordingly the major activities of the settlements of the district are identified to be urban activity, primary activity, secondary activity, agriculture and allied activity or activity non detrimental to forest. The final activity pattern of the district emerging out by superimposing the activities is shown in figure 2.19. Cherpulassery municipality shows the activity pattern as Primary.

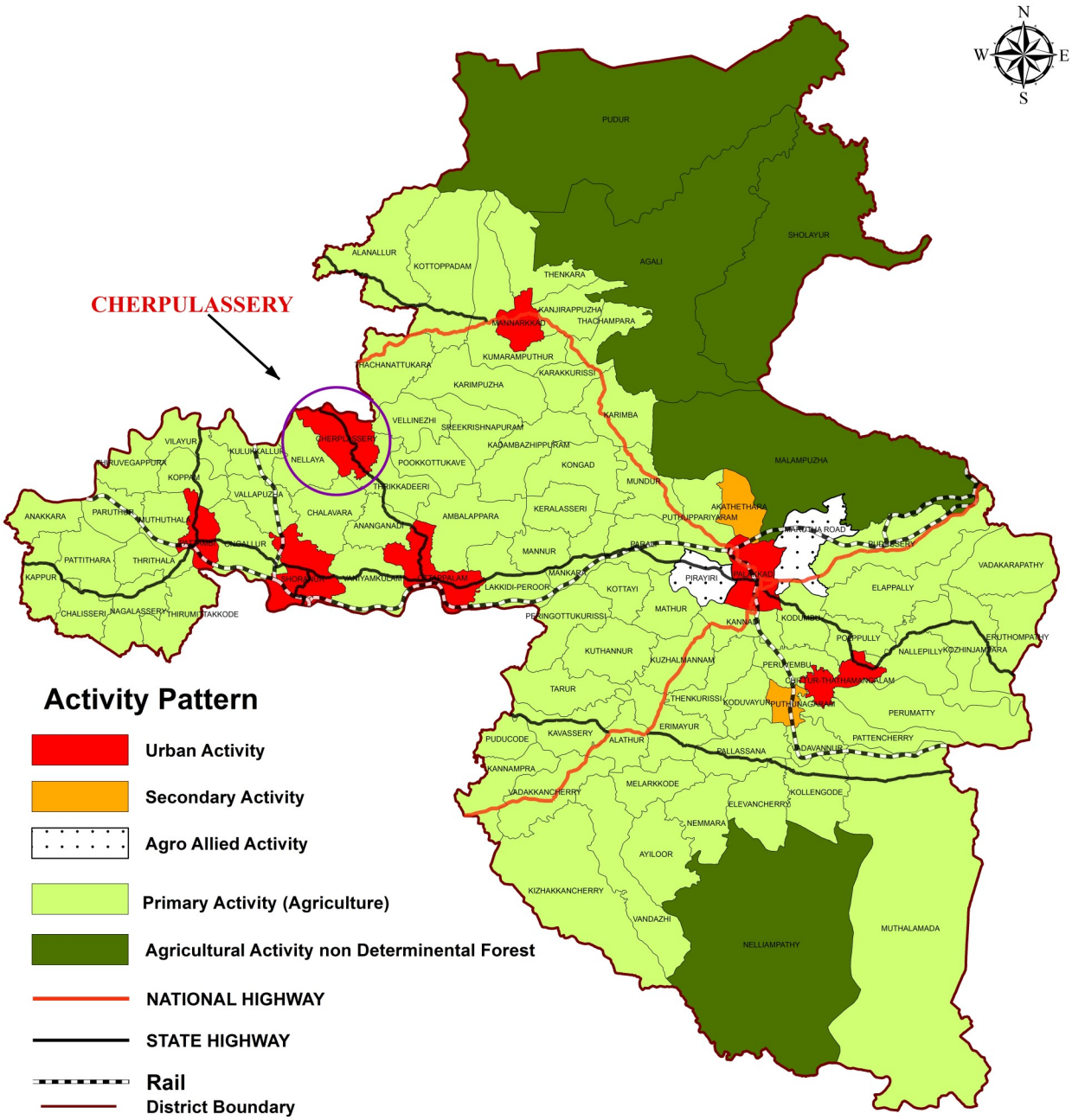


Fig. 2.19 Activity Pattern of Settlements in Palakkad District

Source: IDDP, Palakkad, 2013

2.11.6 Development Concept

The spatial structure of the district is evolved by integrating the activity pattern, regional connectivity and hierarchy of settlements. The development concept of the district is formulated by synthesis of findings of studies in the orbit of goals and objectives over the district platform. The development concept will provide the required frame work for integrated development of the district. As per development concept of IDDP (Fig 2.20), Cherpulassery Municipality comes under Multi functional Zone (2nd Order) and should act as a service centre for the hinter land and this zone is considered very much suitable for industries utilizing agricultural produces of hinter land. Second order urban facilities are to be provided in this zone.



Fig. 2.20 Development Concept

Source: IDDP, Palakkad, 2013

2.12 SERVICE AREA OF CHERPULASSERY TOWN

Based on the Hierarchy of Settlements derived out in the "Integrated District Development Plan" Cherpulassery Municipality comes as the one of the third order settlements in the district. Service area of Cherpulassery Municipality includes the following LSG's and its area and population is shown in Table 2.2 and in Fig 2.21. The service population of the Cherpulassery town being a third order settlement in the district is 1,69,448 .

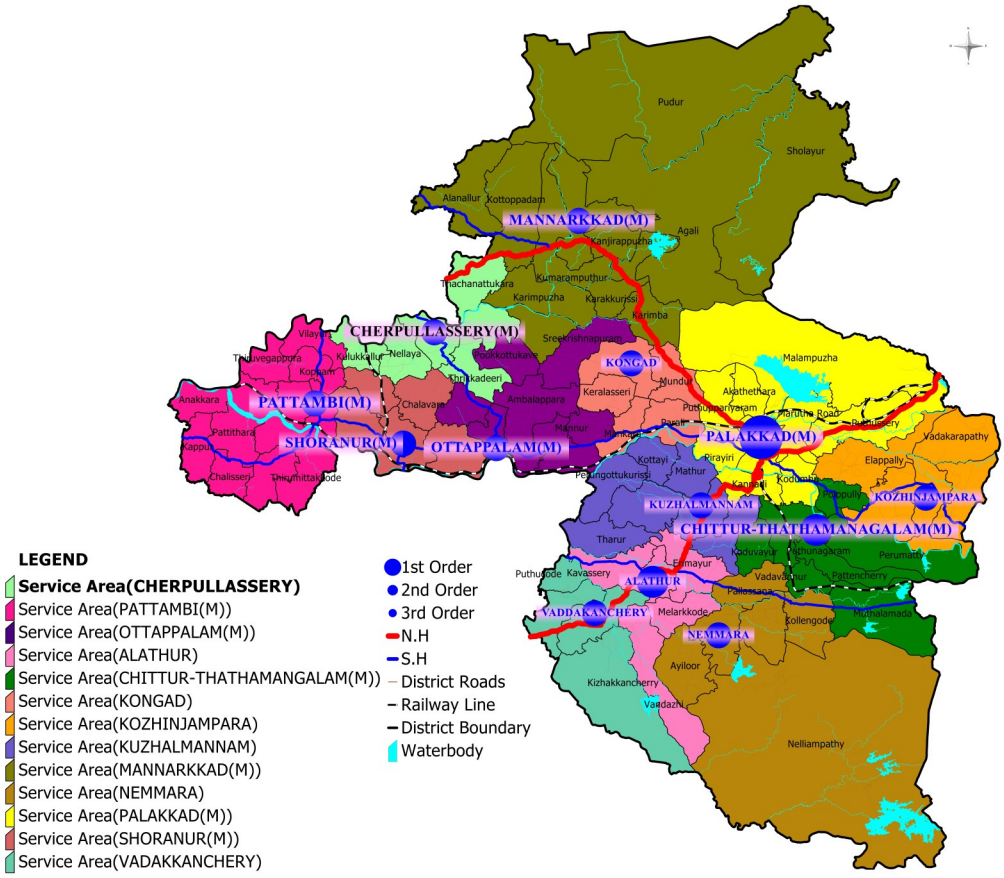


Fig. 2.21 Service area of third order settlements as per IDDP

Source: District Spatial Plan, Palakkad, 2011

Table 2.2 Area and population of LSGs included in Service area of Cherpulassery Town

Sl No	Name of LSGI	Area in Sq Km	Population			
			1981	1991	2001	2011
1	Vellinezhi	26.86	13970	15649	16768	17101
2	Thachanattukara	35.04	15432	19835	23755	26669
3	Thrikkadeeri	22	15099	17834	19855	22320
4	Cherpulasseri	31.88	25302	30490	34593	39241
5	Nellaya	27.41	23226	27714	32056	36146
6	Kulukkallur	22.89	17989	22193	25816	27971

Source: District Spatial Plan, Palakkad,2011

2.13 CHERPULASSERY TOWN AND ITS IMMEDIATE INFLUENCE ZONE

There are five panchayats which surround Cherpulassery town. The surrounding panchayats are Vellinezhi, Thachanattukara, Thrikkadeeri, Nellaya, Kulukkallur. Table 2.3 gives the demographic details of the immediate influence zone.

Table 2.3 Demographic Details of Immediate Influence Zone

Sl No	Name of LSGI	Area in Sq Km	Population				Population Density				Growth rate		
			1981	1991	2001	2011	1981	1991	2001	2011	1981-1991	1991-2001	2001-2011
1	Vellinezhi	26.86	13970	15649	16768	17101	520	583	624	637	12.02	7.15	1.99
2	Chalavara	27.9	16558	19273	21042	23466	593	691	754	841	16.40	9.18	11.52
3	Thrikkadeeri	22	15099	17834	19855	22320	686	811	903	1015	18.11	11.33	12.42
4	Cherpulasseri	31.88	25302	30490	34593	39241	794	956	1085	1231	20.50	13.46	13.44
5	Nellaya	27.41	23226	27714	32056	36146	847	1011	1170	1319	19.32	15.67	12.76

Source : Census 1981, 1991, 2001, 2011

The population of Cherpulassery and its immediate influence region grew from 94,155 persons in 1981 to 1,38,274 persons during 2011 constituting a growth rate of 17.85 % during the decade of 1991-2001 and 11.23% during 2001-2011.

Regional setting studies conducted in connection with preparation of Master Plans for towns in the district, documented as District Spatial Plan as well as draft IDDP for the district, reveals that all the adjoining panchayats exhibit rural nature. Cherpulassery Town has good road connectivity to adjacent local bodies and to District head quarter. Due to this connectivity with all the adjoining areas, all neighbouring LSGI's depend on Cherpulassery Town for their daily needs. The economy of Cherpulassery Town is characterized by primary activity and its immediate influence zone is also characterized by primary activities like agriculture.

Fig 2.22 shows a pictorial representation of Activity Pattern of Cherpulassery Town and surrounding local bodies. From these data, we get a clear view of the primary character of Cherpulassery Town. All the neighbouring LSGI's shows Primary activity , fall under primary activity zone. It can be seen that the immediate surrounding settlments show non-urban nature. Hence the planning area for Master plan was confined to Cherpulassery Municipal area.

2.14 INFERENCE

Based on the Hierarchy of Settlements derived out in the Integrated District Development Plan for Palakkad, Cherpulassery Town is one of the third second order settlements in the district. The service population of the town being a third order settlement in the district is 1,69,448. Hence development of Cherpulassery Municipal area with more improved infrastructural facilities and job opportunities are required to satisfy the needs of the increasing population. Since none of the neighbouring LSG's



Fig. 2.22. Activity Pattern of Cherpulassery and Surrounding LSGI's

show urban character, the Master Plan area is delineated to be the Cherpulassery Municipal Area.

The analysis of Regional linkage of the town with surrounding District/State and Regional setting of the town within the district based on the "Integrated District Development plan" clearly points out the fact that the Cherpulassery municipality is well connected with surrounding District/State, Airport, Port, tourist spots, growth centres within the district by road and rail network.

The analysis also reveals the fact that the Cherpulassery Municipality has to function as a third order settlement, the town has to perform the function of an urban centre with due consideration to service sector activity. Hence development of Cherpulassery Municipal area with more improved infrastructural facilities and job opportunities are required to satisfy the needs of the increasing population.

3. DEMOGRAPHY

Demography is the study of human population dynamics. It encompasses the study of the size, structure and distribution of populations, and how populations change over time due to births, deaths, migration, and ageing. Demographic analysis can relate to whole societies or to smaller groups defined by criteria such as education, religion, or ethnicity.

3.1 PROFILE OF KERALA

The Census of 2011 placed Kerala's population at 3,34,06,061 persons which includes 1,60,27,412 males and 1,73,78,649 females. Although Kerala accounts for ~1.1% of the total area of India, it hosts about 2.76% of the country's total population. Among the States of India, Kerala stands at 12th in terms of population. Out of the State's total population, 52 per cent are women and 48 per cent are men.

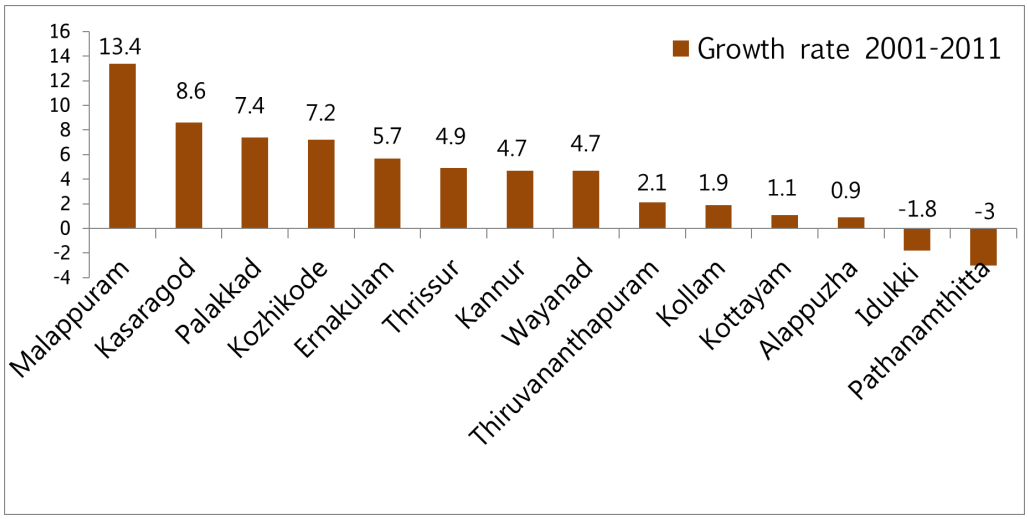


Fig. 3.1 Population growth rate 2001-2011 all Districts and Kerala state

The decadal growth rate of the state stood at 4.9 percent, lowest among Indian states. Among the districts of the state, Malappuram has the highest growth rate (13.4%) while Pathanamthitta registered the lowest (-3.0%). On the other side, the share of urban population in Kerala has posted an increase of 21.74% between 2001 and 2011 raising the share of urban population in Kerala to 47.7% of the total population.

Another positive aspect is the high literacy levels in the state. The effective literacy rate is 93.91% as per census 2011 which is far above the national average. Kottayam tops the list with 97.2% coverage while Wayanad and Palakkad share least coverage levels in the state. The sex ratio also has posted a 26-point rise from 2001 levels, standing at 1,084 which is higher than the national figure. All the districts have sex ratio above 1,000.

3.2 DISTRICT PROFILE AND STATE OF CHERPULASSERY TOWN

The population of Palakkad district as per Census 2011 is 28,09,934 persons consisting of 13,59,478 males and 14,50,456 females and amounts to 8.41% of the total population of Kerala. In terms of area, the district pegs a figure of 4,480 sq. km clocking 11.53% of the area of the state and is the largest district of Kerala. Temporal variation of total decadal Population of Palakkad District is shown in Fig 3.2. The district has also posted a significant positive population growth rate of 7.4% which is third highest in the state during the last decade as per Census 2011.

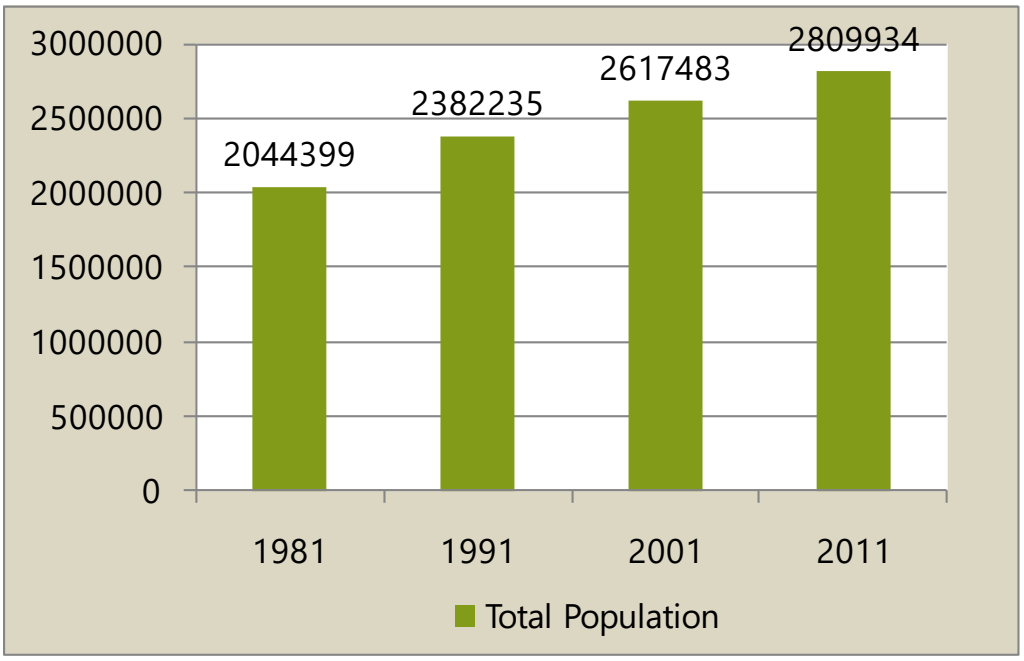


Fig. 3.2 Decadal variation of total population of Palakkad District

Table 3.1 Decadal total and gender wise population of Cherpulassery Municipality

YEAR	Total Population	Male	Female
1981	25302	12084	13218
1991	30490	14559	15931
2001	34593	16740	18153
2011	39241	18656	20585

Source :Census 1991,2001,2011

Narrowing down to Cherpulassery town, population as per census 2011 is 39,241 which includes 18,656 males and 20,585 females. The town has a total geographical area of 31.88 sq. km sharing 0.71 % of total district area and hosts around 1.39 % of District Population. Table 3.1 details the increase in total population over three decades with 1981 as the reference point. Gender wise breakup has also been furnished, which shows a steady growth with female numbers exceeding males in each census. A graphical description of the same is shown in Fig.3.3

Total population of the Town for the years 1981, 1991, 2001 and 2011 are shown in Table 3.1. Temporal variation of total decadal and gender wise Population of Cherpulassery (M) is shown in Fig 3.3.

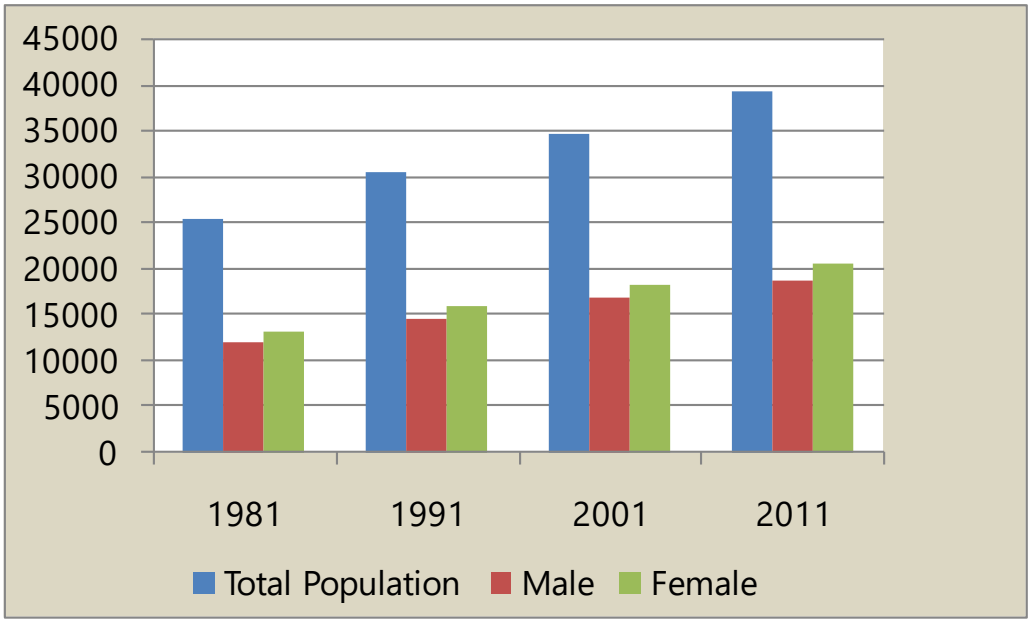


Fig. 3.3 Temporal variation of total decadal and gender wise Population of Cherpulassery (M)

3.3 COMPARISON WITH OTHER MUNICIPALITIES

Mannarkkad, Cherpulassery and Pattambi are the three municipalities that took shape in the year 2015 within Palakkad district. Cherpulassery Municipality was formed coalescing Cherpulassery Panchayat and ward numbers 14,15,16 of Thrikkadeeri Gramapanchayat. Table 3.2 shows comparison of population of Cherpulassery Municipality with other municipalities (census 2011). Given the recent genesis of Mannarkkad and Cherpulassery municipalities, the population of coalesced areas were also added along to arrive at the corresponding population figures.

Table 3.2 Decadal population of Urban LSGIs in Palakkad District

Sl. No	Name of Administartive Unit	Area in sq km	Population		
			1991	2001	2011
1	Palakkad M	26.6	1,23,289	1,30,767	1,31,019
2	Ottappalam M	32.66	44,186	49,242	53,755
3	Shoranur M	32.28	39,550	42,029	43,533
4	Chittur - Thathamangalam M	14.71	32,048	31,886	32,298
5	Pattambi M	15.84	22,108	24,168	28,632
6	Mannarkkad M	14.09	24,973	28,592	31,738
7	Cherpulasseriy M	31.88	30,490	34,593	39,241

Source : Census 1991, 2001, 2011

On comparison with municipalities, Palakkad municipality has the highest population in the district with 1,31,019 persons followed by Ottappalam and Shoranur Municipalities registering 53,755 and 43,533 persons respectively. Fig.3.4 paints a graphic description of temporal variation across Urban LSGIs.

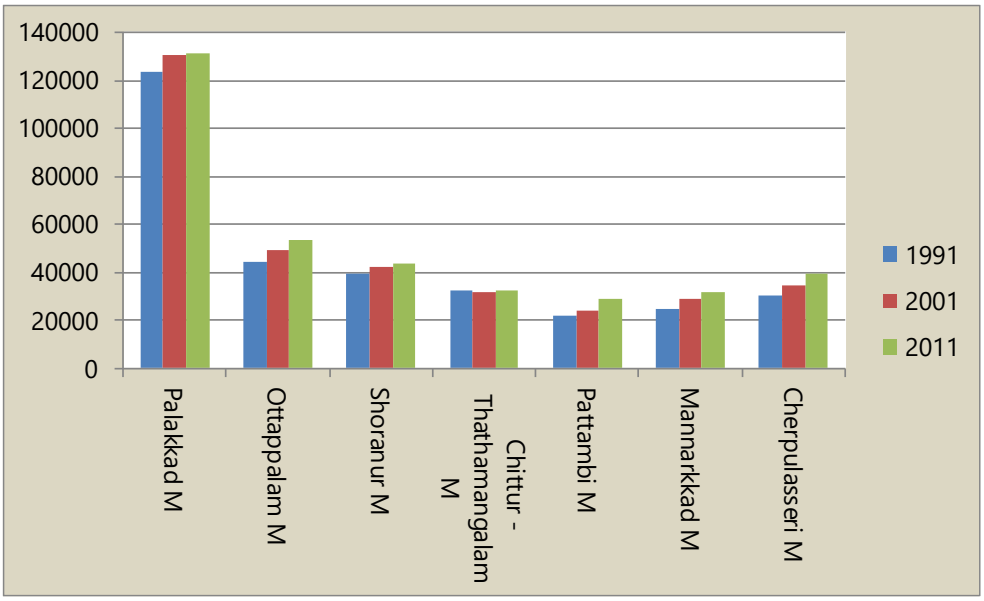


Fig. 3.4 Comparison of temporal variation of total decadal Population of Cherpulassery (M) with other Municipalities in District

Table 3.3 depicts the population figures of nearby local bodies and fig. 3.5 gives a graphical description. While comparing with population of nearby local bodies, Vellinezhi is having lesser population than others. The population of Cherpulassery is highest while comparing neighbouring LSGIs. Analysis of Cherpulassery's population growth indicates that population has grown through natural increase and net migration. Natural increase is the difference between the number of births and deaths within the population. Net migration is the most dynamic element of the population change, being the difference between the number of people moving into the area and the number moving out. Fig.3.6 shows comparison of population of towns having similar growth pattern as of Cherpulassery town.

Table 3.3 Comparison of temporal variation of total population of Cherpulassery Municipality with near by LSGIs

Name of LSGI	1971	1981	1991	2001	2011
Cherpulassery	21380	25302	30490	34593	39241
Thrikkadeeri	14483	15099	17834	19855	22320
Chalavara	14303	16558	19273	21042	23466
Vellinezhi	14121	13970	15649	16768	17101
Nellaya	18772	23226	27714	32056	36146

Source: Census 1971, 1981 1991,2001,2011

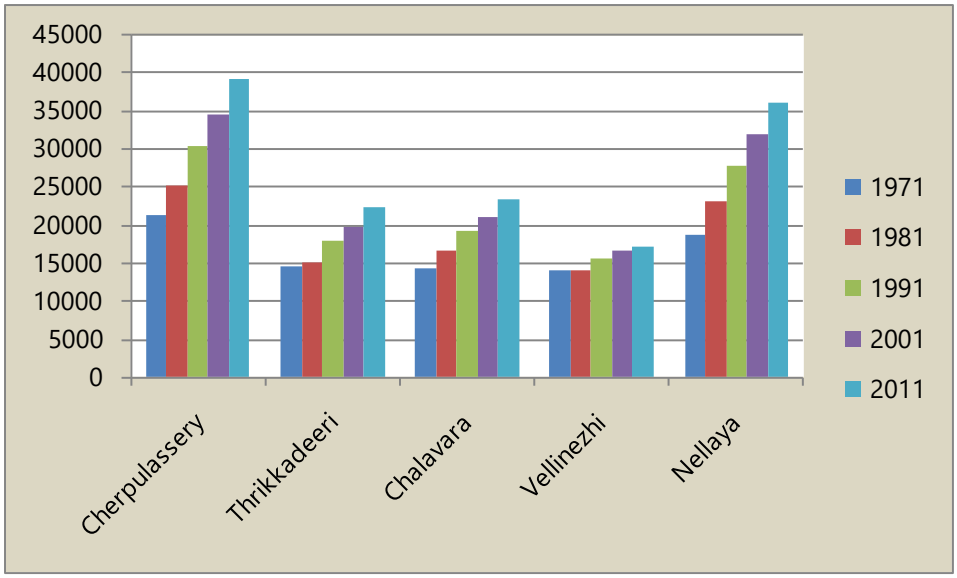
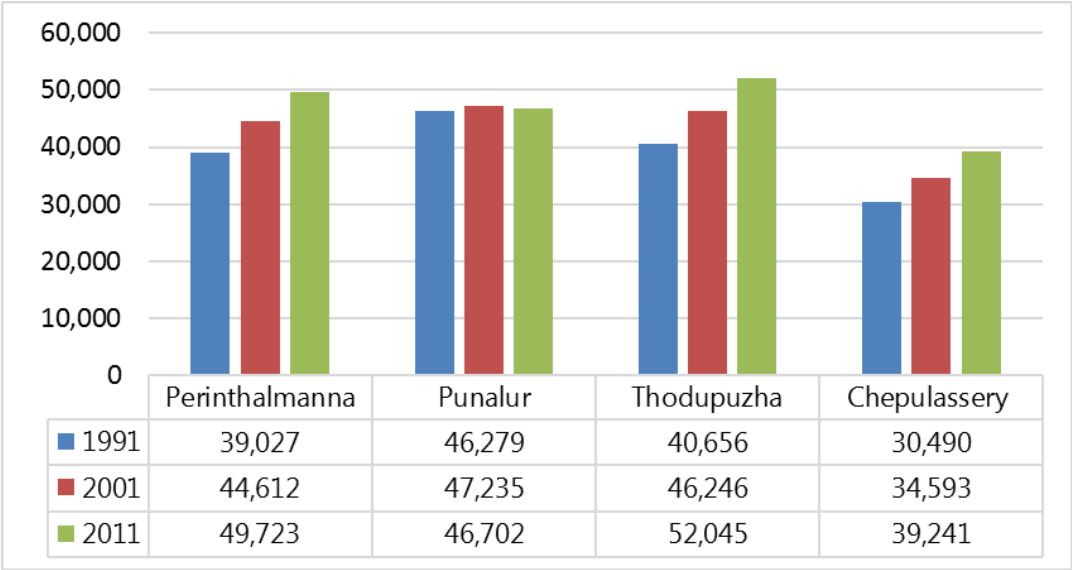


Fig. 3.5 Population Comparison with nearby LSGIs



	Perinthalmanna	Punalur	Thodupuzha	Chepulassery
1991	39,027	46,279	40,656	30,490
2001	44,612	47,235	46,246	34,593
2011	49,723	46,702	52,045	39,241

Fig 3.6 Population Comparison with Similar Towns

3.4 SPATIAL DISTRIBUTION OF POPULATION

According to National Urban Health Mission baseline data 2018 of the Cherpulassery, the total population residing in the Municipal area is 44,339. Table 3.4 gives ward wise population details of Cherpulassery Municipality. Ward wise population values ranges from 920 to 1,842. The highest value is observed from ward 15- Puthanalkkal (1,842) followed by ward 25– Cherpulassery Town (1,795) and ward 16– Niraparambu (1,777). The lowest population is found in ward 26– Kavuvattom (920) and 28– Manjakkal. Fig 3.7 shows ward wise spatial distribution of population in Cherpulassery Municipality.

Table 3.4 Ward wise Population of Cherpulassery Town- 2018

Ward No:	Ward Name	Population	Ward No:	Ward Name	Population
1	Padinjattumuri	1,344	18	Unginthara south	1,405
2	Thootha	1,643	19	Kuttikkodu	1,333
3	Health Centre	1,348	20	Kuttikodu south	1,452
4	Papparambu	1,524	21	Kooliyadu	1,051
5	Naduvattom	1,198	22	Eliyapetta	1,459
6	Karalmanna	1,348	23	Kottakunnu	1,205
7	Alumpara	1,219	24	Secretary padi	1,285
8	Ambalavattom	1,120	25	Cherpulassery Town	1,795
9	Karumanamkurissi	1,270	26	Kavuvattom	920
10	Kunnumpuram	1,075	27	Malmalakunnu	1,097
11	26 th mile	1,298	28	Manjakkal	962
12	Kacherikunnu	1,079	29	Vellottukurissi	1,347
13	Mandakkari	1,221	30	Panniyamkurissi	1,379
14	Illikottukurissi	1,741	31	Chenthrathparambu	1,322
15	Puthanalkkal	1,842	32	Veettikkad	1,152
16	Niraparambu	1,777	33	Nalalamkunnu	1,717
17	Unginthara	1,411			

Source : National Urban Health Mission (NUHM) Baseline data, 2018

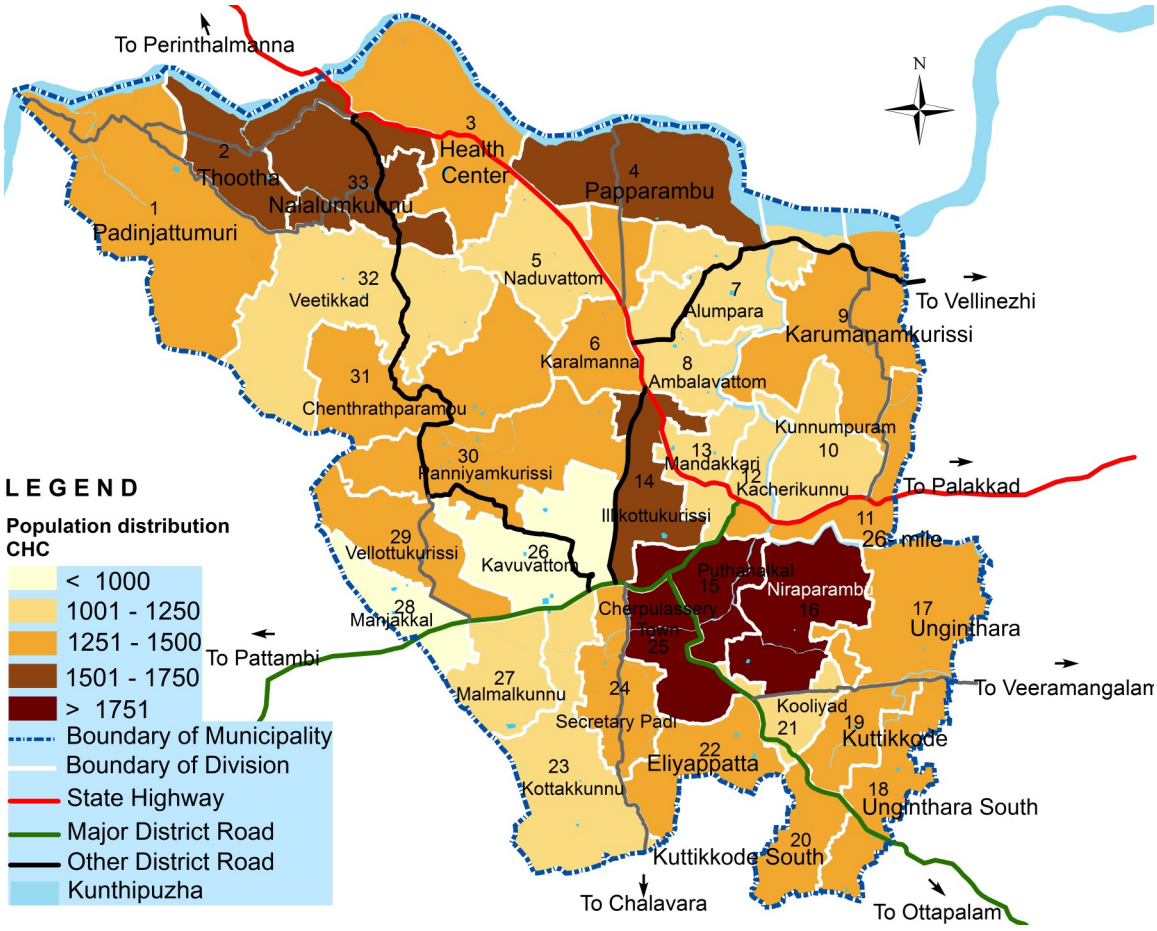


Fig 3.7 Spatial Distribution of Population in Cherpulassery Town

3.5 POPULATION DENSITY

The average population density of the state is 860 persons/sq.km which is 2.25 times the national average. The gross population density of the town is 1,231 persons/ sq.km which is much higher than the district figure of 627 persons/ sq.km. It has been observed that the density is higher in the north eastern parts of the municipality and on the wards along the main roads. The net area of the municipality is 25.49 sq. km and the net population density is 1,568 persons/ sq.km. The ward wise gross population density and net population density is shown in Table 3.5

Table 3.5 Ward wise Gross and Net Population Density

Ward No	Name of Ward	Gross Population Density	Net Population Density	Ward No	Name of Ward	Gross Population Density	Net Population Density
1	Padinjattumuri	582	688	18	Unginthara south	1,899	2,033
2	Thootha	1,628	2,256	19	Kuttikkodu	2,520	3,823
3	Health Centre	918	1,071	20	Kuttikodu south	2,901	4,013
4	Papparambu	1,094	1,367	21	Kooliyadu	3,041	3,082
5	Naduvattom	1,448	2,144	22	Eliyapetta	2,053	2,530
6	Karalmanna	1,780	2,074	23	Kottakunnu	895	1,154
7	Alumpara	1,211	1,960	24	Secretary padi	1,907	2,613
8	Ambalavattom	1,698	2,188	25	Cherpulasseri Town	2,953	3,162
9	Karumanamkurissi	803	1,029	26	Kavuvattom	842	893
10	Kunnumpuram	1,458	1,594	27	Malmalakunnu	1,715	2,093
11	26 th mile	2,163	2,326	28	Manjakkal	1,914	2,143
12	Kacherikunnu	2,489	2,862	29	Vellottukurissi	1,617	1,810
13	Mandakkari	3,983	4,495	30	Panniyamkurissi	947	1,295
14	Illikottukurissi	2,432	2,454	31	Chenthrathparambu	862	907
15	Puthanalkkal	2,874	3,553	32	Veettikkad	585	740
16	Niraparambu	1,714	2,046	33	Nalalamkunnu	1,647	2,601
17	Unginthara	1,305	1,458				

Source :Based on NUHM Population Data

The gross population density in the municipality ranges from 470 persons/sq.km in Padinjattumuri ward to 3,265 persons/sq.km in Mandakkari ward. The net population density ranges from 555 persons/sq.km in Padinjattumuri ward to 3685 persons/ sq.km in Mandakkari ward. Higher gross population density was observed in 26th mile (11) Kacherikunnu (12), Manadakkari (13), Illikottukurissi (14), Puthanalkkal (15), Kuttikode (19), Kuttikode South (20), Cherpulassery town (25), Malmalkunnu (27), Manjakkal (28) wards adjacent to CBD area and along major Transport corridors.

Higher Net Population Densities were observed in Kacherikunnu (12), Manadakkari (13), Puthanalkkal (15), Kuttikode (19), Kuttikode South (20), Kooliyad (21), Malmalkunnu (27), Manjakkal (28). The ward wise gross population density and net population density are shown in Fig 3.8 and Fig 3.9.

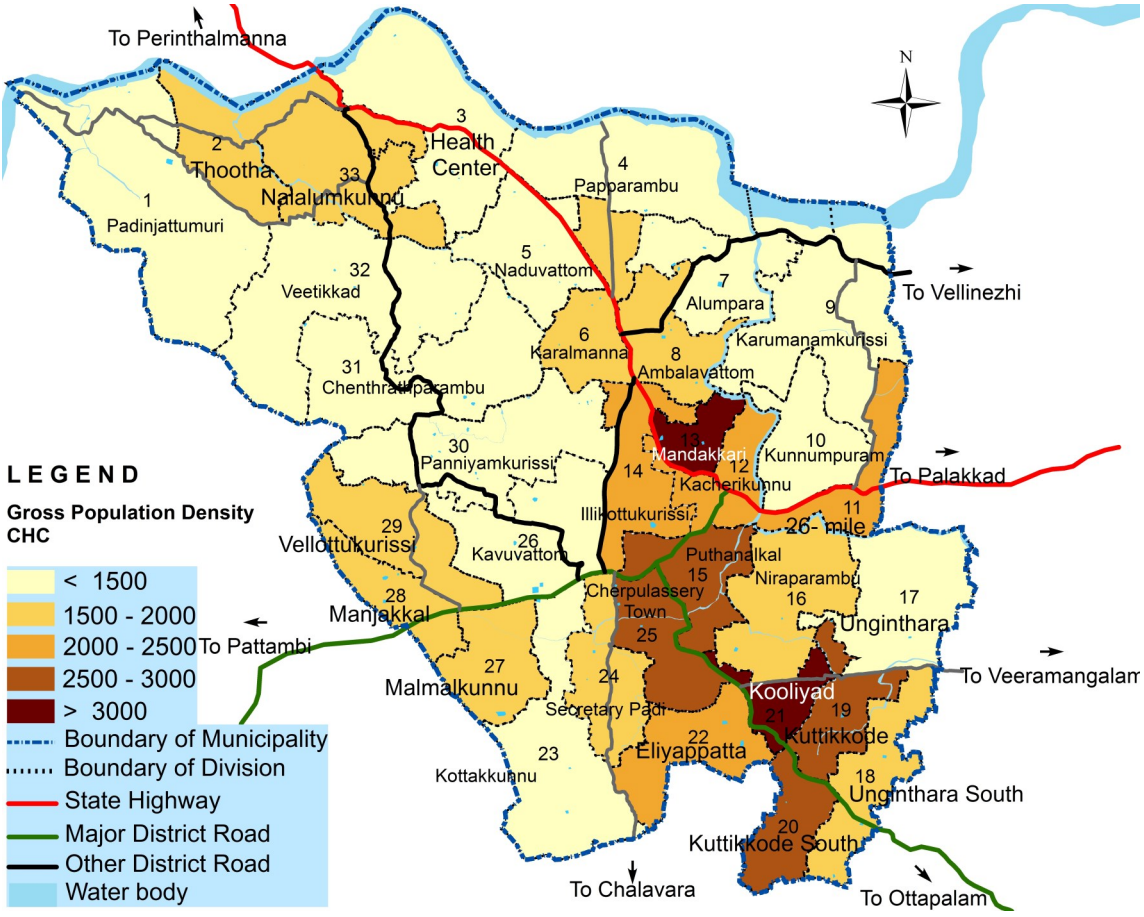


Fig. 3.8 Ward wise Gross Population Density

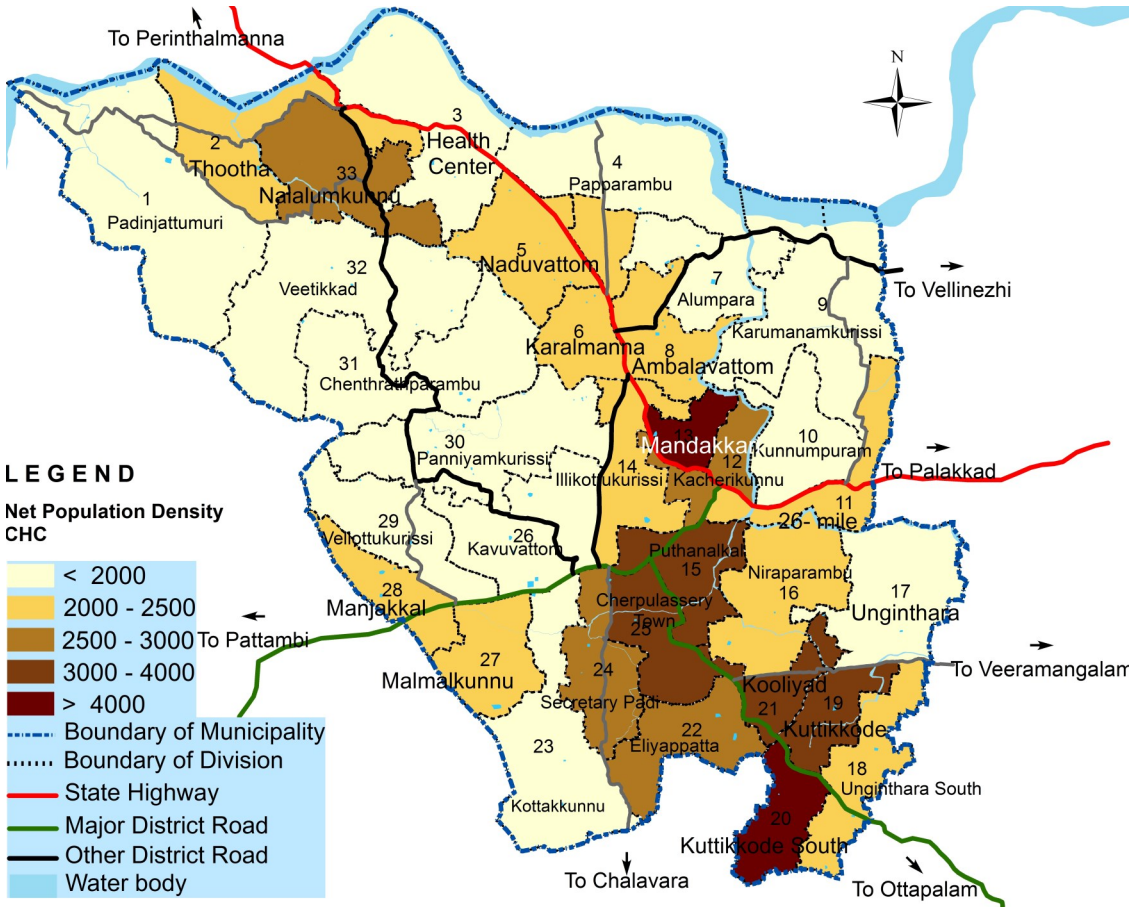


Fig. 3.9 Ward wise Net Population Density

The gross population density of the municipality is least among other towns in the district. Although the municipality share 1.39 % of the total population of the district, the urban population in the municipality amounts to 10.89 % to that of the district. Gross population density of the town shows a rising trend. The gross population density of the municipalities from 1981 to 2011 and their comparison to State and district is shown in table 3.6 and Fig 3.10.

Table 3.6 Gross population density of Municipalities in Palakkad District and comparison with District and State

Sl. No	Name of Administartive Unit	Population Density		
		1991	2001	2011
1	Kerala	749	819	860
2	Palakkad District	532	584	627
3	Palakkad M	4,635	4,916	4,926
4	Ottappalam M	1,353	1,508	1,646
5	Shoranur M	1,225	1,302	1,349
6	Chittur - Thathamangalam M	2,179	2,168	2,196
7	Pattambi M	1,396	1,526	1,808
8	Mannarkkad M	1,772	2,029	2,253
9	Cherpulassery M	956	1,085	1,231

Source : Census 1991, 2001, 2011

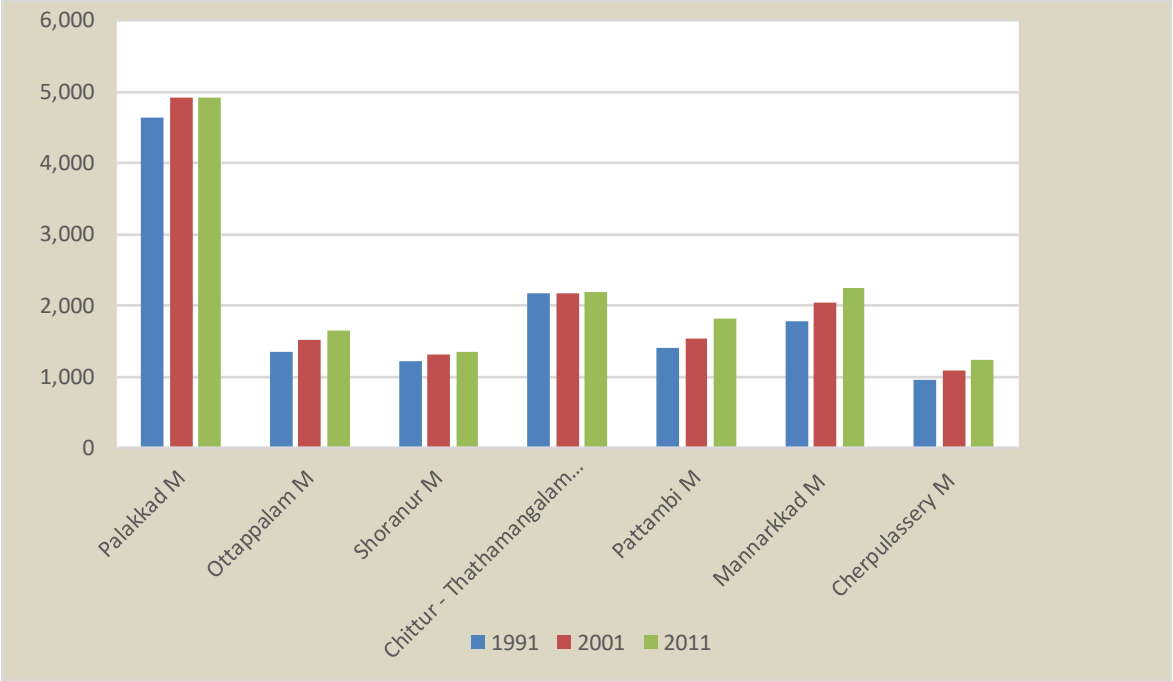
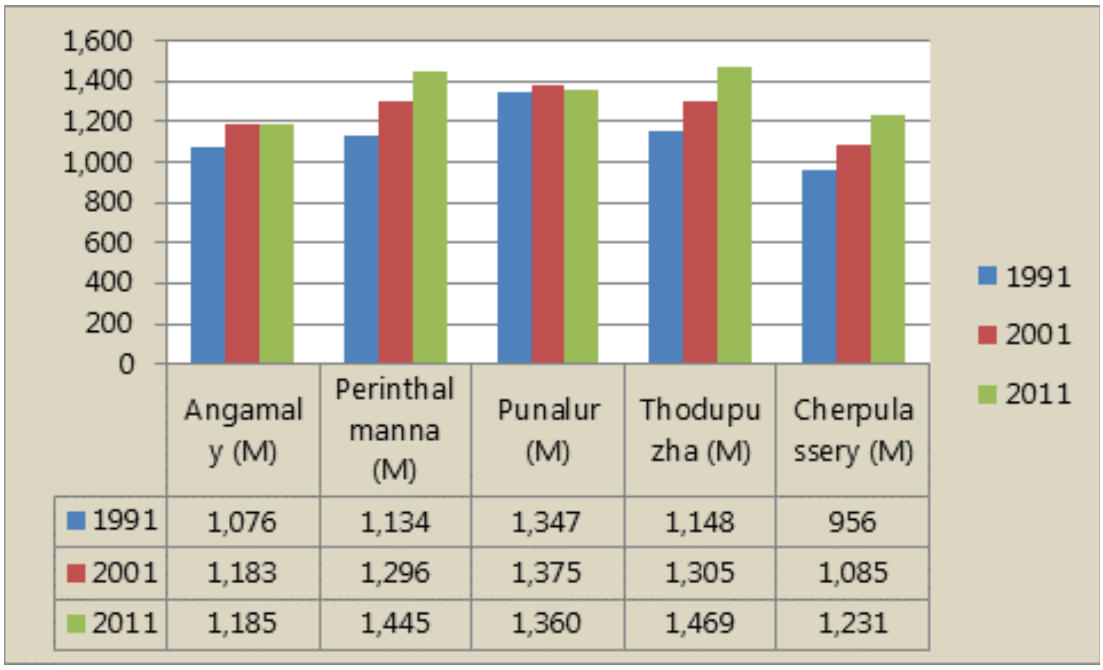


Fig. 3.10 Comparison of Gross Population Density with Other Towns in the District

Source : Census 1991, 2001, 2011

The gross population density of the municipality is lesser than similar towns except Angamali in the district. The gross population density of the Municipality from 1991 to 2011 and its comparison with similar towns is shown in Fig 3.11.

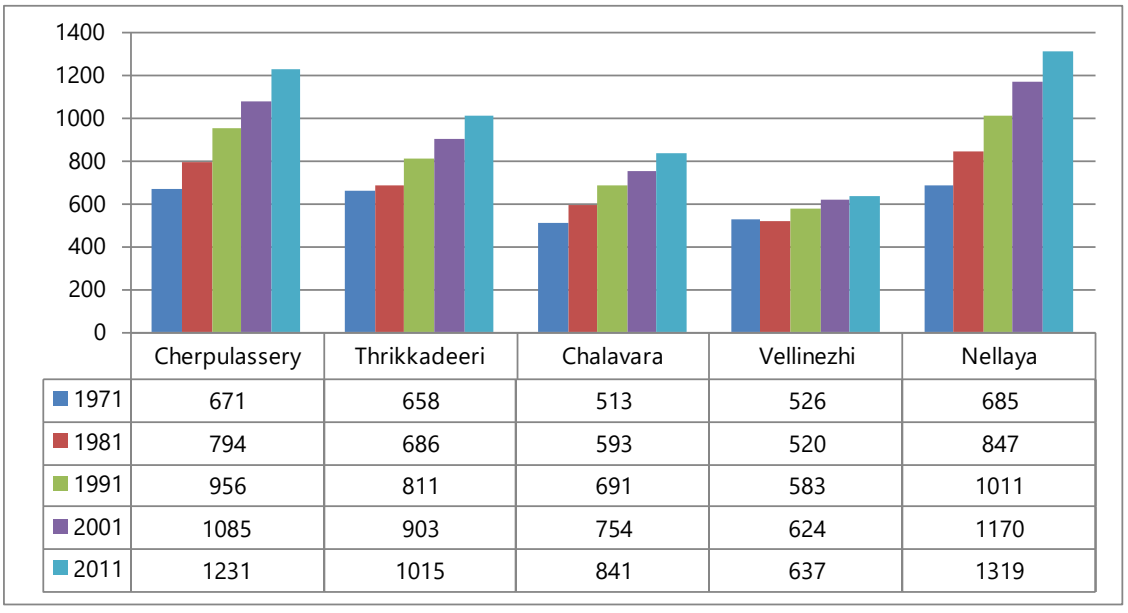


	Angamaly (M)	Perinthalmanna (M)	Punalur (M)	Thodupuzha (M)	Cherpulassery (M)
1991	1,076	1,134	1,347	1,148	956
2001	1,183	1,296	1,375	1,305	1,085
2011	1,185	1,445	1,360	1,469	1,231

Fig. 3.11 Gross Population Density Comparison with Similar Towns

Source : Census 1991, 2001, 2011

The comparison of population density with nearby LSGI's as per 2011 census is shown in Fig. 3.12. Cherpulassery town with a population density of 1,231 persons/ sq.km has a higher population density than the neighbouring LSGI's except Nellaya.



	Cherpulassery	Thrikkadeeri	Chalavara	Vellinezhi	Nellaya
1971	671	658	513	526	685
1981	794	686	593	520	847
1991	956	811	691	583	1011
2001	1085	903	754	624	1170
2011	1231	1015	841	637	1319

Fig. 3.12 Gross Population Density Comparison with Nearby LSGI's

Source : Census 1991, 2001, 2011

3.6 POPULATION GROWTH RATE

The Table 3.7 shows the comparative growth rate of population of State, District and Municipalities for the last three decades. During 1991-2001, the municipality witnessed a slight decline in population growth rate. The population decreased from 32,048 to 31,886 during this period. This may be attributed to a multitude of factors ranging from migration in search of better employment opportunities, better family planning practices or social reasons.

Table 3.7 Decadal Variation of Population Growth Rate

Sl No	Admistrative unit	GR 1991-2001	GR 2001-2011
1	Kerala	9.43	4.91
2	Palakkad District	9.88	7.35
3	Palakkad M	6.07	0.19
4	Ottappalam M	11.44	9.16
5	Shoranur M	6.27	3.58
6	Chittur - Thathamangalam M	-0.51	1.29
7	Pattambi M	9.32	18.47
8	Mannarkkad M	14.49	11.00
9	Cherpulassery M	13.46	13.44

Source : Based on Census Data 1991, 2001, 2011

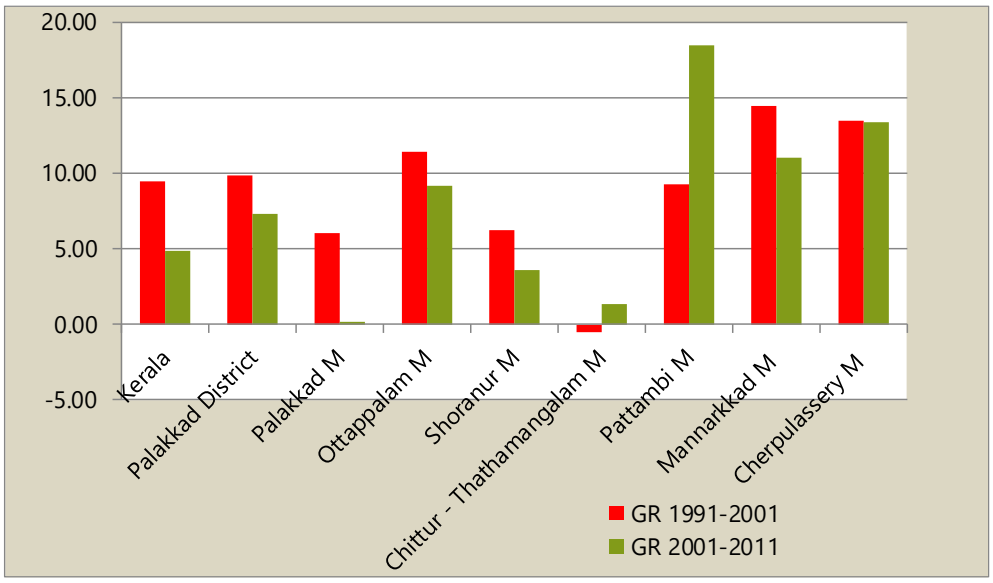
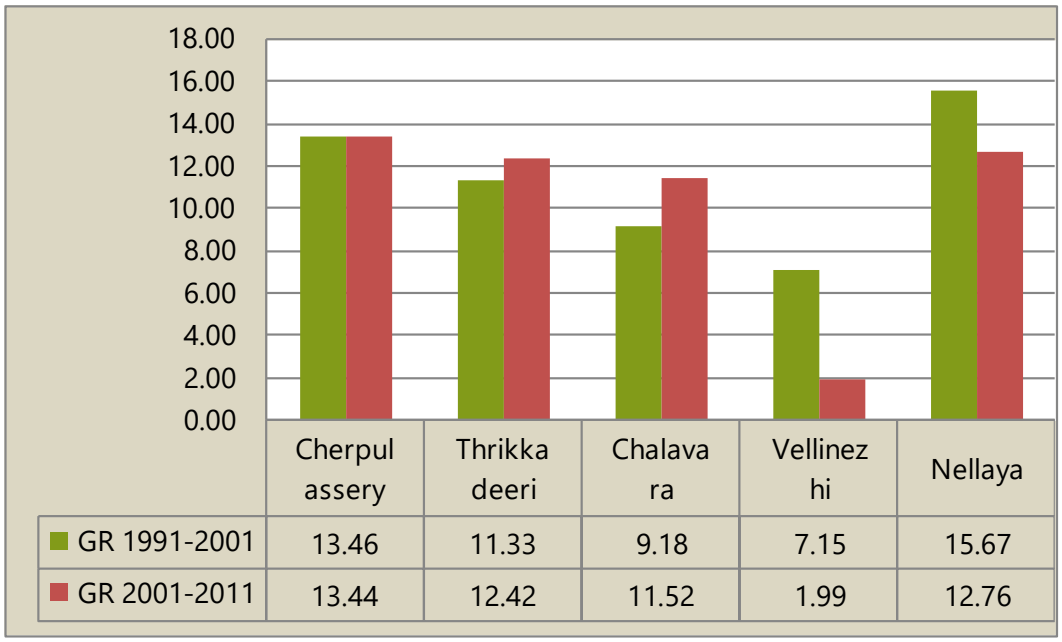


Fig. 3.13 Comparison of population growth rate of Cherpulassery town with other towns in the district

Fig. 3.13 shows the comparison of growth rate of municipalities within the district and with district & state also. During the last two decades, Cherpulassery stands second on comparing with other municipalities in the district.

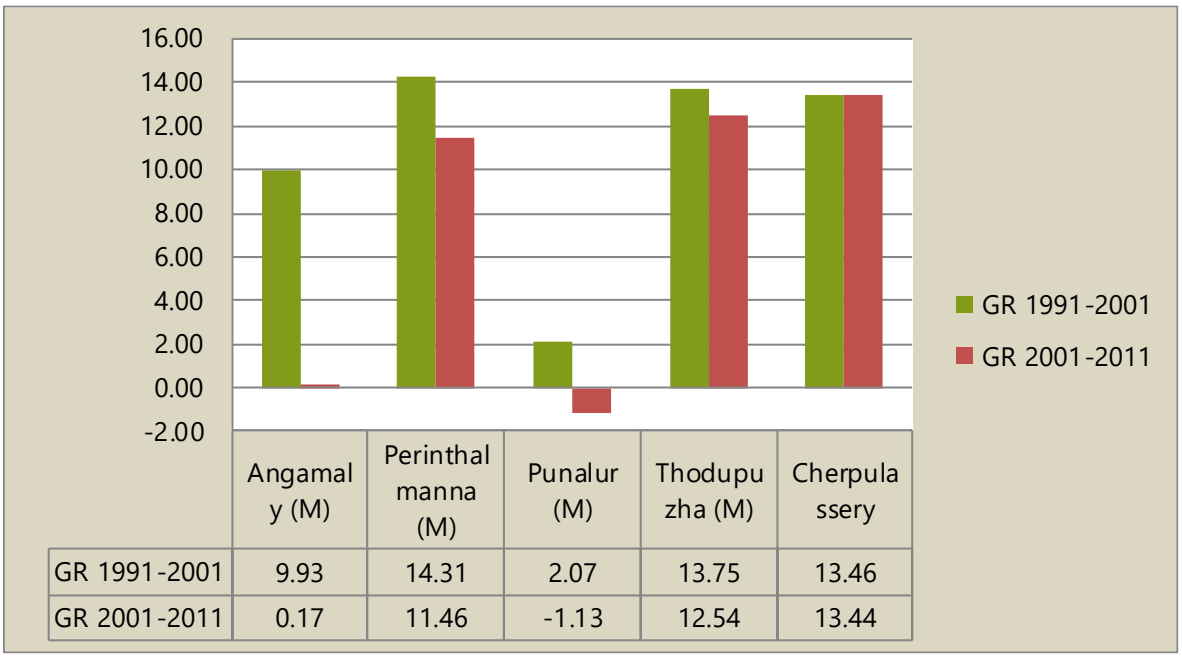
Fig. 3.14 shows the comparison of growth rate of Cherpulassery municipality with nearby LSGIs. The growth rate of Thrikkadderi and Chalavara Grama Panchayats show increasing trend whereas Cherpulassery (M), Nellaya GP and Vellinezhi shows declining trend, whereas Vellinezhi shows sudden fall in Growth Rate from 7.55 to 1.99.



	Cherpulassery	Thrikkadeeri	Chalavara	Vellinezhi	Nellaya
GR 1991-2001	13.46	11.33	9.18	7.15	15.67
GR 2001-2011	13.44	12.42	11.52	1.99	12.76

Fig. 3.14 Comparison of Population Growth Rate with Nearby LSG's

Fig. 3.15 shows the comparison of growth rate of Cherpulassery Town with similar Towns. Even though growth rate of all Towns shows declining trend where as Punalur shows negative Growth Rate and Angamali M having negligible growth rate during the last decade.



	Angamaly (M)	Perinthalmanna (M)	Punalur (M)	Thodupuzha (M)	Cherpulassery
GR 1991-2001	9.93	14.31	2.07	13.75	13.46
GR 2001-2011	0.17	11.46	-1.13	12.54	13.44

Fig 3.15 Comparison of Population Growth Rate with Similar Towns

3.7 POPULATION CONCENTRATION

The population concentration of the municipality is shown in Fig 3.16, 3.17 & 3.18. One third of the population is distributed in the wards Health centre (3), Alumpara(7), Illikottukurissi (14), Puthanalkkal (15), Niraparambu(16) ,Kottakunnu (23), Kavuvattom (26), Malmalkunnu (27) , Panniyamkurissi (30) and half the population will be covered on adding Thootha(2), Papparambu (4), Unginthara(17), 26th mile(11), Cherpulassery Town (25), Chenathuparambu (31) On adding the population of Naduvaatom(5), Amabalavattom (8), Manjakkal (28), Vellottukurissi (29), Nalalumkunnu (33) two third population will be covered.

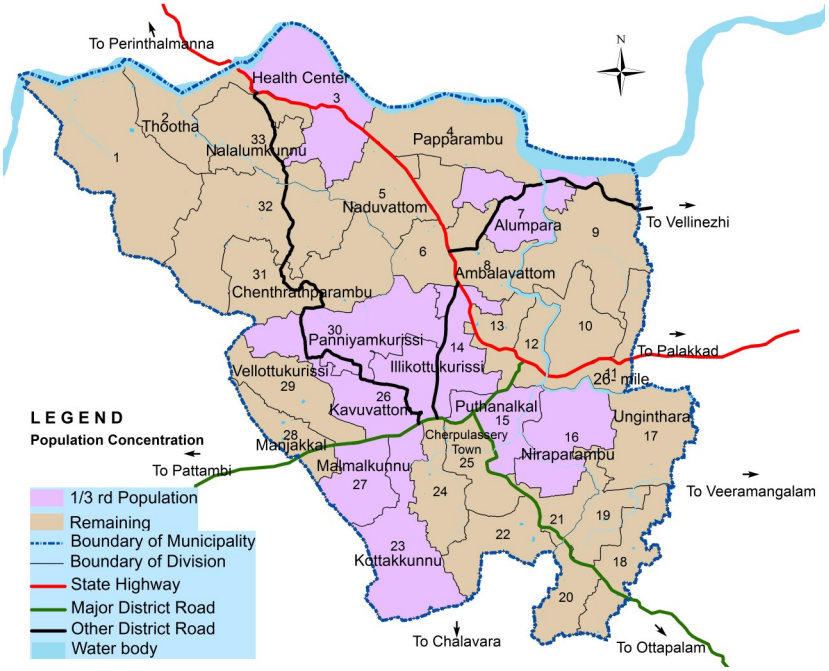


Fig 3.16 1/3rd Population Concentration of Cherpulassery Municipality

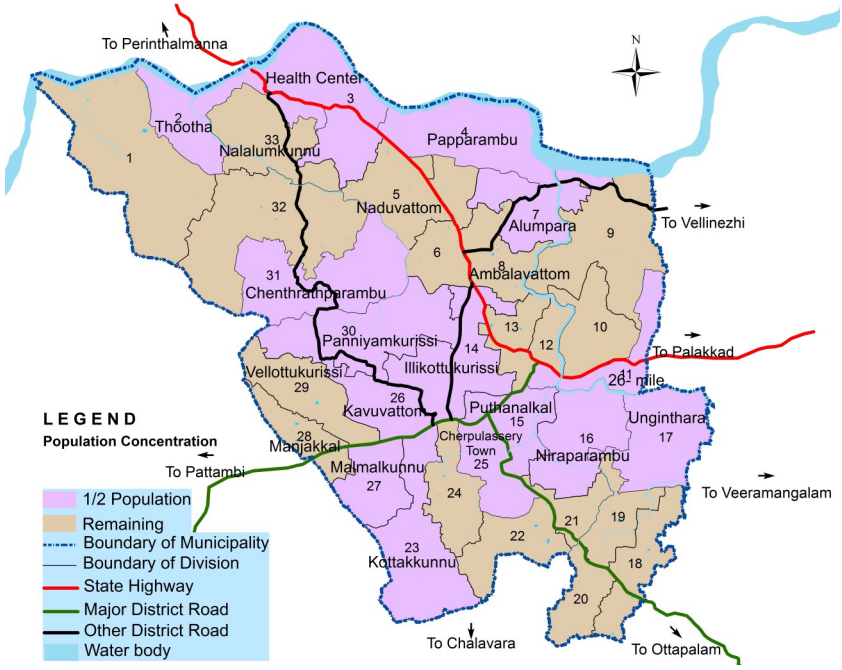


Fig 3.17 Half Population Concentration of Cherpulassery Municipality

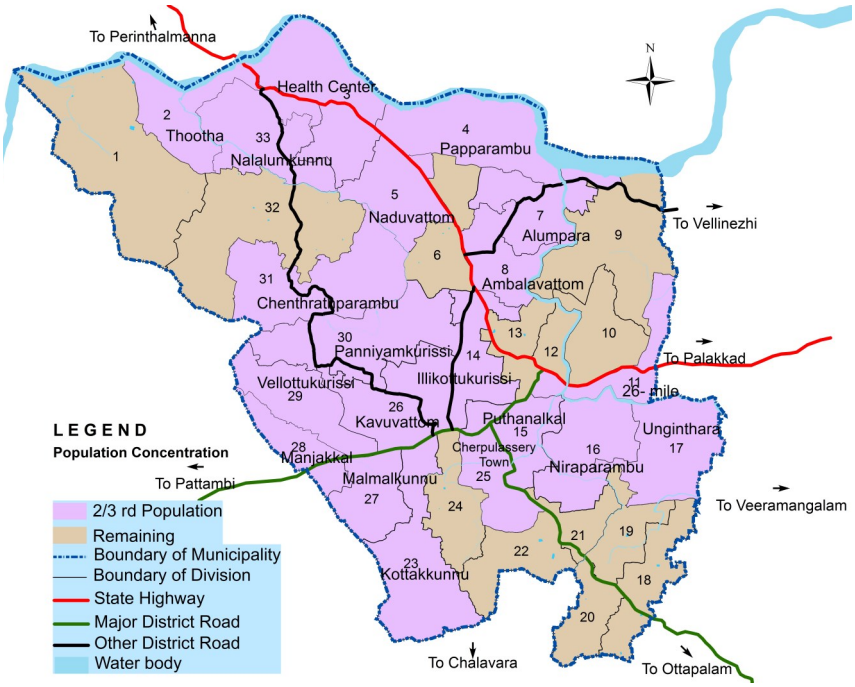


Fig 3.18 2/3rd Population concentration of Cherpulassery Municipality

3.8 SEX RATIO

Sex composition of the human population is one of the basic demographic characteristics, which is extremely vital for any meaningful demographic analysis. It is defined as the number of females per 1000 males. Changes in sex composition largely reflect the underlying socio – economic and cultural patterns of the society. It is a measure of prevailing equity between males and females at a given point of time.

According to the 2011 Census, Cherpulassery Town is having a sex ratio of 1103, 19 points higher than 2001 Census value of 1,084. Sex ratio of the state and the district figures shows a rising trend over the last three decades as can be seen from the Fig 3.19.

Fig 3.20 shows the comparison of sex ratio with other municipalities and that of the district. In the case of sex ratio, Kerala is unique, being the only state in India where females have predominance over males with a sex ratio of 1084. As per 2011 Census, Palakkad district is having a sex ratio of 1,067, 1 point above the previous decade's value of 1066. However, the sex ratio in the municipality is higher than that of the district. Ottapalam municipality is having the highest sex ratio followed by Cherpulassery, Shoranur. Pattambi Municipality is having the lowest sex ratio in the district. The sex ratio of Cherpulassery municipality in 1971 was 1,081 which increased to 1,103 over the last 4 decades (22 points).

Fig 3.21 shows the comparison of child sex ratio with other towns in the district. Changes in Child Sex Ratio index reflects underlying socio-economic and cultural patterns of the society, especially its attitude towards the girl child. Cherpulassery town

have a healthy gender ratio and there is absence of discrimination against girls, the absence of female infanticide, which is the killing of girls after birth, or of female foeticide, sex-selective abortion of the foetus. As per census 2011, Child sex ratio is highest in Chittur-Thathamanagalam municipality and least in Pattambi Municipality.

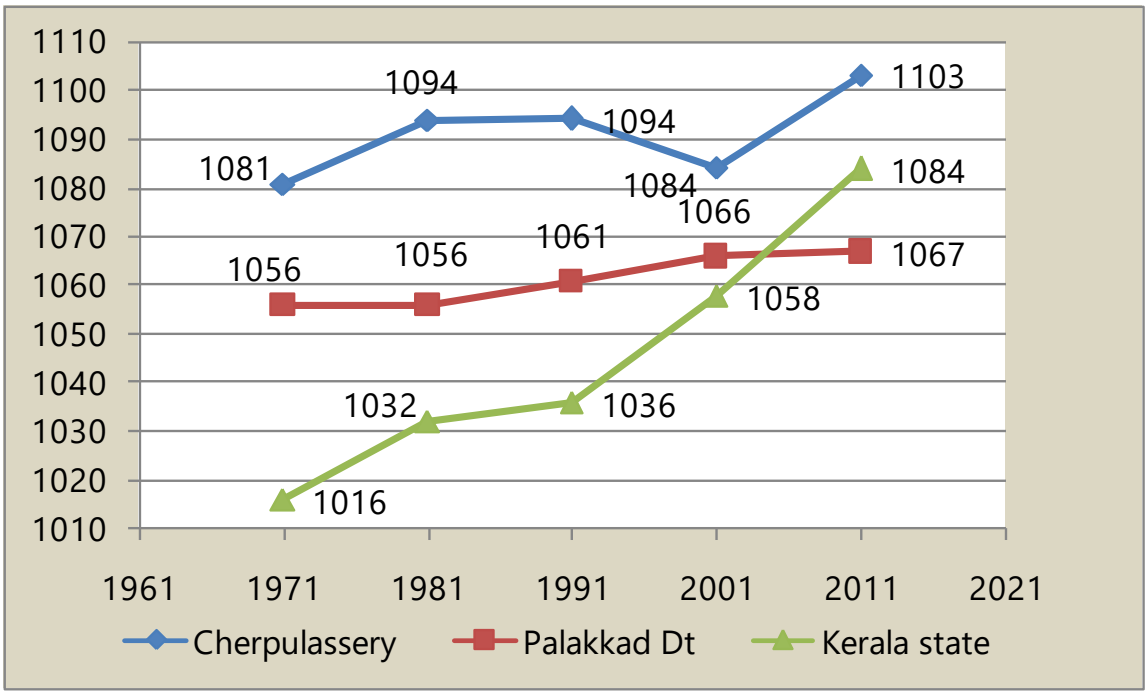
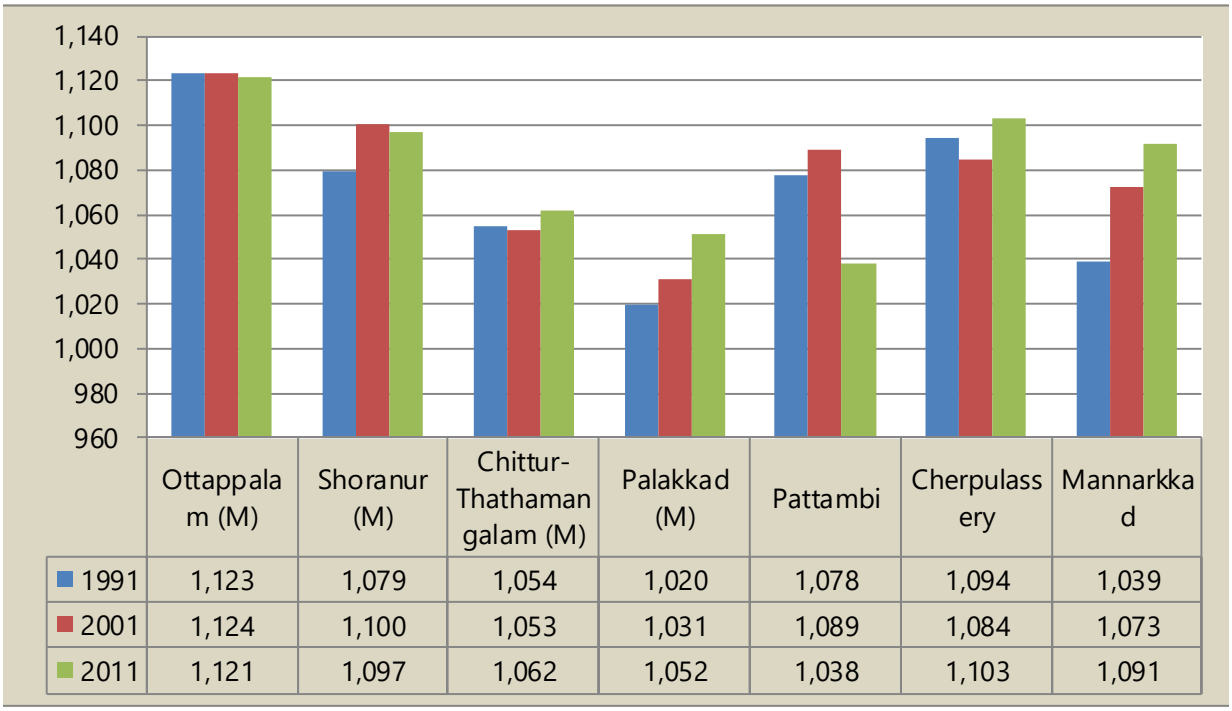


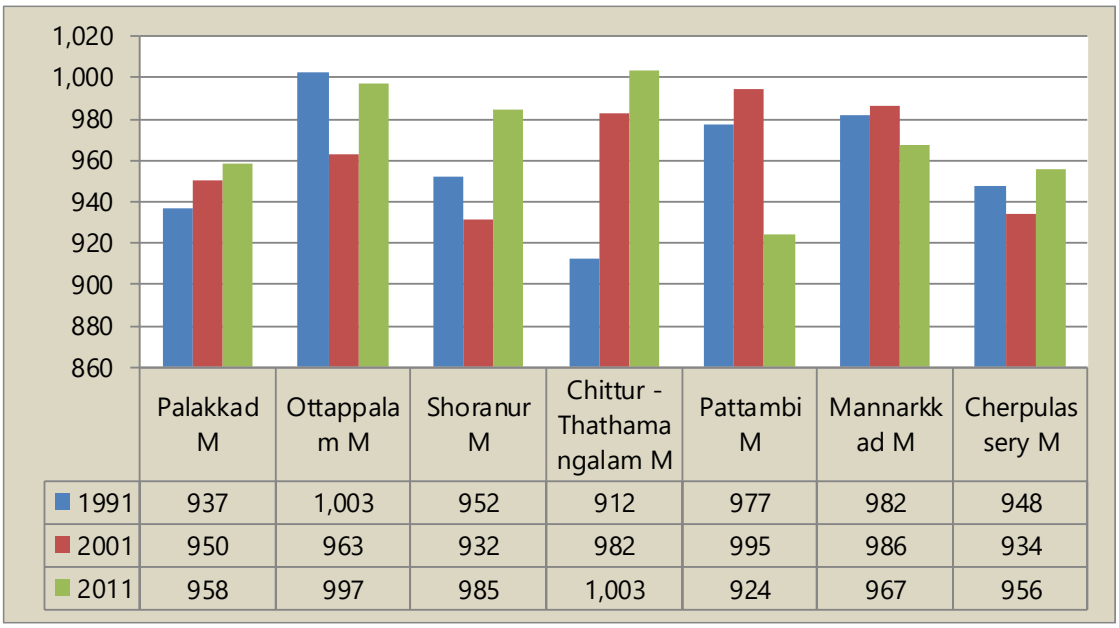
Fig 3.19 Temporal Variation of Sex ratio of Cherpulassery Town, Palakkad District and Kerala State



	Ottappalam (M)	Shoranur (M)	Chittur-Thathamangalam (M)	Palakkad (M)	Pattambi	Cherpulassery	Mannarkkad
1991	1,123	1,079	1,054	1,020	1,078	1,094	1,039
2001	1,124	1,100	1,053	1,031	1,089	1,084	1,073
2011	1,121	1,097	1,062	1,052	1,038	1,103	1,091

Fig 3.20 Temporal variation of sex ratio of Cherpulassery Town, comparison with other Municipalities in Palakkad District

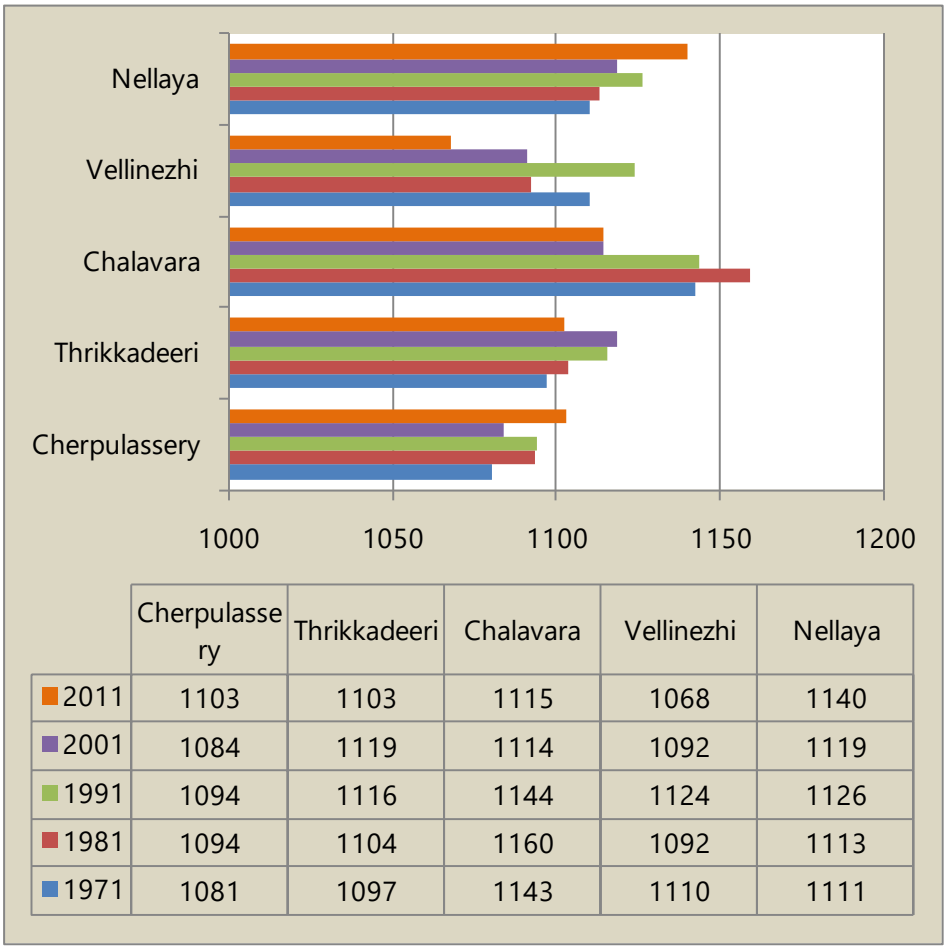
Source : Census 1991, 2001, 2011



	Palakkad M	Ottappalam M	Shoranur M	Chittur - Thathamangalam M	Pattambi M	Mannarkkad M	Cherpulassery M
1991	937	1,003	952	912	977	982	948
2001	950	963	932	982	995	986	934
2011	958	997	985	1,003	924	967	956

Fig. 3.21 Temporal variation of Child sex ratio of Cherpulassery Town, comparison with other towns in Palakkad District

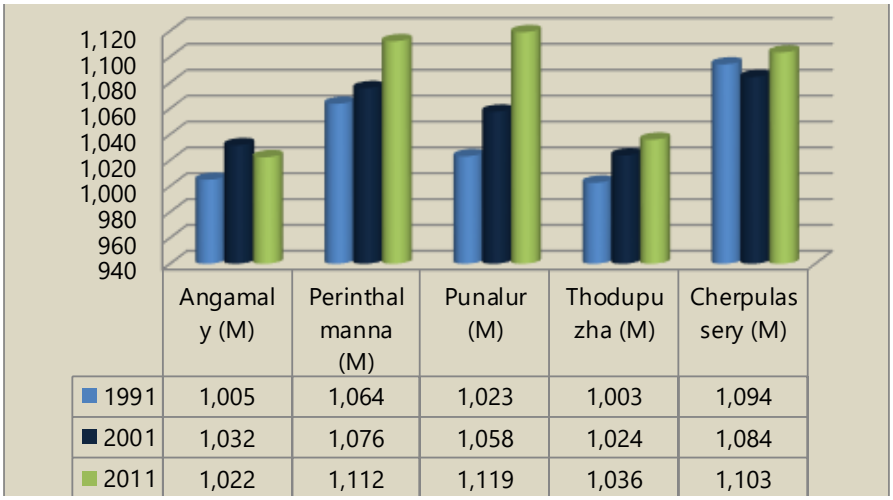
Source : Census 1991, 2001, 2011



	Cherpulassery	Thrikkadeeri	Chalavara	Vellinezhi	Nellaya
2011	1103	1103	1115	1068	1140
2001	1084	1119	1114	1092	1119
1991	1094	1116	1144	1124	1126
1981	1094	1104	1160	1092	1113
1971	1081	1097	1143	1110	1111

Fig. 3.22 Temporal variation of sex ratio of Cherpulassery Town, comparison with neighbouring LSGs

Source : Census 1971, 1981, 1991, 2001, 2011



	Angamaly (M)	Perinthalmanna (M)	Punalur (M)	Thodupuzha (M)	Cherpulassery (M)
1991	1,005	1,064	1,023	1,003	1,094
2001	1,032	1,076	1,058	1,024	1,084
2011	1,022	1,112	1,119	1,036	1,103

Fig 3.23 Temporal Variation of Sex ratio of Cherpulassery Town, Comparison with Similar Towns

Source : Census 1991, 2001, 2011

3.9 AGE STRUCTURE

Age structure of population in a city plays a major role in urban planning as it gives an idea about the dependent population, working population, the jobs to be created, the present and future requirements of educational, health and other facilities and amenities. From socio economic survey, the age structure of population (Fig 3.24) is derived which shows that majority of the people among the males and females are within the age group 15-40 years. The municipality has 12 % of the population in the age group 0 to 6 years as per census 2011.



Fig. 3.24 Age Sex Pyramid

Source: Socio- economic survey, 2016

3.10 LITERACY

The literacy rate of the Cherpulassery has shot up from 91.17% in 1991 to 94.71% in 2011 (Fig 3.25). Males literacy rate is more than female literacy rate. In the municipality, 96.09% of the males and 93.49% of the females are literates as per census 2011.

Chittur- Thathamangalam Town has the lowest literacy rate than all other municipalities in the district (Fig 3.26). However, this is just above the average literacy rate of 89.31% of the district. The municipality has highest literacy rate when compared to the neighbouring LSGI's (Fig 3.27) and when compared to similar towns (Fig 3.28) Angamaly, Perinthalmanna and Thodupuzha Towns are having more literacy rate than Cherpulassery Town.

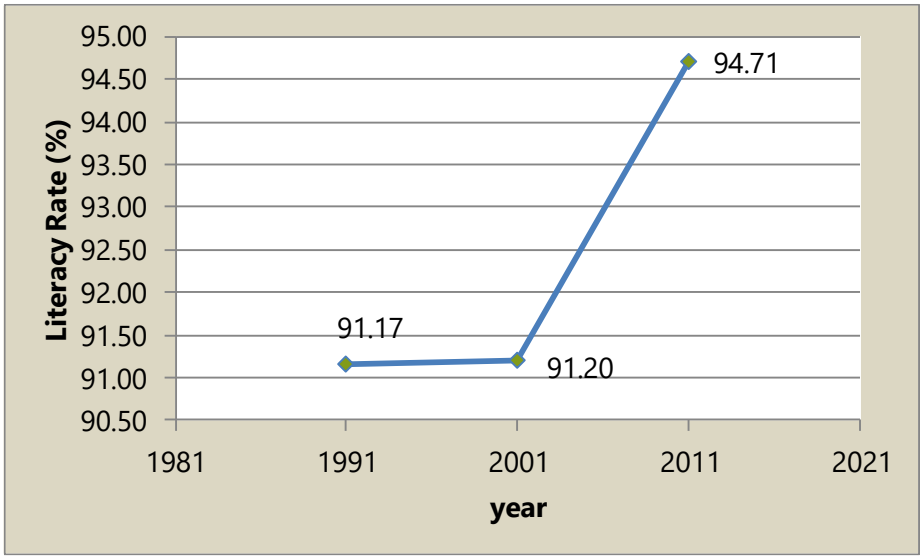


Fig 3.25 Temporal variation of literacy rate in the municipality

Source : Census 1991, 2001, 2011

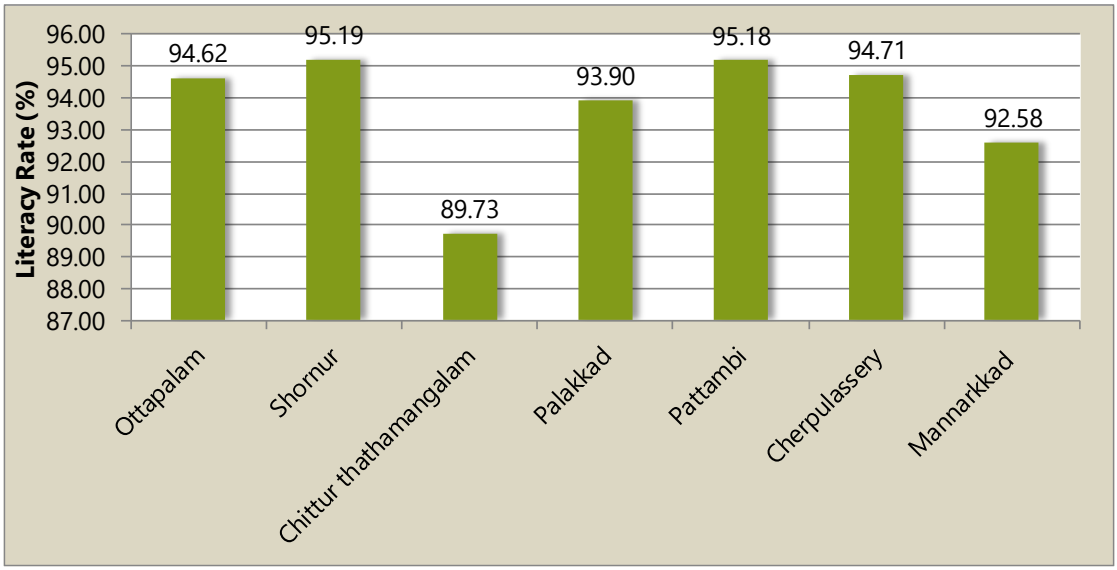
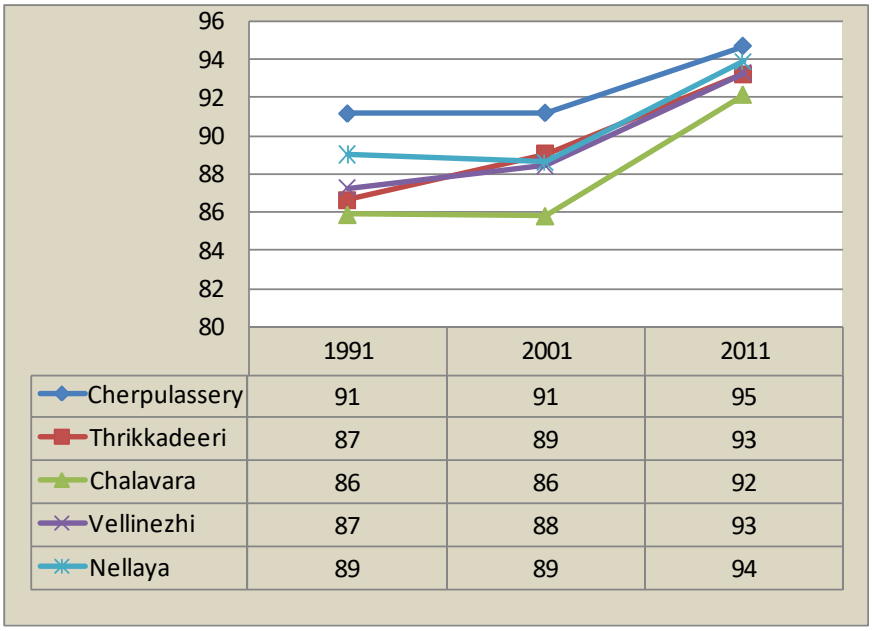


Fig 3.26 Comparison of Literacy rate of Cherpulassery Town with other towns in District

Source : Census 2011



	1991	2001	2011
Cherpulassery	91	91	95
Thrikkadeeri	87	89	93
Chalavara	86	86	92
Vellinezhi	87	88	93
Nellaya	89	89	94

Fig 3.27 Comparison of literacy rate with neighbouring LSGI's

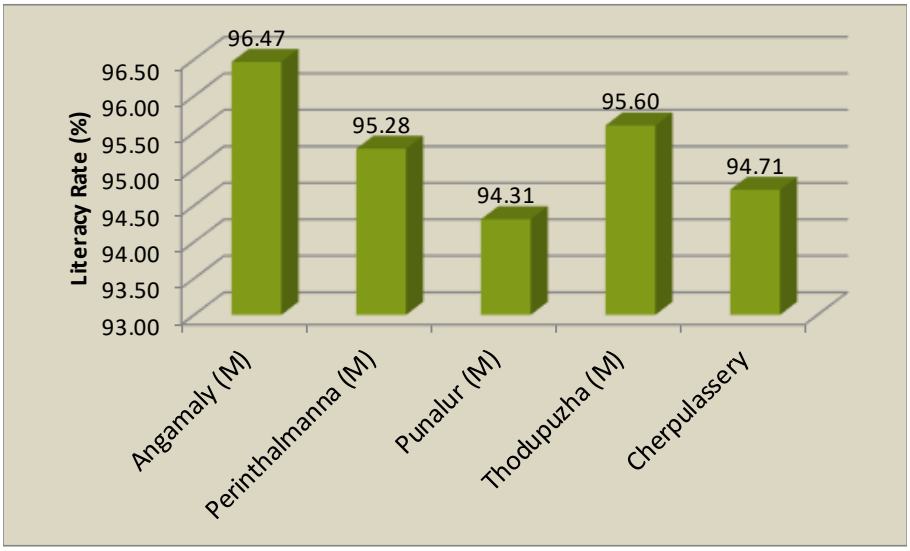


Fig 3.28 Comparison of literacy rate with similar towns

Source : Census 1991, 2001, 2011

3.11 SIZE OF HOUSEHOLDS

The total number of households in the municipality as per Census 2011 is 5,897. The average household size is 4.65 which is higher than the district average (4.41) as well as other municipalities in the district (Fig 3.29). When compared with the neighbouring LSGI's also, the municipality is having the lowest household size. Nellaya Panchayat is having the highest household size among the neighbouring LSGI's (Fig 3.30). The trend in household size has been steadily decreasing from 6.00 in 1971 to 4.65 in 2011 indicating the shifting of preference from joint families to nuclear households (Fig 3.31). Fig 3.32 shows the comparison of household size with similar Towns.

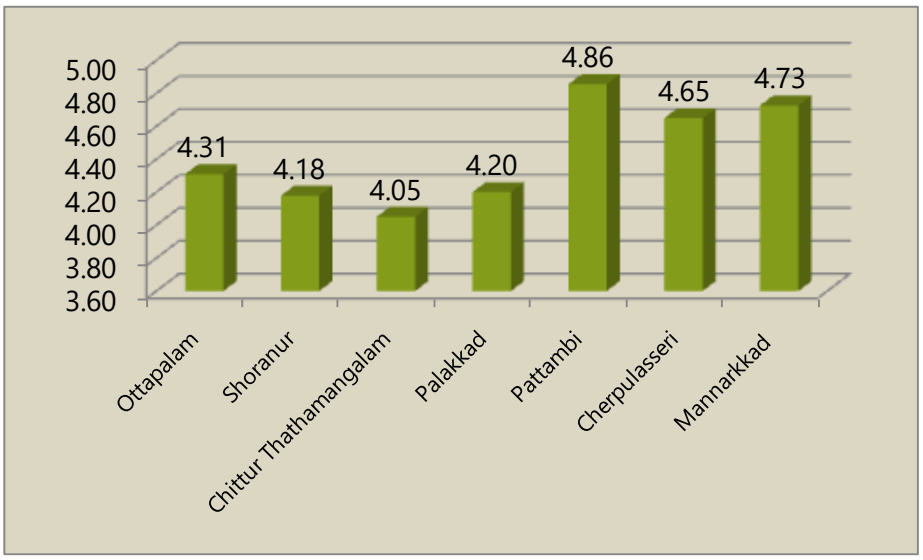


Fig 3.29 Comparison of House Hold size with Other Towns in District

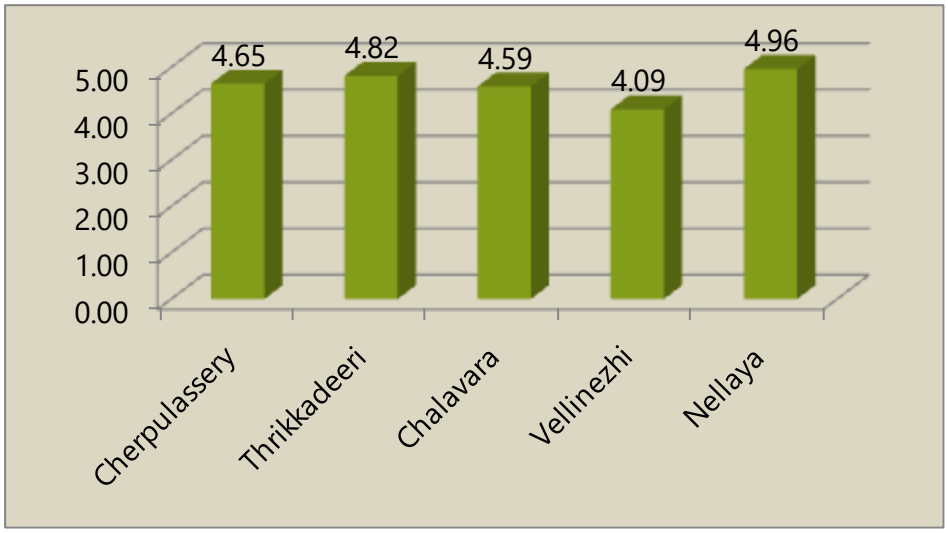


Fig 3.30 Comparison of House Hold Size with nearby LSGI

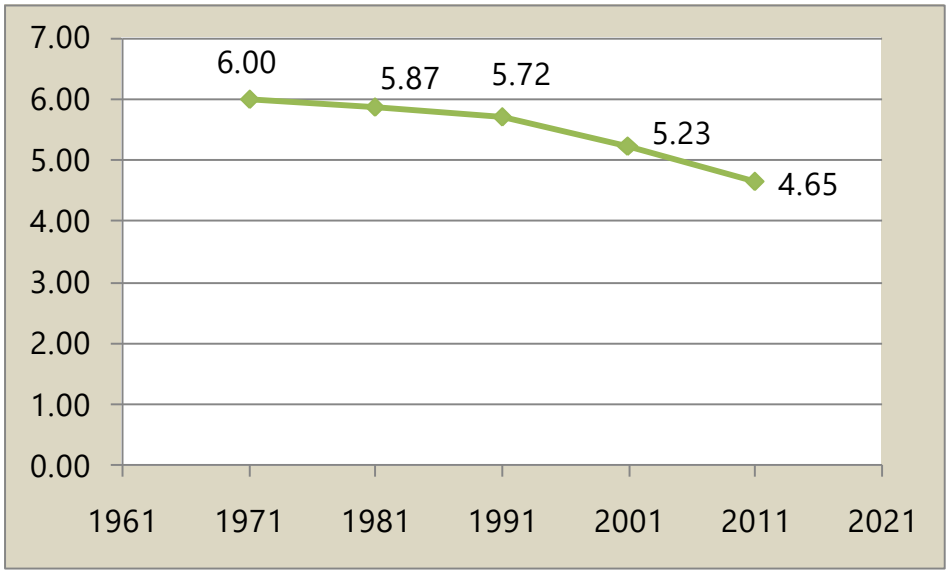


Fig. 3.31 Temporal variation of household size in Cherpulassery Town

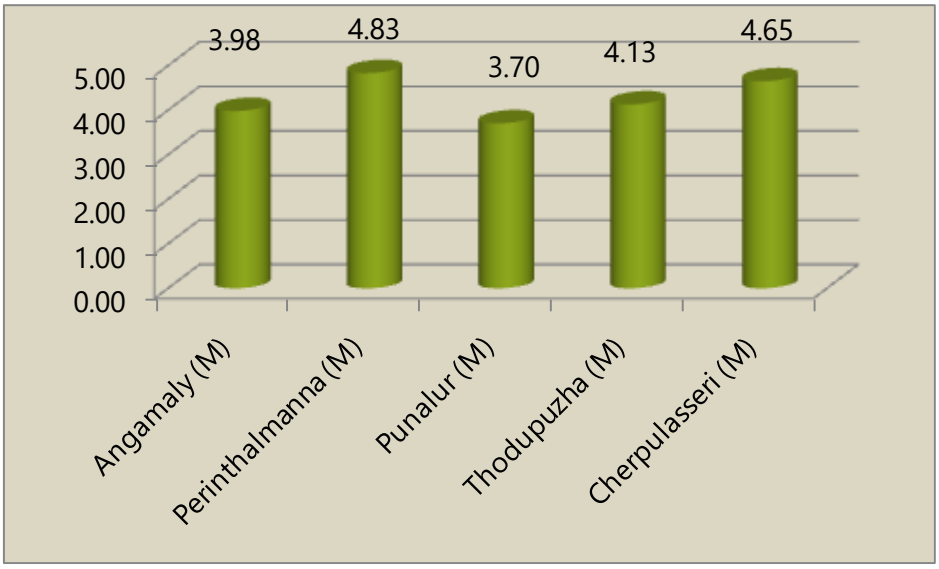


Fig 3.32 Comparison of House Hold Size with Similar Towns

3.12 SOCIAL COMPOSITION

Social composition mainly represents the percentage of Scheduled Castes and Scheduled Tribes population in the municipality. Out of the total population in the municipality 11.27 % are SC's and a negligible 0.18% is ST's (Fig. 3.33). The religion wise population shows that nearly 59.37 % are Hindus, 40.40 % Muslims and 0.23 % Christians. (Fig. 3.34)

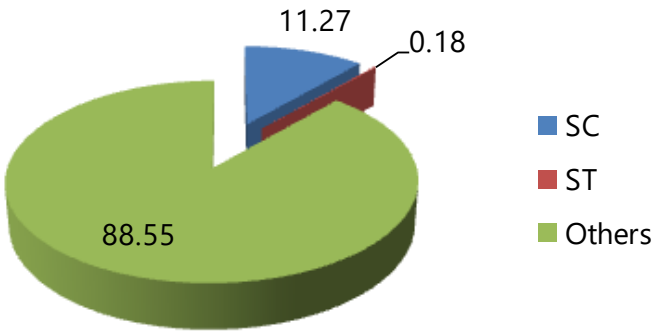


Fig 3.33 SC/ST composition of Cherpulassery Town

Source :Census 2011

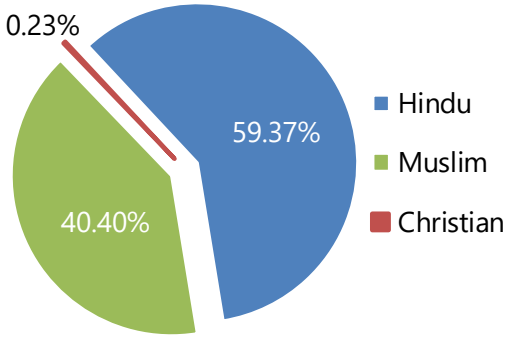


Fig 3.34 Religion wise population break up

Source : Socio economic survey 2016

3.13 MIGRATION

Human migration is the movement of people from one place to another with the intention of settling to a new location. It forms an important component of the process of urbanization and helps in understanding the dynamics of the society

Migration trend is a major factor in determining future population of the town. People who migrate into a territory are named as immigrants, whereas those who migrate from an area is treated as emigrants. Census of India defines the migration in two

ways viz., migrants by place of birth and migrants by place of last residence. Migrants by place of birth are all those enumerated at a village/town at the time of census other than place of birth while a person is considered as migrant by place of the last residence, if the place in which he is enumerated during the census is other than his place immediate last residence. The low percentage of population growth rate and comparatively small household size shows that there is less immigration to the town.

Total migration in Cherpulassery municipalityis very low. Only 0.56 % of families of total population migrated outside the local body within the last five years. Table 3.8 gives the percentage of families migrated outside to different places from Cherpulassery within the last five years. Among this it can be seen that 0.34 % migrated outside but within the district and 0.11% outside the district, but within Kerala and 0.11% to Tamilnadu.

Table 3.9 shows the migration profile of Cherpulassery as per Pravasi Survey, 2013. It can be seen that 2,049 persons have gone abroad for better employment opportunities, of which majority have relocated themselves to Middle east. More than 50% (1,075Nos) of them are working as Labourers, followed by Drivers (476 Nos), sales man (230Nos) and Business (100 Nos).

Table 3.8 Percentage of families migrated within the last five years (Origin wise)

Migrated to	Outside but within the district	Outside District but within Kerala	Tamilnadu
Average % for the LSGI in each category	0.34	0.11	0.11

Source: Socio – economic survey, 2016

Table 3.9 No of Pravasis (Destination wise)

Migrated to	Saudi	UAE	Kuwait	Oman	Quatar	Baharin	USA	Eurpoean countries	African countries	other Asian countries
No of NRKs	839	797	42	95	159	47	27	8	9	26

Source: Pravasi survey, 2013

3.14 INFERENCE

The demographic profile of Cherpulassery town posts an aspiring picture akin to urban area at its genesis. Given its healthy sex ratio and rising household size, it would be prudent to provision service levels at par with the trend. Even though the child sex ratio in the urban area has been improving over the past three decades, there is still room for achieving better levels. Also there has been an uptick in population growth trend, with population doubling its size during three-decade period of 1981-2011.

Population growth rate of Town is higher than other towns in the district except Pattambi.

Given these conditions, it is imperative that its growth be channelled through proper planning efforts.

4. OCCUPATIONAL STRUCTURE

Occupational distribution of a population reflects the degree of development and the diversification achieved in an economy. Productive employment opportunities are essential for achieving poverty reduction and sustainable economic and social development. There is a close relationship between development of an economy on the one hand, and occupational structure on the other. Economic progress is generally associated with certain distinct necessary and predictable changes in occupational structure.

4.1 WORKERS

Work is defined as participation in an economically productive activity with or without compensation, wages or profit. Such participation may be physical or mental in nature. Work involves not only actual work, but also includes effective supervision and direction of work. It also includes part time help or unpaid work on farm, family enterprise or in any other economic activity. All persons engaged in 'work' as mentioned above are workers.

The total workers are classified into *main workers* and *marginal workers*. A person who has worked for 6 months or more in any economically productive activity is termed as a main worker and those who have worked for less than six months in the last one year preceding to the date of enumeration is termed as marginal worker. For the first time in Census 2011, the marginal workers have been sub divided into two categories, namely persons worked for less than 3 months and those worked 3 months or more but less than 6 months.

The total number of workers in Cherpulassery Town as per Census 2011 is 12,318 (31.39% of the total population of the town). This is less than Work Participation Rate of Palakkad district (37.10 %). The total workers include 10,414 (26.54 %) of main workers and 1,904 (4.85 %) of marginal workers. Figure 4.1 paints a picture of the above information.

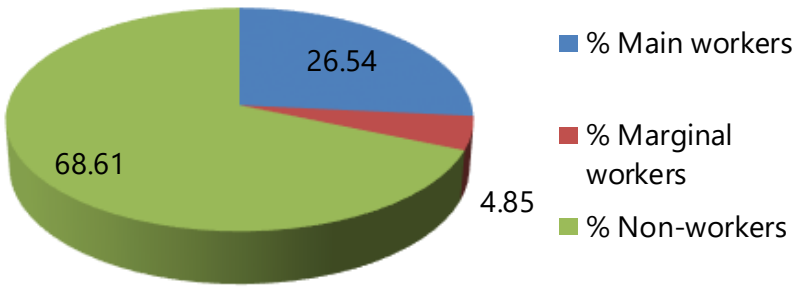


Fig 4.1 Share of Main, Marginal and non workers in Cherpulassery Town. (Census 2011)

Table 4.1 Decadal Variation in Percentage of Workers in Cherpulassery Town

	% Main workers	% Marginal workers	% Total workers	% Non-workers
1981	26.01	1.22	27.23	72.77
1991	28.13	1.66	29.79	70.21
2001	25.27	3.82	29.09	70.91
2011	26.54	4.85	31.39	68.61

Source: Census 1981, 1991, 2001, 2011

Table 4.1 depicts the decadal change in the percentage of workers and non-workers. The percentage of non-workers has been steadily decreasing during 1991-2011. The total number of workers have increased from 27.23 % of the total population in 1981 to 31.39 % in 2011. Decadal variation of total workers, marginal workers, main workers and non-workers are shown in Fig.4.2.

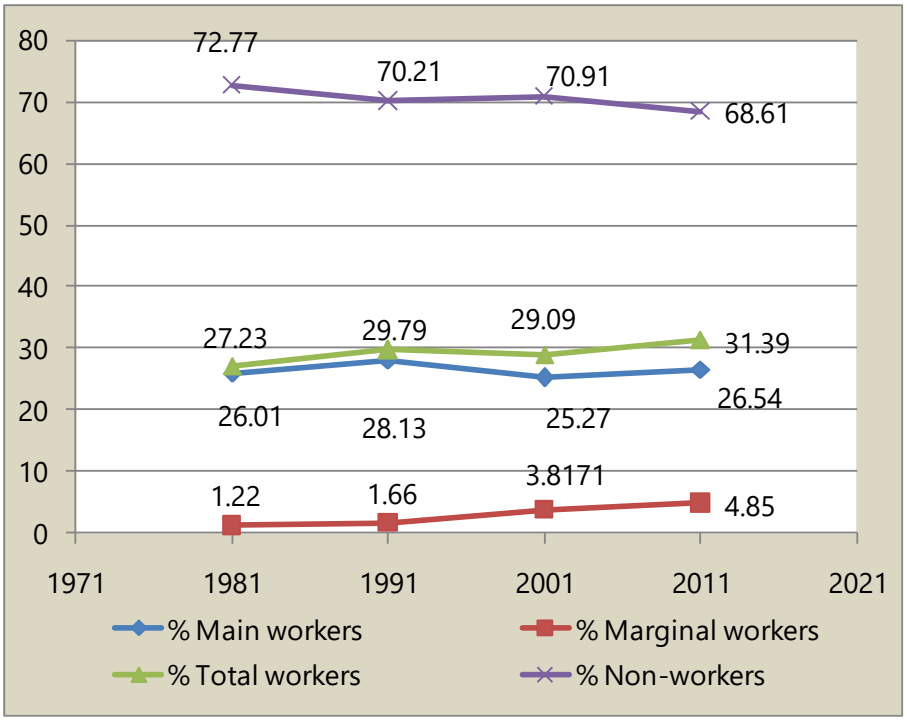


Fig. 4.2 Decadal variation of Total workers, Marginal workers, Main workers and Non-workers

There is an uptick in the share of main workers during the last decade which is a healthy employment scenario. More efforts are need to be pressed in to drop the non-workers and increase the share of main workers. Table 4.2 details the share of workers across the urban local bodies in Palakkad district as per census 2011. It may be observed that, Cherpulassery stands second to the least share of Main workers amongst the urban local bodies. This could be attributed to the large dependency of populace on agriculture as their mainstay and low levels of diversification in income source.

Table 4.2 Share of Main workers, Marginal workers, and Non-workers (2011) in % across urban Local bodies in Palakkad District

Year	2011		
Name of LSGI	Main Workers(%)	Marginal Workers(%)	Non workers(%)
Ottappalam (M)	27.05	5.85	67.10
Shoranur (M)	29.88	3.78	66.34
Chittur-Thathamangalam (M)	34.17	5.83	60.00
Palakkad (M)	31.32	3.58	65.11
Pattambi	24.11	5.79	70.10
Cherpulassery	26.54	4.85	68.61
Mannarkkad	26.55	3.92	69.53

Source: Census 1981,1991, 2001, 2011

4.2 WORK PARTICIPATION RATE

Work Participation Rate (WPR) is defined as the percentage of total workers to the total population. WPR of Kerala according to 2011 Census is 34.78 % and that of Palakkad district is 37.10%. District is having 7th rank in the State. Fig 4.3 shows the decadal variation of total, Male, Female WPR in Cherpulassery town.

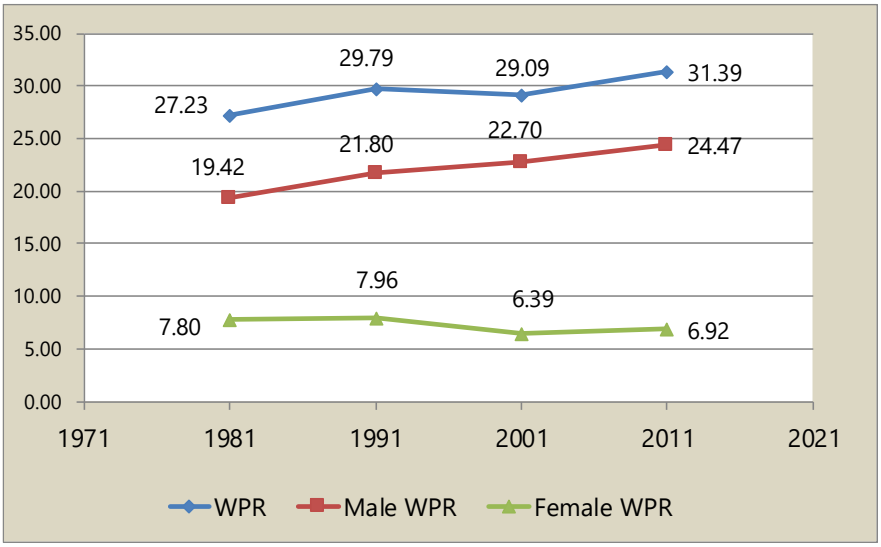


Fig. 4.3 Decadal variation of Total, Male, Female WPR of Cherpulassery Town

Source: Census 1981,1991, 2001, 2011

The graph depicts an overall rising trend except a slight dip in the year 2001. It could mean that economic activities are gaining momentum providing job opportunities. However, with males contributing to 24.47 % and females 6.92 % of the total working population in the municipality, the gender inequality in WPR is quite staggering and concerning at the same time. A comparison of WPR across Urban Local bodies, similar towns and adjacent LSGs are shown in figures 4.4, 4.5 & 4.6 respectively.

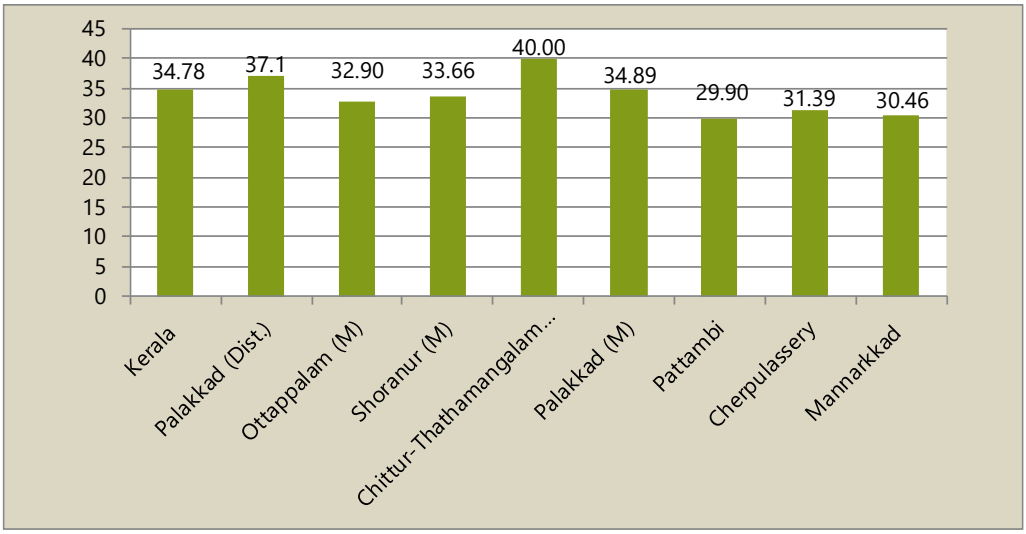


Fig. 4.4 Comparison of WPR with State ,District & other Urban Local Bodies within the District

Source: Census 2011

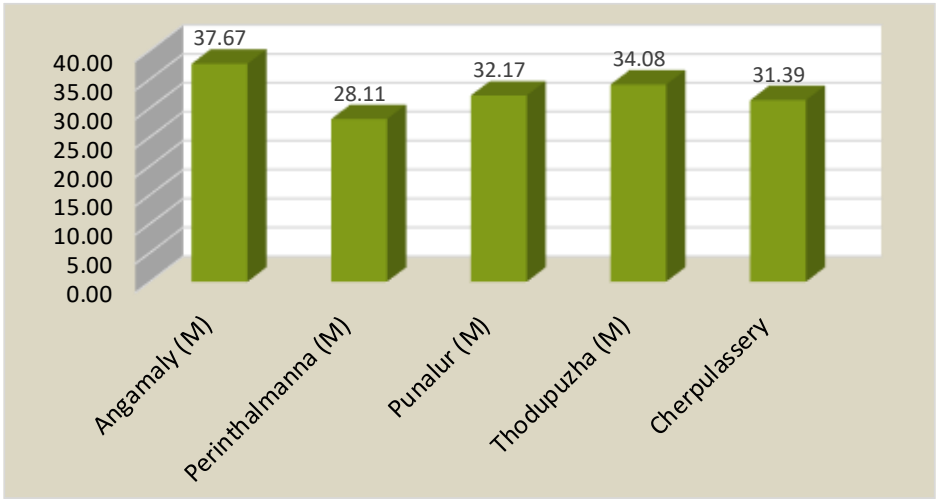


Fig. 4.5 WPR Comparison with Similar Towns

Source: Census 2011

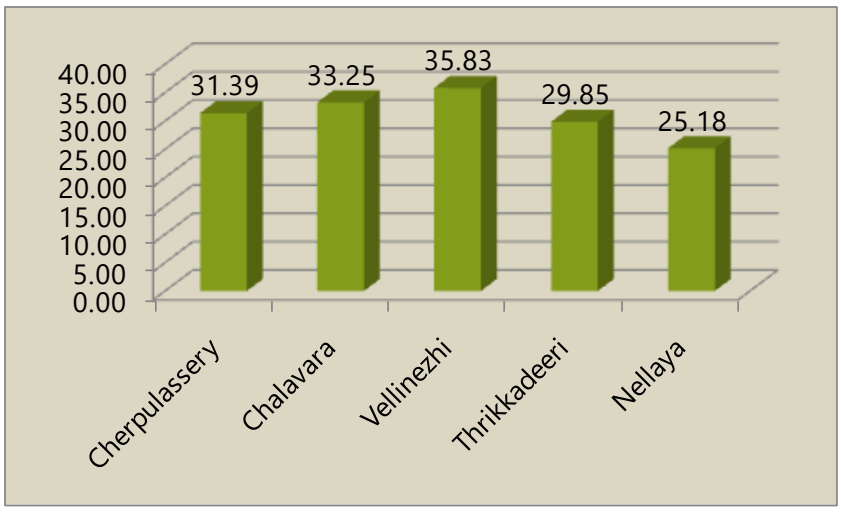


Fig. 4.6 WPR Comparison with Adjacent LSGIs

Source: Census 2011

Cherpulassery Town secures fifth position among other municipalities in the district with a WPR of 31.39 % (Fig 4.4), lesser than the average value of the district (37.10 %) and the state (34.78 %). When compared with similar towns, it can be seen that the WPR of Cherpulassery Town is much below the value of WPR of similar Towns other than Perinthalmanna as per census 2011 (Fig 4.5). When compared with adjacent Panchayats, it can be seen that the WPR of Cherpulassery Town is lower than Vellinezhi and Chalavara, but higher than Thrikkadeeri and Nellaya as per census 2011 (Fig 4.6). All these comparisons paint a prospective picture with a lot of potential to improve upon.

4.3 OCCUPATIONAL STRUCTURE

Occupation refers to an economic activity which provides means of livelihood for those engaged in it. People engaged in various economic activities are called workers. The whole of working population i.e. the population working in any type of economic activity at the ongoing wage rate, is termed as the workforce. There are various types of economic activities in which people work. We can group them into three major sectors in the economy viz

I. Primary

II. secondary and

III. Tertiary

Primary sector includes agriculture and allied activities such as cultivation, forestry and logging, fisheries, poultry and dairy farming etc. Secondary sector activities include manufacturing industry, large and small scale construction etc. The tertiary sector activities include services such as banking and insurance, trade and commerce. transport and communication, real estate, social services etc. The distribution of total work force of an economy among the above said various sectors is called occupational structure of that country.

A person is classified as cultivator if he or she is engaged in the cultivation on land owned or held from government or held from private persons or institutions for payment in money, kind or share. Cultivation includes effective supervision or direction in cultivation. A person working on another person's land for wages in cash or kind or combination of both is termed as agricultural labourer.

Household workers include those working in the household industries engaged in manufacturing, processing, servicing and repair of goods. A person who has been engaged in some economic activity during the reference period but not as a cultivator, agricultural labourer or in household industry is termed as 'other worker'.

According to 2011 Census, 77.98 % of the total workers of Cherpulassery Town

are male workers. There is a clear dominance of male workers in all classes of workers. Female work participation is more in other worker's section followed by agricultural labourers section and least in cultivator's section.

Analysing the economic base of the development plan area in past decades will help understand the direction of growth of area in terms of economy. Share of workers (%) across various categories in last three decades have been discussed in Table 4.3.

Table 4.3 Occupational Structure of Main workers 1981, 1991, 2001, 2011

Year	1981	1991	2001	2011
Cultivators	1067	1096	747	668
Agricultural Labourers	2599	2996	1662	1654
Household Industrial Workers	230	193	229	187
Other Workers	1470	2090	3761	5342
Total	**5366**	**6375**	**6399**	**7851**

Source: Census 1981,1991,2001,2011

It can be seen that except for *other workers*, the number of *agricultural labourers*, *cultivators* and *household industrial workers* have been constantly decreasing in the municipality (Fig 4.7).

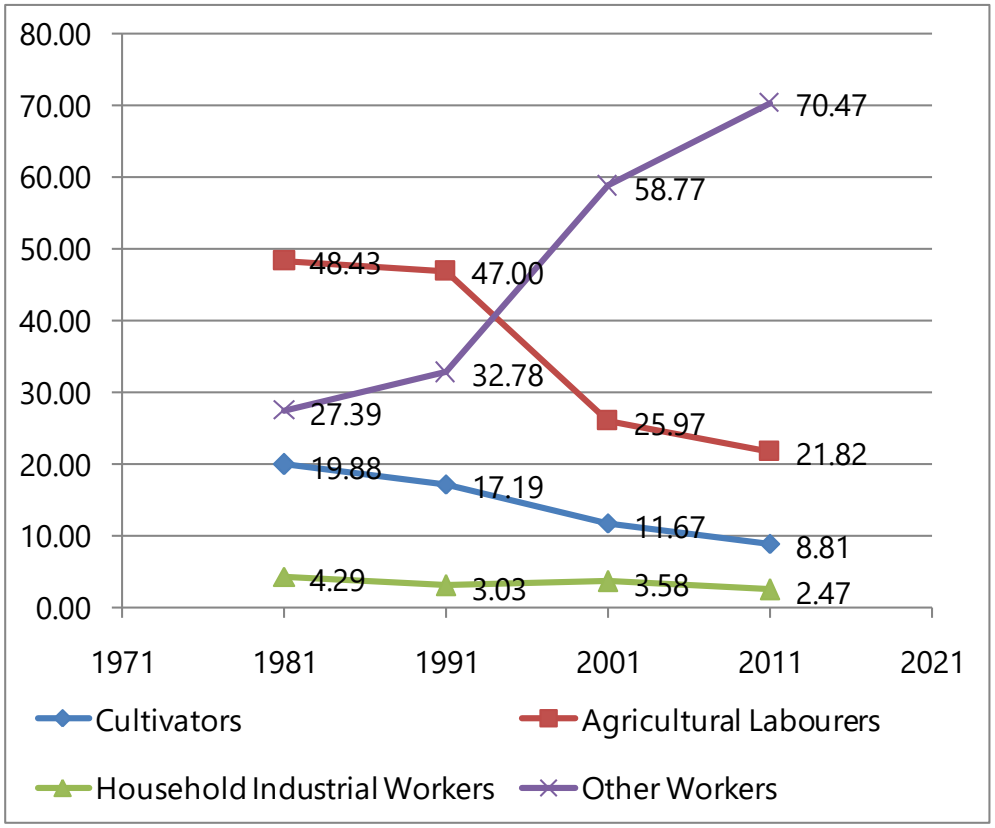


Fig 4.7 Decadal Variation of Four-fold classification of Main Workers in Percentage

Source: Census 1981,1991, 2001, 2011

This clearly shows that there is a shift from traditional agricultural activities to other activities like trade and commerce, construction activities etc. The *other workers* consist mainly of government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists etc. While the share of *other workers* has increased by 43.08 % over the last three decades, the number of household industrial labourers shows a decline from 4.29% to 2.47 % over the same period.

Workers are also classified into primary, secondary and tertiary workers. The workers in *other category* can be considered as tertiary workers and therefore the increase in the total number of workers is due to an increase in the number of tertiary workers. On analysis of socio economic survey, it was found that the majority of workers are engaged in tertiary sector.

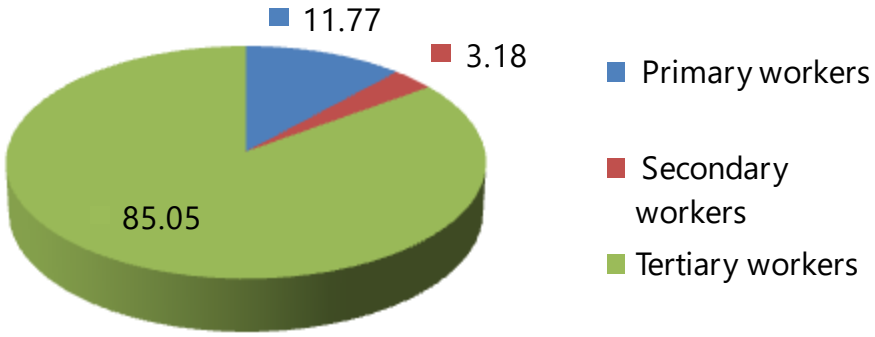


Fig. 4.8 Share of workers (%)

Source: Socio economic survey, 2016

The breakup of workers (%) is shown in Fig.4.8. Primary workers amounts to 11.77 %, secondary workers to 3.18 % and tertiary workers amounts to 85.05 % of the total workers in the municipality. Thus it can be seen that the economic growth of Cherpulassery Town would heavily depend on the service sector or tertiary sector.

On analysing the employment pattern from the socio – economic survey (Fig 4.9) , it can be seen that the private sector provides major employment opportunities in the municipality followed by self-employment. It can also be seen that the percentage of unemployed population trying for employment is also significantly higher in the municipality. Only 4% among the population are employed in public sector.

4.4 SPATIAL DISTRIBUTION OF WORKERS

The concentration indices of cultivators, agricultural labourers, household industrial workers and other workers are shown in Fig. 4.10, 4.11, 4.12 and 4.13 respectively. It can be seen that the concentration of *cultivators* are maximum in Thootha(2), Kooliyad(21), Manjakkal(28), Vellottukurissi (29), Panniyamkurissi (30) wards. The concentration of *agricultural labourers* were found to be maximum in Health Centre (3), Karuma-

namkurissi(9), Mandakkari (13), Niraparambu (16), Chenathparambu (31) Veetikad (32), wards on the northern and western periphery of the municipality.

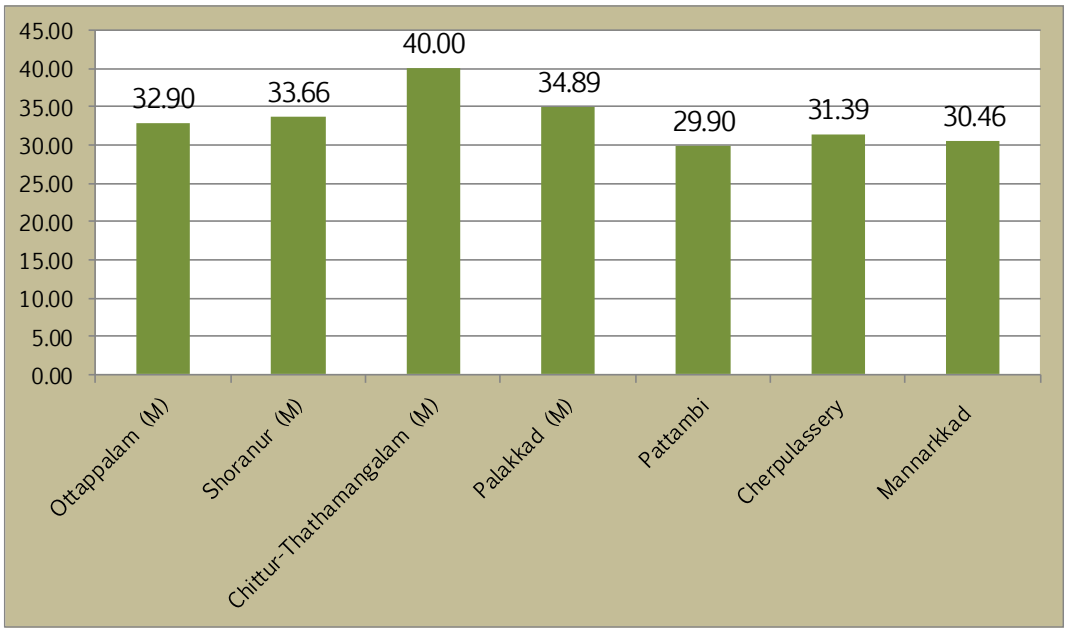


Fig. 4.9 Employment Pattern

Source: Census 2011

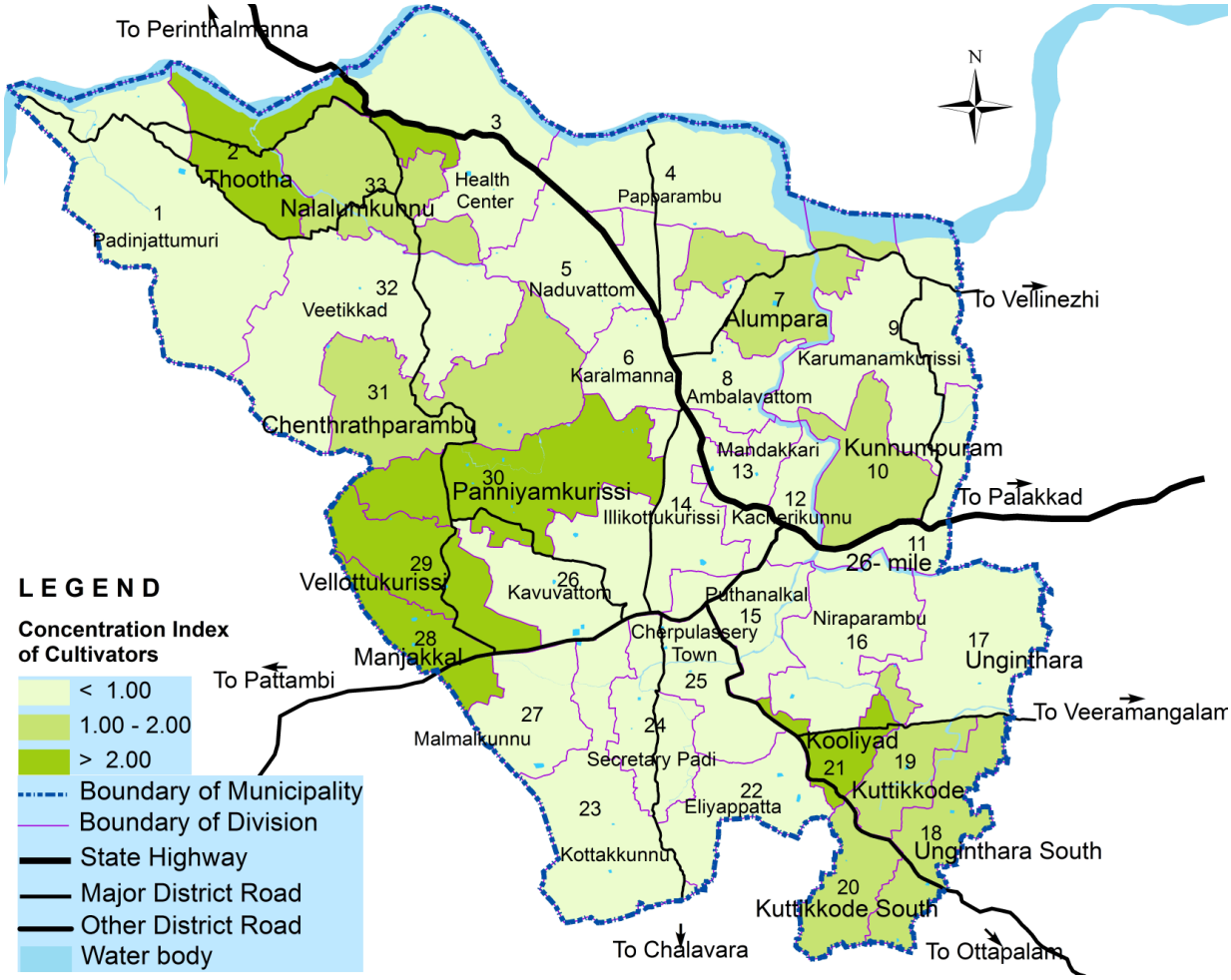


Fig. 4.10 Cultivators Concentration Index

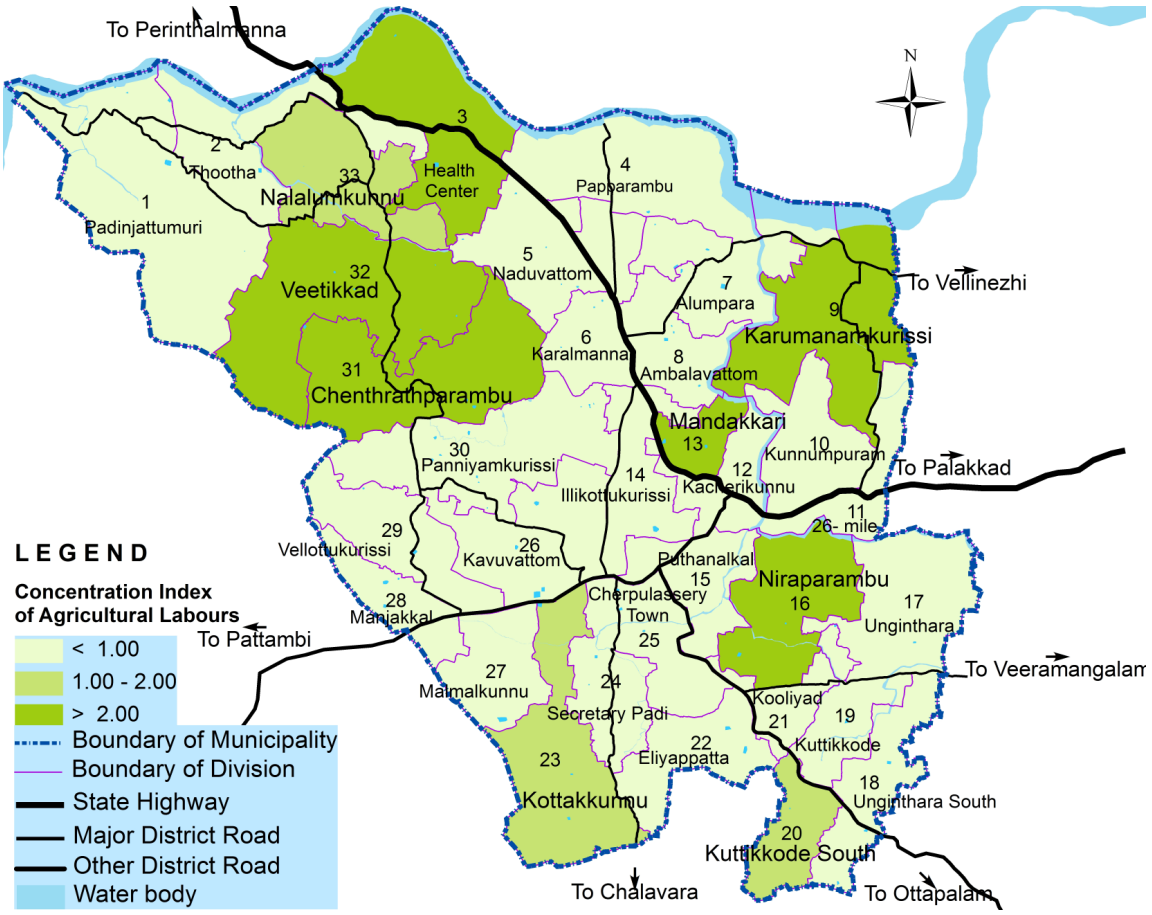


Fig 4.11 Agricultural Workers Concentration Index

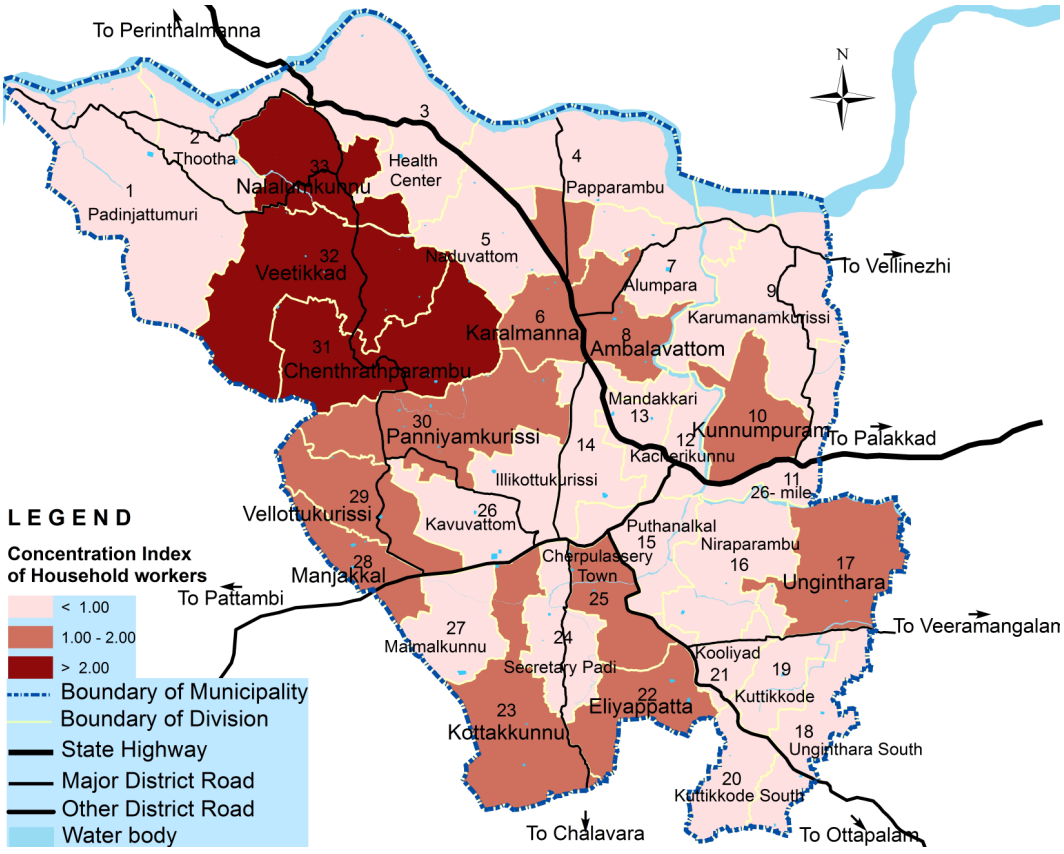


Fig 4.12 Household Industrial Workers Concentration Index

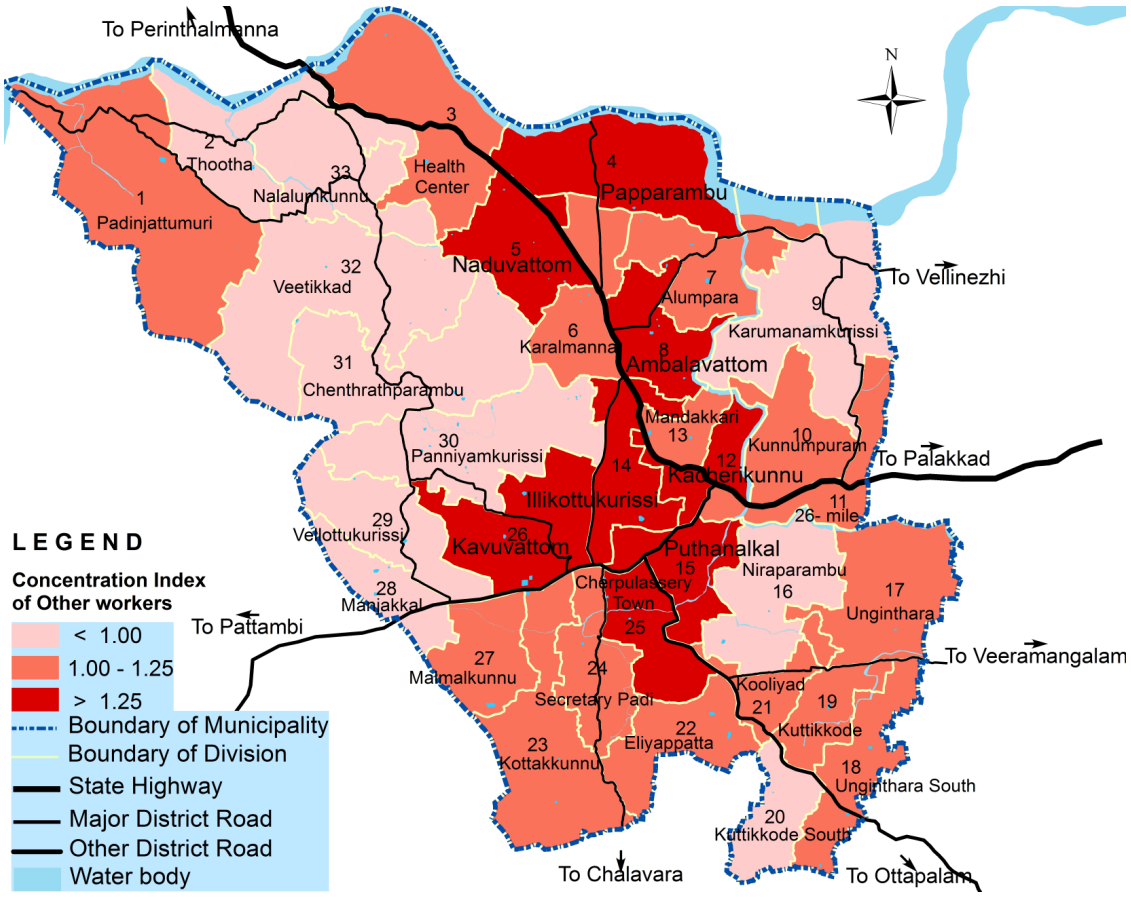


Fig 4.13 Other Workers Concentration Index

Highest concentration of household industrial workers were found to be in Karalamanna (6), Unginthara(17), Manjakkal (28), Vellottukurissi(29), Panniyamkurissi (30), Chenathuparambu (31) and Veettikad (32) wards. The concentration of other workers is distributed more or less uniformly in the municipality however the highest concentration of *other workers* are found in Ambalavattam (8), Kacherikunnu (12), Illi-kottukurissi(14), Puthalakkal (15), Kavuvattom (26) wards.

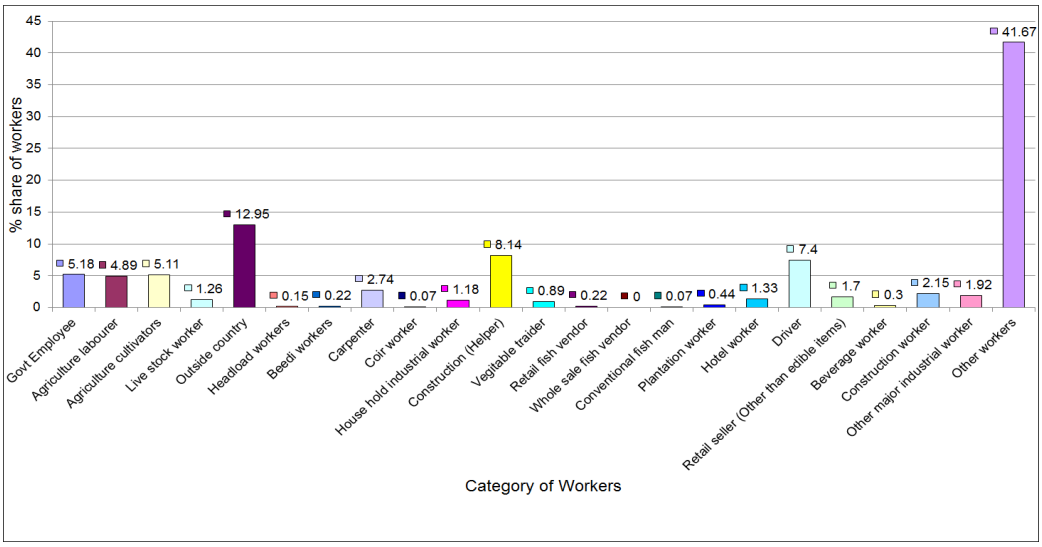


Fig 4.14 Percentage Share of workers in each category

Source: Socio economic survey, 2016

The status of employment as per Socio economic survey 2016 (Fig 4.14) shows 12.95% are working outside country followed by 8.14% working in construction field. 5.18% are Government employees, 5.11 % are agricultural cultivators and agricultural labourers comes to 4.89%.

4.5 DEPENDENCY RATIO

This indicator gives the ratio of non-workers to the workers in the municipality. A high ratio means that the working people and the overall economy face a greater burden in supporting non-working population. Table 4.4 indicates the dependency ratio of the town in comparison with other municipalities in the district, the district and state average.

Table 4.4 Dependency ratio of the town in comparison with other municipalities, with the District and the State

Administrative Unit	Non workers (2011 census)	Workers (2011 census)	Dependancy ratio	Dependancy ratio (Dependants x 100/workers)
Kerala	2,17,86,998	1,16,19,063	1.88	188
Palakkad District	17,67,594	10,42,340	1.7	170
Palakkad Municipality	85,259	45,696	1.87	187
Chittur-Thathamangalam Municipality	19,380	12,918	1.5	150
Ottappalam Municipality	36,092	17,700	2.04	204
Shoranur Municipalitry	28,878	14,655	1.97	197
Pattambi Municipality	20,071	8,561	2.34	234
Cherpulassery Municipality	**26,923**	**12,318**	**2.18**	**218**
Mannarkkad Municipality	22,069	9,669	2.28	228

Source: Census 2011

It can be seen that Chittur – Thathamangalam municipality has the lowest dependency ratio. Pattambi municipality with a dependency ratio of 2.34 has the highest value when compared with other municipalities in the district indicating more burden of non-workers on the working population. Cherpulassery Town has a value of 2.18 which is higher than state average of 1.88 and district average of 1.70.

4.6 INFERENCE

Low work force participation rate and a high dependency ratio indicate a weak occupational structure of the municipality. There is a visible gender inequality in terms of work participation rate. But the rising trend in WPR is a good sign which shows that the economic base of the municipality is getting stronger with time especially in the tertiary sector. The primary and secondary sectors are showing a very feeble contribution to the work force.

5. LAND USE

Land is one of the most essential natural resources for the survival and prosperity of humankind, and it is the platform on which human activities take place. Land is a limited resource with increasing substantial demands placed on it. As a result of increasing heavy pressure on land resources, agricultural production declines, the quantity and quality of land deteriorates, resulting in increased competition for access to land.

Land resources management has many components, including land-use planning. The rational planning and management of urban system is possible through regular survey of land use which helps in delineating land suitable for various activities. The objective of sustainable land management is to harmonise the complimentary goals of providing environmental, economic, and social opportunities for the benefit of present and future generations, i.e. the use of land to meet changing human needs while ensuring long-term socio-economic and ecological functions of the land.

5.1 EXISTING LAND USE OF CHERPULASSERY TOWN

The analysis of land use has a key role in the preparation of development plan for a town in a spatial platform and it is essential for effective utilisation of land for the future demands**.** This chapter deals with the study of the micro level survey on existing land use & its categorisation, spatial distribution, spatial concentration pattern, comparison with planning standards etc. The total geographical area of 31.88 km^2 has been categorised on the basis of land use manifested by natural and manmade structures at the point of survey period.

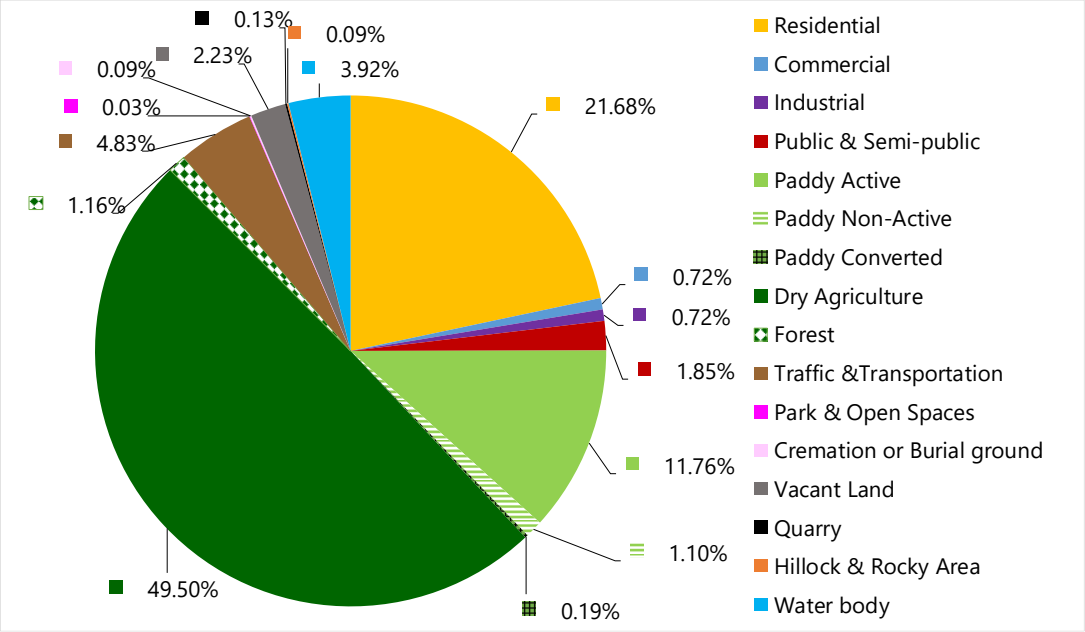


Fig. 5.1 Land use breakup of Cherpulassery Town

In order to understand the land use breakup of the area of a town, commonly categorised as residential, commercial, industrial, traffic and transportation, public and semi-public, paddy fields, water bodies etc. Breakup of the existing land use is presented in table 5.1 and is graphically represented in figure 5.1. The table 5.2 shows the ward wise distribution of land use.

The study of the categorization of existing land use revealed that the town consists 19.88 sq.km of agricultural land including dry and wet land and which

Table 5.1 Land use breakup of Cherpulassery Town

Sl No.	Land use	Area(Sq.km)	Percentage of Total Area
1	Residential	6.91	21.68
2	Commercial	0.23	0.72
3	Industrial	0.23	0.72
4	Public & Semi-public	0.59	1.85
5	Paddy Active	3.75	11.76
6	Paddy Non-Active	0.35	1.10
7	Paddy Converted	0.06	0.19
8	Dry Agriculture	15.78	49.50
9	Forest	0.37	1.16
10	Traffic &Transportation	1.54	4.83
11	Park & Open Spaces	0.01	0.03
12	Cremation or Burial ground	0.03	0.09
13	Vacant Land	0.71	2.23
14	Quarry	0.04	0.13
15	Hillock & Rocky Area	0.03	0.09
16	Water body	1.25	3.92
Total		31.88	100.000

Source: Land Use Survey, 2016

constitute 62.36 % of the total land area of the Municipality. The developed area derived as 9.54 sq.km, which constitute 29.92 % of the total Municipal area including residential, commercial, industrial, public & semi-public, transportation, park and open space and cemetery land uses. The summarized land use as forest, water body, vacant and quarry are seen as 2.37 sq.km i.e. 7.44 % of total land area of the town. The figure 5.2 shows the existing land use map of Cherpulassery town.

5.2. WARD WISE LAND USE ANALYSIS

The spatial distribution and ward wise concentration of various land use types in the planning area are analyzed separately. The concentration pattern of a land use

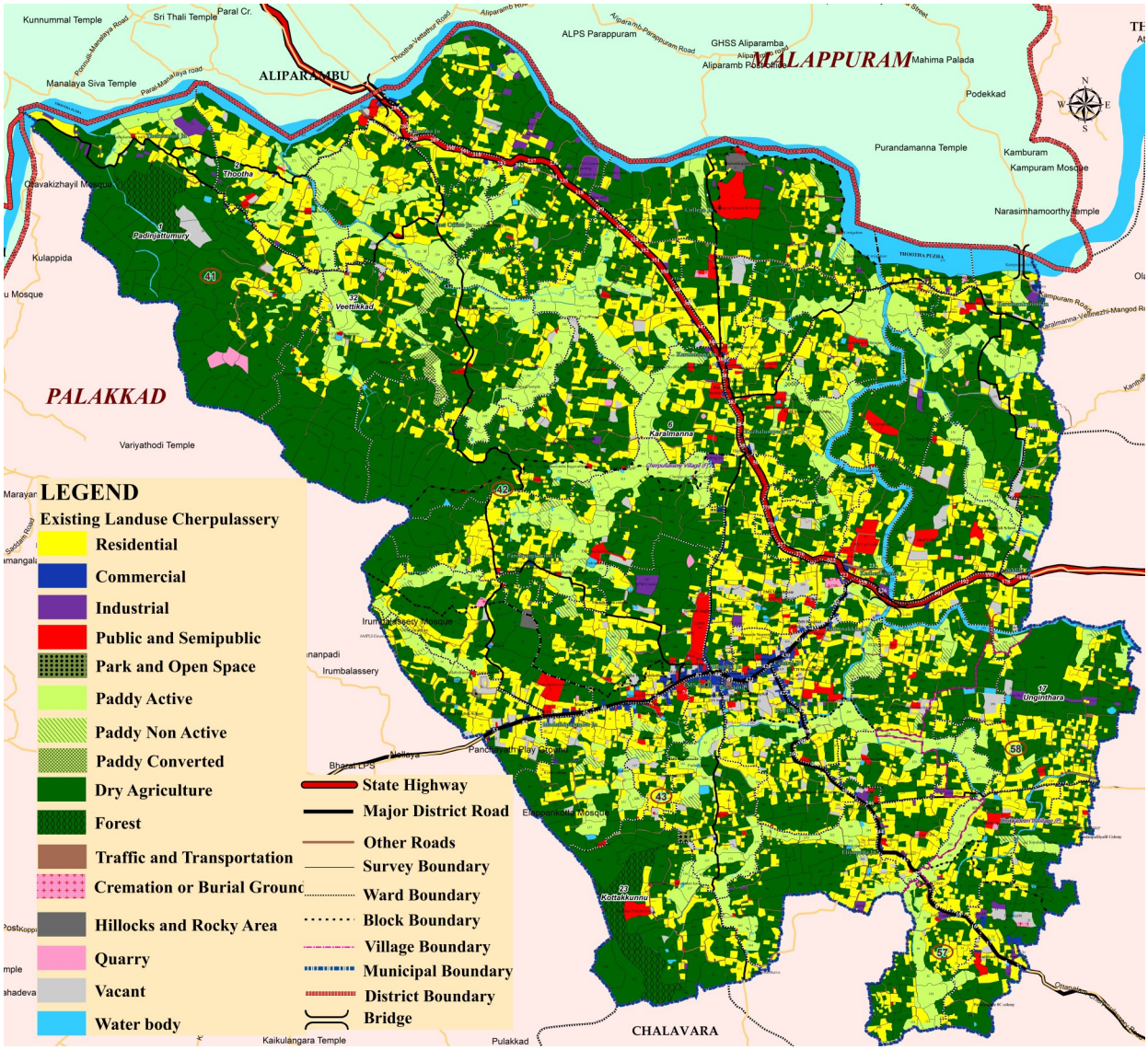


Fig. 5.2 Existing land Use Map of Cherpulassery Town

gives an idea about where that particular land use is concentrated within the Municipality. The concentration pattern of land use can be ascertained by the concentration index of the land use which is calculated as follows.

Concentration index (C.I) of a particular land use in the municipality

$$= \frac{\text{(Area of that land use in a ward) / (Total area of the ward)}}{\text{(Area of that land use of the Municipality) / (Total area of the Municipality)}}$$

The Concentration Index may be greater than one, equal to one or less than one. Wards with any particular land use concentration index greater than one indicates that the land use under consideration is highly concentrated in that area.

5.2.1 Residential Land Use

The residentially developed land area of the town is 6.91 Sq.km and which occupies 21.68% of total area. The residential development has taken place in a scattered manner. The spatial distribution of residential land use is shown in fig 5.3 and it is evident that the residential areas are developed mostly in places with accessibility and proximity to the town facilities. The largest land area of 0.33 sq.km for residential land use is shown in division 2-Thootha and least area of 0.110 sq.km is shown in



Fig. 5.3 Spatial Distribution of Residential Land Use

division 13-Mandakkari. As per the URDPFI standards 45 - 50% of area has to be available for residential purpose in a town. The peripheral areas of Cherpulassery town is found mostly with the homestead type of residential development, i.e. residential agriculture mix.

The figure 5.4 shows the ward wise residential concentration pattern of Cherpulassery Town. Residential concentration index value ranges from 0.41 to 2.19. The high values of residential concentration (CI value >1.45) is seen in the wards such as 21-Kooliyad, 14-Illikottukurissi, 13-Mandakkari, 28-Manjakkal, 2-Thootha, 12-Kacherikunnu. The least concentration value is observed in division 1-Padinjattumuri

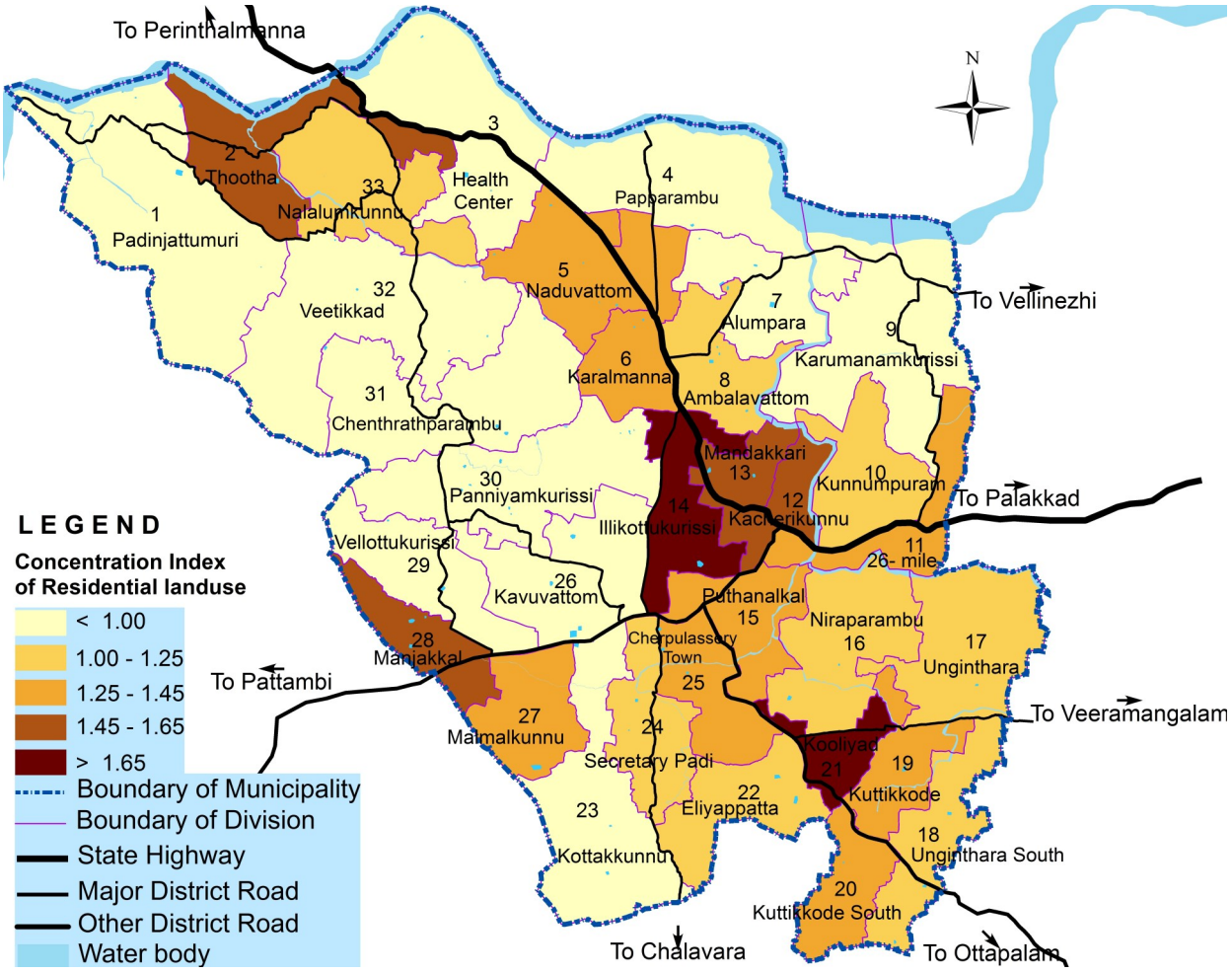


Fig. 5.4 Ward wise Concentration of Residential Land Use

(0.41). Other divisions having concentration value less than 1 are 1-Padinjattumuri, 32-Veettikkad, 31-Chenthrathparambu, 30-Panniyamkurussi, 29-Vellottukurussi, 26-Kavuvattam, 23-Kottakunnu were agriculture activities are more predominant. The analysis also reveals that higher values of residential concentration are reported from wards located in the central and south-east parts of the Municipality.

5.2.2 Commercial Land Use

The commercial activities are mainly located at core area of town and also along the sides of the major roads; Pattambi-Palakkad, Cherpulassery-Ottapalam and Palakkad- Perinthalmanna roads. The total land area for commercial activity comes only under 0.23 sq.km in the town, which constitute 0.72 % only. The distribution of commercial land use is shown in figure 5.5. The largest land area of 0.044 sq.km with commercial land use is shown in division 15-Puthanalkal and least extent of land comes in ward 32-vettikkad.



Fig. 5.5 Spatial Distribution of Commercial Land Use

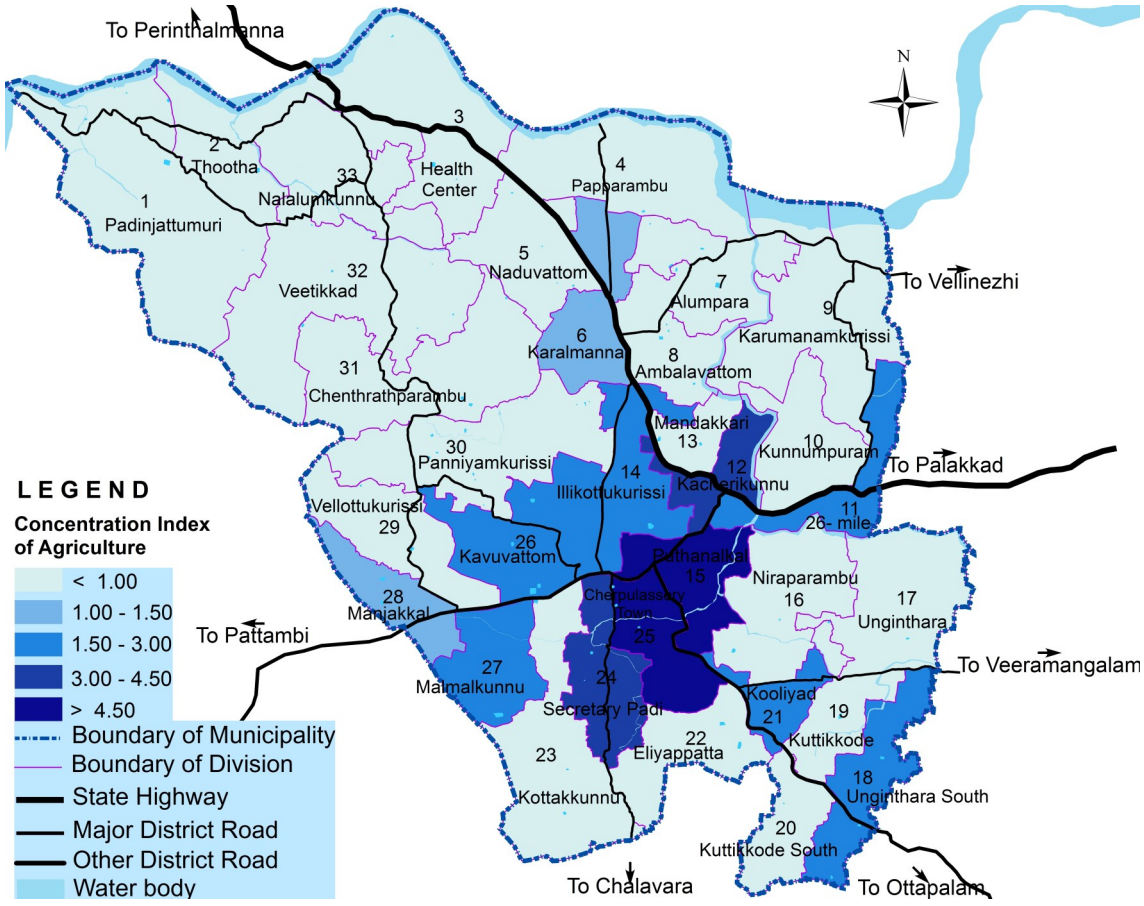


Fig. 5.6 Ward wise Concentration of Commercial Land Use

The concentration pattern of commercial land use is shown in figure 5.6. Concentration index values range from 9.25 to 0.02. Divisions 15-Puthanalkkal, 25-Cherpulasseri Town, 12-Kacherikunnu and 24-Secretarypadi have higher values for commercial land use concentration (CI value >3). The highest concentration is observed in division 15-Puthanalkkal (9.25) and least concentration in 32-Veettikkad (0.02) division.

5.2.3 Industrial Land Use

There are no large, medium scale industries in Cherpulassery town. There are only 12 small scale units and 154 micro scale enterprises within the town and in which majority units are engaged for the manufacturing of building materials, engineering works and automobile works. The industrial units in town are scattered around and interweaved with the commercial and residential land uses. The land area coming under industrial land use comes only 0.23 sq.km which constitutes 0.72 % of the total land area of the town. The highest land area for such use is 0.048 sq.km coming in division 3-Health center. The distribution of industrial land use in the Municipality are shown in figure 5.7.



Fig. 5.7 Spatial Distribution of Industrial Land Use

As per the concentration pattern of the industrial land use, the highest concentration is seen in ward 21-Kooliyad (5.76) followed by 3- Health Centre (4.47).

The concentration pattern of the industrial land use is shown in figure 5.8.

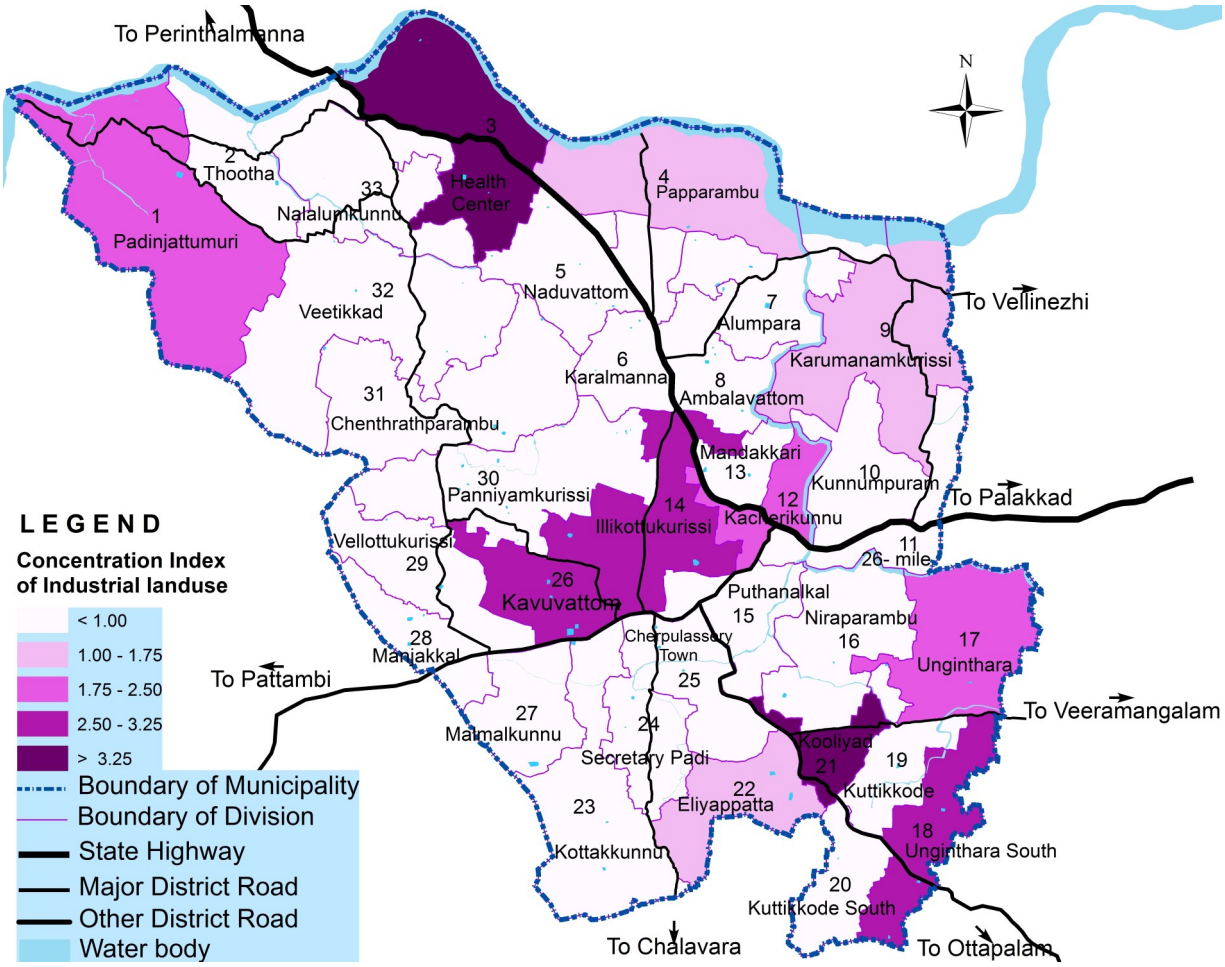


Fig. 5.8 Ward wise Concentration of Industrial Land Use

5.2.4 Public & Semi-public Land Use

Government/Semi Government offices, educational and research institutions, medical and health institutions, social, cultural and religious institutions, Govt. lands etc. are coming under the public and semi-public category. An area of 0.59 sq.km land comes under the public and semi-public category, which is only 1.85% of the total area of town. Most of the public buildings are scattered and located at core area of the town. As per URDPFI standards 6-8% of area of this category of land use has to be available in a town. The distribution of public and semi-public land use shown in fig 5.9. Majority of public buildings are located in the wards Kavuvattam (26), Kacherikunnu (12), Puthalakkal (15), Papparambu (4). The highest land area under the public and semi-public category as 0.08 sq.km comes in division 4-Papparambu and least area as 0.0014 sq.km shown in wards 20- Kuttikode South.

The concentration pattern of public and semi-public land use is shown in figure 5.10. Land use concentration values ranges from 0.06 to 5.68. It revealed that the

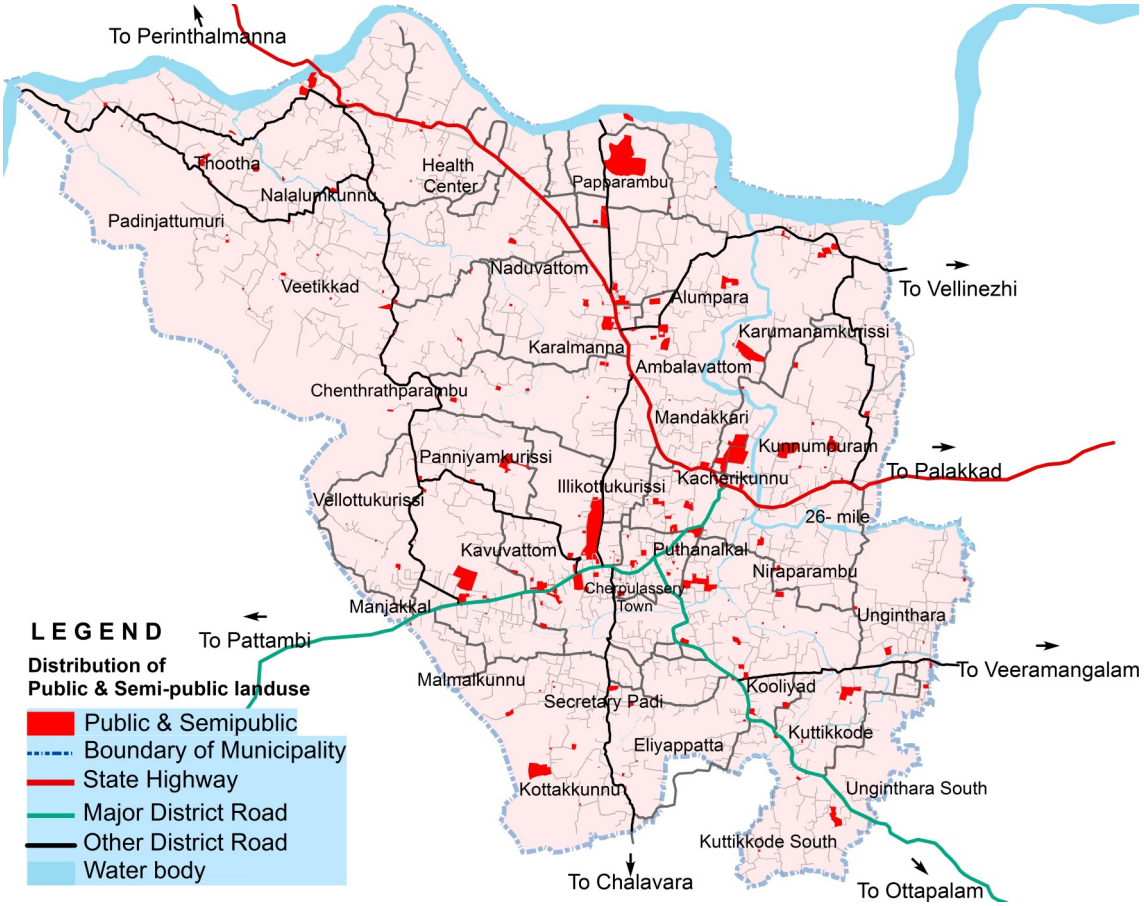


Fig. 5.9 Spatial Distribution of Public & Semi-public Land Use

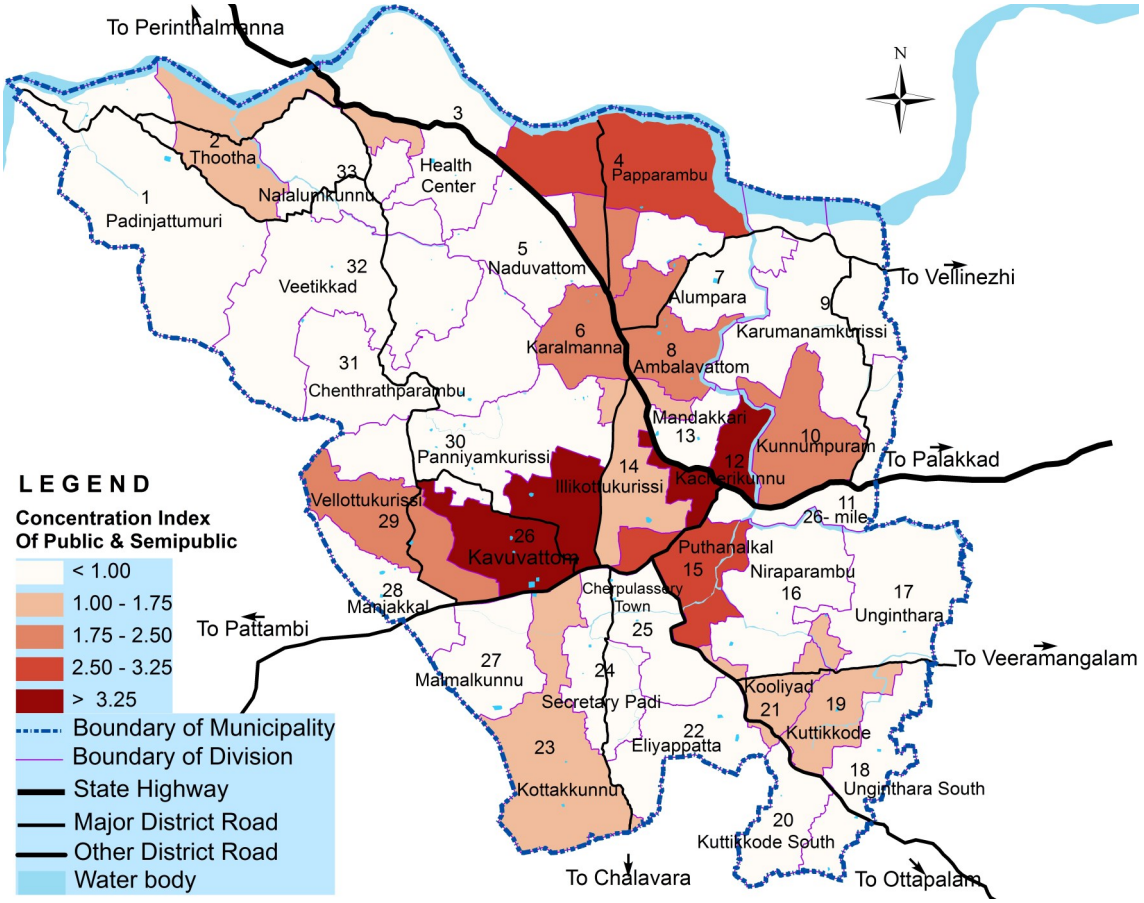


Fig. 5.10 Ward wise Concentration of Public & Semi-public Land Use

highest concentration of this category of land use shown in division 12-Kacherikunnu (5.68) since major public institutions like KSEB substation, Police station, Treasury, Village office etc. are located there. Least concentration value is observed in division 1-Padinjattumury (0.06).

5.2.5 Agricultural Land Use

The agricultural land use in Cherpulassery Municipal area includes paddy fields, and dry agriculture, which sums up to an extent of 19.88 sq.km, and constitute 62.36 % of the total area. The dry agriculture land use consists the crops like coconut, arecanut, banana, tapioca etc. which comes to an area of land 15.78 sq.km ie. 49.50 % of total land area. The wet land area as paddy consist an area of 4.10 sq.km and which comes 12.86% of total area. The active paddy consists of 3.75 sq.km of land and non-active paddy is 0.35 sq.km of land. Land parcels which are enlisted as paddy in data-bank and found to be converted for other purposes are categorized under 'Converted paddy' which constitutes 0.06 sq.km of land. It cannot be reverted back to the original condition by ordinary means.

The distribution of dry agriculture land use is shown in fig 5.11. The highest land area under dry agriculture category as 1.637 sq.km comes in division 1-Padinjattumury and least area as 0.115 sq.km shown in division 21– kooliyad.

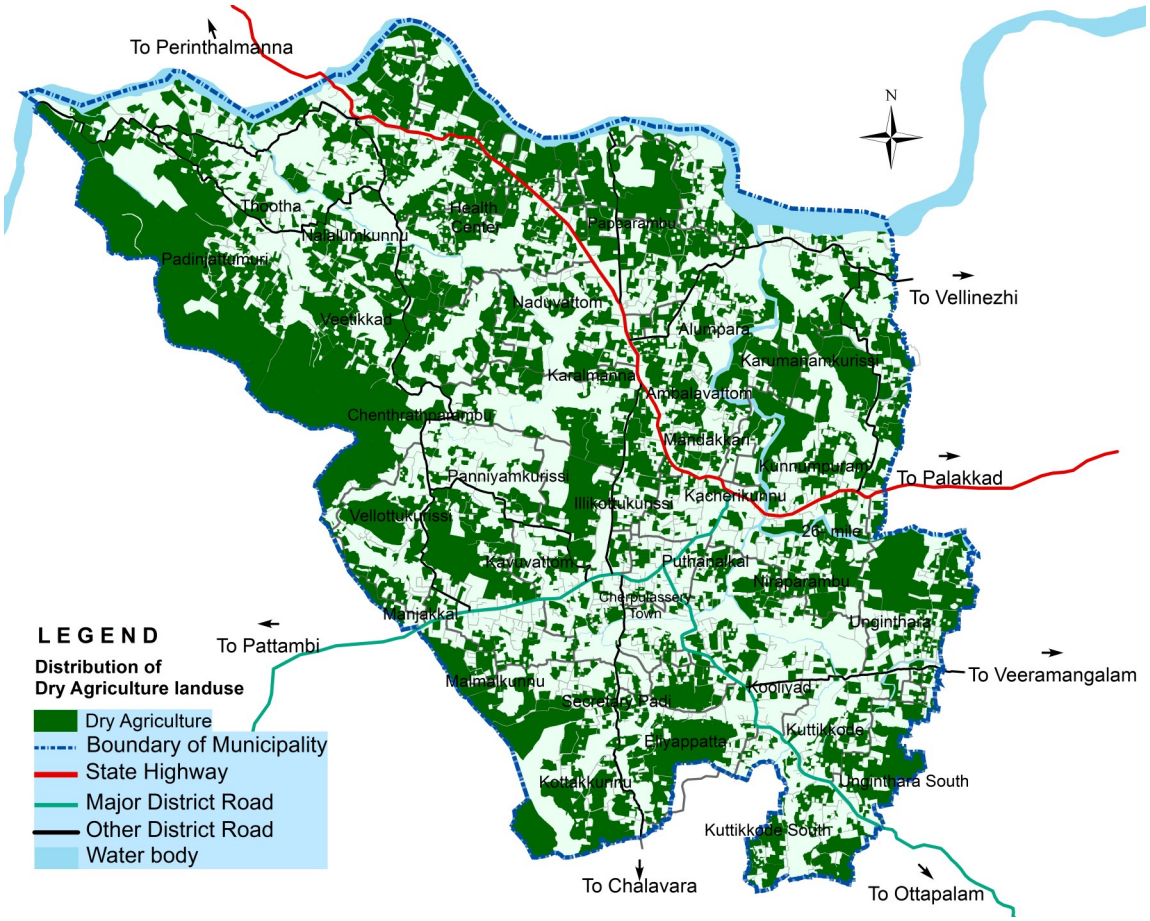


Fig. 5.11 Spatial Distribution of Dry Agriculture Land Use

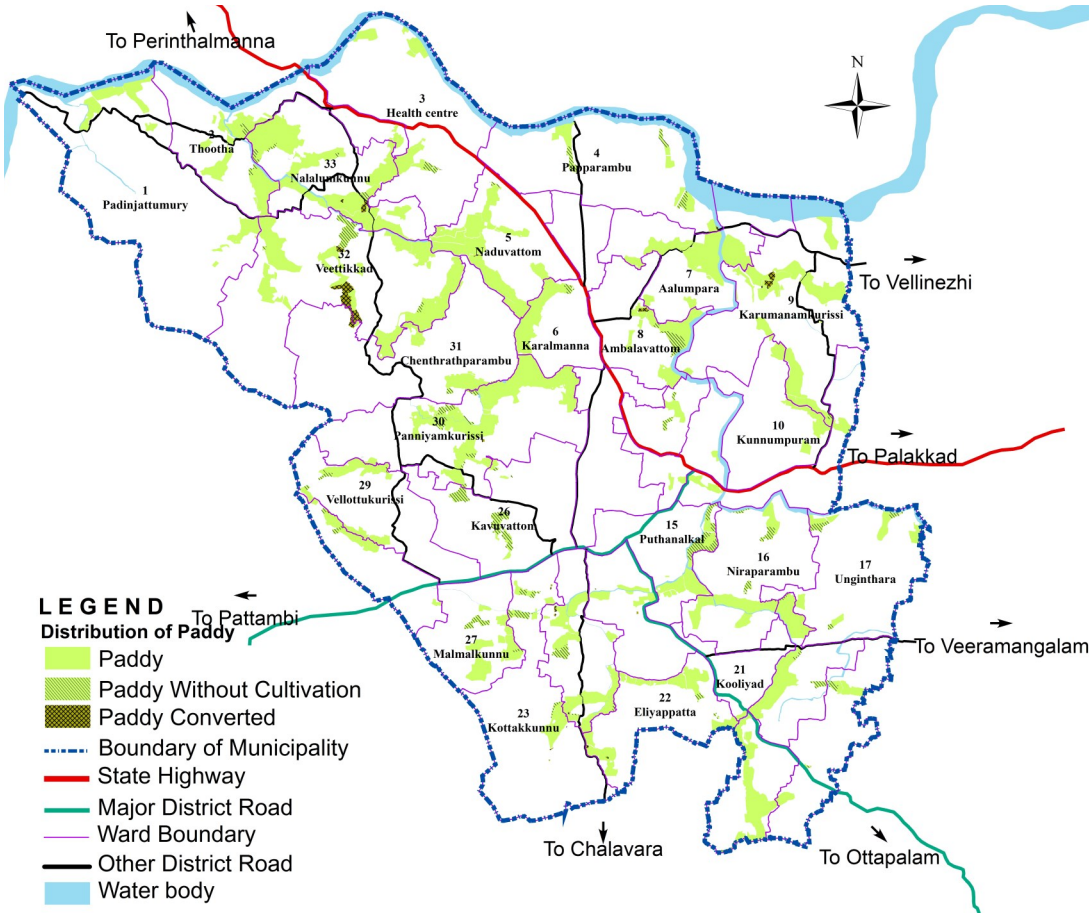


Fig. 5.12 Spatial Distribution of Paddy Land Use

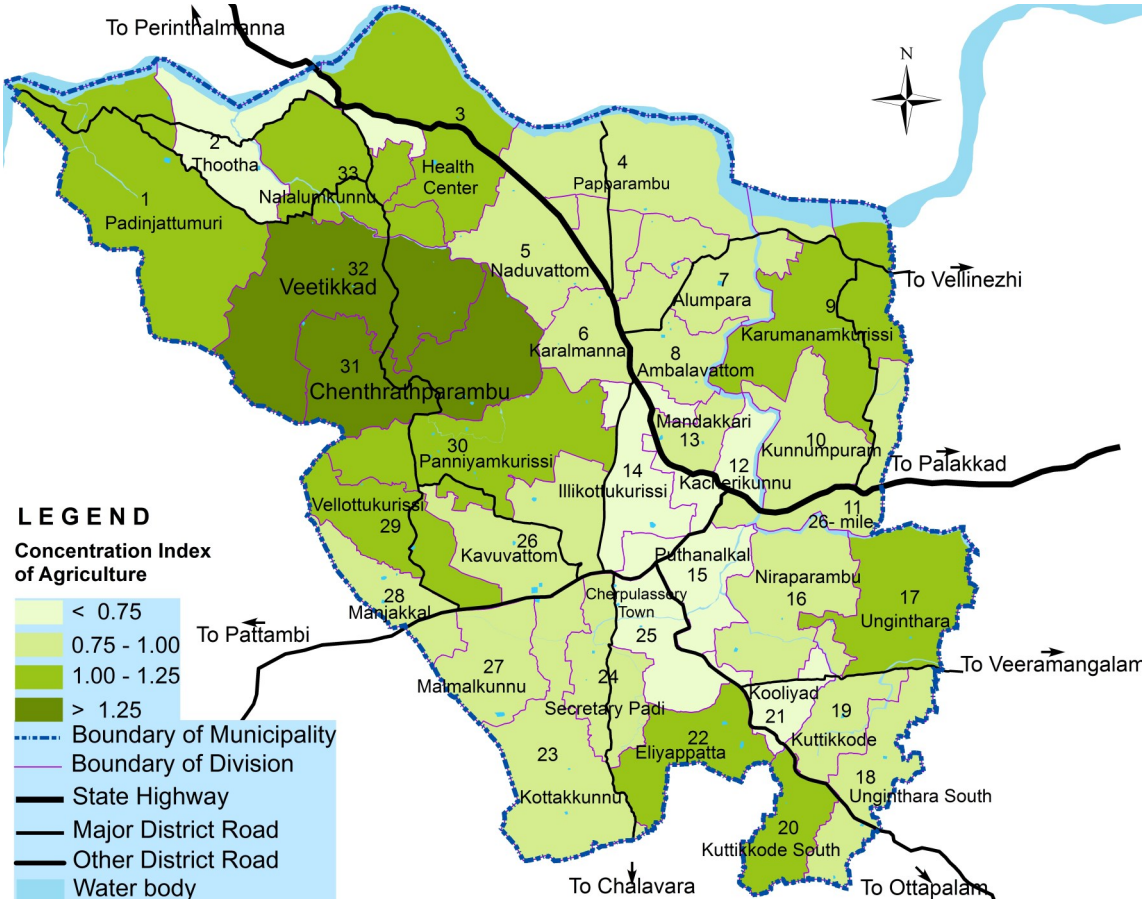


Fig. 5.13 Ward wise Concentration of Agricultural Land Use

The distribution of paddy land use is shown in fig 5.12. As per the ward wise distribution of paddy field division 32-Veettikkad have the highest land area as 0.39 sq.km of paddy.

The figure 5.13 shows the concentration pattern of agriculture land use. Veettikkad (32), Chentrathparambu(31), Panniyamkurissi (30) and Padinjattumuri (1) divisions have higher concentration values (CI value>1) which are located in the north-west part of the Municipality area. This study reveals that division 32-veettikkadhavu the highest concentration (1.32) and division 12-Kacherikunnu shows the least concentration value (0.49).

5.2.6 Transportation Land Use

System of transportation has evolved as a result of the intersection between various land use functions. Its requirement is the physical manifestation of the mobility requirement of people. State highways connecting Palakkad to Perinthalmanna (SH-53) is passing through the town and all regions are well connected by roads such as MDR, ODR and Municipal roads. The area covered by transportation is 1.54 sq.km i.e. 4.83% of total area of town and which is below the standards prescribed in URDPFI as 10-



Fig. 5.14 Spatial Distribution of Transportation Land Use

12%. Following fig 5.14 shows the spatial distribution of transportation land use. The concentration pattern of transportation land use is shown in figure 5.15. Transportation Land use concentration values ranges from 0.47 to 2.09. Concentration analysis revealed that the highest concentration of this category of land use is found in division 11-26th Mile (2.09) and least concentration value is observed in division 1- Padinjat-tumury (0.47).

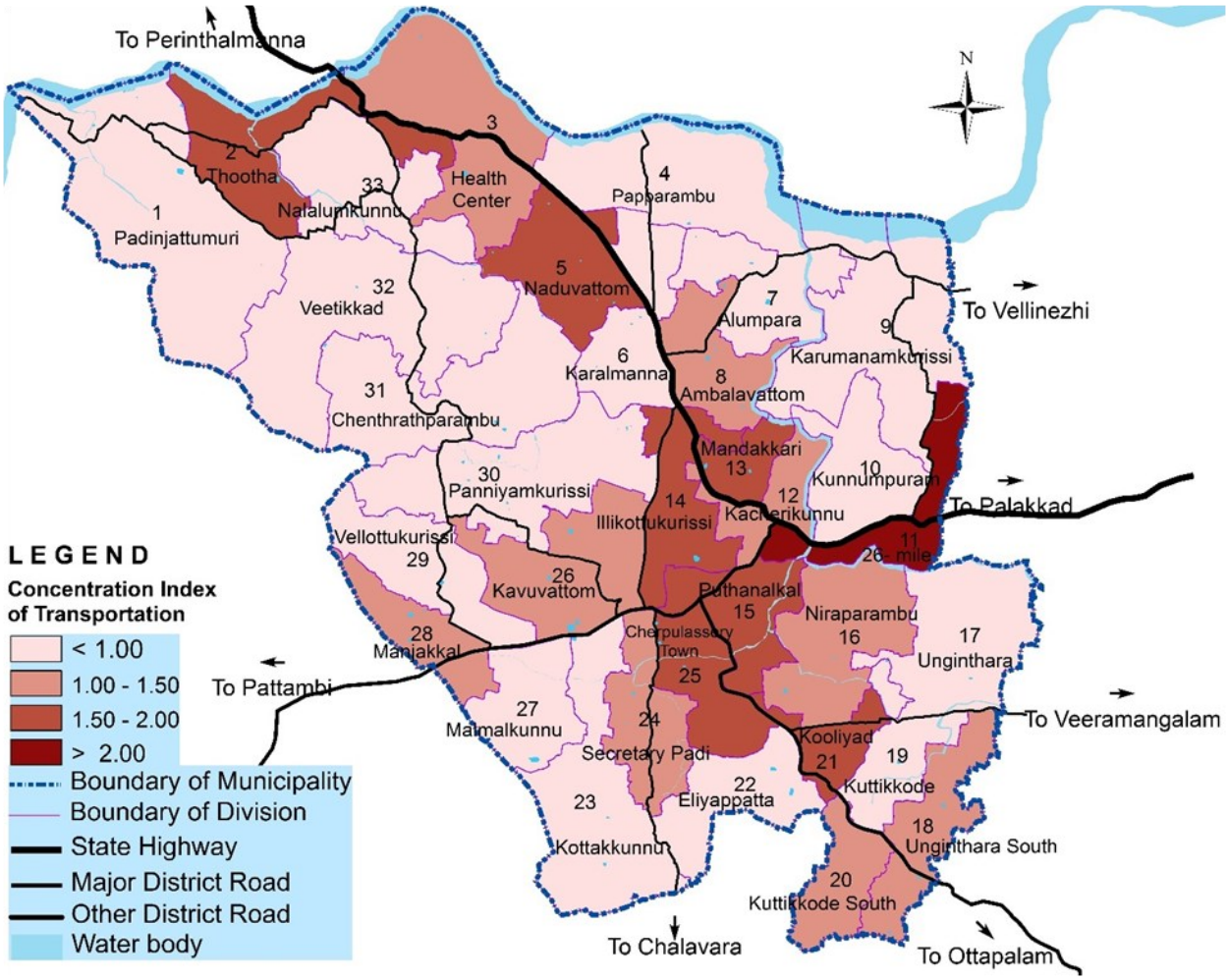


Fig. 5.15 Ward wise Concentration of Transportation Land Use

5.2.7 Forest

The forest land area located near Veettikadan Mala (North-west part of the Municipality) and at Kottakunnu (South-west part of the Municipality) and which are under Vested Forest under section 3 of the Kerala Private Forests (Vesting and Assignment) Act 1971 aiming to the management of ecologically fragile lands with a view to maintaining ecological balance and conserving bio-diversity.

The total extent of forest land within the Cherpulassery Municipal area is 0.37 sq.km and which is 1.16 % of total area of town. The spatial distribution of forest land use is shown in figure 5.16.

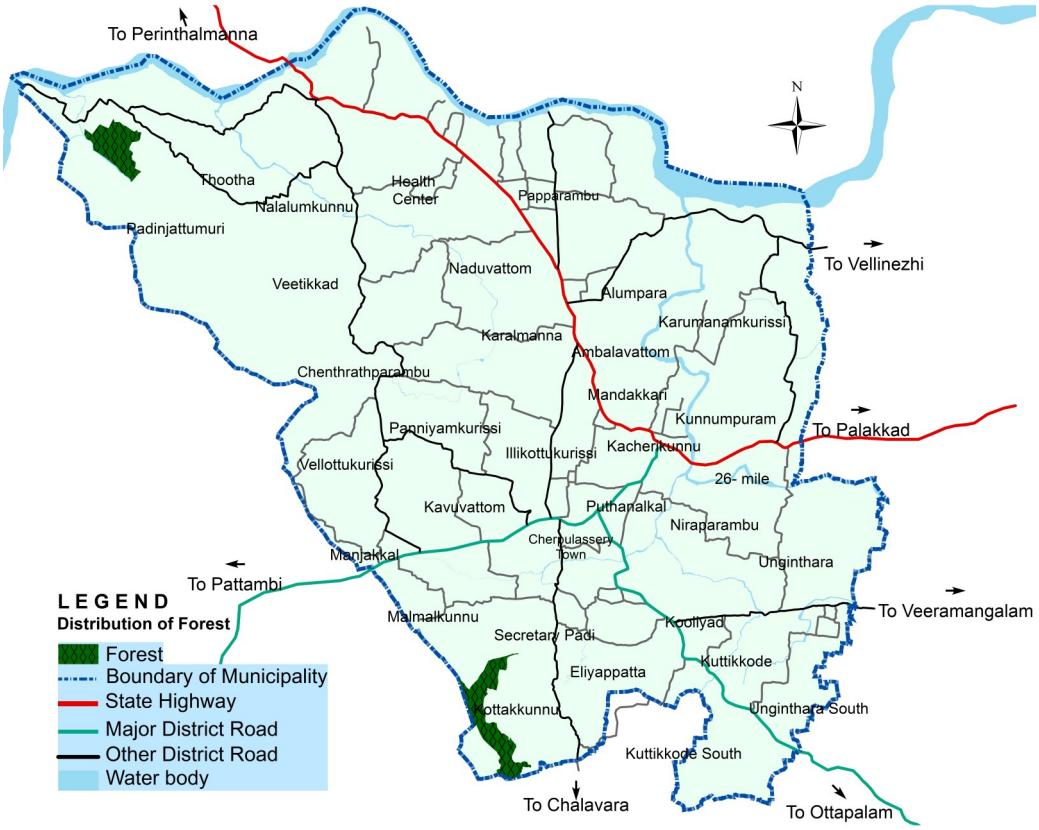


Fig. 5.16 Spatial Distribution of Forest

5.2.8 Water Bodies



Fig. 5.17 Spatial Distribution of Water Courses

The major water bodies flowing through the Cherpulassery town are Kunthipuzha through northern boundary and Kakathodu through north-east part joined with Thoothapuzha at Vadakumuri. The area comprising water bodies in the town comes to 1.25 sq.km and it accounts to 3.92% of the total area of town. The other important rivulets are namely Koramba and Pattikam. Among the several ponds existing 5 ponds are owned by the Municipality. Spatial distribution of water courses are shown in fig 5.17.

5.2.9 Other Land Uses

The land area with meager extent having little influence in development at present are categorized as 'other land use' which includes park and open spaces, cemetery, quarry and vacant land. The park and open spaces are mainly for recreational facilities like parks, playground, stadium, club etc. and which have important role for qualitative healthy social and culture life in any city.

Fig 5.18 shows the spatial distribution of other land use. The total area under recreational category within the town is only 0.01 sq km and it constitutes 0.03% of the total Municipal area. The developed area under this use is much less than the prescribed norm as 12-14% of URDPFI standards.

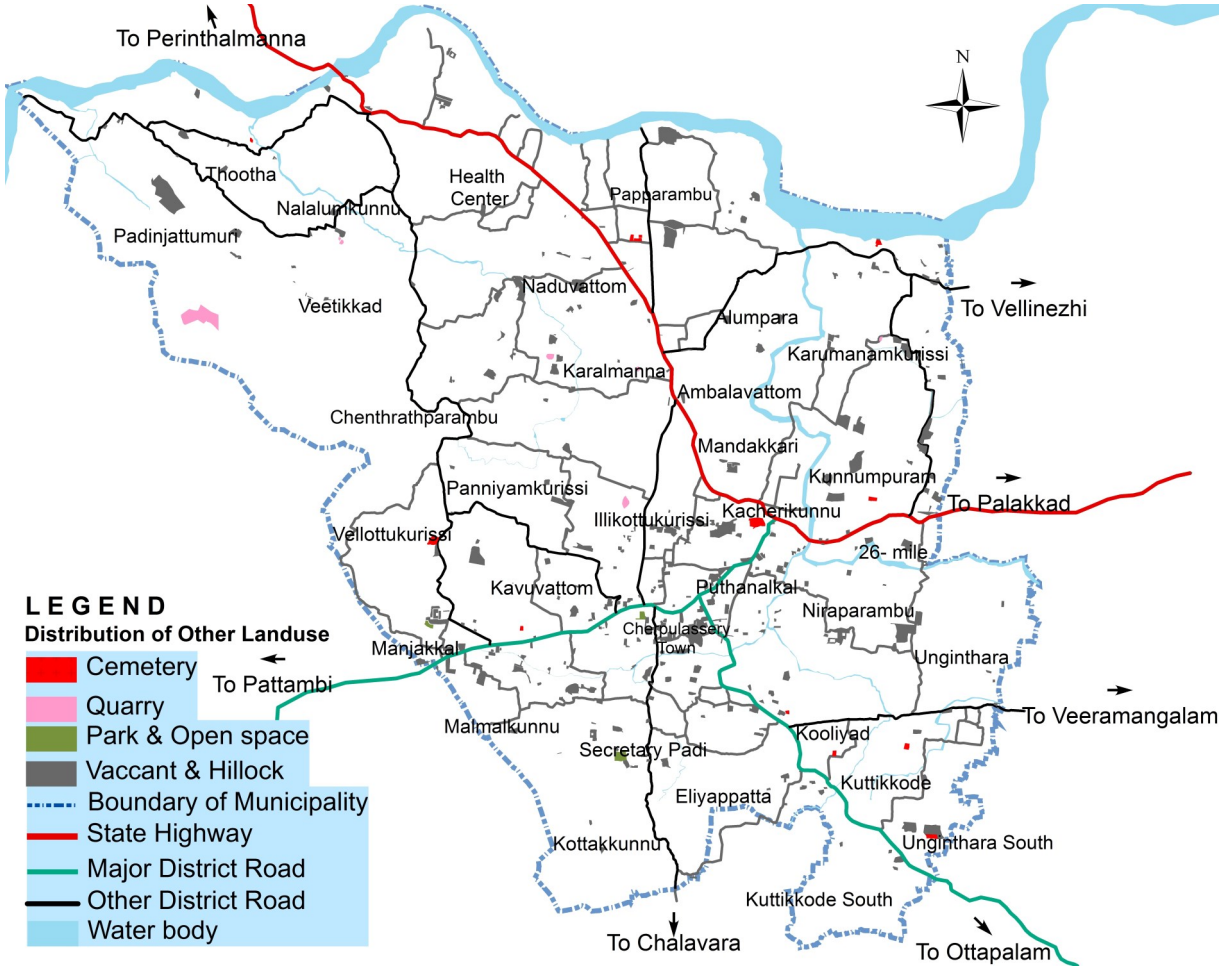


Fig. 5.18 Spatial Distribution of Other Land Uses

The land has no specific use at presently is categorised as vacant land which consist 0.71 sq.km in area i.e. of 2.23% of the total Municipal area. Land under cemetery use consists 0.03 sq.km quarry land consists of 0.04 sq.km of land and Hillock comprise 0.03sq.km.

5.2.10 Ward wise Distribution of Land Use

Table 5.2 shows the ward wise land use split up of Cherpulassery Municipality. The analysis of land use in the 33 wards of municipality reveals that in majority of wards agriculture land constitutes the major share of land. The fig 5.19 shows ward wise land use split up of Cherpulassery Municipality.

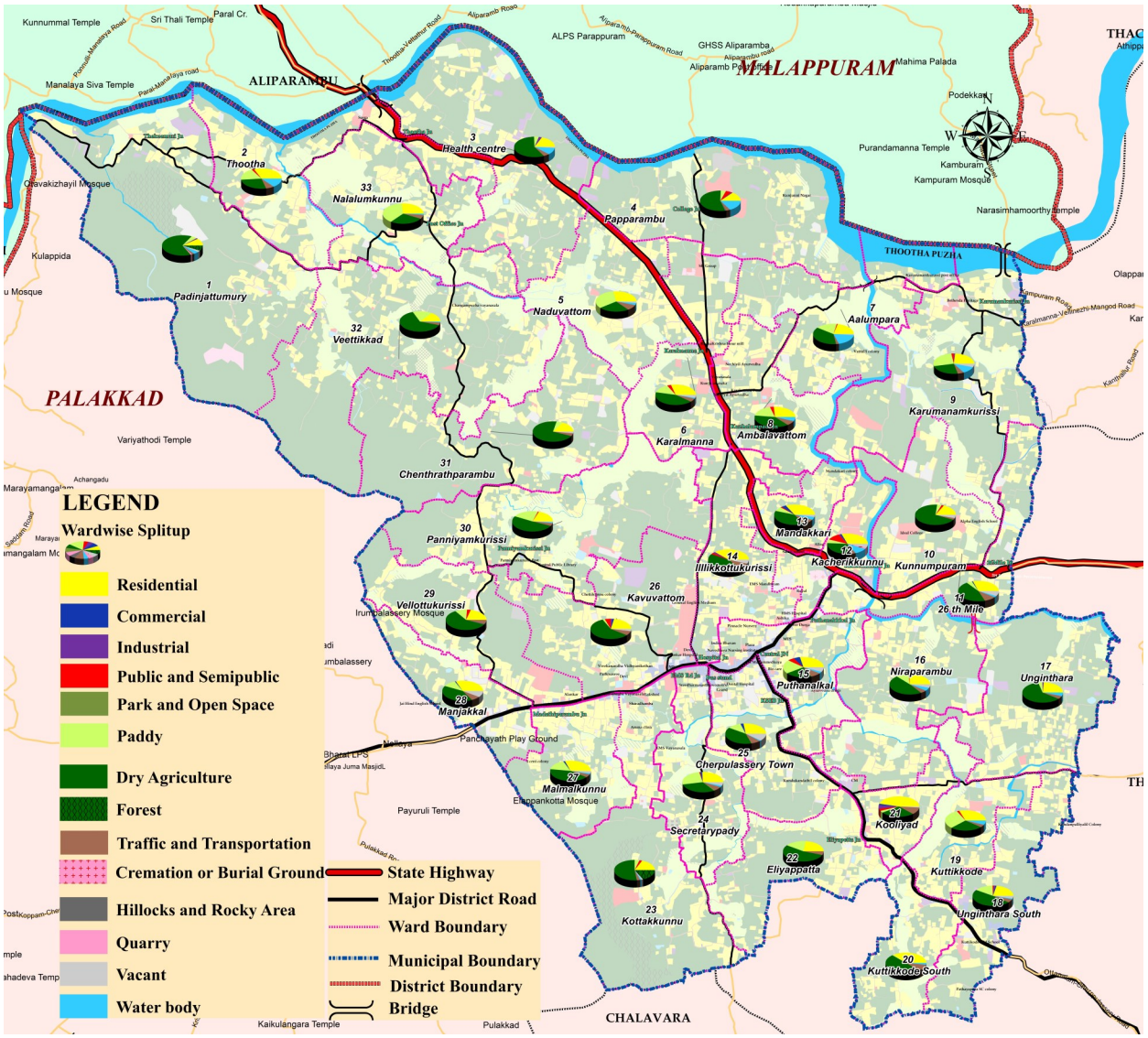


Fig. 5.19 Ward wise Land Use Split-up

Table 5.2 Ward wise Land use Split-up

Ward No	Name of Ward	Residential (Sq.km)	Commercial (Sq.km)	Industrial (Sq.km)	Public & Semipublic (Sq.km)	Paddy Active (Sq.km)	Paddy Non-active (Sq.km)	Paddy Converted (Sq.km)	Dry Agriculture (Sq.km)	Forest (Sq.km)	Transportation (Sq.km)	Waterbody (Sq.km)	Park & Open Spaces (Sq.km)	Vacant Land (Sq.km)	Cremation or burial ground (Sq.km)	Quarry (Sq.km)	Hillock & rocky area (Sq.km)	Total (Sq.km)
1	Padinjattumury	0.2083	0.0074	0.0306	0.0028	0.1218	0.0000	0.0000	1.6377	0.1502	0.0544	0.0947	0.0000	0.0499	0.0000	0.0298	0.0000	2.39
2	Thootha	0.3361	0.0074	0.0026	0.0226	0.1607	0.0084	0.0000	0.2936	0.0000	0.0805	0.1208	0.0000	0.0077	0.0007	0.0000	0.0000	1.04
3	Health centre	0.2537	0.0088	0.0482	0.0025	0.0787	0.0074	0.0001	0.8918	0.0000	0.0764	0.1293	0.0000	0.0169	0.0000	0.0000	0.0000	1.51
4	Papparambu	0.1712	0.0005	0.0177	0.0796	0.0558	0.0248	0.0005	0.7957	0.0000	0.0565	0.2061	0.0000	0.0100	0.0000	0.0000	0.0184	1.44
5	Naduvattom	0.2360	0.0025	0.0024	0.0029	0.2557	0.0016	0.0006	0.2500	0.0000	0.0667	0.0194	0.0000	0.0154	0.0000	0.0000	0.0000	0.85
6	Karalmanna	0.2300	0.0070	0.0037	0.0298	0.0978	0.0049	0.0000	0.3343	0.0000	0.0362	0.0079	0.0000	0.0246	0.0036	0.0011	0.0000	0.78
7	Aalumpara	0.2099	0.0015	0.0017	0.0106	0.2120	0.0000	0.0000	0.3727	0.0000	0.0315	0.1845	0.0000	0.0117	0.0018	0.0000	0.0000	1.04
8	Ambalavattom	0.1767	0.0035	0.0010	0.0275	0.0965	0.0234	0.0026	0.2692	0.0000	0.0443	0.0325	0.0000	0.0000	0.0000	0.0000	0.0000	0.68
9	Karumanamkurissi	0.2384	0.0048	0.0120	0.0298	0.2533	0.0014	0.0075	0.2692	0.0000	0.0639	0.1041	0.0000	0.0398	0.0000	0.0007	0.0000	1.02
10	Kunnumpuram	0.1974	0.0014	0.0002	0.0296	0.0582	0.0000	0.0000	0.8761	0.0000	0.0262	0.0065	0.0000	0.0466	0.0020	0.0000	0.0000	1.24
11	26 th Mile	0.1912	0.0071	0.0008	0.0021	0.0318	0.0000	0.0006	0.2749	0.0000	0.0626	0.0113	0.0000	0.0364	0.0000	0.0000	0.0000	0.62
12	Kacherikkunnu	0.1413	0.0071	0.0057	0.0467	0.0128	0.0065	0.0000	0.1267	0.0000	0.0279	0.0457	0.0000	0.0190	0.0081	0.0000	0.0000	0.45
13	Mandakkari	0.1103	0.0134	0.0000	0.0039	0.0183	0.0000	0.0000	0.1255	0.0000	0.0301	0.0113	0.0000	0.0081	0.0000	0.0000	0.0000	0.32
14	Illlikkottukurissi	0.2821	0.0022	0.0137	0.0146	0.0000	0.0000	0.0000	0.3135	0.0000	0.0603	0.0064	0.0000	0.0336	0.0000	0.0000	0.0000	0.73
15	Puthanalkal	0.1902	0.0443	0.0004	0.0355	0.0750	0.0366	0.0000	0.1707	0.0000	0.0573	0.0152	0.0000	0.0358	0.0000	0.0000	0.0000	0.66
16	Niraparambu	0.2731	0.0003	0.0005	0.0114	0.1123	0.0167	0.0000	0.5160	0.0000	0.0522	0.0449	0.0000	0.0418	0.0000	0.0000	0.0000	1.07
17	Unginthara	0.2546	0.0008	0.0171	0.0062	0.0346	0.0148	0.0000	0.6662	0.0000	0.0443	0.0442	0.0000	0.0087	0.0000	0.0000	0.0000	1.09
18	Unginthara South	0.1828	0.0104	0.0153	0.0123	0.1503	0.0060	0.0000	0.4243	0.0000	0.0385	0.0094	0.0000	0.0261	0.0030	0.0000	0.0000	0.88
19	Kuttikkode	0.1622	0.0019	0.0009	0.0123	0.1321	0.0034	0.0000	0.1581	0.0000	0.0183	0.0263	0.0000	0.0039	0.0019	0.0000	0.0000	0.52
20	Kuttikkode South	0.1442	0.0013	0.0027	0.0015	0.0047	0.0000	0.0000	0.1901	0.0000	0.0326	0.0076	0.0000	0.0008	0.0000	0.0000	0.0000	0.39
21	Kooliyad	0.1678	0.0058	0.0146	0.0095	0.0047	0.0042	0.0000	0.1156	0.0000	0.0318	0.0000	0.0000	0.0045	0.0022	0.0000	0.0000	0.36
22	Eliyappatta	0.1603	0.0021	0.0058	0.0018	0.1268	0.0198	0.0009	0.3858	0.0000	0.0306	0.0072	0.0000	0.0073	0.0000	0.0000	0.0000	0.75
23	Kottakkunnu	0.2308	0.0068	0.0010	0.0392	0.0572	0.0148	0.0010	0.7247	0.2181	0.0495	0.0158	0.0000	0.0244	0.0000	0.0000	0.0000	1.38
24	Secretarypady	0.1736	0.0152	0.0005	0.0072	0.1605	0.0000	0.0017	0.2328	0.0000	0.0394	0.0124	0.0097	0.0270	0.0000	0.0000	0.0000	0.68
25	Cherpulassery Town	0.1838	0.0218	0.0001	0.0032	0.0337	0.0450	0.0004	0.2593	0.0000	0.0573	0.0077	0.0000	0.0596	0.0000	0.0000	0.0000	0.67
26	Kavuvattom	0.2311	0.0202	0.0207	0.0687	0.0112	0.0134	0.0000	0.6259	0.0000	0.0600	0.0088	0.0000	0.0276	0.0000	0.0036	0.0043	1.10
27	Malmalkunnu	0.2000	0.0113	0.0010	0.0033	0.0974	0.0049	0.0000	0.2810	0.0000	0.0263	0.0085	0.0000	0.0175	0.0000	0.0000	0.0000	0.65
28	Manjakkal	0.1657	0.0053	0.0006	0.0028	0.0477	0.0063	0.0003	0.2095	0.0000	0.0375	0.0027	0.0023	0.0389	0.0000	0.0000	0.0000	0.52
29	Vellottukurissi	0.1713	0.0030	0.0000	0.0343	0.0824	0.0252	0.0000	0.5001	0.0000	0.0382	0.0028	0.0000	0.0050	0.0056	0.0000	0.0103	0.88
30	Panniyamkurissi	0.2657	0.0028	0.0016	0.0157	0.3642	0.0033	0.0005	0.7474	0.0000	0.0496	0.0147	0.0000	0.0151	0.0000	0.0000	0.0000	1.48
31	Chenthrathparambu	0.2316	0.0012	0.0040	0.0072	0.0662	0.0343	0.0045	1.1677	0.0000	0.0534	0.0087	0.0000	0.0308	0.0000	0.0023	0.0000	1.61
32	Veettikkad	0.2472	0.0003	0.0011	0.0088	0.3712	0.0121	0.0301	1.2464	0.0000	0.0602	0.0214	0.0000	0.0083	0.0000	0.0013	0.0003	2.01
33	Nalalumkunnu	0.2810	0.0025	0.0001	0.0039	0.3676	0.0094	0.0046	0.3317	0.0000	0.0507	0.0144	0.0000	0.0064	0.0000	0.0000	0.0000	1.07
	Total	6.91	0.23	0.23	0.59	3.75	0.35	0.06	15.78	0.37	1.54	1.25	0.01	0.71	0.03	0.04	0.03	31.88

Source: Land Use Survey, 2017

For further analysis, land under commercial, industrial, public & semi-public and transportation uses are grouped together as Urban land use since it clearly demarcates the extent of urban content of the area. Now, ward wise land use split-up is, revamped as shown in fig.5.20. And it is clear that Kooliyad (21), Puthanalkal (15), Illikotukurissi (14), Mandakkari(13), Kacherikunnu (12) and Cherpulassery town (25) are the divisions containing urban character in Cherpulassery Municipality. And in the remaining divisions agriculture constitutes the major share.

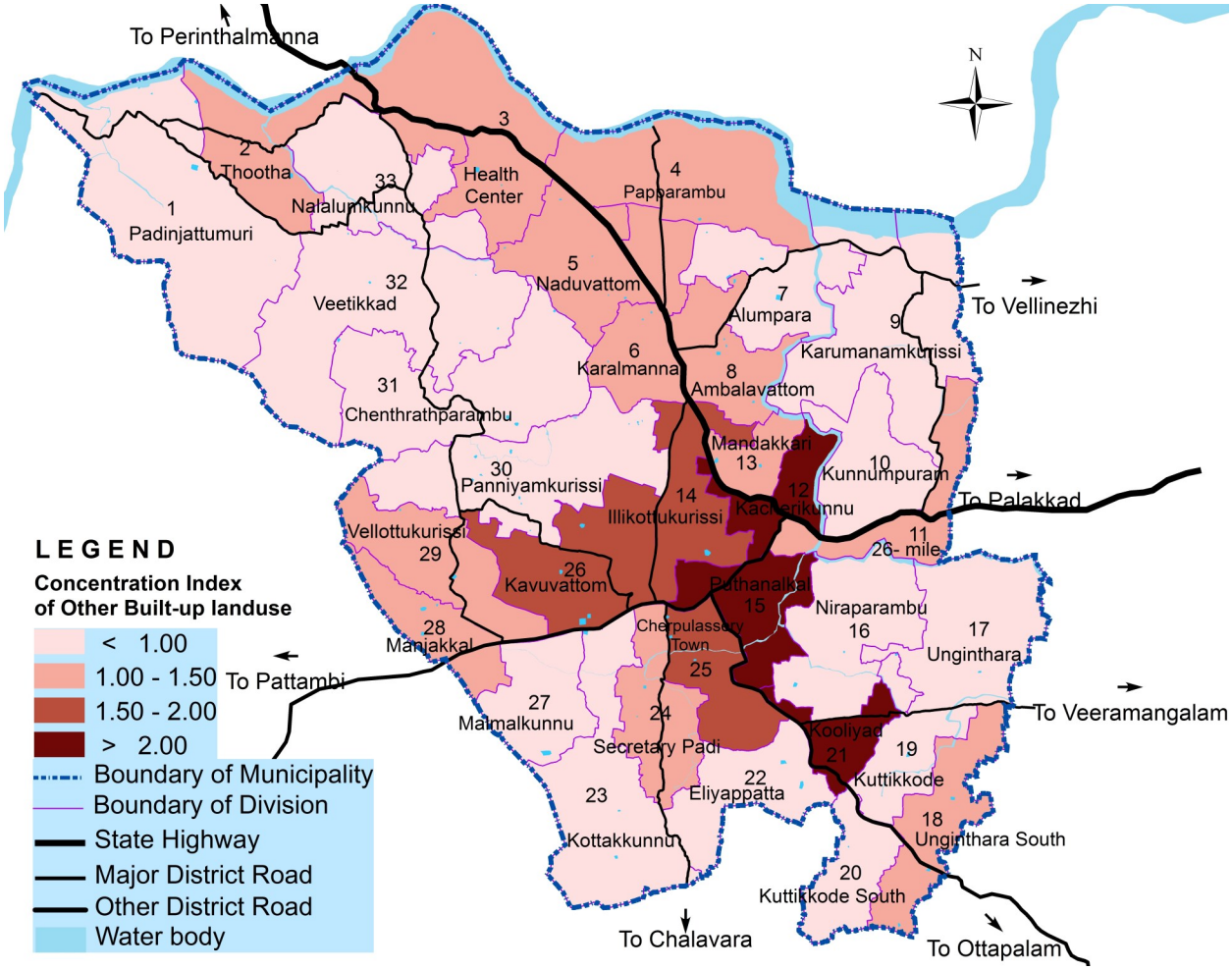


Fig. 5.20 Ward wise Concentration of Urban Land Use

5.3 INFERENCE

As per the existing land use analysis, the predominant land use in Cherpulassery is agriculture including dry and wet which constitutes 62.36% of the total area. Of which 20.62% are coming under wet agriculture while remaining 79.38% are in dry agriculture. Even though the agriculture land use is spread throughout the municipal area higher concentration is found in wards located in the north-west parts of the Municipality.

The second major land use is residential coming at 21.68% of the total area and is nearly one third of the total agricultural land. Higher values of residential concentration are reported from divisions located in the south-eastern parts.

Commercial activities, public & semi-public are concentrated in the central part of the town. Industrial activities are mainly concentrated in northern, central & south eastern parts of the Municipality.

The analysis shows that there is a clear demarcation between the various land uses. Nearly 68% of planning area is covered by environmentally sensitive areas - water bodies, paddy, forest and dry agriculture. Urban land uses are concentrated in the remaining 32% of geographical area of the town.

The analysis of existing land use of the municipality revealed that the urbanization land uses are seen only at the core area of the town. So urban planning measures essentially has to be adopted while preparing the proposed land uses so as to ensure the distribution of service facilities in an equitable manner within the Municipality.

6. AGRICULTURE

Palakkad is one of the districts where the agriculture is having a major role in the economy and hence it is called the 'Granary of Kerala'. Agriculture sector requires special attention in the district. The economy of Cherpulassery municipality is largely agrarian in nature.

6.1 EXISTING SCENARIO

Agriculture is the mainstay of the Cherpulassery town with land area of 19.88 sq.km., i.e. 62.36% of the area of Municipal town consisting dry and wet agriculture, of which dry agriculture accounts for 15.78 sq.km i.e. 49.50% of total area while wet agriculture consist of 4.10 sq.km i.e. 12.86 % of total area. Out of total agricultural area dry agriculture comes as 79.38% and remaining 20.62 % comes wet agriculture as paddy. The figure 6.1 shows the shares of wet and dry agriculture.

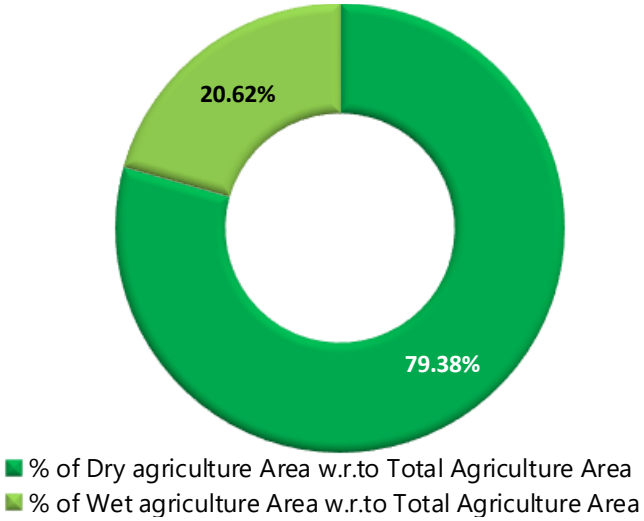


Fig. 6.1 Share of Dry and Wet Agriculture w.r.to total Agriculture Area

6.2 CROPPING PATTERN

The main natural factors that governs the cropping pattern are type of soil, extent of rainfall and climate. The average annual rainfall is 286 mm and the average precipitation period is June to mid-November. The soil type of Cherpulassery area is broadly classified into laterite and sandy soil.

Paddy is the main agricultural crop within the municipality and serves for large number livelihood of people. The other crops like rubber, coconut, arecanut, cashew, pepper, ginger, turmeric, yam, tapioca, banana and vegetables are also seen in the municipality. The crop wise analysis is explained hereunder.

6.2.1 Paddy

In Cherpulassery Municipality, land under paddy field is 410.17 Ha. which constitutes about 12.86% of the total municipal area. Around 35 Ha. of paddy land is kept as vacant and not cultivated, which constitutes ~8.54 % of total paddy land and 1.1 % of the total municipal area. Same as about 71.32 Ha of paddy land are being utilized for cultivation in other crops, which constitutes 17.27 % of total paddy field.

The areas of paddy field under cultivation are showing a decreasing trend. There are mainly two paddy cultivation seasons as Virippu and Mundakan or Winter Paddy. The viruppu is the first crop grown in autumn season (From April/May – September/October) while the Mundakan the second crop, (September/October - December/January).

There is traditional cultivation method namely 'Koottu-Mundakam' is continuing by Karuparambil family with an area of paddy field of 2.5 Acres at Cholakkal padasekharam in Cherpulassery. Traditionally paddy varieties as Chenkazhama (Short term variety seed) and Chettadi (Long term variety) are used for this and the paddy field is sown in the ratio of 6:4 or 7:3.

Speciality of this unique paddy cultivation is that once the land is prepared for sowing for the second crop, there is no need to spend money or time in land preparation again. When first crop is harvested second crop paddy also will be cut, but it will grow back and mature. This traditional system is more suitable to area where the transplanting of a second crop is difficult due to deep water. The yield obtained from the Koottu-Mundakan is less than the cumulative yield of two separate Virippu and Mundakan.

It is seen that gradual shifting of the cropping pattern from food grain crops (rice) into garden land crops such as Elephant foot yam, Tapioca, banana, ginger and vegetables constitute about 19 % of total paddy land. About 11.87 % have been shifted for banana cultivation, 2.49% for elephant foot yam, 3.23% for tapioca and remaining are for ginger, coconut and areca nut etc. The fig. 6.2 shows the percentage share of various crops cultivated in wet land.

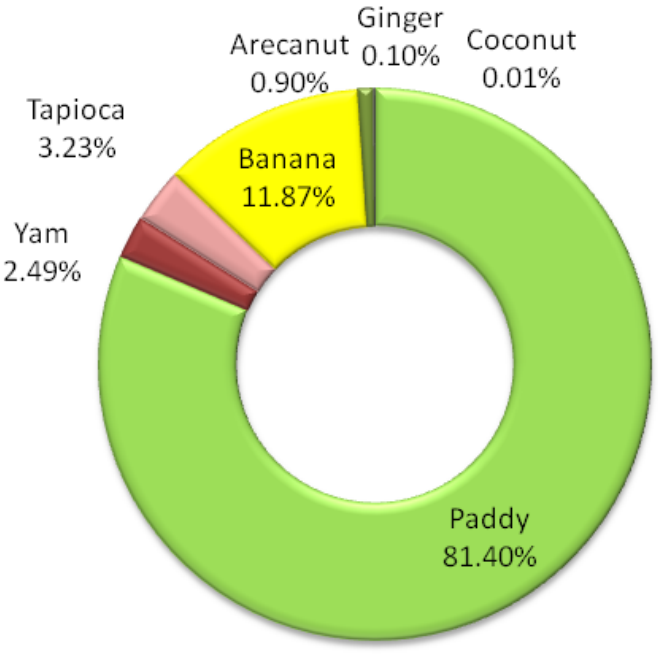


Fig. 6.2 Percentage share of various crops cultivated in wet land

And figure 6.3 shows the distribution of uncultivated paddy. Table 6.1 shows the season of various garden land crops cultivating in paddy fields

Table 6.1 Season of Crop wise Cultivation

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice	⁂				⁂	⁂	⁂	⁂	⁂	⁂	⁂	⁂
Yam	Ÿ	Ÿ	Ÿ	Ÿ	Ÿ	Ÿ	⁂	⁂	⁂	⁂		Ÿ
Banana	B	B	B	B	B	B	B	B	⁂	⁂	⁂	B
Tapioca	T	T	T	T	T	T	⁂	⁂	⁂	⁂		T
Vegetables	V	V			⁂	⁂	⁂	⁂		V	V	V

⁂ - Paddy B - Banana Ÿ - Yam V - Vegetables

Source: Krishi Bhavan Office, Cherpulassery

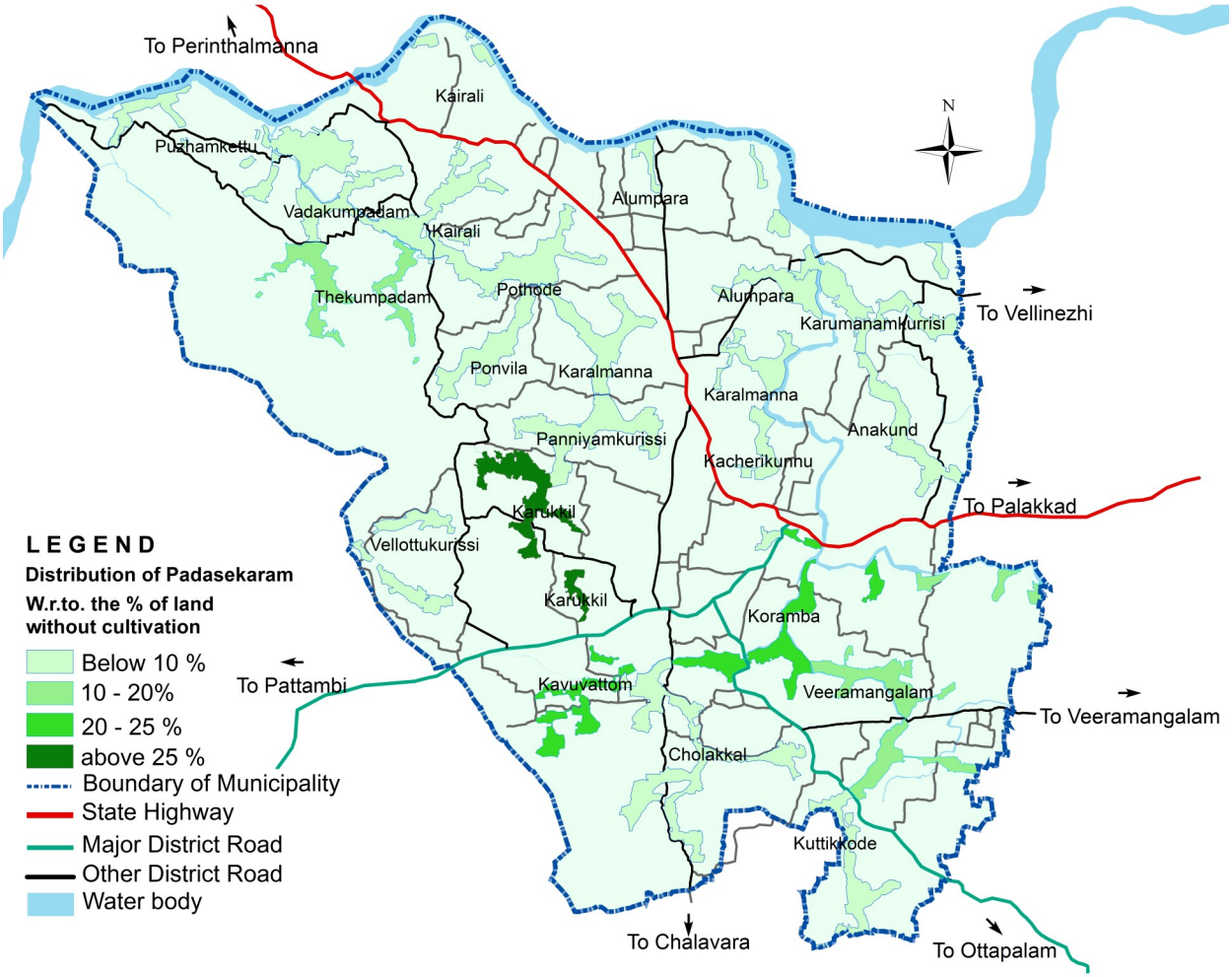


Fig 6.3 Distribution of Uncultivated Paddy

- **Irrigation Sources**

Water is vital requirement for the existence of paddy cultivation. Thoothapuzha flowing along the northern boundary of Cherpulassery is the main source of water in this planning area. There are no major Irrigation projects in Cherpulassery Municipality.

Presently this municipality depends on the Kanjirappuzha irrigation project for the irrigation purposes. This project is one of the medium irrigation project commissioned in 1980 with aims to irrigate and supply water for second crop and also supplement the rainfall dependent crops in the rain season. In Cherpulassery there is a 2.973 Km. of distributor canals which is the tail end portion of the scheme, so the benefit of the scheme to this municipality is very limited.

There is one minor irrigation scheme namely Karalmanna lift irrigation under minor irrigation wing of Irrigation Department, Kerala which distributes water through 2.5 km length main canal and two sub canals.

Table 6.2 shows the details of irrigation source of each padasekharam name and details of each padasekharam and figure 6.4 shows irrigation source of each padasekharam in Cherpulassery Municipality.

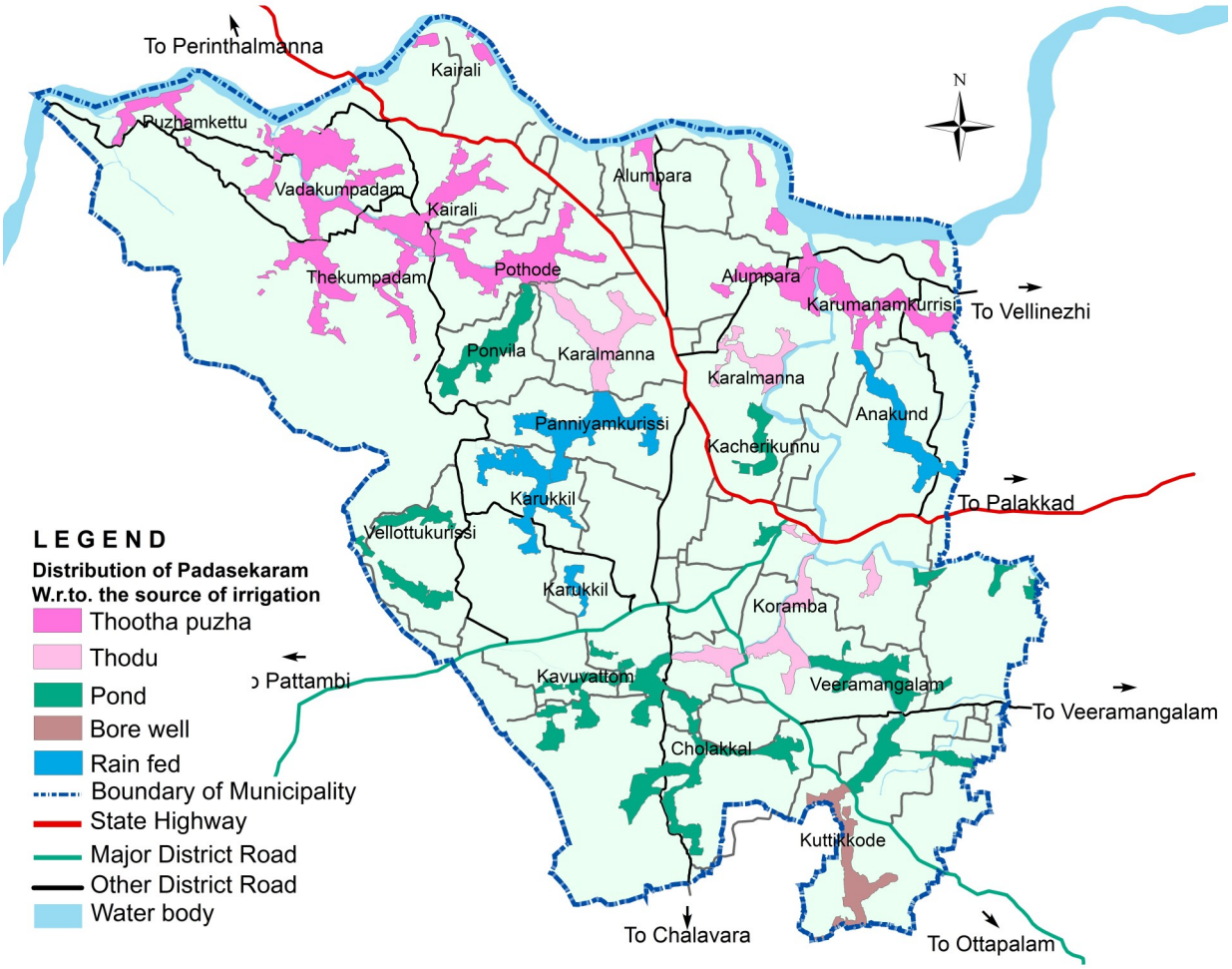


Figure 6.4 Irrigation Source of each Padasekaram

Table 6.2 Details of irrigation sources of each Padasekharams

Sl. no.	Name of Padaseghara samithies	No. of Farmers	Season	Total Area (in Ha.)	Irrigation source	No of machineries used	Seed facilities
1	CHOLAKKAL	46	1st & 2nd	38.23	Pond	Tractor, Tiller, Transplantor, Harvester	Satisfied
2	KARALMANNA	35	1st & 2nd	30.06	Thodu, Thoothapuzha		
3	THEKKUMPADAM	87	1st & 2nd	23.55	Thoothapuzha		
4	VADAKKUMPADAM	96	1st & 2nd	33.91	Thoothapuzha		
5	KARUMANAMKURISSI	50	1st & 2nd	29.08	Thoothapuzha		
6	KORAMBA	45	1st & 2nd	24.72	Thodu		
7	PUZHAMKETT	32	1st & 2nd	7.98	Thoothapuzha		
8	ALUMPARA	30	1st & 2nd	15.62	Thoothapuzha		
9	KAVUVATTAM	15	1st & 2nd	14.64	Pond		
10	ANAKUNDU	Inactive	1st & 2nd	17.06	Rain fed		
11	VELLOTTUKURUSSI	9	1st & 2nd	13.94	Pond		
12	KARUKKIL	18	1st & 2nd	21.95	Rain fed		
13	PANNIYAMKURUSSI	34	1st & 2nd	25.96	Rain fed		
14	PONVILA	16	1st & 2nd	17.54	Pond		
15	KAIRALI	25	1st & 2nd	23.72	Thoothapuzha		
16	KACHERIKUNNUI	25	1st & 2nd	9.27	Pond		
17	KUTTIKODE	52	1st & 2nd	25.5	Bore well		
18	VEERAMANGALAM	46	1st & 2nd	32.97	Pond		
19	POOTHODU	4	1st & 2nd	27.14	Thoothapuzha		

Source: Krishi Bhavan Office, Cherpulassery

In Cherpulassery Municipality there are eight other minor lift irrigation schemes source as Thoothapuzha, namely Nalalumkunnu lift irrigation , Thootha lift irrigation , Chinthamani lift irrigation , Kalikadavu lift irrigation , Karumanamkurissi lift irrigation , 29-mile lift irrigation , Alumpara lift irrigation and Panamghayam lift irrigation .

The natural sources such as Kaakka thodu, Pattikam thodu, Koramba thodu, Parachi thodu and Puthan thodu benefitting the paddy fields are also present. The Pa-

dasekarams namely Ponvila, Kacherikunnu, Vellattukurissi, Kavuvattom, Cholakkal and Veeramangalam are depending on nearby ponds for irrigation. The Padasekharam namely Anakundu, Panniyamkurissi and Karukkil purely depends on rain for cultivation. Kuttikode padasekaram use bore well as irrigation source. Figure 6.4 shows the system of irrigation and their source of each padasekharam in Cherpulassery Municipality.

6.2.2 Elephant foot yam

Elephant foot yam is one of the tuber crops cultivated in Cherpulassery and it is a primary alternative and competitive crop in Cherpulassery. 13.42 Ha of land has been utilized for this cultivation, ie. 0.42 % of total area of town.

Elephant foot yam has fewer incidences of pests, insects and diseases and has steady market demand. Easy availability of seed, less labour cost, intercrop profitability etc. are the attracting factors of the Elephant foot yam cultivators.

Tender stems and yam leaves are also consumed as vegetables. It is a natural product that is high fibre and considered to be a healthy low fat food. Elephant foot yam is widely used in the treatment of patients suffering from piles and suitable for hypertension as it has a cooling effect on the body.

6.2.3 Banana

Banana is another alternate competitive crop in Cherpulassery Municipality. About 82.47 Ha of land comes under banana cultivation, ie.2.6 % of municipal area. About 49.53 Ha i.e. 11.87% of paddy fields are utilizing for as shifting from paddy to banana cultivation in some season.

6.2.4. Tapioca

According to the Kerala Agricultural policy Tapioca is declared as food crop. In Cherpulassery Municipality 14.65 ha of land is under tapioca cultivation, i.e. 0.46 % of Municipal area. About 12.38 ha or 3.23% of paddy field have been utilized for tapioca cultivation as shifting the paddy to tapioca. It indicates that 84.51 % of tapioca cultivation is in paddy field. Once tapioca was a staple food for the rural population, but now it is gaining popularity in urban society.

6.2.5 Ginger

Ginger cultivation doesn't have a major role in the agricultural activity of the Municipality. The ginger cultivated is about 10 ha of land within the Municipality which comes only 0.31 % of the total land area of the Municipality. It can also be seen that about 0.38 ha of uncultivated paddy land has also been utilised for this cultivation.

6.2.6 Pepper

In Cherpulassery Municipality, pepper is an inter crop with coconut and cultivated

in backyards of residence. The pepper cultivation comes in 34 ha of land i.e. 1.06 % of total Municipality area.

6.2.7 Arecanut

The arecanut is cultivating in 40 Ha of land within the town which constitute 1.25 % of municipal area. The demand of arecanut is less since the bye products of areca nut is banned in Kerala. It is also seen that about 3.42 Ha. of paddy fields have been converted for arecanut cultivation.

6.2.8 Coconut

In Cherpulassery Municipality 136.85 Ha of land covered with coconut cultivation which is 4.29 % of total municipal land area. The diseases, scarcity of skilled labours (tree climbers) low and fluctuating price of nut are the main problems in coconut cultivation.

While global and national statistics coconut production measure yield only in terms of oil and copra, there is lot of immense potential behind the coconut palm. Coir -solid skin of the nut are used for rope, tender coconut water, toddy obtained from coconut tree is a beverage and hard case of the nut are used for manufacturing cups and vessels are some of the few potential utilities of coconut palm.

6.2.9 Rubber

In Cherpulassery Municipality 524.84 Ha of land is under the cultivation of rubber which constitute 16.46 % of Municipality area, which is also 33.08 % of dry agriculture within the Municipality.

6.2.10 Production and Productivity of Major Crops

Table 6.3 Details of Area, Production & Productivity of Major Crops

Type of crop	Area (Ha)	Production (T)	Productivity (Kg/ Ha)
Paddy 1st&IInd crop	310	900	2,903
Coconut	136.85	916	6,700
Rubber	524.84	671.7	1280(nuts/ha)
Areca nut	40	36	900(nuts/ha)
Cashew nut	42	6.3	150
Pepper	34	10.7	315
Banana	82.47	692.75	8,400
Tapioca	14.65	293	20,000
Ginger	10	150	15,000
Turmeric	10.5	94.5	9,000

Source: Krishi Bhavan Office, Cherpulassery

6.3 WATERSHEDS

Watershed is an extent or an area of land where surface water from rain or ice converges to a single point in lower elevation. These water bodies supply drinking water, water for agriculture and manufacturing, offer opportunities for recreation and provide habitat to numerous plants and animals. Unfortunately various forms of pollution, including runoff and erosion, can interfere with the health of the watershed and hence its protection is important. The details of water sheds are given in Table 6.4 and their spatial location is given in Fig 6.5.



Fig 6.5 Locations of Watershed

Table 6.4 Details of Watersheds

Sl No	Name of Watershed	Area in Ha	Local bodies	Priority
1	Pattiamthodu	1084.5	Cherpulassery	Medium
2	Kaakkathodu 1	326.25	Cherpulassery and Vellinezhi	Low
3	Kaakkathodu 2	463	Cherpulassery	Low
4	Korambathodu	1314.3	Cherpulassery and Thrikadeeri	Medium

Source: Krishi Bhavan Office, Cherpulassery

6.4 INFERENCE

The risk factors due to climate change, large scale fluctuation in rain fall also affect the productivity of paddy. Cost of seed, fertilizer, pesticide, and labour had gone up considerably resulting in higher cost of production. The area of paddy cultivation had shrunk considerably because paddy farming has become a losing vocation. Non-adoption of scientific management practices such as scientific spacing, manuring, based on soil data, irrigation and Integrated Pest Management (IPM) measures. Lack of facilities for post harvest processing, storage and value addition.

In the absence of an organized marketing structure, private traders and middlemen dominate the marketing and trading of agricultural produces. Agricultural sector in this Municipality is mainly dependent on the rain. Most of the farmers are doing 1st crop and 2nd crop. The second crops are totally supported by irrigation schemes. Hot arid climate and lack of efficient irrigation facilities causes less production. Crop damage by wild animals were reported from many places. This could be prevented by adopting measures like proper fencing, use of natural repellents and conservation of forest area.

The lush green of paddy fields is one of the most captivating features of Cherpulassery town, which accounts for 12.86% of the total area, covering 4.10 Sq.km of land. The Padashekhara samithies and Kudumbasree groups are also known to have taken initiatives in paddy cultivation. Coconut integrated farming method has to be adopted in the Municipality. There is tremendous scope for organic farming. Organic vegetables will fetch premium price, as people are health conscious and vegetable is an indispensable dietary component. There is scope for value addition / product diversification, scope for terrace cultivation for achieving food security and sufficiency in homesteads. productivity of different variety of crops.

7. ANIMAL HUSBANDRY

Animal Husbandry is a science as well as an art of management including scientific feeding, breeding, housing, health care of common domestic animals aiming for optimum returns from them. This sector plays a vital role in the uplift of population by providing supplementary income with less investment. Moreover animal Husbandry is an active production sector and playing an important role in food security also.

7.1 LIVE STOCK POPULATION

The livestock species mainly includes cattle, buffaloes, goat, fowls, duck and their products such as meat, milk and egg. As the latest cattle population census was published on 2012, official data post period remains unavailable, so the analysis remains limited by such constraints. The figure 7.1 shows the percentage shares of each live stock within the municipal area. Among the total livestock population 75.01 % are fowls, followed by 9.76% of cow / buffalo, 7.79 % of goat, 3.71 % of dog, 3.41% of duck and remaining constitutes elephants and rabbits.

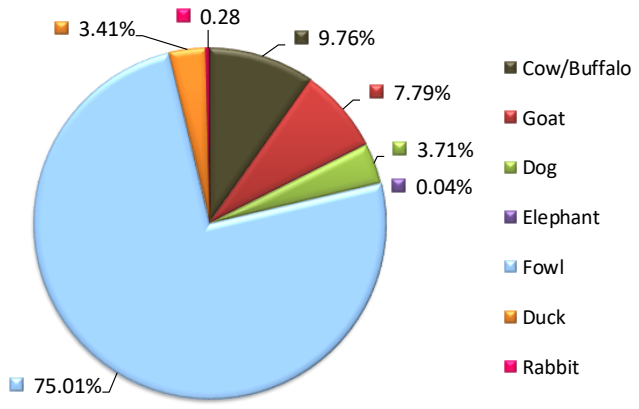


Fig. 7.1 Percentage share of each livestock

Table 7.1 Temporal Variation of Live Stock Population

Livestock	2007	2012
Cow/Buffalo	1604	1330
Goat	1200	1062
Dog	454	505
Elephant	5	5
Cats	98	-
Fowl	6425	10221
Duck	-	464
Rabbit	-	39

Source : Live stock census 2007,2012

As per the data available for the periods as 2007 and 2012, the cow / buffalo population has decreased by about 17.08 %, while the goat population has declined as much as 11.5 % during the same period. But poultry population in the town showed an increasing trend by 59.08 %. Table 7.1 shows the temporal variation live stock population for the years 2007 and 2012.

7.1.1 Cattle

The total cattle population availed only 10 % of the total livestock population. The products mainly from the cattle are meat and milk. There are only 3 dairy farms existing

within the municipality located at Karalmanna, Karumanamkurissi, and at Panniyamkurissi with animals as 25, 10, and 10 respectively. The table 7.2 shows the details of existing dairy farms within the municipality.

Table 7.2 Details of Existing Dairy Farms

Sl.No.	Location	Number of milking animals	Daily production of milk in litres	No. of employees
1	Karalmanna	25	120	3
2	Karumanamkurissi	10	60	2
3	Panniyamkurissi	10	70	2

Source : Primary Survey

The total milk produced from 3 farms comes to 250 litres per day and has 7 employees engaged in the farms. There are only 2 nos. of milk societies namely Karalmanna milk society and Cherpulassery milk society with employees 7 & 5 as shown in the table 7.3. The average quantity of milk collected by the societies is 1,500 and 400 litres per day.

Table 7.3 Details of Milk Societies

Sl No.	Name of Unit	Location	Name of owner	No. of employees	Avge Qty of Milk Collected per day
1	Karalmanna Milk Society	Karalmanna	APCOS	7	1500 Ltr
2	Cherpulassery Milk Society	Cherpulassery Town	Co-operative	5	400 Ltr

Source : Primary Survey

7.1.2 Poultry

According to the food habit of Keralites, the poultry is mainly for the egg and meat. There are only 31 nos of poultry farms existing within the municipality with a production of 45,900 kg of meat per year which is far away from the actual requirement, so the town is dependent on neighbouring district and state for about 90% of the requirement. The backyard poultry also supports the requirement of egg within the town. Table 7.4 contain the details of fowl in Cherpulassery.

Table 7.4 Backyard poultry in Cherpulassery

Fowls	Purpose	Desi	Improved	Total
Cocks	Meat	1,086	108	1,194
Hens	Egg/ meat	2,514	424	2,938
Chickens	Egg	1,842	6,425	8,267

Source : Primary Survey

7.2 PHYSICAL INFRASTRUCTURE

The supporting infrastructure facilities available within the town are a Veterinary hospital and an Integrated Cattle Development Programme (ICDP) sub centre within the municipality. The Kerala Livestock Development Board lends support to this sector by providing and distributing frozen semen artificial insemination centres. But regional artificial insemination centres are located at Mannarkad and Shoranur. The nearest Veterinary Poly Clinic is situated at Ottapalam and Mannarkad and dairy training centre located at Malampuzha.

7.3 ONGOING PROJECTS

The cattle feed is provided at half rate to selected 50 farmers to feed the 6 months aged cattles Under the SLBP scheme in Cherpulassery town. The SLBP (Special Livestock Breeding Program) - objectives is to provide extension support, adequate health and Insurance coverage and good quality feed at subsidized price to the growing cross breed female calves for the BPL farmers for a period of 28 months or till its first calving whichever is earlier.

7.4. INFERENCE

The animal husbandry sector has no significant potential in influencing the economic pattern of the municipality at present. The potentials of allied sector of agriculture have not been tapped to improve this sector. An integrated project has to be prepared with the primary allied sectors so as to obtain sustainable economic development for the town.

8. INDUSTRY

Palakkad district has a key role in industrialisation within the state, Palakkad is the second most industrialized district in the State. District is considered to be the most potential location in the State for sustainable industrial development due to its strategic location with infrastructural facilities and conducive environment. The intensity of industrial activities within a town also have a role for determination of economic activity of the town.

8.1 EXISTING SCENARIO

The Industrial units in this town are scattered around throughout the municipal area and are inter woven with commercial and residential occupancy. There is no Industrial development plots and Industrial Estates in Cherpulassery municipal town. There is one crusher unit as major unit in the town and there are no medium type industrial units in the town. The municipal area consist of small and micro industrial units which constitute 99% of total industrial units. Only 1% of large type industrial unit are established in the town at present. The figure 8.1 shows the classification of industries of Cherpulassery.

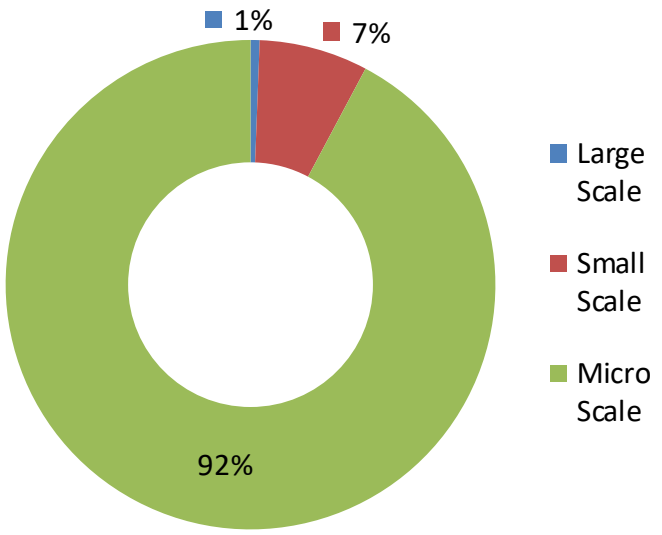


Fig. 8.1 Classification of Industries in Cherpulassery Town

The industrial land use comes to 0.23 Sq.km within the town which is 0.72 % of the total area of town. The figure 8.2 shows the spatial distribution of industrial units. As per land use analysis, it is seen that major units are located in the wards 14-Illikottukurissi, ward 15 - Puthanaikkal, ward 26 - Kavumvattom, ward 30 - Panniyamkurissi ward, and ward 3 - Health Center. The ward wise distribution of industrial units are shown in Fig. 8.3.

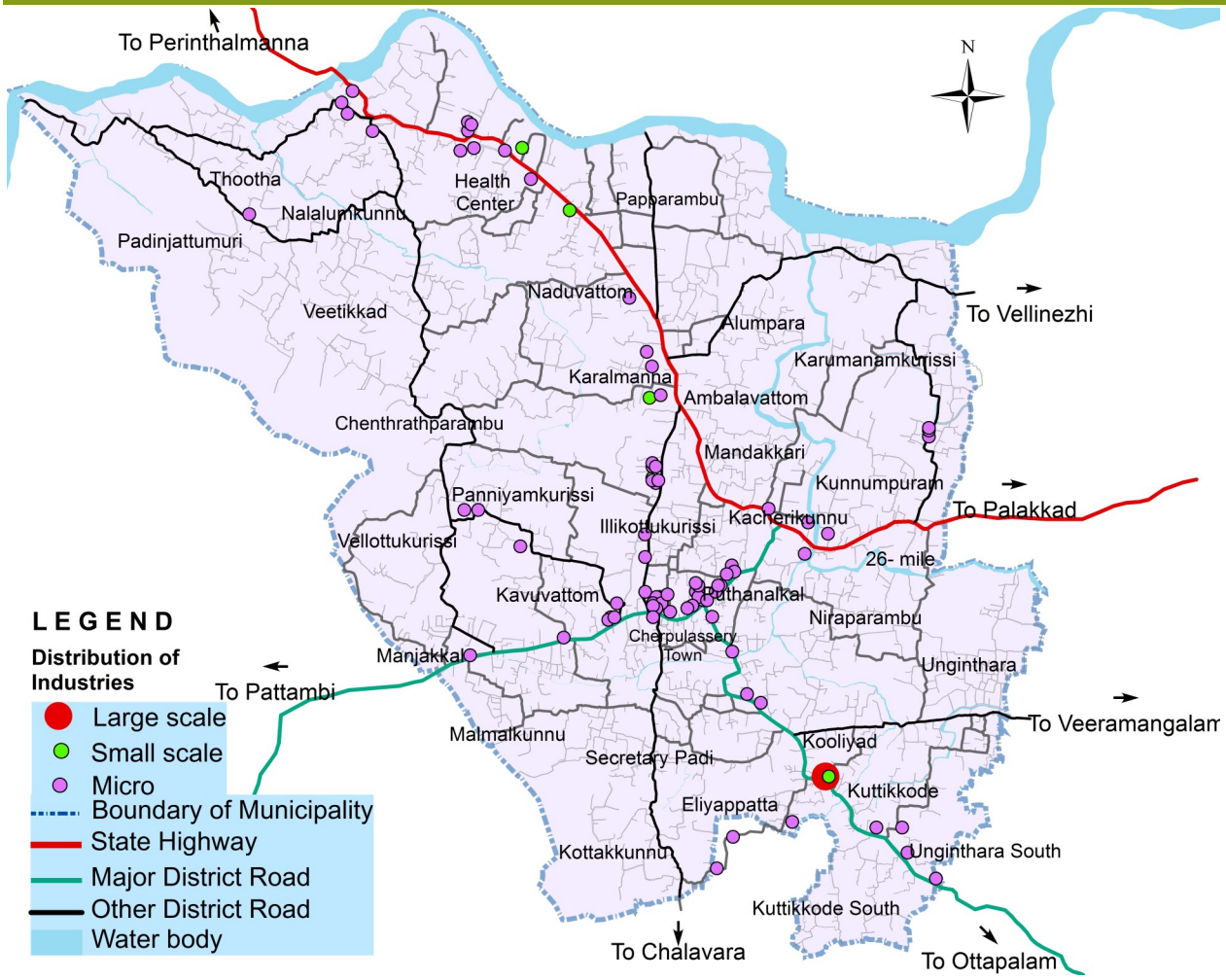


Fig. 8.2 Spatial Distribution of Industrial Units

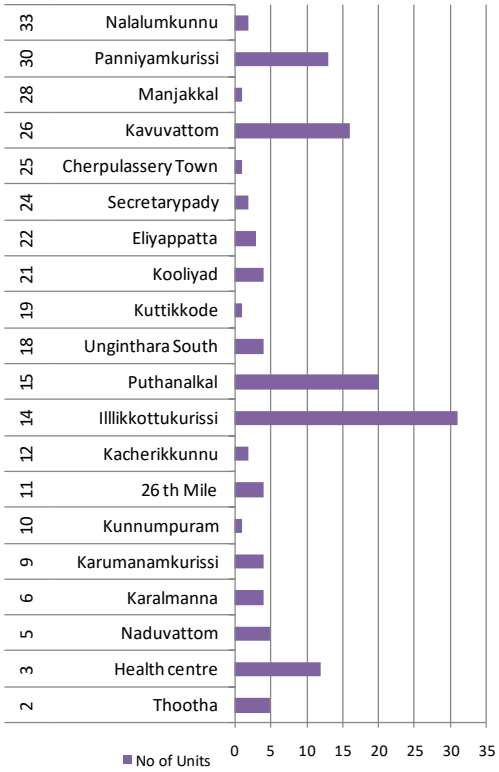


Fig. 8.3 Ward wise Distribution of Industrial Units

The industrial units in product wise are described in figure 8.4. The majority of industrial units are engineering based, secondly animal husbandry based, followed by textile, others and agro-based. There are no considerable potentials for the industrial units with product based by forest, rubber, minerals, mining, chemical, electrical, electronics, plastic and services, and each of them coming less than 10 units only.

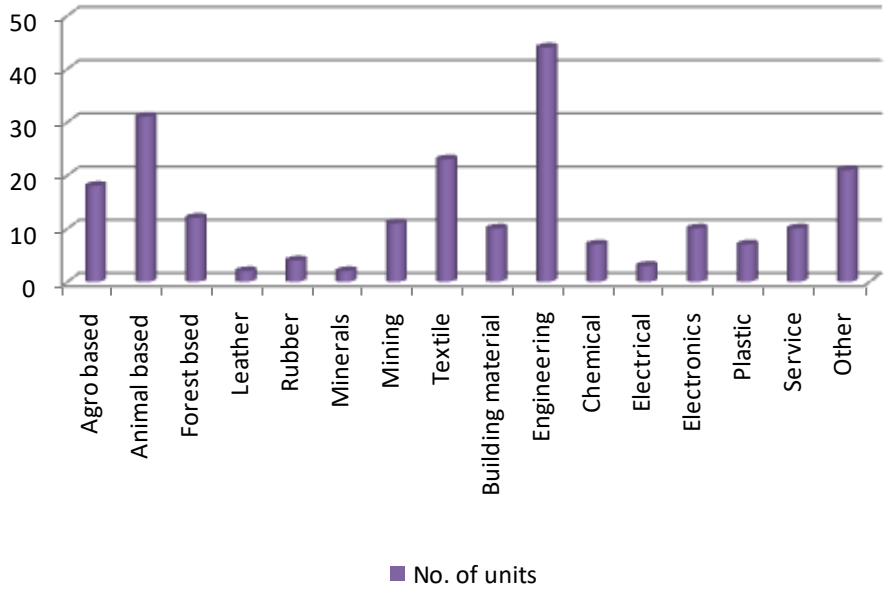


Fig. 8.4 Details of Product wise Industrial Units

Fig 8.5 shows the details of land ownership of the industrial units. It revealed that only 29 % of units have owned land and other 71 % of industrial units are working in rented or in leased lands .

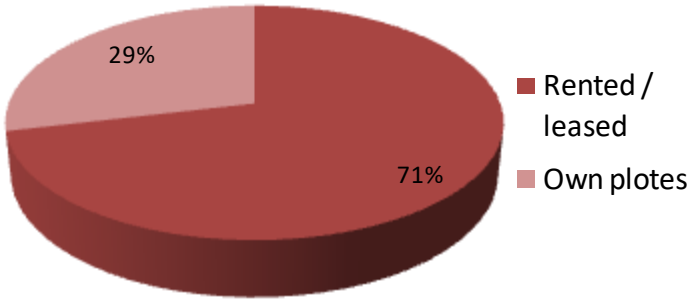


Fig. 8.5 Details of land ownership of the industrial units.

The spatial distribution of industrial units with respect to the ownership of land are shown in fig 8.6. The spatial distribution of industrial units classified according to turn over is shown in figure 8.7. There are only two industrial establishments having annual turnover between 1 crore to 1.5 crore and 5 industrial units having annual turnover between 20 lakhs and 1 crore. The industrial units having turn over less than 20 lakhs register the largest number.

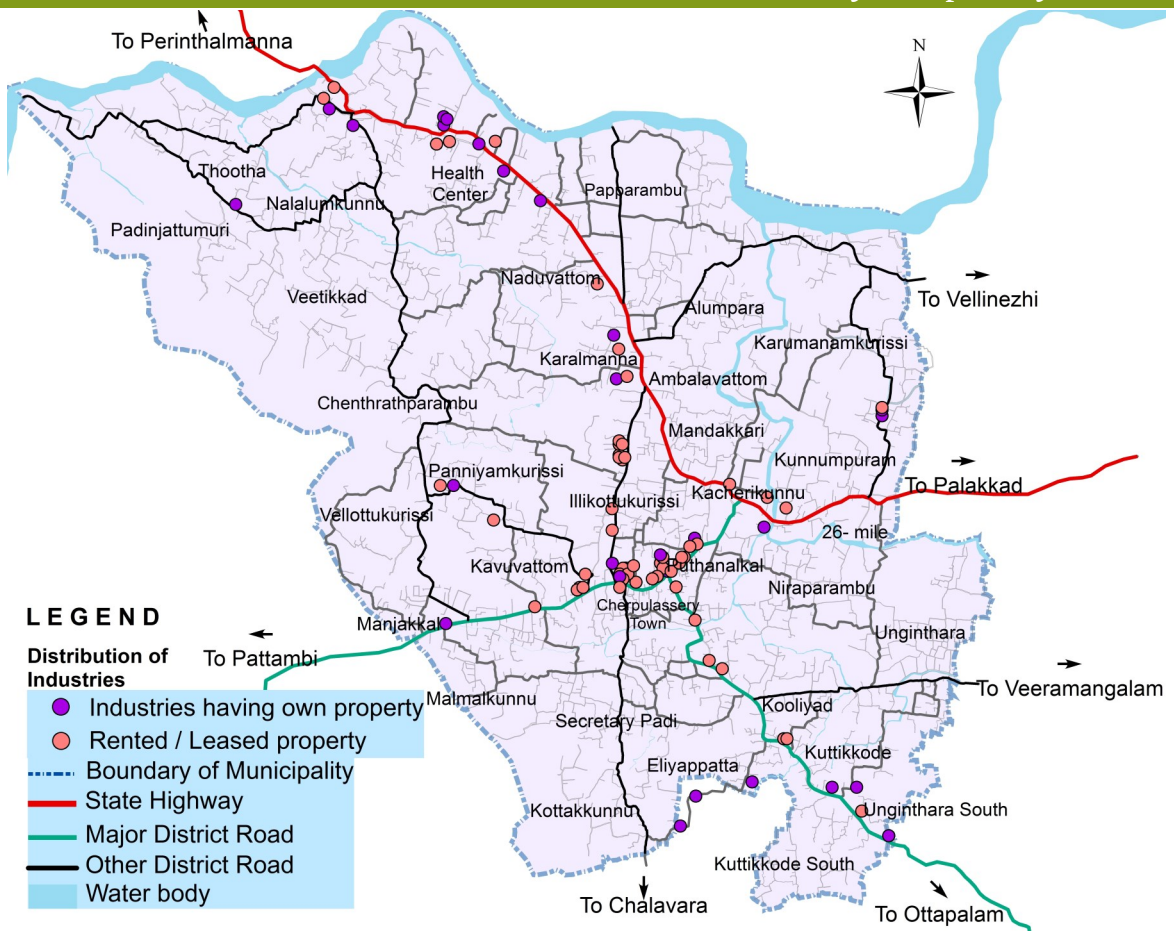


Fig. 8.6 Spatial distribution of land ownership wise industrial units

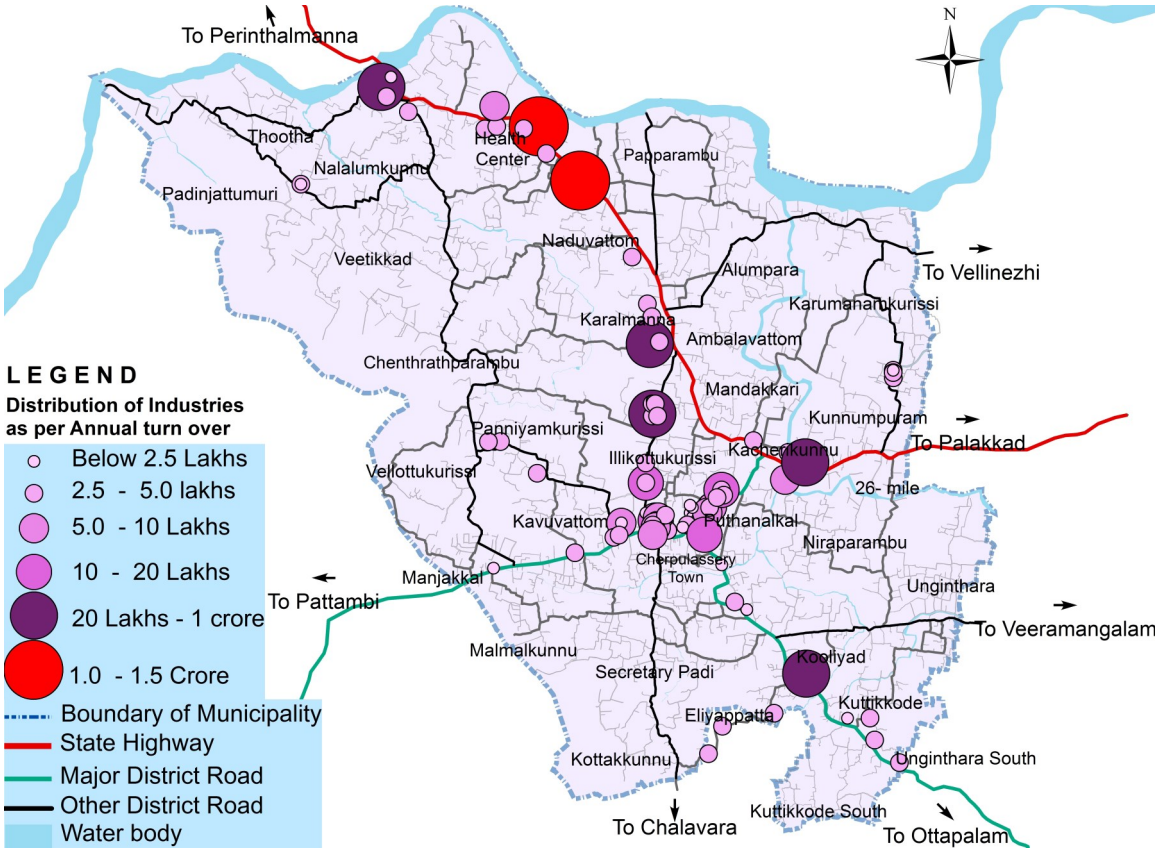


Fig 8.7 Spatial distribution of industrial units classified according to turn over

8.2 TEMPORAL VARIATION OF INDUSTRIAL UNITS

There are 294 small scale industrial units in the town and remaining are micro units. There is an increasing trend shown in small scale units since year 2000, the total units in year 2000 increased to 229 in 2005 and further increased to 294 in the year 2017. The table 8.1 and Fig 8.8 shows the temporal variation of industrial units.

Table 8.1 Temporal Variation of Small Scale Industries in Town

	2000	2005	2017
Agro based	12	21	34
Rubber based	4	4	3
Plastic	0	0	0
Forest	10	11	10
Animal Husbandry	5	5	3
Textile	29	37	52
Chemical	8	9	7
Engineering	29	38	45
Electronic	4	11	0
Mineral	0	0	2
Building material	4	5	0
Others	82	88	138
Total	**186**	**229**	**294**

Source: District Industries Centre, Palakkad

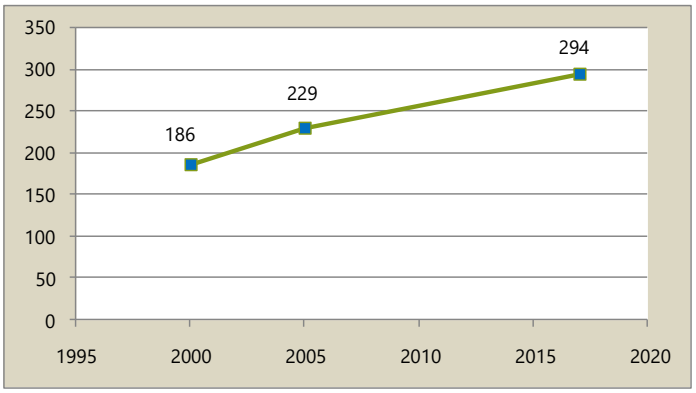


Fig 8.8 The temporal variation of Industrial Units

8.3 EMPLOYMENT PATTERN

There are 580 employees working in various industrial units within the town , in which 411 nos. are male and 169 nos. are female. The female participation in the industrial sector is only 29 % while the male participation is 71%. The figure 8.9 shows the employment pattern of the industrial sector of the town. Out of 580 nos. of industrial workers 46 nos. are non Keralites, which constitute 8% of the total population.

8.4 POLLUTION ASPECTS

The industrialisation causes harm to the environment owing to pollution in air, water and soil, and in future may trigger health issues and extinction of species. The pollution Index (PI) of any industrial sector is a number from 0 to 100 and the increasing value of PI denotes the increasing degree of pollution from the industrial sector.



Fig 8.9 Industrial employment pattern

Source: District Industries Centre, Palakkad

A PI score of 60 and above denotes Red category, PI score between 41 to 59 denotes an Orange category, while a PI score between 21 to 40 denotes green category and a PI score below 20 denotes white category. The newly introduced white category of industries pertains to those industrial sector which are practically non-polluting. Figure 8.10 shows classifications of industries units based on PI score.

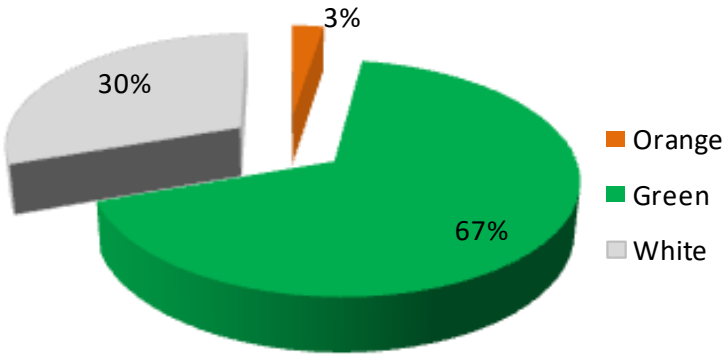


Fig. 8.10 Classifications of industries units based on PI score

Source: District Industries Centre, Palakkad

There are no red category industries within the municipal area and only 3 % of industrial units are coming under orange category. Almost 67% of industrial units fall in green category while 30 % in white category. It can be deduced that the Pollution due to the industrial activity are comparatively less in this Municipal town .

Figure 8.11. shows spatial distribution of industrial units with respect to their Pollution Index score.

8.5 TRADITIONAL INDUSTRIES

Bamboo and reed

There is an absence of organised industry based on bamboo and reed here, which currently are operating at household & traditional industry level. The employment opportunity in this traditional field is very limited since the forest based raw ma-

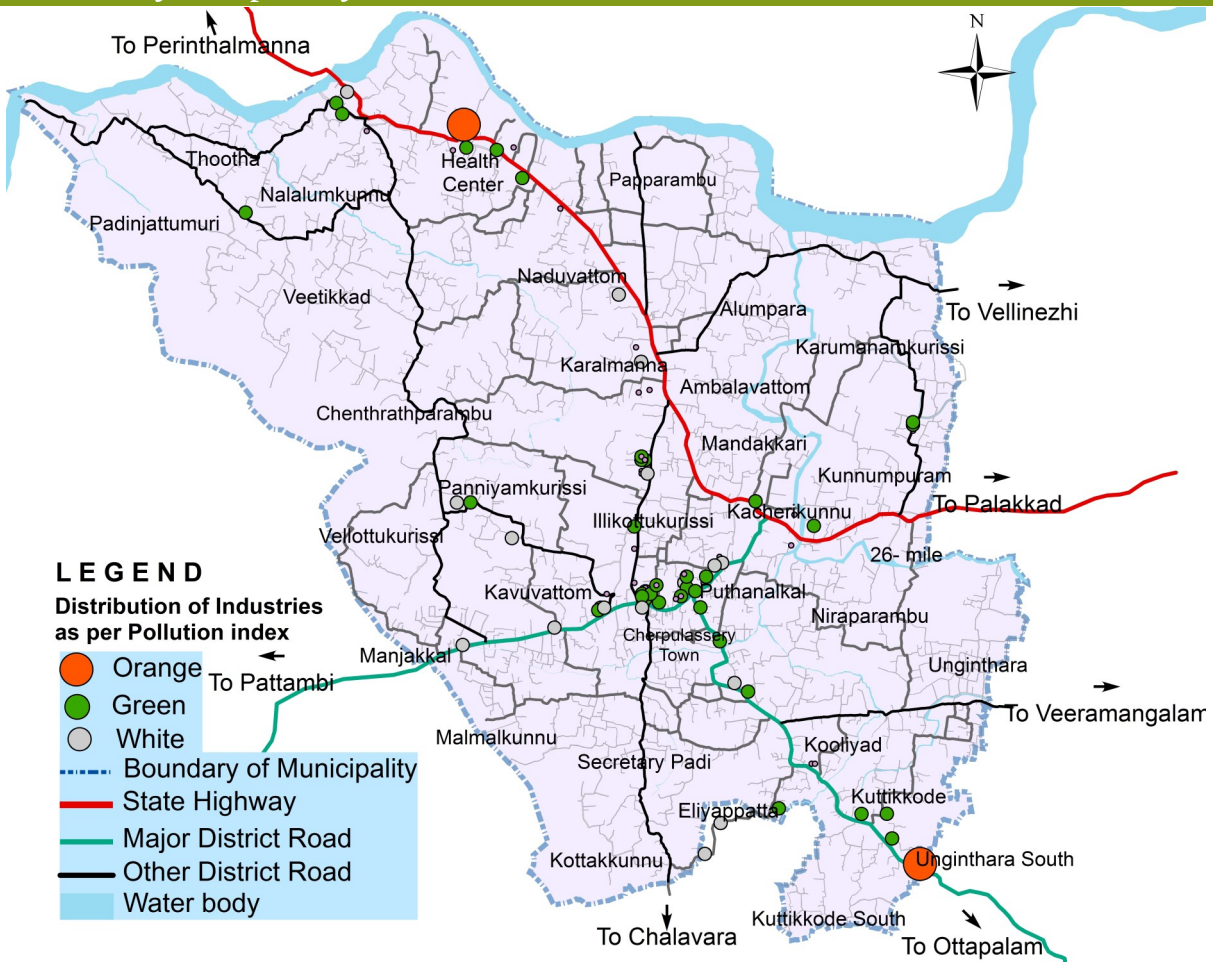


Fig. 8.11 Spatial distribution of industrial units with respect to their Pollution Index

terials have to be supplied by Kerala State Bamboo Corporation (KSBC) .

In Cherpulassery Municipality only 8 households are engaged in this traditional industries sector with 12 people. There is no mechanised technology in the field at present and only making by traditional manual weaving products as Kotta (basket), Vatti, muram (sifts) and Panambu.

There are no marketing facilities for these products and the weavers are directly involved in sales by door to door method. The non availability of marketing facility, high cost of raw material, and availability of cheap substitutes in the market are the problems faced by this traditional industry.

Blacksmith



Blacksmiths is one of the last vestiges of cast-based hereditary occupations. Now only 7 households are engaged in this field within the municipality. The main products are the agricultural implements such as hoes, spades, plough, picks, etc. At present there is limited scope in this

traditional industry as advanced mechanised technology has replaced this traditional industry in terms of scale and profit.

Pottery

Pottery is one of the main significant traditional industries of Kerala. At present 8 households with 25 persons are engaged in this traditional industry which are located at Karalmanna within the municipality. The main products are kitchen wares, cooking vessels, water pots, garden pots etc. The main problems with the traditional industry are non availability of suitable clay and restriction on clay mining by the Government. Marketing is also another problem faced by this field.



Handloom

For several centuries, weaver villages in Palakkad were the major source of handloom dress material for Kerala. Cherpulassery have also their own weavers at Karumanamkurussi.

After Independence, the weavers were brought under cooperative societies and they had a wide marketing network. Buyers from all over India and abroad flocked to the villages to buy products. There is a similar facility at Karumanamkurussi within the municipality. Heavy competition from power looms, Inadequate working capital and razor thin profit, non adoption of modern design, drop out of expert weavers from the sector due to low wages, price hike on the raw material, are the main problems faced by the sector at present .

Kathakalikoppu



Kathakalikoppu means the ornaments used for the classical art Kathakali. The main koppu is the crown as shown in picture. There are many folk communities, traditional artists and artisans who have been living on the shore of Thoothapuzha. Kothavil family, one of the famous artisans at Vellinezhi very near to the Cherpulassery Municipal town are the masters in the making of Kathakali head gears and wooden ornaments. The kothavil family follows as traditional work the making of wooden head gears and ornaments under their own craftsmanship for more than sixty years. The main problems faced by the other traditional industries are also faced by this sector .

Adakkaputhur metal mirror

There is one family from Adakkaputhur village near Cherpulassery municipal town is making the metal mirror with equal quality of well known "Aranmula Kannadi". A

man namely Sri. Balan Moosari (late) had invented the secret combination of this metal mirror, till then only a few families in Aranmula knew this technique. People from far off & nearby areas flock to buy these mirrors. The mirror or "Val-kannadi", symbolises Goddess Bhagavathi and hence these mirror are consider auspicious for every home.

8.6 PROBLEMS AND POTENTIALS

Problems

- Very limited industrial base for determining the economic base of the cherpulassery.
- The major problem in this sector is the lack of marketing facilities, high cost of production and high interest rate of bank loan. Lack of infrastructure viz., facilitated land and lack of an organized systems, absence of proper institutional facilities to guide industrial entrepreneurs are also faced by the industrial sector. Area under industrial use constitutes only 0.23 Sq Km i.e. 0.72% of total land area.
- Most of the establishments fall in small and micro scale industries.
- Agriculture sector is dominant in the town, but only few agro-based industries exist here.

Potentials

- Food processing is a sunrise sub-sector which has huge potential for promoting agriculture through, value addition.
- The presence of traditional industrial activities has to be integrated in an economically viable manner.
- There are possibilities to promote house hold industries by tapping the rural craft and skills of the people through Kudumbashree self help groups.
- Conducting awareness programs, promote small scale industries and Bamboo based products are some of the immediate remedies to current problems.

9. TRADE AND COMMERCE

Trade and commerce are core components of the economy. The exchange of goods and services over long distances may be called trade, and the exchange of goods and services at specific markets is commercial activities. Trade and commerce have evolved over space and time, from low volume and limited extent prior to the industrial revolution, to the extensive flows and transactions that characterize the contemporary global economy. Trade is as old as human society itself. Trade and commerce are the life blood of a healthy economy. This chapter discusses about the trade & commerce activities in Cherpulassery.

9.1 EXISTING SCENARIO

As per the Integrated District Development Plan Palakkad 2013 (IDDP Palakkad 2013), the Cherpulassery town comes in 3rd order in hierarchy of settlement within the district and the nearest node 3rd order is at Sreekrishnapuram.

The municipality has an agrarian economy and majority of the people depend on agriculture for their livelihood. The Trade and Commerce is the other main activity of the town and act as a one of the economic base of the Cherpulassery town. The transport corridors in the town have become the main centres of trade activity. Town act as a trade service centre for the inhabitants of this town and neighbouring LSGs like Chalavara, Thrikkadeeri, Nellaya and Vellinezhy. The people from the neighbouring local bodies depends on the town for trading their agricultural produce and daily items.

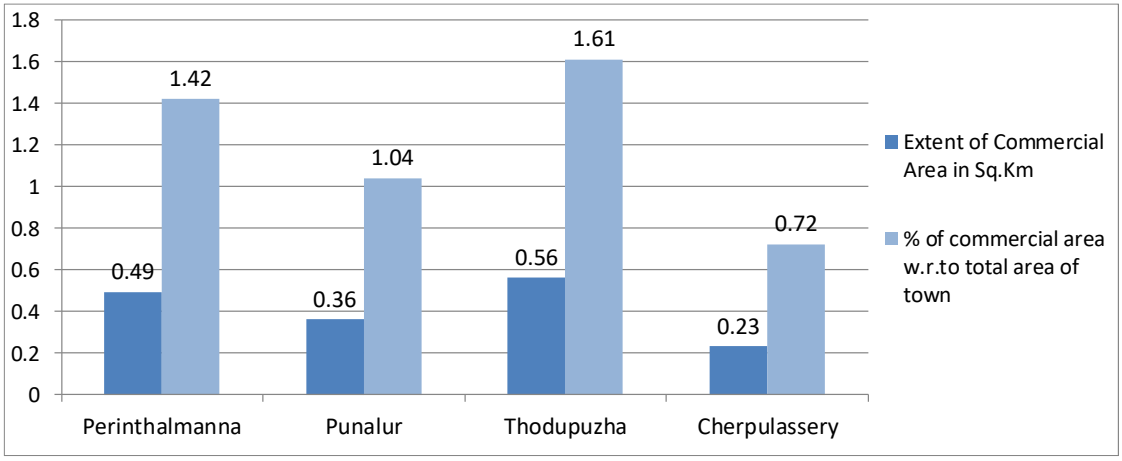


Fig. 9.1 Area comparison with Similar Municipalities

Source: Master Plans for Perinthalmanna, Punalur, Thodupuzha

Presently the town consist 19 nos. of wholesale shops,1,016 nos. of retail shops, 32 nos. of business establishments and 71 Nos. of restaurants/ hotels and all of them

are providing employment for 2,900 persons. The main commercial activities are clothes, jewellery, building materials and food & grocery in retail nature.

In Cherpulassery town, commercial land use constitutes only an area of 0.23 Sq.km, i.e. 0.72 % of total municipal area. Comparison of percentage share of commercial land use with similar town and the municipal towns within the district are shown in fig 9.1 and fig. 9.2 respectively. It is seen from the figures that the share percentage of commercial activities is very less as 0.72% while comparing the similar towns like Perinthalmanna, Punalur and Thodupuzha.

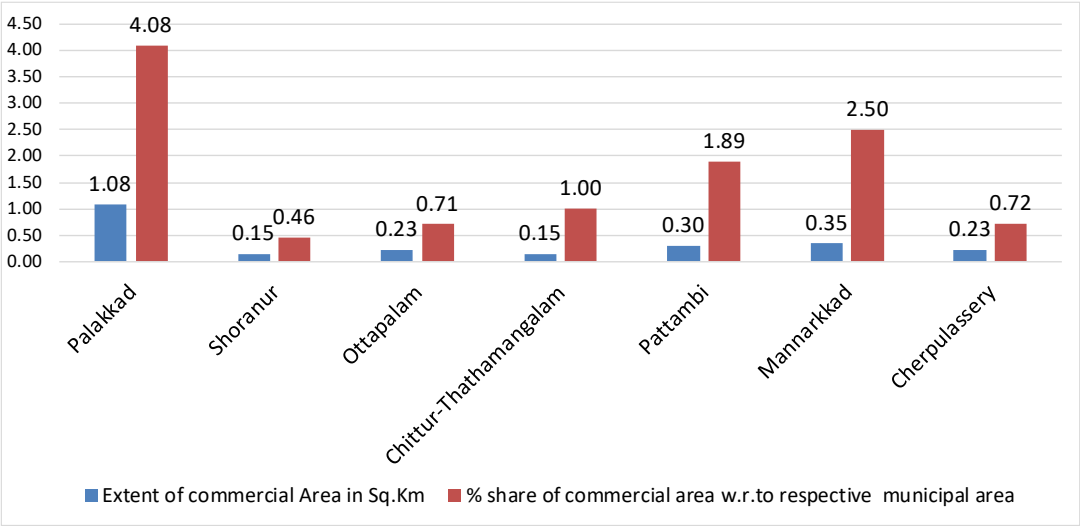


Fig. 9.2 Comparison with Municipalities with in Palakkad District

Source: Master Plan Documents of the respective Towns

9.2 SPATIAL DISPENSATION OF TRADE & COMMERCE ACTIVITIES

As stated in chapter 5, the commercial activities are mainly located at core area of town and also along the sides of the major roads namely Pattambi-Palakkad, Cherpulassery-Ottapalam and Palakkad- Perinthalmanna roads. It can be seen that majority of the commercial establishments are located along Cherpulassery - Pattambi road; in between Ayyapankavu and Puthanalkal, a nearly 3 km stretch in the East – West direction. The town is also expanding to the Ottappalam road, AKG road, EMS road and the High school road. The centre of focus now is the bus stand. Fig. 9.4 shows the spatial distribution of commercial activities in the town.

Also there is a market located at EMS road with an extent of 30 cents with the commercial activities of Vegetables, Fruits, Fish, Meat, Groceries and Stationaries in retail manner which are mainly brought from Palakkad, Pattambi and Mannarkkad. There are 16 Nos of shops together having built up space of 5,348 sq.m.



Fig 9.3.Existing Market Area

Fig 9.3 Existing Market Area



Fig. 9.4 Spatial Distribution of Commercial Land Use in Cherpulassery



Fig 9.5 Commercial areas in Cherpulassery Town

Insufficient space for parking, loading and unloading goods are the main problems in the existing commercial areas. Delivery vehicles and customers often park on the roadway lanes and this generates negative impacts in terms of road capacity and safety.

9.3 HIERARCHY OF NODES

Normally an area commercially developed is known as commercial centre but the agglomeration of commercial activity around a junctions act as a node. The hierarchy of junctions are determined by the cumulative value of roads according to their status which are intersecting to form a junction.

The nodes are characterized depending on the concentration of commercial activities and by the extent of commercial activity taking place in a hierarchal junctions.

Accordingly there are 3 hierarchical categories of nodes consisting in the municipality. Among the five numbers of nodes within the municipality town centre is the 1st order, Thootha junction, Kacherikunnu junction, Madathiparambu junction are the 2nd order nodes and others like Karalmanna junction, Eliyapetta junction, 26-th mile junction are coming under 3 rd order nodes. The table 9.1 shows the hierarchy of nodes of the municipality. And the fig 9.6 shows the spatial distribution of hierarchy of nodes.

Table 9.1 Hierarchy of Nodes

Sl. No:	Name	Hierarchy
1	Town Cenetre	I
2	Thootha Junction	II
3	Kacherikunnu Junction	II
4	Madathiparambu Jn.	II
5	Karalmanna Jn.	III
6	Eliyapetta Jn.	III
7	26 th Mile Jn.	III

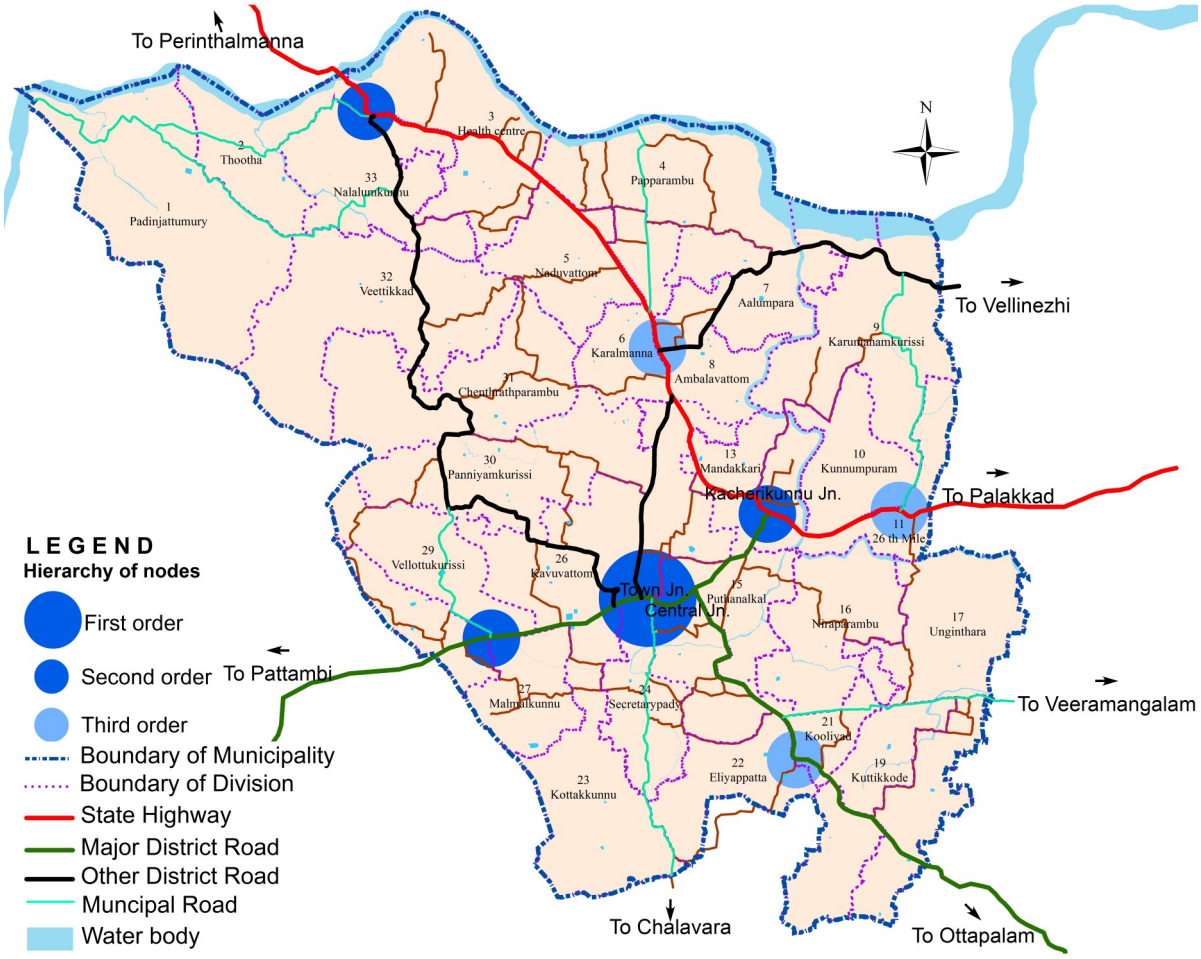


Fig. 9.6 Hierarchy of Nodes

9.4 STREET VENDORS/ INFORMAL SECTOR

Street vendors are an integral part of urban economies in India. It refers to those community who sell goods and services in public space. They provide consumers with convenient and accessible retail options and form a vital part of the social and economic life of a city. The National Policy on Urban Street Vendors, 2009 recognizes the positive role of street vendors being an integral and legitimate part of the urban retail trade and distribution system for daily necessities of the common man. Spatial distribution of street vendors are given in Fig 9.8 and their details are given in Table 9.2.

Street vendors are commonly seen at many parts of the municipality. Their tendency is to settle in areas where there is a constant movement of people, especially near the commercial nodes and bus terminals. The street vendors are mainly concentrated along Palakkad-Cherpulassery road and near Manjakkal, Thootha junctions.



Fig 9.7.Street vendors near hospital jn.

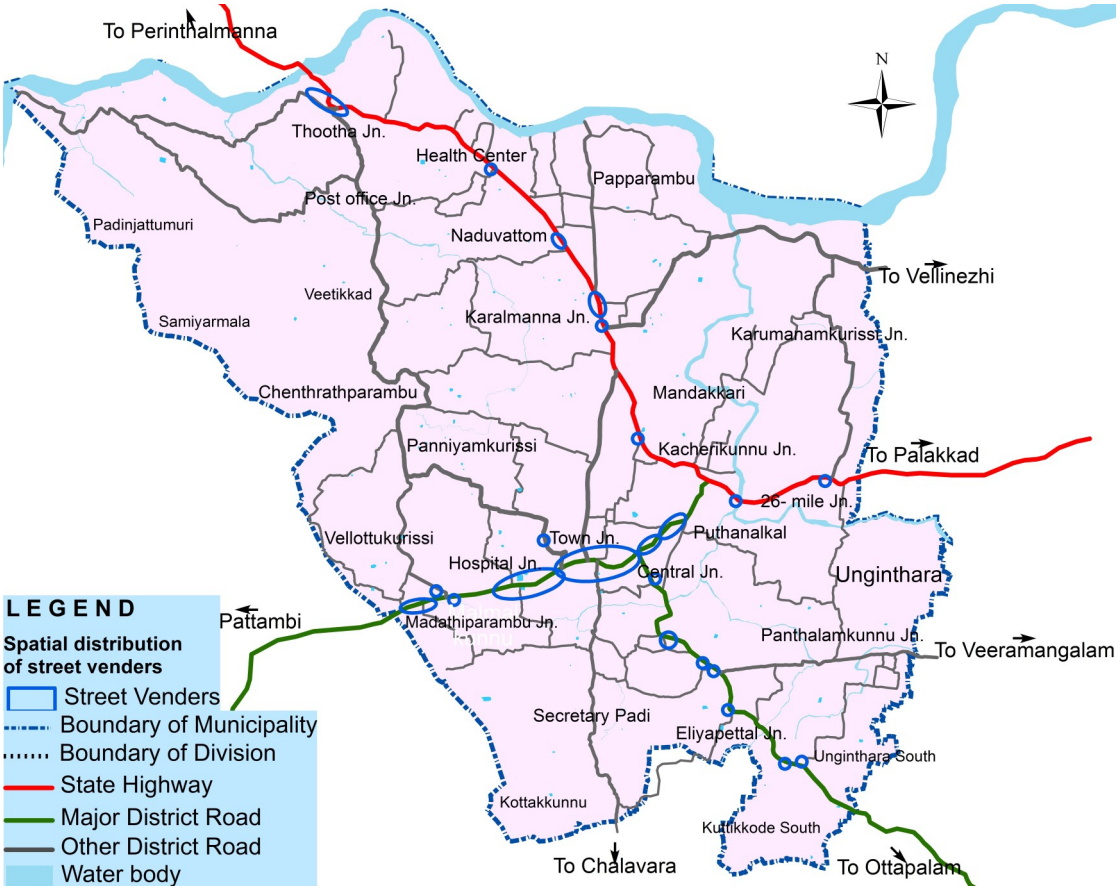


Fig. 9.8 Spatial Distribution of Street Vendors

Table 9.2 List of Street Vendors (location wise)

Name of Place/Road/Locality	Type of activity	Number of street vendors
10TH Mile	Food Items	1
26TH Mile	Food Items	2
Aliyumkulam	Poultry	1
Cherpulassery Bus stand	Clothes	1
	Electronics	2
	fruits	2
	Food items	10
	Plants	5
	Lottery	2
	Seeds	1
	Bag items	1
	Chappal, sandals	2
Cherpulassery puthalkal temple	Food Items	1
Chertpulassery town near SBI	Food Items	1
Chertpulassery town near central bank	Food Items	1
Cherpulassery near kavitha jewellery	Food Items	1
Cherpulassery Palakkad Road	Food Items	1
	fish	1
Cherpulassery Pattambi road	Food Items	11
	fish	2
	meat	1
	kallukothu pani	1
	vegetables	2
	perfumes	1
Cherpulassery Perinthalmanna road	food items	7
	stationary	1
Karalmanna library Junction	vegetables	1
Karalmanna	food items	6
KPIP Road junction	food items	1

Source: Cherpulassery Municipality, Urban Street vendors survey 2017 by NULM

Name of Place/Road/Locality	Type of activity	Number of street vendors
Kuttikkode	pots	1
	stationary	1
Madathiparambu UP school	Food items	2
Ottapalam road	Food items	3
Pattambi road	food items	5
	Clothes	1
	Lottery	1
	Fish	1
Puthanalkal	Fish	1
	Kallukothipani	1
Thootha sahppumpadi	food items	2
Thootha	food items	2
Total		**91**

The gender wise distribution of street vendors shows that 99% of the street vendors are male and only 1% are females. Age distribution shows that 27% of the street vendors are in the age group of 18-40 and 73% are in the age group of 40-80. There is only one female street vendor in the town and she falls in the age group 40-80. There are 5 differently abled street vendors in the municipality.

Figure 9.9 shows the nature of street vending items sold in the municipality. Among the total street vendors 76% sell perishable goods such as food items, vege-

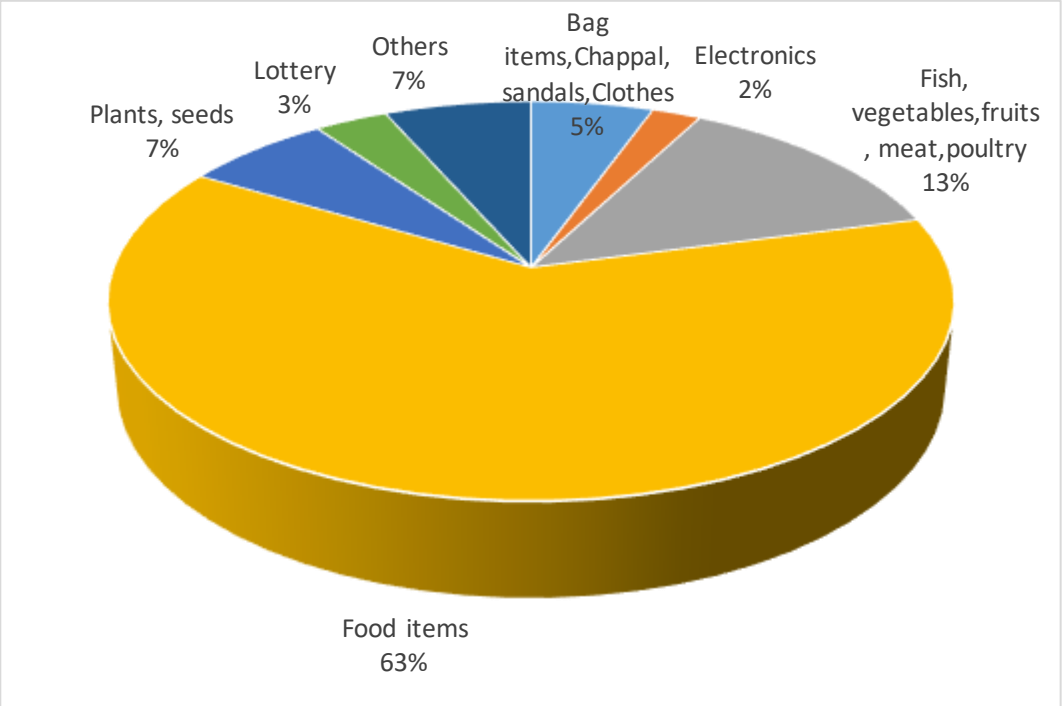


Fig. 9.9 Details of street vending items in Cherupulassery municipality

tables, fruits, meat and fish though they have to face the problem of storage. And remaining 24% deals with non perishable goods.

People engaged in street vending do not have a fixed daily income. Their income keeps changing. Some days they have a very little income, whereas next day they may get more income. Figure 9.10 depicts income status of street vendors in the municipal area. Most of the street vendors (52%) had daily income of Rs 251-500, 36% had income between Rs. 501-1000 and only a very few had daily income more than Rs 1000.

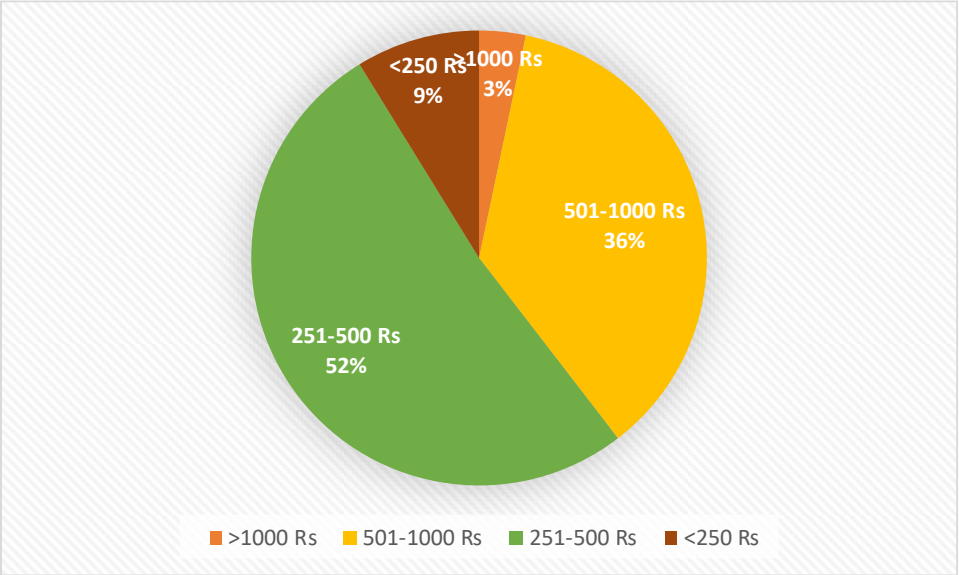


Fig. 9.10 Daily income status of street vendors.

Figure 9.11 shows the regular modes of vending in Cherpulassery municipality. Majority of street vendors (31%) use temporary platforms as their regular mode of vending. Other modes of vending are cart (24%), floor (26%) and vehicles (19%).

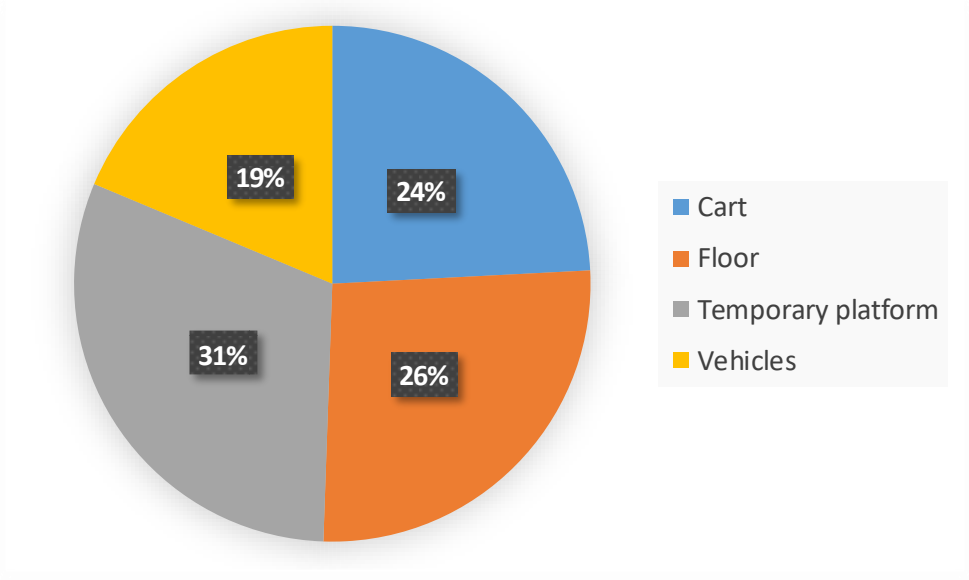


Fig. 9.11 Regular modes of vending in Cherpulassery municipality.

By giving them proper education and training they can improve their entrepreneurial skills, so that they could increase their income level and have a better livelihood. Street vending should be regulated so that it does not result in unauthorised occupation of roads and walkways. Effective measures should be taken to streamline their activities by the municipality and should be secured with institutional financial support and legally enforceable protection.

9.5 FINANCIAL INSTITUTIONS

There are 45 nos. of financial institutions existing within the municipality, among which 10 nos. of scheduled banks, one Treasury of state government, a branch of KSFE, co-operative institutions and others are private financial institutions.

9.6 INFERENCE

Insufficient space for parking, loading and unloading of goods are the main problems in the existing commercial areas. There is lack of an organised market within the municipality. There is no scientific slaughter house within Municipality but some unauthorised slaughter houses and meat shops are functioning there. Street vendors are mainly concentrated along the main corridors and this can create problems in smooth flow of the traffic.

10. TOURISM AND HERITAGE

Tourism is considered as one of the sectors, which can drive Kerala economy to the pinnacle of socio-economic development owing to its potential for generating income and employment. Heritage is an array of inherited properties that has its own ancient values attached with history, tradition, sociological, cultural, aesthetics, art, architecture, craftsmanship etc.

10.1 EXISTING SCENARIO

The tourist attraction spots can be classified into the various categories based on the potential and natural resource available in the locality. It can be Natural and Aqua Tourism, Eco Tourism, Adventure Tourism, Heritage Tourism, Cultural Tourism, Health Tourism, Pilgrim Tourism, Farm Tourism etc. There are no major tourism spots within the municipality, but the possibilities have not yet been utilized in an effective manner. Presently there are some Religious festivals and Culture activities as follows within the municipality.

10.1.1 Ayyappankavu


Ayyappankavu Temple

A temple namely, Ayyappa temple popularly known as the Sabarimala of Malabar, is located near core area of the municipality. The People believed that Shree Dharmashastha with his consort Prabhadevi and son Satyka have a presence here and reportedly this temple is one of the 108th Dharmashastha temples ageing more than 1,200 years. "Ada" a favourite sweet is the main accepted offering in this temple to Dharmasastha. It is one of the few temples in Kerala where marriage can be solemnized in front of Ayyappa. It is one of the custom that the pregnant women visit this temple during the 7th month of their pregnancy.

People believe the history of this temple to the following; more than 10 Namboothiri families lived in this vicinity and one among them started a penance at the Thiruvullakkavu Shastha temple in Peruvanam village, Thrissur district with a wish of fathering a son. After years of penance and hardships he became weak and decided to return home. The next day on his birthday, at early morning he noticed a stone in the form of a quadrangle which was not there before, He could easily make out that this

was nothing but the divine form of Shastha. Being a pious and faithful worshipper, a baby boy was born to them.

During Sabarimala pilgrimage season (mid November to mid January) large number of devotees visited the temple. The annual festival conducted in the temple is on the month of Kumbam (February to March) with ten day various classical temple arts.

10.1.2 Puthanalkkal Temple

Puthanalkkal is one of the famous temple of Kerala dedicated to Bhagavathy. Puthanalkkal temple is known for the kalavela (usually February) and followed by Thalappoli. Tholpavakoothu is also a speciality of this temple, which is performed followed by kodiyettom. The annual Makara Chowaa (Malayalam calendar date) is an important and auspicious date in the temple.

10.1.3 Thirumullappulli Mahadeva Temple, Karalmanna

The Thirumullappulli Siva temple of Karalmanna is quite unique in that its prathishta has but few parallels anywhere around. This is Aghora Siva, the fierce Lord sitting preoccupied and hell-bent on avenging Daksha and worshipped in "Roudrabhava " in a posture that is awe-inspiringly ascetic. To the multifarious devotees of Karalmanna, Lord Siva of Thirumullappulli is both a protector and benefactor.



Thirumullappulli Siva Temple

The most significant festival in Thirumullapulli is the yearly Temple Festival which commences exactly eight days before the Thiruvathiranakshathtra in the month of Kumbham (Malayalam month). The festival culminates with the Aarattu, the holy bath of the Lord at ThoothaPuzha.

10.1.4 Sree Mangode Bhagavathi Temple

This is a very sacred and important pilgrim centre of Kerala. This famous bhagavathy temple is located at Mangode on the way to Palakkad Cherpulassery route. It is believed to be about 500 years old.

10.1.5 Thootha Pooram

Sree Thootha Bhagavathi Temple is one of the main Bhadrakaali temples of Old Malabar and is located at the bank of the Thootha river. The main event that takes place in this temple is Thootha Pooram associated with the festival season of Val-



luvanad. The main attraction of the festival is the processions with about 50 caparisoned elephants pageantry.

The historical event is believed that, once when a Brahmin woman was bathing in the Thootha River she found a pot of milk floating. Astonished to find it, she took it and kept it on the bank and went on to finish her bath. But when she returned to take it she found that it had stuck to the ground and was unable to lift up.

She informed her family about this miracle and later it was found that it belonged to the Sree Parkoli Bhagavathi of Mannarkkad and that the pot contained the Devi's Chaitanya. The Brahmin family then went ahead and installed the pot with proper rituals and conducting regular pooja. Years later the temple, the rituals and surrounding area passed on to the hands of the Kannambra Nair family.



Thootha Bagavathy Temple

10.1.6 Thiyyattu

Thiyyattu is a cultural form of temple art performed by Thiyyattu Nambiyar community. Thiyyattu involves four phases of presentation. i) Kalamezhuthu - Sketching picture of Ayyappa using natural pigments, ii) Kottumpattum, iii) Koothu, iv) Velichapadu - The slow paced to frenzied dance of the oracle who eventually erases the kalam.

10.1.7 Tholpavakoothu (Puppetry)

Tholpavakoothu is a temple art form performed in the Bhagavathy temples in Palakkad district and nearby region in Kerala. The story of Tholpavakoothu performance is from the Indian epic Ramayanam. The puppetry performed in a specially built theatres in temple called 'Koothumadam".





10.1.8 Kaalavela

Kaalavela is performed coinciding with the Bhagavathy kavu festivals as a cultural festival of farming community. These rituals reflects man's admiration and submission to nature and earth. The main attraction is the procession of people to the temples taken with huge idols of bulls which made with cloth and hay pageantry with various coloured wooden handicrafts. Presently 22 families from Ellikottukurissi are engaged in the production of this huge bull.

10.1.9 Nagakalam



Nagakalam is a ritual art form performed at sarpakavu and rarely in households, performed by the people from Pulluva community. They are experts in preparation of Nagakalam namely Sarpayakshikalam, Nagayakshikalam, Ashtanagakalam etc. which are formed with multi colour natural pigments. Nagakalam is commonly performing on the day of aayilyiam nakshthram of the Malayalam months Kanni, Thulam and Kumbam (September to March).

Nagakalam Performance contains a particular folk song by percussion instrument Pulluva veena and Kudam and thullal by women from the pullava family with the cluster of areca nut leaf (Kovinginpookula), eventually erases the kalam. Out of 13 Pulluvas families, 11 of them are involved in this traditional art.

10.1.10 Vazhakkada Kunchu Nair Smaraka Trust



An organization namely Vazhakkada Kunchu Nair Smaraka Trust founded in 1987 May 16 at Karalmanna for the memory of the great kathakali perfomer Padmasree Vazhankada Kunchu Nair. Chennampurath tharavadu at Karalmanna is the birth place of Kunchu Nair

and his childhood and education were at Vazhakkada in Malapuram district. He was an outstanding Kathakali maestro of 20 the century (1909 - 1987) and the first Principal of Kerala Kala Mandalam. He was a frontline disciple of the legendary Pattikkamthodi Ravunni Menon.

Vazhakkada Kunchu Nair Smaraka Trust hosts several seminar and workshops on Kathakali and associated classical arts. The trust also conducted annual fest as Dhanu Avittom, Kottakkal Sivaraman Orma, Venmani Haridasanusmaranam and Pranathiare. The trust published a monograph on Kathakali namely *Kathakalivettom* in 1993. And one of the major awards in Kerala is given for the life time contribution to Kathakali namely *"Kunchu Nair Samskrithi Samman" comprising* of Rs. 1 Lakhs and citation. A performing group was formed in associated with the smarakam for performing kathakali namely *Kathakalivettom*. Presently auditorium with Grameena Vayanasala have under the ownership of the trust as a venue for cultural events.

10.2 ADJACENT HERITAGE/TOURISM SPOTS

10.2.1 Vellinezhi Kalagramam

Vellinezhi one of the village shared boundary with Cherpulassery town blessing with a rich tapestry of art forms, artists and artisans. The presence of about 46 art forms as Koodiyatam, Ottanthullal, Krishnanattam, Tholpavakoothu, Pulluvanpattu etc. are finding this tiny village. So aiming to preserve these art forms Vellinezhi was declared as Kalagramam in year 2012. It is located just 5 km from Cherpulassery town.



Vellinezhi Kalagramam



10.2.2 Olappamanna Mana

Olappamanna Mana, one of the Ettukettu having 300 years old, once was the home of the great leaders and the centre of Kathakali studies in the early 20th century.


Olappamanna Mana

Olappamanna Mana is the birth place forenamed scholar the late M.M.C. Narayanan Nambudiripad who gave a Malayalam interpretation to Rigveda, also the poet Mahakavi Subrahmanian Nambudiripad and Scholar Dr. O.M. Anujan.

Now Olappamanna Mana is vacated abode that exists as a trust that lets its premises out for film, and a part of the mana is let out as a home stay which sees travellers arriving to watch kathakali and Kalampattu. Olappamannamana was a venue for Pattikamthodi Ravunnimenon who formed Kalluvazhi style of Kathakali. Kothavil family only one of the example for that, has specialised in the craft of designing and making Kathakali costumes.


Vayillakunnilappan Temple

Thadiyarangu and Kathakali program conducted by *Nanu Nair Smaraka Kalakendram* are the major attraction in this village and that awaits for travellers. *Vellinezhi* village is also famed for its handmade *Adakkaputhur metal mirror* which enjoys a prime status with its unique craftsmanship.

10.2.3 Vayillakunnillappan Temple

Vayillakunnilappan (The mouth less god) is still revered as a deity in Vayillakkunnillappan temple at Kadampazhipural and temple is very near to the Cherpulassery Municipal town. It is believed that this deity is a one of the member of "Parayipettapanthirukulam"a popular folktale in Kerala.

10.2.4 Naranathu Mangalathu Mana

Naranathu Mangalathu Mana where Naranathu branthan who was one among the twelve offspring of Vararuchi was brought up, is situated at Chethallur very near to Cherpulassery Town.


Pathirikunnathu Mana

10.2.5 Pathirikunnathu Mana

Kerala state has several temples dedicated to the worship of serpents

(Naga/snake). The most famous among these are at Mannarsala, Pathirikunnathumana and Pambumekkattu. Pathirikunnathumana is situated at Mundakkottukurissi in Chalavara Grama Panchayath with short distance from Cherpulassery town. Most of devotees prefer to visit during the Malayalam month of Vrichikum (Nov- Dec) to this mana.



10.3 PROMINENT PERSONALITIES

Prof. **Rajalakshmi** was a Malayalam Writer and Poet (June 2, 1930 - January 18, 1965). She was born at Cherpulassery. Her father was Marath Achutha Menon and Mother Kutty Malu Amma. Professionally she was a lecturer in Physics and worked in NSS College. As notable writer she won the Kerala Sahithya Achademy Award in 1960 for her novel *OruVazhiyum Kure Nizhalukalum*. Her other notable works of fiction are *Njaneenna Bhavam*, *Uchaveyilum Ilam Nilavum* and *Ninne Njan snehikkunnu*.

Table 10.1 Prominent Personalities

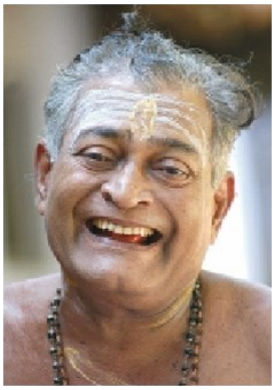
Kathakali artists in Cherpulassery	
Kalamandalam Ramankutty Varrier (Late)	
Sadananm Krishnankutty	
Kottakkal Sivaraman	
Narippara Narayanan Namboothiri	
Sadanam Basi	
Kalamandalam Rajendran	

Percussionists	
Cherpulassery Sivan	Maddalam
Cherpulassery Haridasan	Timila
Aliparambu Kesava Poduval	Chenda
Aliparambu Krishna Poduval	Chenda
K.P.Sivarama Poduval	Chenda
Krishnakumar Poduval	Chenda
Rajesh	Chenda
Jayan & Vijayan	Chenda
Valaparambil Kunhan Nair	Thavil
Chazhiyathu Appunni Nair	Thavil

Carnatic Music Artists	
Puzhikunnathu Sankunni Nair	Nadaswaram
Madhavan Nair	Nadaswaram
Kuttikrishnan Nair	Nadaswaram
Sankaran Nair	Nadaswaram

Music, dance and drama
Smt. Bhargaviamma
Smt. Sadanam Lakshmikutty
Smt. Kalamandalam Suseela
Sri. Gopalakrishnan
Sri. Sreedharanunni
Sri. Narayana swami

Poet
Smt. Rajalskami, **Kerala Sahithya Academy Awadee in 1960**
Sri. Avinasi Ezhuthachan



Kottakkal Sivaraman



Cherpulassery Sivan



Sri. Avinasi Ezhuthachan is another poet lived in Cherpulassery (1864 - 1909). His notable works in literature are Vaishnavamanjari, Kamadevashakaram, Kalidasacharitham, Njhan, Innathelokam. Cherpulassery has been the birth place as well as home of many artists in dance, music and drama. The names of the living and dead artists and their area are shown in table 10.1

10.4 Natural Resources

10.4.1 Thootha River

Rivers are the major spatial element of the landscape and constitute a significant tourism resource. Thoothapuzha is a scope of eco friendly river front tourism for Cherpulassery Municipality. Thootha River, one of the tributaries of Bharathapuzha which originates from the Silent Valley rainforest in the Western Ghats, where it is known as Kunthi. All religious, social, cultural and occupational activities of the villagers are closely associated with the river. River bed is laden with beautiful rocks, which are visible during the summer months as the water level declines. The Thootha merges with the Nila at Koottakadavu.

Thootha has tremendous potential for river tourism. The Bridge across the river that links the districts of Malappuram and Palakkad offers a panoramic view of the river and the Bhagavathy temple nearby. Visitors throng the river in mornings and evenings for fishing and to enjoy the scenery. During summers, a lot of people take bath in the river and as underwater currents are strong, safe zones are identified for bathing. The river bed is an abode of migratory birds and rare species of water birds.

The re-emergence of Otters indicates that ecological health of the river has improved. Otters are consider Bio-indicator since their presence signifies improvements in water quality and availability of fish and other aquatic animals.

After nearly two decades of absence, smooth coated Otters have finally returned to the Thoothapuzha. *'Their return to a river is akin to tiger returning to the forest'*. It is an evident that there is plenty to eat for the otters and there is a natural habitat safe enough for them to breed.



Cheenikkapara

The improvement of the river

water quality is believed to be the result of a campaign conducted by the group of people under the banner of *Thoothapuzha Samrakshana Samithi*.

10.4.2 Cheenikapara

A marvellous hillock on the bank of Thoothapuzha at Kaalikadavu. This Ideal location for enjoying aesthetic beauty of Thoothapuzha and seen a probability for an open auditorium.

10.4.3 Farm Tourism, River front Tourism & Pilgrim Tourism

Cherpulassery has tremendous potential for developing farm Tourism and river front in a big way without much additional investment. Green paddy fields forming a blanket upon the land may attract people. There is a possibility of converting potential cropped areas as tourist attractions with minimum intervention to transfer the benefits of tourism directly to the farmers. The various schemes underway are intended to pre-

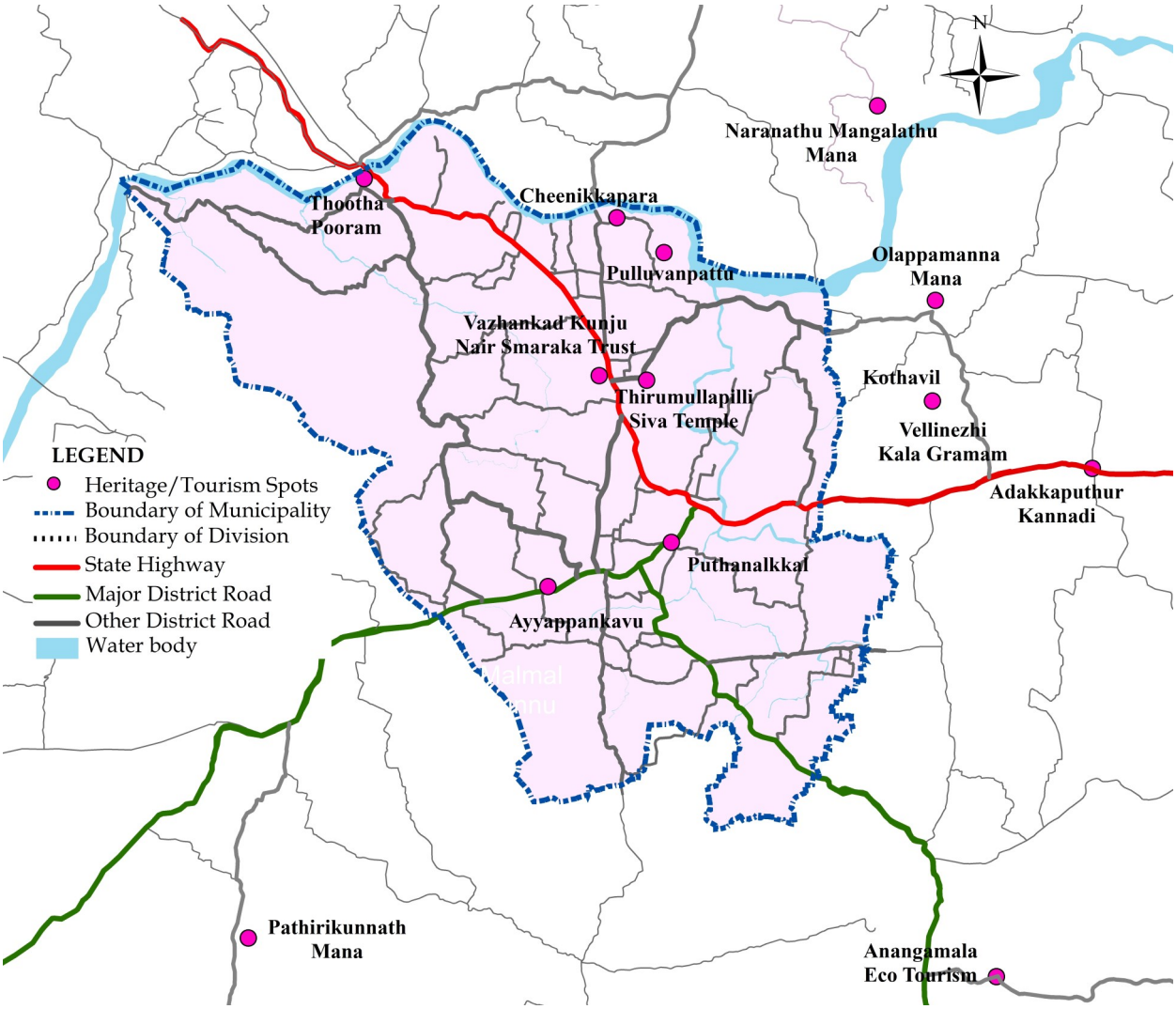


Fig 10.1: Heritage and Tourism Location in and around Cherpulassery

pare the farms to receive tourists by presenting a positive image of the farm and of agriculture as a whole, in view of revitalising the agriculture sector through tourism.

The town is becoming a pilgrim center in north Kerala with the three renowned temples; Ayyappan Kavu, Puthanalkal & Thirumullapilli Siva Temple. Fig 10.1 shows the spatial distribution of pilgrim centers & locations having tourism potentials in and around Cherpulassery. Since the tourist flow is seasonal, the data regarding pilgrims and tourists is presently not available.

10.5 AVAILABILITY OF TOURISM INFRASTRUCTURE

Since the tourist flow is only seasonal here, there are no major tourist infrastructural facilities in the town. A transport system acts as a bridge between places of tourist origin and destination. It opens out a region by providing an access to its tourist places. Roads in Cherpulassery town provide easy links to the network of major routes by means of roadways. It is a junction of



Bethesda Heritage

Table 10.2. Lodging Facilities Available in Cherpulassery Municipality

Sl. No.	Name	Govt./ Private/ Local body	No. of rooms	Availability of accommodation	Distance from Railway Station (km)	Distance from Bus stand (km)	No. of employees	Whether food is served to inmates	Remarks
1	Royal Plaza Regency, Market Road, Cherpulassery	Private	17	42	18 Km	300 mtrs	13	Yes	_
2	Melbourne Tourist Home, Pattambi Road, Cherpulassery	Private	20	48	18 Km	300 mtrs	2	No	_
3	Gayathri Grand Restaurant, Kavuvattam	Private	18	36	19 Km	750 Mtr	40	Yes	4 Star
4	Midhila Regency, Kavuvattam	Private	15	30	19 Km	850 Mtrs	42	Yes	4 Star
6	Deepa Tourist Home, Near Bus Stand, Cherpulassery	Private	15	35	18 Km	100 Mtr	23	Yes	_
6	Geethanjali Inn, opp. Ayyappan Kavu	Private	6	12	18 Km	1 Km	1	No	_
7	Thoufeeq Tourist Home, Pattambi Road	Private	12	28	18 Km	500 Mtr	1	No	_
8	PWD Rest House, Cherpulassery	Govt.	12	24	20 Km	1.5 km	2	No	_
9	Bethesda Heritage Inn, Karumanamkurissi	Private	8	16	21 Km	4 Km	4	Yes	_
10	K.R. Tourist Home,Cherpulassery	Private	8	20	19 Km	1 Km	1	No	_

Source: Primary Survey

roads converging from four towns - Ottapalam, Pattambi, Mannarkkad, and Perinthalmanna. At Kacherikunnu, the semi-hilly road also branches off eastwards to the district headquarters town of Palakkad

The need for accommodation in different classes of hotels suiting the varying requirements of tourists is no less an important part of tourism infrastructure. There is a home stay facility named "Bethesda Heritage" located at KarumanamKurussi. Olappamanna Mana another home stay facility at Vellinezhi at a distance of 6 km from Cherpulassery. There are 10 nos of economy hotels.

10.6 INFERENCE

There are no major tourism centres present in Cherpulassery. The existing few tourism spots within the municipal area are not yet utilized in a viable manner. The religious institutions as Ayyappankavu, Puthanalkal temple, Thootha temple. Thirumullapully Mahadeva temple, Mangode Bhagavathy temple etc are the potential for the pilgrim tourism activities.

The traditional festivals as Puthanalkal Kaala vela and Thootha Pooram, and associated cultural art forms as Thiyyattu, Tholpavakoothu, Naga kalam, are also the specialities of Cherpulassery and so which are to be promoted in the scale of tourism. A hillock namely Cheenikapara one of the hillock on the bank of Thoothapuzha at Kaalikadavu has a potential for eco-tourism activities .

The traditional architectural and historical places and monuments as Olappamannamana, Naranathu-mangalathumana etc are located within 15 KM from Cherpulassery and these may be included in the tourism plan. The potential of Thootha river bank has to be developed as river front tourism activities.

Thus various projects has to be framed with the possibilities and potentials within the town. A tourism net work has to be prepared with the possibilities within the town and with the nearby centres.

11. PHYSICAL INFRASTRUCTURE

Adequate physical and social infrastructure is a pre-requisite for the growth of a city. Physical infrastructure refers to the basic physical structures required for an economy to function and survive, such as transportation networks, water supply, energy, sewerage and waste disposal systems. Socio-economic growth of a town is motivated by means of physical development in the town. Urban local agencies are responsible for fulfilling the physical infrastructure requirements and thus enhancing efficiency of urban services according to the local preferences. The transportation sector of the Cherpulassery is discussed in a separate chapter, and all other physical infrastructures are referred hereunder.

11.1 WATER SUPPLY

Adequate, convenient and safe access to water has a positive impact on the resident's health and productivity, which reflects in the economic growth and enables local body to reach their food security, energy security and human development goals. On the other hand, scarce or unclean provision of water implies large health burdens from water related diseases and exacerbated impacts on poverty. Municipal water supply system provides water for a city's residential, commercial, parkland, schools, and fire-fighting needs.

A Municipal water supply system cannot service its customers unless there is a continuous supply of water to meet the domestic needs in the broadest sense and water needs for structural fire protection. Note that the quality and quantity of water for each use is different. Water used for domestic purpose needs to be high quality but is used in relatively small amounts, whereas usage in industry or agriculture require water of lower quality, but the demand is much higher in terms of quantity.

Kerala Water Authority is an autonomous authority established for the development and regulation of water supply, waste water collection and disposal, to fix the tariff and charges for water supply and sewerage services in the state of Kerala.

11.1.1 Major Sources of Water

Thoothapuzha is the major surface water source for the town. The sources of water identified by socio economic survey are shown in figure 11.1. It is seen that majority of the people ~ 44 % within the town depends on well water followed by 41 % on piped water supplied by Kerala Water Authority, 4% of people depend on public bore well as their source, 2% depends on community well and 9 % of residents are dependent on river, pond and other sources.

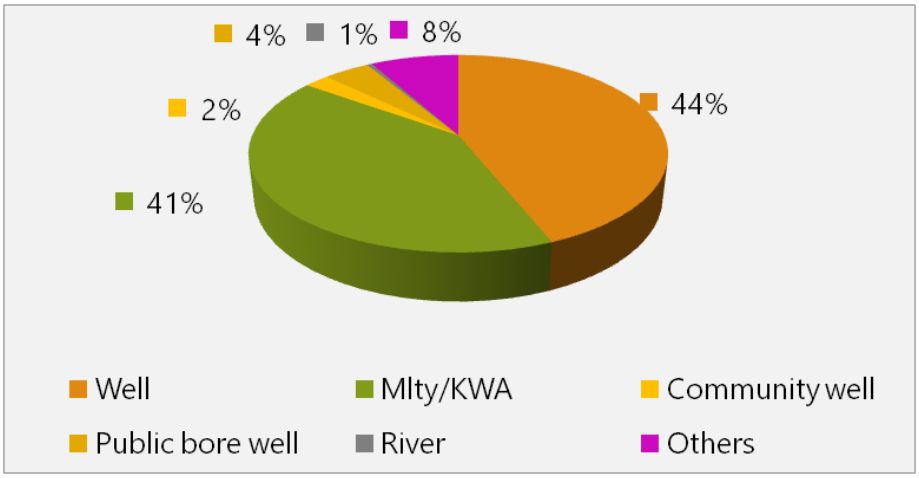


Fig.11.1 Sources of Water in Cherpulassery Town

Source: Socio-economic Survey 2016

11.1.2 Ground Water Table & Quality

There is only one ground water monitoring well within the Municipal area which is an open well located at Puthanalkal Bhagavathy Temple premises. The hydrograph of the observation well is shown in the Figure 11.2. As per the latest statistics, the average water level seen as 6.68 mbgl. Ground water level gets decreased during summer season and it leads to acute water shortage problems. The trend analysis shows that water level in ground water monitoring well of the region is going down considerably.

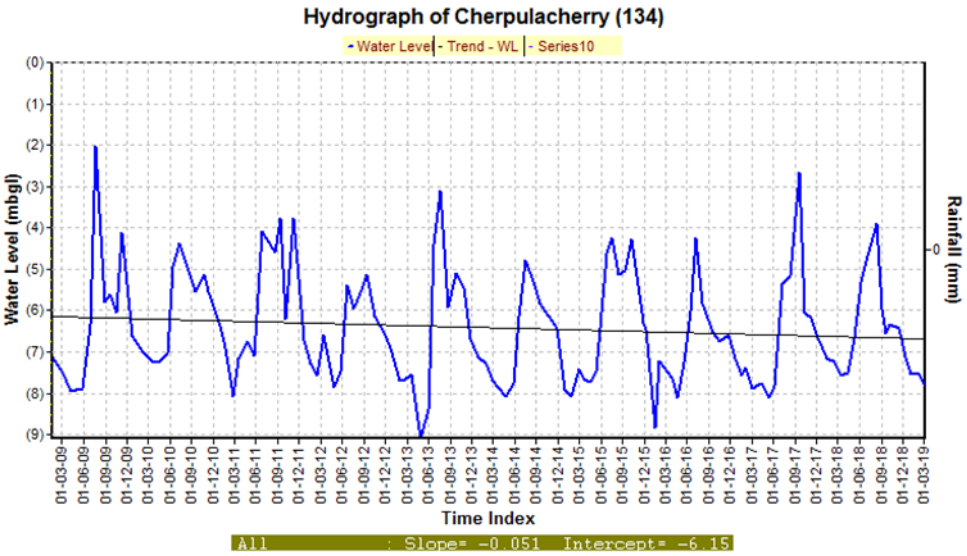


Fig.11.2 Hydrograph of Observation Well Located at Puthanalkkal Bhagavathy Temple premises

Source: Ground Water Department Office, Palakkad

Despite heavy rainfall, water is lost to the sea and less water is left for infiltration, percolation and storage. Conversion of watershed areas has led to lowering of ground-water table in Cherpulassery also as seen all over Kerala.

As 44% of the households depend open well, it is necessary to assess the quality of the ground water enable to protect the health of the human habitants and the conservation of the water system. Table 11.1 describes quality details of ground water. On analysis, the quality of water is observed as good and the major parameters are within the permissible limit.

Table 11.1 Quality Details of Ground Water

Sl. No.	Parameter	Obtained Value	Permissible limit for Drinking Purpose
1	P^H	9	6.5-8.5
2	Total Dissolved Solids (TDS)	85	500
3	Total hardness as CaCo3	70	200
4	Calcium Hardness (Ca)	22	75
5	Magnesium hardness (Mg)	7.3	0.1
6	Sulphates(SO_4)	17.8	200
7	Nitrates (NO_3)	0	45
8	Chlorides(Cl)	37	250
9	Alkalinity (mg/L)	150	200
10	Iron(Fe)	0	200

Source: Ground Water Department Office, Palakkad

11.1.3 Existing Water Supply System

The existing water supply scheme including the town is under the KWA and was designed and implemented as per norms for rural water supply during the period 1973-85. An infiltration gallery with collecting well located at Kalikadavu near Karalmanna in Tootha River is the source of water for the scheme. The details are given table 11.2.



Intake well at Kalikkadavu

Table 11.2 Details of Water Source and Intake Structure

Source of water	Location and details of intake structure	Raw Water Pumps	Treatment Plant	Clear Water Sump	Reservoir for Cherpulassery
Thoothapuzha	6m dia. Intake well cum pump house at Kallikadavu	2 nos. 60 HP to Cherpulassery& 15HP to Ananganadi GP	Nil	Nil	1.6 Lakh litres G.L. tank near Govt. School compound(collapsed in 2005 and abandoned)

Source: KWA-Cherpulassery

Water from Thoothapuzha is taken through infiltration gallery, disinfected and supplied directly to the mains. Presently there is no water treatment plants and reservoirs for Cherpulassery. The existing water treatment facility acts only as a pressure filter without any pre-treatment.

The existing distribution system is designed for a service level of 25-40 lpcd and a minimum residual pressure of 3m. The total length of distribution network is about 90 km consisting 200mm dia. AC pipe to 40mm PVC pipe laid and maintained 1980 onwards. The main distribution pipes with AC are frequently bursting and require urgent replacement. Details of service connections are given in the table 11.3. Fig 11.3 shows the existing water supply network of Cherpulassery Town.

Table 11.3 Details of Service Connections & Street Taps of KWA

Street Taps	Service Connections		Total
	Domestic	Non-domestic	
496	4770	406	5672

Source: KWA-Cherpulassery

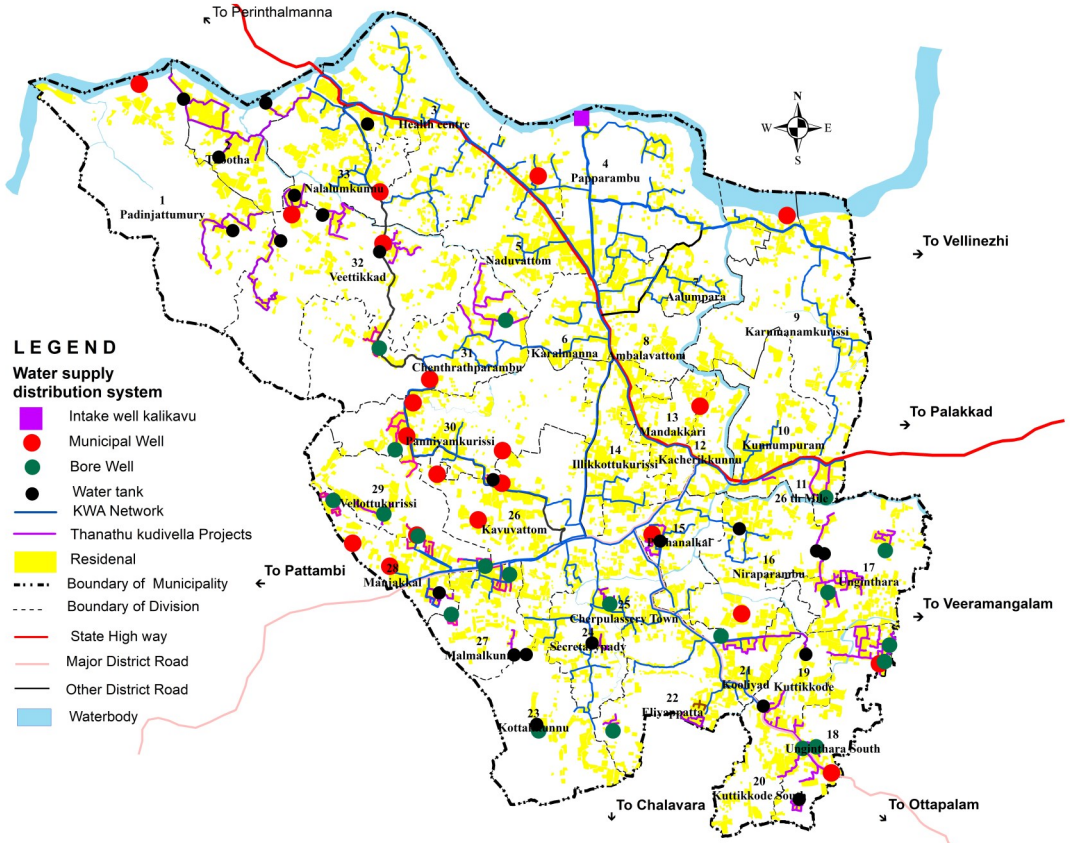


Fig.11.3 Existing Water Supply Distribution Network in Cherpulassery Town

Apart from these there are 34 small scale drinking water projects were implemented by the local body and through beneficiary committees. Details of these projects are given in Table 11.4. All these 34 projects together comprise getting benefits to 2,103 households.

Table 11.4 Details of Small Scale Water Projects

SL No	Name of projects	Sources	Name of Wards	Distance (Meter)	No of Houses
1	Tannikunnu	Borewell	1,Padijattumuri	1600	65
2	Narikunnu	Municipal well	33,NalalamKunnu	1000	120
3	LakshmVeedu	Borewell	32,Vettikkad	1100	50
4	Maliyattu	Borewell	31,Chendrathparambu	2200	130
5	Changapuzha	Thootha-puzha	32,Vettikkad	1000	150
6	Kuttikode	Municipal well	20,Kuttikode south	1200	102
7	Nochigathodi	Borewell	19,21, Kuttikode,Kooliyad	600	20
8	Chadachipalliyal	Borewell	21,Kooliyad	1000	30
9	Alachipalliyal	Borewell	18,Unginthara South	1200	50
10	Panamkurussi	Borewell	18,Unginthara South	400	20
11	Shaliyamkunnu	Borewell	25,Cherpullassery Town	500	25
12	Oliyath	Pumbu house	2,32,Thootha,Vettikkad	5000	150
13	Kizhakemannumkuzhi	Borewell	17, Unginthara	600	26
14	Palapatta	Borewell	17, Unginthara	900	85
15	Vettiyara	Borewell	17, Unginthara	1700	20
16	Nadukkachira	Municipal well	18,19,Unginthara south,Kuttikode	2600	50
17	KooliyadKozhithodi	Borewell	18,19,Unginthara south,Kuttikode	1200	40
18	26 th mail	Borewell	11,26th mail	1500	120
19	Mundiyanparambu	Municipal well	15,Puthanakkal	900	85
20	Aralamkunnath	Borewell	22,Eliyapetta	400	20
21	Eliyapetta	Borewell	22,Eliyapetta	500	35
22	Kallivalapel	Borewell	22,Eliyapetta	300	15
23	Kalimali	Borewell	24,Secratarypadi	500	20
24	Malmathodi	Borewell	27,Malmalkunnu	1000	90
25	Nalucent Colony	Borewell	27,Malmalkunnu	700	50
26	Manjakkal	Borewell	28, Manjakal	900	50
27	Vettikkalthodi	Municipal well	28, Manjakal	900	75
28	Vellottukurussi	Municipal well	29, Vellottukurussi	1000	85
29	Vadakkekara	Borewell	29, Vellottukurussi	500	30
30	Thagalpadi	Municipal well	30, Panniyamkurussi	1000	95
31	Plassarikalam SC Colony	Municipal well	30, Panniyamkurussi	500	25
32	Chattikunnu SC Colony	Municipal well	30, Panniyamkurussi	700	50
33	MadathiparambuKi-zhakkepadam	Borewell	29, Vellottukurussi	650	45
34	Chenthrathparambu	Borewell	31,Chentrathparambu	650	80

Source: Basic Statistics for Local Level Development (BSLLD) Data for Cherpulassery Municipality

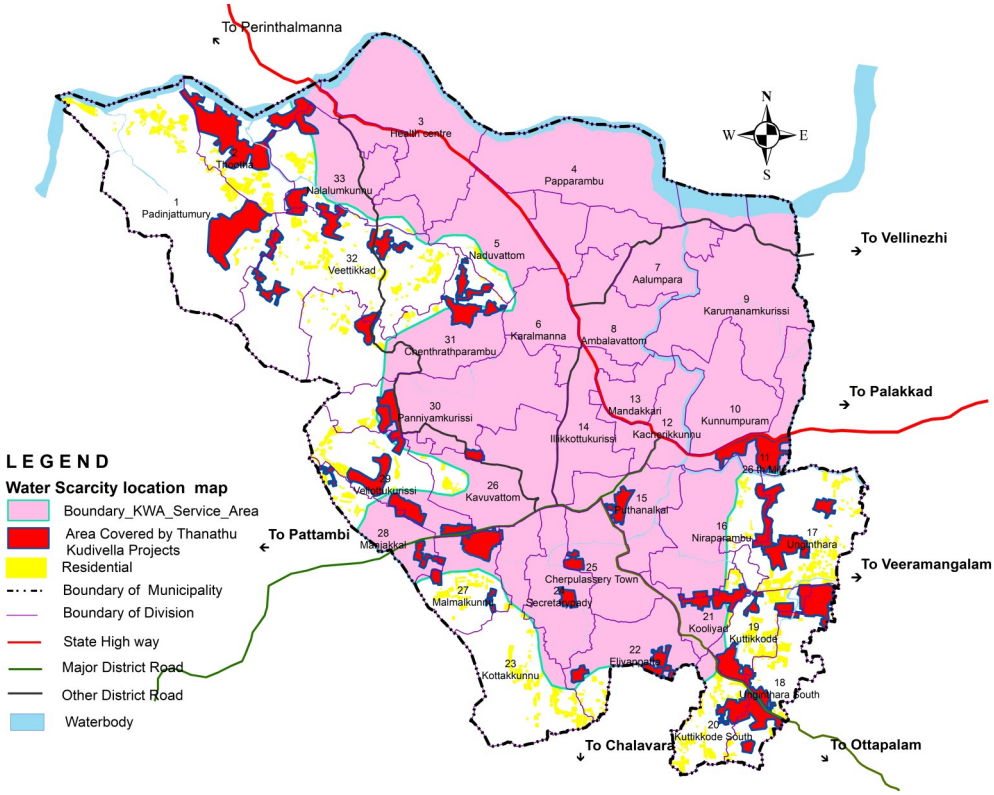


Fig.11.4. Water Distribution Network Coverage of the Municipality

The figure 11.4 shows the coverage of water distribution network and which reveals that the wards are not covered in a full strength by the water supply projects. The uncovered areas are mainly located North-west and south-east parts of the Municipality having higher altitudes.

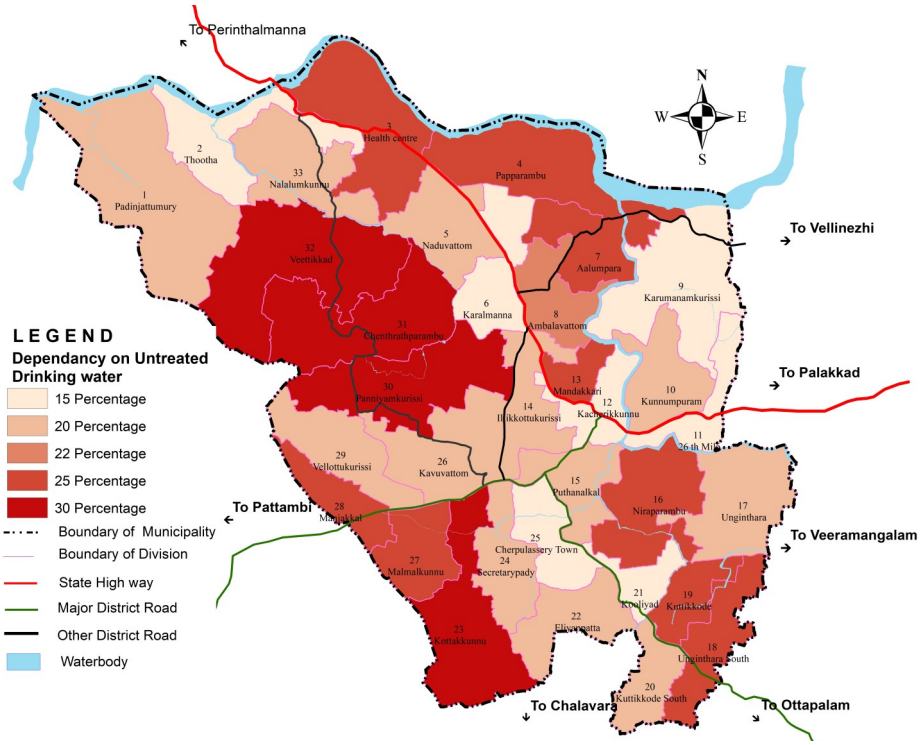


Fig 11.5 Ward wise Percentage of population not covered under any water distribution network.

The Fig 11.5 shows the ward wise percentage of population not covered under any water distribution network. They depends on unprotected water sources like open wells. The figure represents that 30% of the Households from the 4 wards namely-Panniyamkurussi, Chenthratparambu, Vettikkad, and Kottakkunnu are depend on un-protected water sources and 25% of the households from 8 wards namely-Health centre, Papparambu, Alumpara, Manjakkal, Unginthara south, Kuttikode, Mandakkari, Niraparambuhave are making use of unprotected water sources.

11.1.4 Accessibility of Water Sources

The accessibility in terms of distance to the source of water is also an issue related with the water supply sector which are mainly seen at the areas where high altitude within the municipality. The figure 11.6 shows the accessibility of water sources in terms of distance. It describes that 89.47% of the households have drinking water source inside their premises and remaining 10.53% have water source outside their compound with distance varies from 50m to 1km.

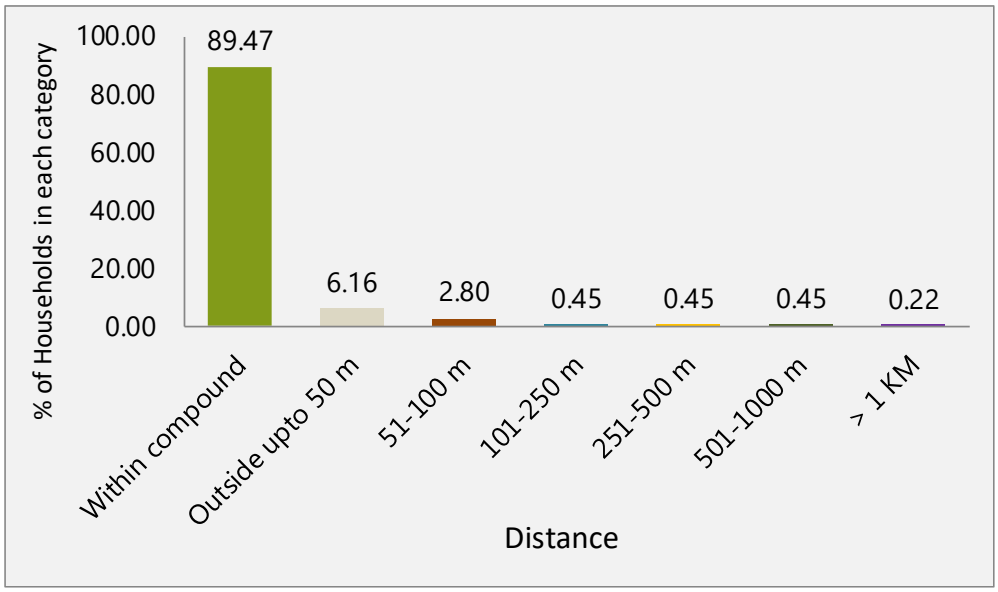


Fig.11.6. Accessibility of Water Source

Source: Socio-economic survey 2016

11.1.5 Frequency of Water Availability

The socio-economic survey conducted within the municipal area reveals that only 17.70 % of the houses are getting water for all 24 hrs, 7.01 % of houses are getting 12-24 hrs, 12.87 % of houses get water only for 6-12 hrs. The major portion of households ~50.92 % face water shortage as they get water only for 1- 6 hr and 9.2% are with less than 1 hr water supply. Same as 2.3% of households are suffered by getting water only once in 2 or more days. Fig.11.7. shows the frequency of water availability in Cherpulassery town.

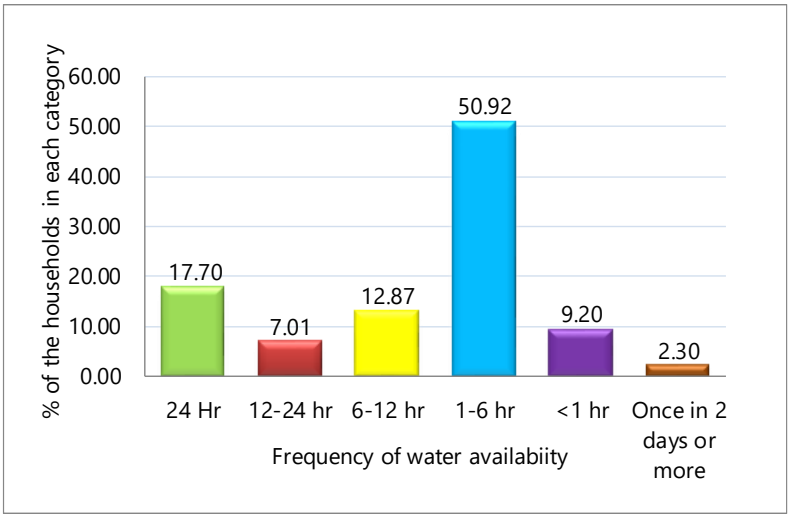


Fig.11.7 Frequency of Water Availability

Source: Socio-economic survey, 2016

11.1.6 Water Scarcity

The analysis of the availability of sufficient drinking water throughout the year revealed that ~45.02 % of households have no water scarcity. But 10.41 % of HHs are facing more than 6 months water scarcity followed by 7.73 % facing 3-6 months of scarcity, while 13.21 % HHs face water scarcity for 2-3 months and 23.63 % has scarcity for a period of 1-2 months. The details of water scarcity of the Municipality is shown in figure 11.8.

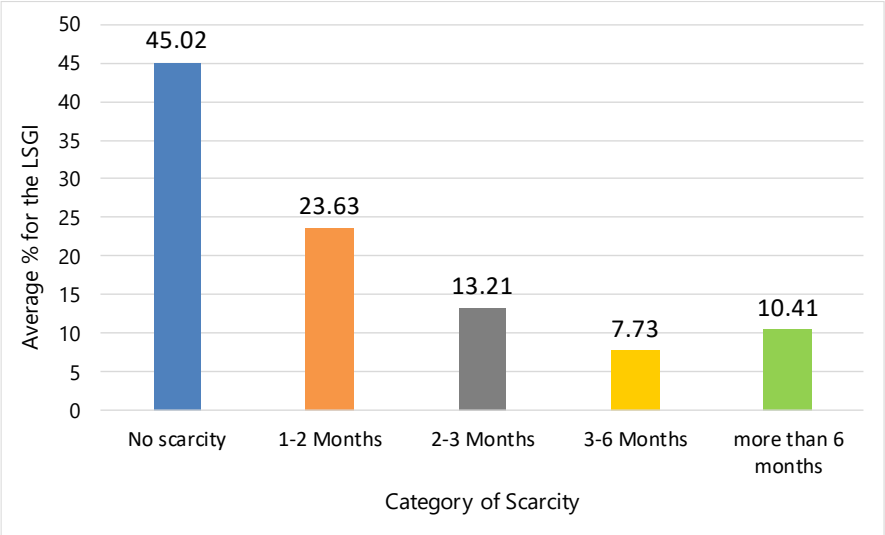


Fig.11.8 Details of Water Scarcity

Source: Socio-economic survey,2016

The water scarcity details are spatially shown in figure 11.9. and it describes that 2-Thootha, 31- Chenthrathparambu and 11- 26th mile wards have water scarcity more than 6 months, 4-Papparambu, 7-Alumpara, 9-karumannamkurussi, 10- Kunnumpuram, 15-Puthanalkal,18- Ungithara south, 20– Kuttikkod South, 28- Manjakkal and 30-Panniyamkurussi wards have water scarcity less than 2 months.

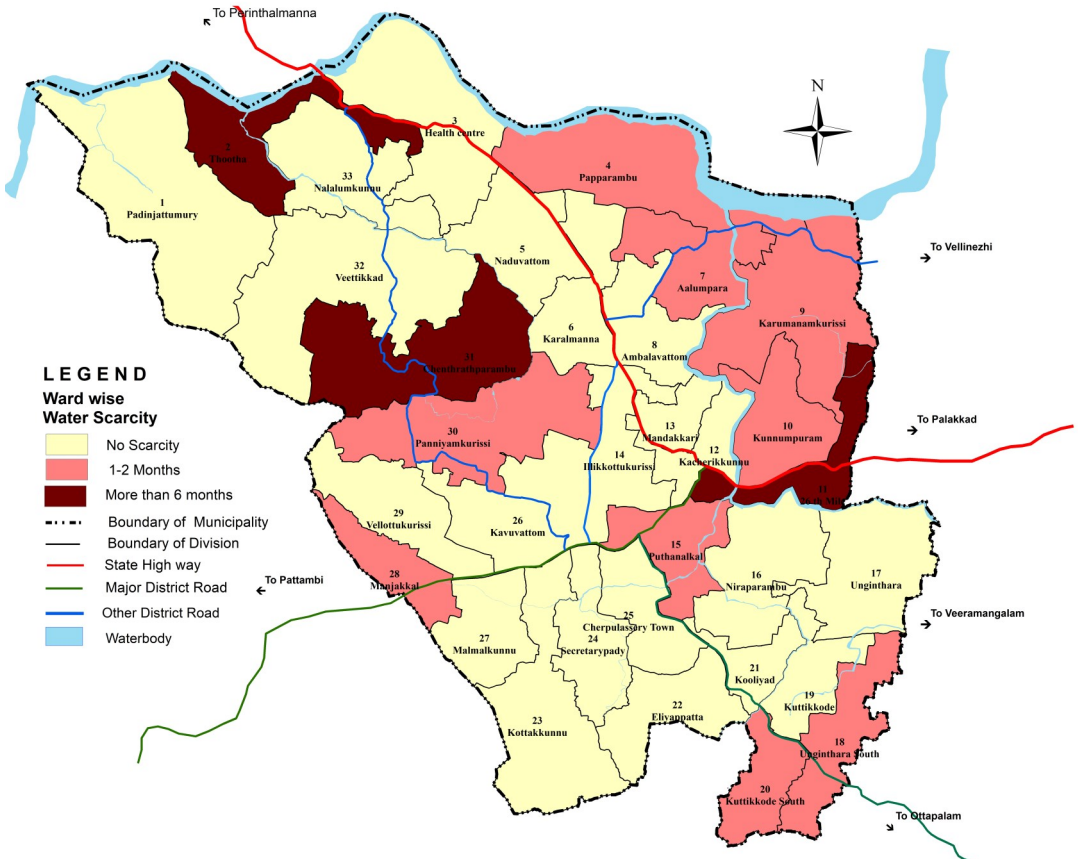


Fig 11.9 Water Scarcity – Ward wise

11.1.7 Water Demand

The water demand needs to be considered so as to supply with safe and sufficient water to the inhabitants of the municipality. The per capita water demand is taken with urban standard as 135 lpcd and estimated demands for the current population. Table 11.5 shows the total water demand of the Municipality for various purposes. The water demand for domestic purpose is about 5.99 MLD and total demand considering non-domestic and fire fighting etc constitute 8.14 MLD.

Table 11.5 Water Demand for the Municipality

Year	2018
Population	44,339
1. Domestic water demand @ 135 l/h/d	5.99 MLD
2. Non-domestic water demand @ 20.8% of (1)	1.24 MLD
3. Fire demand 1% of (1)+(2)	0.06 MLD
4. UFW @ 15% of (1) + (2) + (3)	0.85 MLD
5. Total water demand @ (1)+(2)+(3)+(4)	8.14 MLD
6. Storage capacity required @ 33% of supply	2.69 MLD

The total amount of water supplied by the existing piped water supply scheme is only 3.04 MLD which is significantly less than the existing demand 8.14 MLD. The table 11.6 depicts the existing supply and demand gap of the Municipality. There exist demand gap comes as 5.1 MLD.

Table 11.6 Water Demand Gap for the Municipality

Existing demand(MLD)	Supply (MLD)	Demand gap (MLD)	storage requirement (MLD)	Existing storage facility (MLD)	Additional requirement (MLD)
8.14	3.04	5.1	2.7	Nil	2.7

As a planning concept of master plan for a town, future demand for 20 years also has to be accounted and supply mechanisms to be framed.

11.1.8 The comprehensive WSS to Cherpulassery Municipality and adjoining Panchayaths

Presently it has been decided to implement a new water supply scheme as 'The comprehensive WSS to Cherpulassery Municipality and adjoining Panchayaths-Thrikadeeri, Ananganadi & Chalavara' to fulfil the needs of the Municipality and 3 adjoining Panchayaths. The preliminary details of the scheme are hereunder.

Source:-The existing intake well cum-pump house at Kalikkadavu will be utilized as the source of this proposed scheme. A weir is proposed to be constructed across the river on the downstream of the well-cum-pump house by irrigation department. This will make the source perennial during acute draught period also. As the part of the renovation of source, in the existing intake well cum pump house, construction of electrical cabin room, operator's cabin, provision of gantry crane, raw water collection pipe etc. has to be done.

Water Treatment Plant & service reservoir:-A treatment plant with lamella type clarifier system is proposed for treatment of raw water for this scheme of capacity 21 MLD, suggested at Samiyarkunnu. The treated water will be collected in a sump of 9L capacity considering 1 hour storage in the treatment plant site itself. A 27LL OHSR for Cherpulassery will also be constructed in the WTP site.

The new distribution system is to be designed for 7 mm minimum residual pressure and 135 lpcd service level for the Municipal area. The project is not yet started.

11.1.9 Inference

The existing water supply system cannot service to the municipal inhabitants in a safe and sufficient manner. The inhabitants of the municipality are facing issues related to water scarcity, frequency of availability, accessibility of water supply, non-

availability of water in the area with high altitudes etc.

The physical condition and service delivery performance of the existing scheme is very poor due to non-availability of the scheme components and dilapidated conditions of gravity transmission mains. Due to this the water distribution to the farthest areas is very much limited.

On implementation of the proposed project the demands of water supply will be met to a limited extent. Since urban standards were not taken while designing that project, a new comprehensive project has to be framed to solve the identified problems in future and so as to improve the social and economic status of the community.

Existing water sources should be protected and water conservation techniques should be implemented to meet the water demands of people in the Municipality. Appropriate strategies and mechanism needs to be explored including recycling of waste water. Mechanism of rain water harvesting should also be encouraged so as to minimise the fast depletion of ground water table.

11.2 DRAINAGE

Drainage is the system of water or waste liquids flowing away from somewhere into the ground or down pipes. Drainage may be either natural or artificial; many areas have some natural drainage to swamps or to lakes and rivers. Natural drainage, however is often inadequate and in such case the requirement of artificial or man-made drainage is to be considered. The drainage facilities of the Cherpulassery municipality are dealt hereafter.

11.2.1 Existing Scenario

The drainage system consists of natural as well as engineered drains that ultimately discharge into Thootha River through the northern portion of the Municipality.

The digital elevation map for the Municipal area is shown in Figure 11.10. The surface average elevation is 73 m (ranging from 18 to 205 m) above the mean sea level. Southern and western parts of the municipality have higher elevation level as compared to northern parts, since the existence of hilly area in the southern and western parts. The natural terrain for the flow is in north direction i.e., towards River Thootha and so there are number of natural drains through which are directly drained into Thootha River.

Now a days the natural drains are blocked due to encroachment and dumping of waste in to natural streams. Therefore provision of artificial drainage system have to be thought of for the proper disposal of water to avoid the flooding in the streets especially in rainy season.

In the past, the provision of drainage infrastructure has been fragmented and

was provided basically to meet the need of individual roads or parcels of land development. This approach has drawbacks of being unable to formulate a comprehensive and long-term solution to the drainage problems. Storm drains of various agencies together constitute a drainage network having a length of 31 km and they were constructed as a part of the major roads stretches. Out of which only 8 km stretch is covered and remaining comes under uncovered as given in table 11.7.

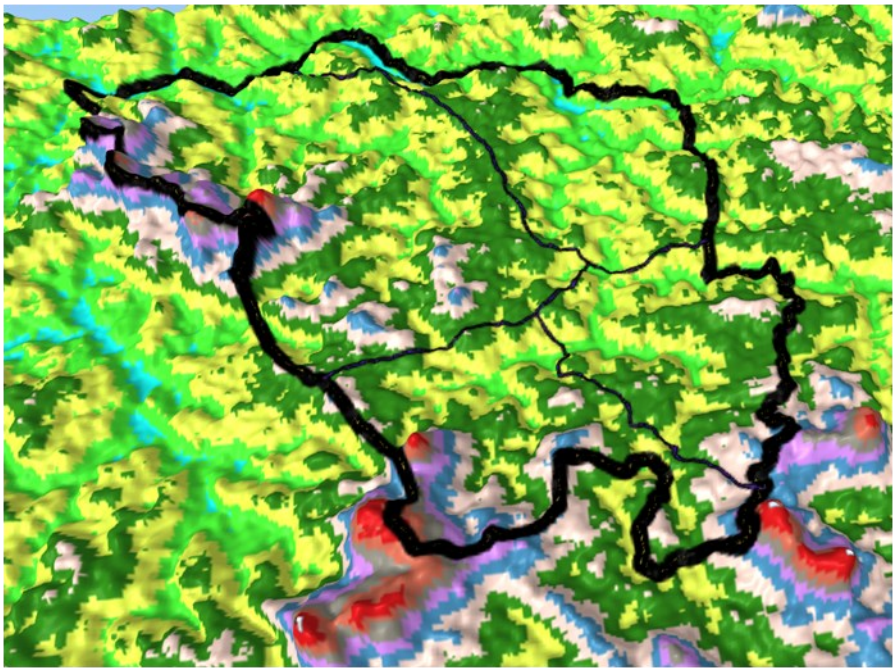


Fig 11.10 DEM model of the Municipal Area

Table 11.7 Details of Storm Drains in the Municipality

Sl. No.	Type of Drains (Covered/ Uncovered)	Length of existing drains (Km.)
1	Covered	8
2	Uncovered	23

Development has mushroomed along major transport network especially in the CBD area. The CBD area is susceptible to serious and frequent water logging issues due to its low-lying topography and inadequacies in the drainage system. The impact of water logging become more prominent as the south-east territories has experienced particularly rapid economic and housing developments over the last decade. Fig 11.11 shows the existing natural drainage system.

Most of the natural drains are encroached upon and disposal of debris along the side of their course is a common view. The town's storm-water system receives no treatment before the water travels through a series of canals or ditches to the nearest waterway. This means that whatever enters the storm inlets on the side of roads during rain events or from illegal dumping is what ends up directly in the nearest stream, river, lake or other watershed.

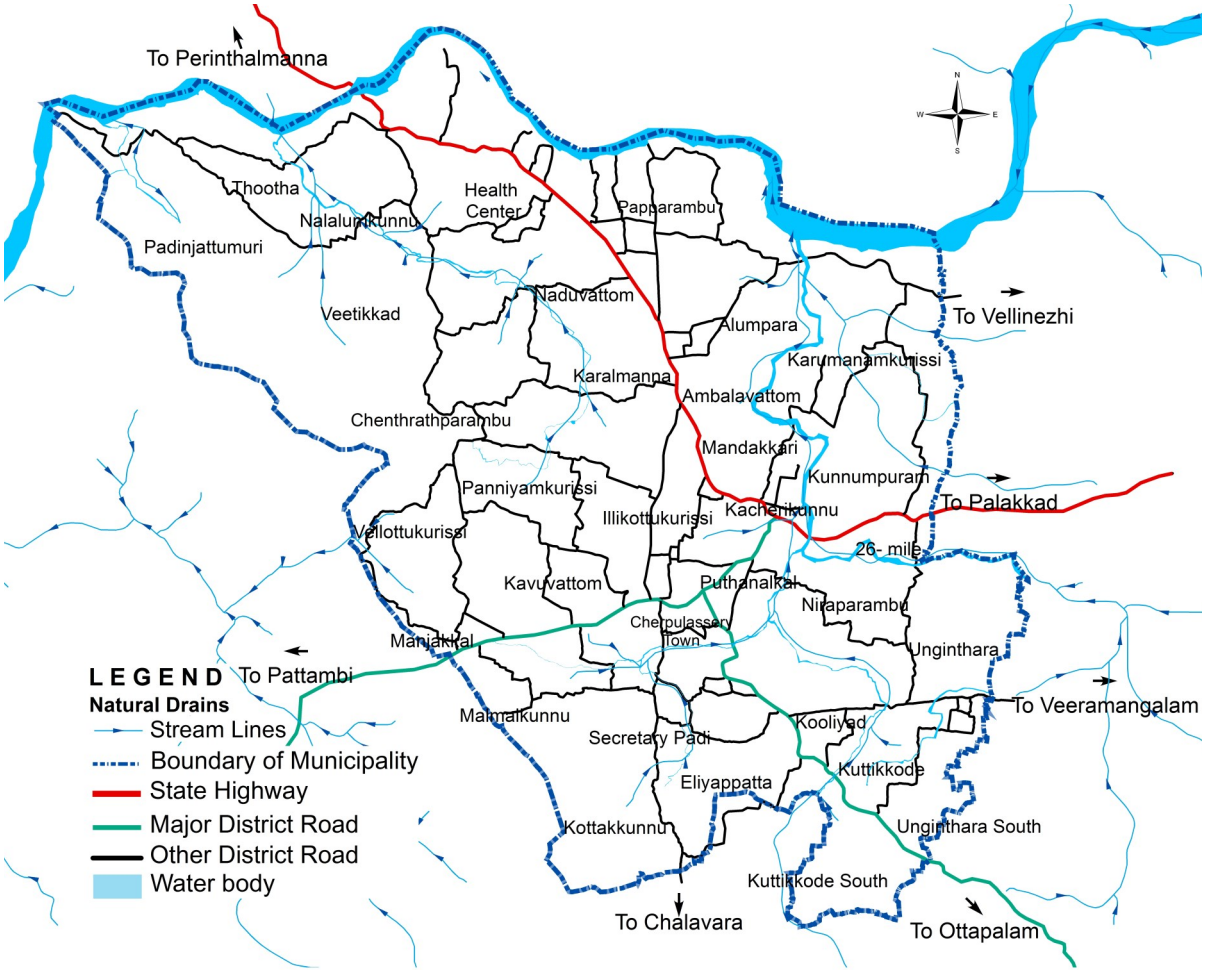


Fig 11.11 Existing Drainage System

The drains are increasingly being used for discharging sewage and industrial effluent, especially from colonies where an adequate sewer conveyance system is not in place. The problem is aggravated by the fact that the maintenance of storm-water drains are least attended with the only response evidenced is during excessive damage to the drains.

11.2.2 Inference

Rapid unplanned urbanization, shallow groundwater level, low to medium elevation have resulted in frequent water logging problems in this region. In order to alleviate flooding and to support sustainable growth of Cherpulassery Municipality, a time bound action program for augmentation and capacity revision of existing and new drains (due to increase in runoff from urban extensions) is vital. Check dams and depression/ lakes may be designed for increasing ground water table and as storm water holding points wherever needed. The design shall preserve the natural drainage pattern after the development of the area.

11.3 SANITATION AND SEWERAGE SYSTEM

The sanitation process involves disposing of waste properly, so it does not

threaten the environment or public health. Wastewater management and adequate sewer systems play important roles in sanitation and disease prevention. Sewerage system in urban areas is an important priority because of rapid urbanization, industrialization, population growth and migration. Treatment of wastewater is one of the important steps to prevent contamination of urban underground water.

11.3.1 Existing Sanitation System

From the data collected through socio economic survey it is seen that 84.43 % of households have septic tank, 14.79% are having pit latrines, and a very few as 0.78 % of households are in other methods. There is no public sewerage system for the Cherpulassery municipality. Figure 11.12 shows the types sanitation facility of the households.

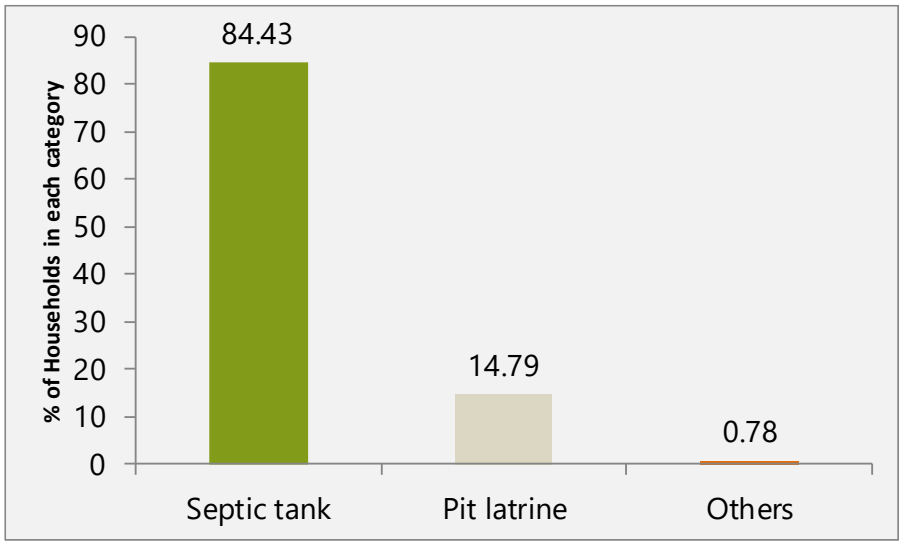


Fig 11.12 Types of Sanitation Facility

Source: Socio-economic survey,2016

There are both technical and institutional dimensions to the problem of septic tanks. The septic tanks design does not comply with the national guidelines with reference to planning, design and construction. Local masons are unaware of the existing design and construction guidelines to construct and design the septic tanks. Septage management is viewed as private provision with limited role of urban local bodies. Figure 11.13 shows the ward wise sanitation system of the town.

The drinking water and toilet facilities in the schools in Cherpulassery are showing a good coverage. There are two Public Comfort Stations located in the ward 25 – Cherpulassery town. This is operated and managed by private parties. Pay-and-use system is adopted in both stations.

11.3.2 Inference

Majority of the houses in the municipal area use leach pit tank/septic tank for sanitation. Moreover, there is no public sewerage system within Cherpulassery Munici-

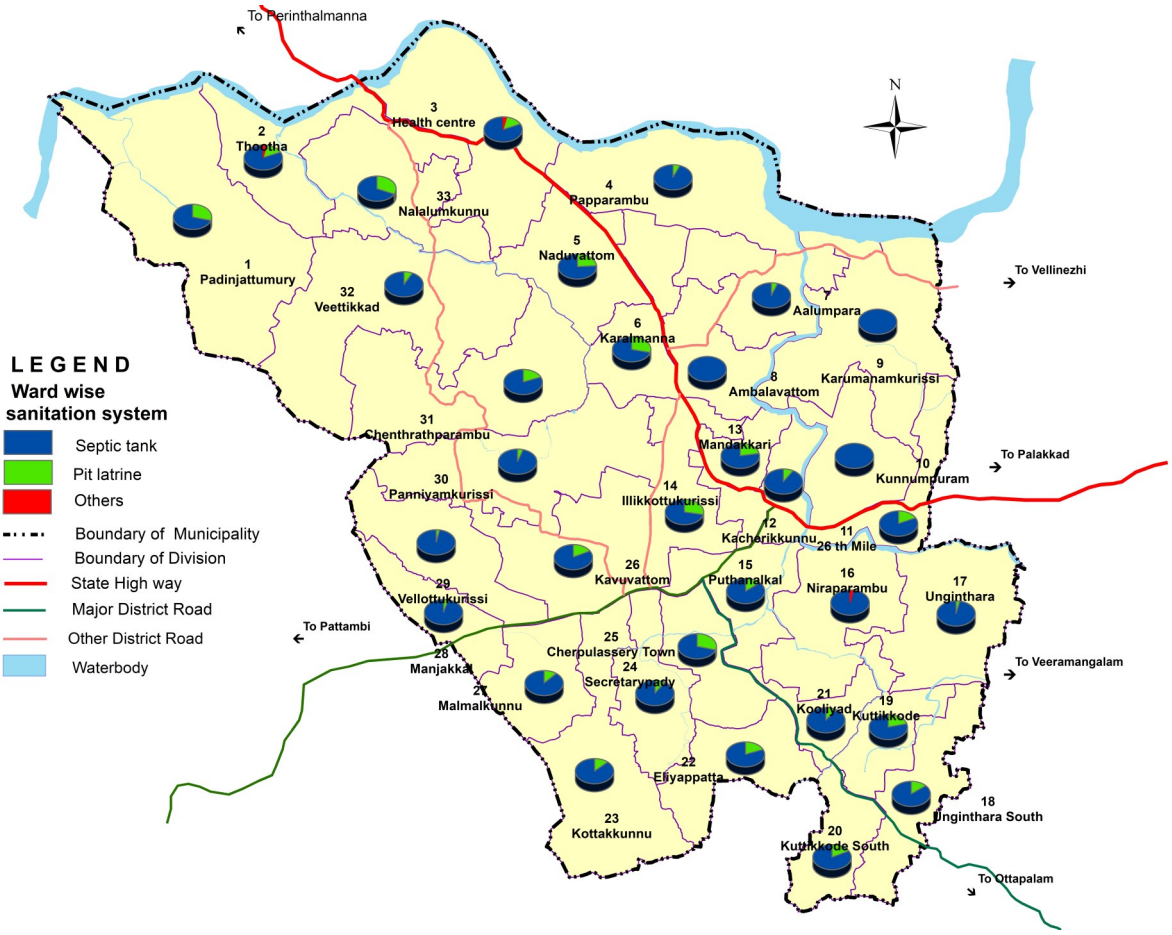


Fig 11.13 Ward wise Sanitation System

pal area. There has been wide spread bacteriological contamination of fecal origin in ground and surface water which relate to close proximity of increasing numbers of leach pit latrines, leakages from septic tanks, washing, bathing and other domestic activities. The promotion of adequate number of public and community toilets is required to be focused to cater to the needs of floating population of tourists and migrants.

11.4. SOLID WASTE MANAGEMENT

Solid-waste management means the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution. The solid waste management is the main problem faced by the local bodies throughout the Kerala. The primary goal of solid waste management is reducing and eliminating adverse impacts of waste materials on human health and environment & to support economic development and superior quality of life. This section analyses the current waste generation trend, existing management system, and the problems due to lack of waste management system.

11.4.1. Existing Solid Waste Management System

Increase in population and urbanization will also increase the generation of solid

waste. An effective disposal of solid waste in the society is one of the challenging issues. Cherpulassery town does not have door to door waste collection system. Solid waste generated in the town is collected by sweeping and handpicking. Existing Scheme named 'Harithasena project' deals with the collection of plastic waste only, In in which Kudumbashree volunteers collect plastic from various parts of the Municipality and hand over to Plastic shredding unit. Other kind of wastes is disposed by individuals, traders or any other institutions within their compound. Throwing of waste to the road sides is a problem in the Municipality. In the absence of bins, residents dump the waste on roads as dogs and cattle squatter upon the waste and also consume it.

Municipality has a waste dumping yard at Panniyamkurussi. But it is closed now due to local protests. The unsorted waste was dumped on site, causing a stench; leakage into the water supply and health problems for local residents. There is no scientific treatment facility in place at present.

Municipality does not maintain any record for the composition of waste quantity of waste generated or collected. As per State standards, Waste generated per capita per day is taken as 250 gm. Accordingly the table 11.8 shows details regarding the total quantity of waste generated in a day.

Table 11.8 Calculated Quantum of Waste Generation

Year	Unit	2018
Population		44,339
1. Solid waste generation @ 250 g/h/d	Tonnes/day	11.08
2. Including 30% extra for other institutions	tonnes/day	14.41
4. Area required for Composting plant @400 sq.m/t	Acres	1.42

Source: Calculations as per Suchitwa mission standards & URDPFI.

Lack of adequate staff for operation and management of solid waste management services is also a major issue.

11.4.2 Inference

In the absence of efficient water treatment systems and solid waste management systems, untreated domestic and industrial wastes natural environment is getting polluted and which leads to unhygienic conditions. Municipality need to take adequate measures and options to compost organic waste; co-process dry fractions of municipal waste in cement/power sectors and waste incineration for energy production could also be explored.

11.5 ENERGY

Energy conservation is important because we depend on energy for virtually everything in our lives. Energy doesn't just make our lives more comfortable, in many ways it's imperative for our survival. We have limited quantity of non-renewable energy resources available on earth, it is very important to preserve energy from our current supply or to utilize renewable resources so that it is also available to our future generations.

11.5.1. Existing Scenario

The economic growth and development of a region depends heavily on the reliability and quality of the electric power supply. The ability of the power transmission system to transport electric power from the points of generation to the points of demand in the quantities and at the times required is defined as the reliability of the system. The power reliability index for the Cherpulassery town is 99.5%.

Kerala State Electricity Board Ltd (KSEB Ltd) is the public sector agency under the Government of Kerala that generates, transmits and distributes the electricity supply in the state. There is one 110KV substation within the Cherpulassery town. It serves 60% area of Cherpulassery town and nearby areas like Thutha, Nellaya, Kothakurussy and Adakkaputhur. Table.11.9 shows the details of substation in Cherpulassery town.

Table 11.9 Details of Substation in Cherpulassery town

Sub station	Capacity in KV	Serving area	
Cherpulassery	110 KV	Cherpulassery Town	60%
		Thutha	20%
		Nellaya	10%
		Kothakurussy	5%
		Adakkaputhoor	5%

Source: KSEB Section, Cherpulassery.



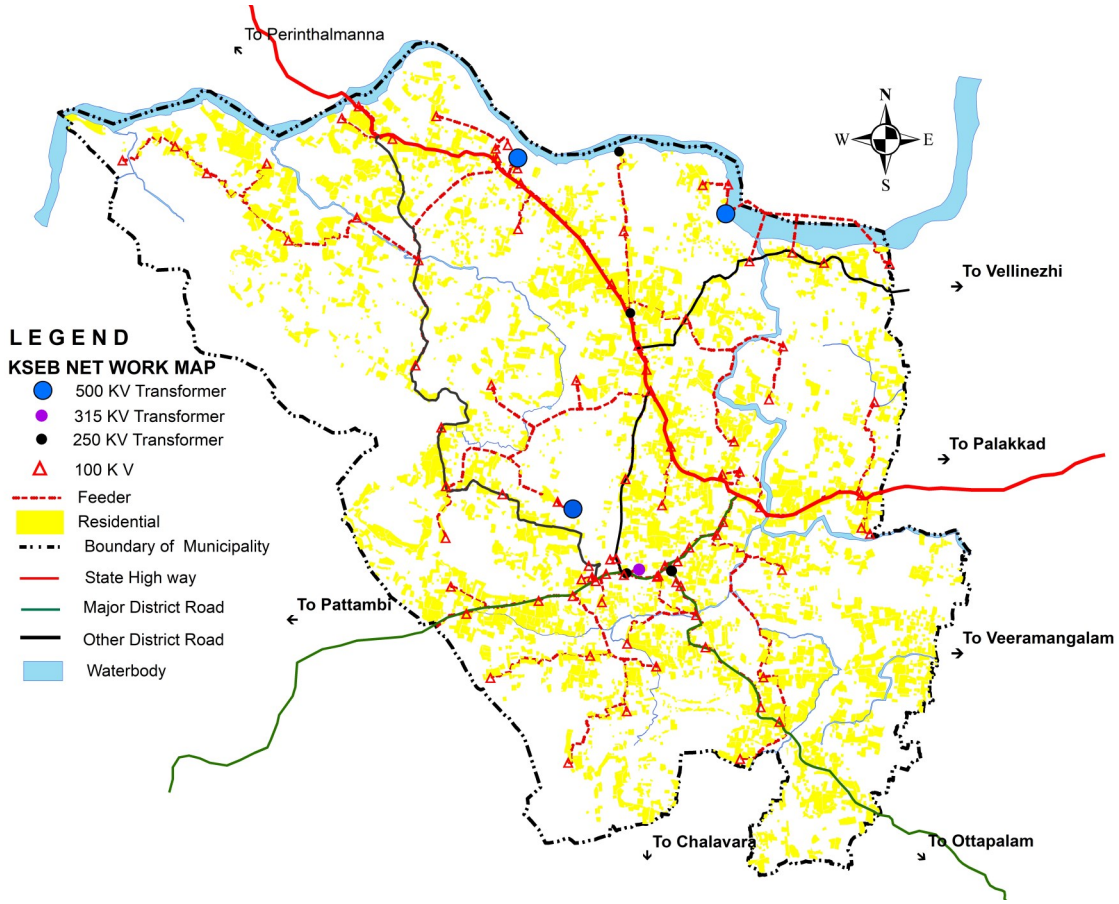
Substation Cherpulassery

Fig 11.14 shows the KSEB distribution network of the Municipality. The total length of High tension (HT) line is 40 km and that of low tension (LT) line is 174 km. Table 11.10 shows the details of major transformers. In addition to this 18 nos. of 160 kV Transformers and 66 nos. of 110 KV Transformers are existing within the Municipality.

Table 11.10 Details of Transformers in Cherpulassery town

Sl No	Name of Location	Capacity in KV
1	Panamkayam lift	500 KV
2	Pulimanthodi HT	500 KV
3	Vettikad crusher	500 KV
4	AKG road	315 KV
5	City king	250 KV
6	Kalikave	250 Kv
7	Karalmanna 2	250 KV
8	PTB road	250 KV

Source: KSEB Section, Cherpulassery.



11.14. KSEB Distribution Network of Cherpulassery Town

Category wise connection details in Cherpulassery town are given in Table 11.10. It reveals that the yearly variation of domestic and commercial connections is showing a more increasing trend when compared to connections in industrial and agricultural

sector. In the period of 2012 to 2016 only 22 connections were allotted for the agriculture purpose.

Table 11.11 Details of Category wise connections in Cherpulassery Town

Year	Category wise break- No. of connections					Total
	Domestic	Industrial	Commercial	Agricultural	Others	
2012	9300	160	3200	600	3	13263
2013	9579	170	3400	608	3	13760
2014	9866	174	3598	616	3	14257
2015	10161	180	3813	620	3	14777
2016	10467	184	4041	622	3	15317

Source: KSEB Section, Cherpulassery.

Fig.11.15 shows the percentage share of category wise connection. It shows that the major connections at 68.34 % are for domestic followed by commercial sector as 26.38%. The connections in agriculture and industrial sectors are 4.06% and 1.20% respectively. A very few percentages of about 0.02% is connections for other purposes.

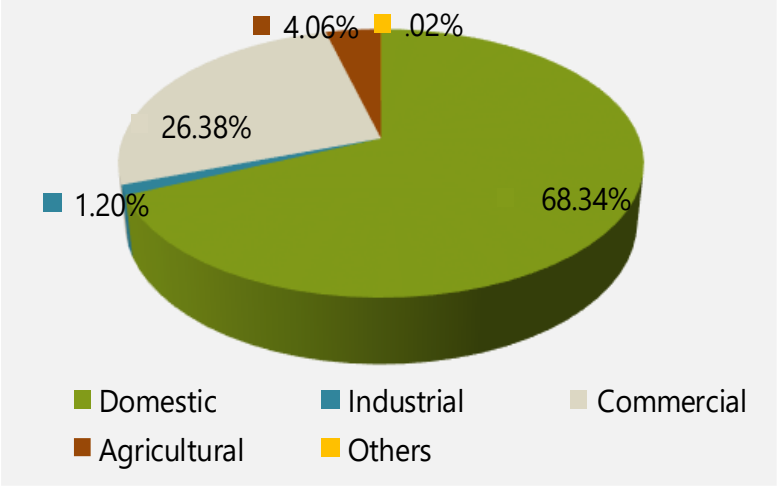


Fig.11.15 Percentage shares of Category wise connection

Source: KSEB Section, Cherpulassery.



11.5.2 Street Lights

The Municipality maintains around 2,151 street lights. 10.13% of the luminaries in the Municipality are ordinary bulbs, 8.93% of lights are LED, 37.75% are tube lights, Sodium vapour lamps constitutes 1.58% and 41.28 % are CFL lamps and remaining 0.33% are highonees. The details of street lighting are presented in Table 11.12.

Table 11.12 Details of Street Lighting in Cherpulassery Town

Sl.No.	Type of Luminary	Specification	Number
1	Ordinary bulb	40W	199
		60W	19
2	Fluorescent tube	2X40W	793
		1X40W	19
3	Sodium vapour lamp	750W	18
		250W	16
4	Compact Fluorescent lamp	22W	888
5	LED light	24W	154
		45W	38
6	Solar Minions	4X150W	6
7	Highonees	6X100W	1

Source: Municipal Office Cherpulassery

11.5.3 Inference

Presently Cherpulassery Municipality does not have major energy problems. Utilisation of non-conventional energy is very much limited. However in order to meet the future demands and achieve energy sustainability, low energy consuming gadgets and Non conventional energy sources like recovering energy from sewerage, solar energy should be promoted in house hold as well as institutional levels.

12. EDUCATION

Education forms the foundation of any society for its progress in growth and development. Kerala is endowed with a slew of robust literacy programmes and infrastructure that have placed it foremost among the states in India in terms of coverage and outcomes. However, the rate of literacy in Palakkad is lowest amongst the districts which make it worthy of further attention to bring it at par with the state average. Cherpulassery on the other hand stands tall in comparison to Palakkad district literacy levels with a 94.71% figure. This may not be construed as a reason for complacency as the gender gap in literacy is yet to be mitigated.

An assessment of the existing facilities in Cherpulassery can divulge further details on the infrastructure gap that the municipality faces.

12.1 EXISTING SCENARIO OF SCHOOLS

Kerala hosts a mix of government, aided and unaided schools & colleges running the educational landscape. Cherpulassery is not different from this trend and boasts of five government schools, eleven aided schools and eight unaided schools. In other words, around 46% of the schools are aided by government in Cherpulassery municipality. Table 12.1 presents further details on the existing school infrastructure in town.

There are 22 schools in total having primary school facility, while two schools have a higher secondary school facility. Apart from these, there is one vocational higher secondary school in Cherpulassery. It is evident from the figure 12.1 that Northern portion of the municipality is comparatively less populated with pre-primary school facilities.

12.1.1 Primary Schools

There are twenty-two primary schools in Cherpulassery Municipality out of which four are government while eighteen are privately managed. Table 12.3 shows the details of primary schools and numbers of students, while fig.12.2 depicts the spatial distribution of primary school within the Municipality.



South ALP School Cherpulassery



Sabari Central School



G. L.P School karumanamkurissi

Table 12.1 Details of School Infrastructure in Cherpulassery Municipality

Sl. No	Name of school	Location	Number of students					
			Pre Primary	Primary	UP	High schoo	HSS	VHSS
Govt. Schools								
1	Govt. Higher Secondary School	Cherpulssery			510	1936	835	
2	GUP School	Cherpulassery		194	313			
3	GLP School	Veeramangalam		41				
4	Govt. Vocational Higher Secondary School	Cherpulassery						236
5	GLP School	Karumanamkurissi		30				
AIDED								
1	AMLP School	Cherpulassery South (Eliyapetta)	36	84				
2	AMLP School	Panniyamkurissi East	38	63				
3	AMLP School	Vadakkumuri		55				
4	ALP School	Cherpulassery		103				
5	ADLP School	Cherpulassery (10 th Mile)	60	146				
6	AUP School	Karumanamkurissi	12	54	68			
7	ALP School	Cherpulassery South ((Vazhakunnath)	36	84				
8	NNNMUP School	Karalmanna		408	445			
9	ALP School	Panniyamkurissi West	40	77				
10	BVALP School	Karalmanna		81				
11	ALP School	Thekkumuri		146				
UN AIDED								
1	Sabari Central School	Vellottukurissi	328	633	498	248	52	
2	Alpha School	Cherpulassery	51	127	70	28		
3	Salafi school	Kacherikunnu		110				
4	General English Medium	Cherpulassery		148				
5	Vevekanadha Vidhyanikethan	Kavuvattam			163			
6	Jai Hind English Medium School	Cherpulassery		172				
7	National English Medium	Karalmanna		70				
8	KEMCS	Kuttikode	75	183	109	7		
Total			**676**	**2509**	**2013**	**2219**	**887**	**236**

Source: Primary Survey

Table 12.2 Details of Pre-primary Schools and Students

Sl No	Name of School	Location	Number of Pre Primary
1	AMLP School	Cherpulassery South Elipetta	36
2	AMLP School	Panniyamkurissi East	38
3	ADLP School	Cherpulassery (10th Mile)	60
4	AUP School	Karumanamkurissi	12
5	ALP School	Panniyamkurissi East (Vazhakunnath)	36
6	ALP School	Panniyamkurrissi West	40
7	Sabari School	Vellotkurussi	328
8	Pinnacle Nursery	Cherpulassery	125
9	Alpha School	Kunnampuram	51
10	Kuttikode EM School	Kuttikode	75

Source: Primary Survey

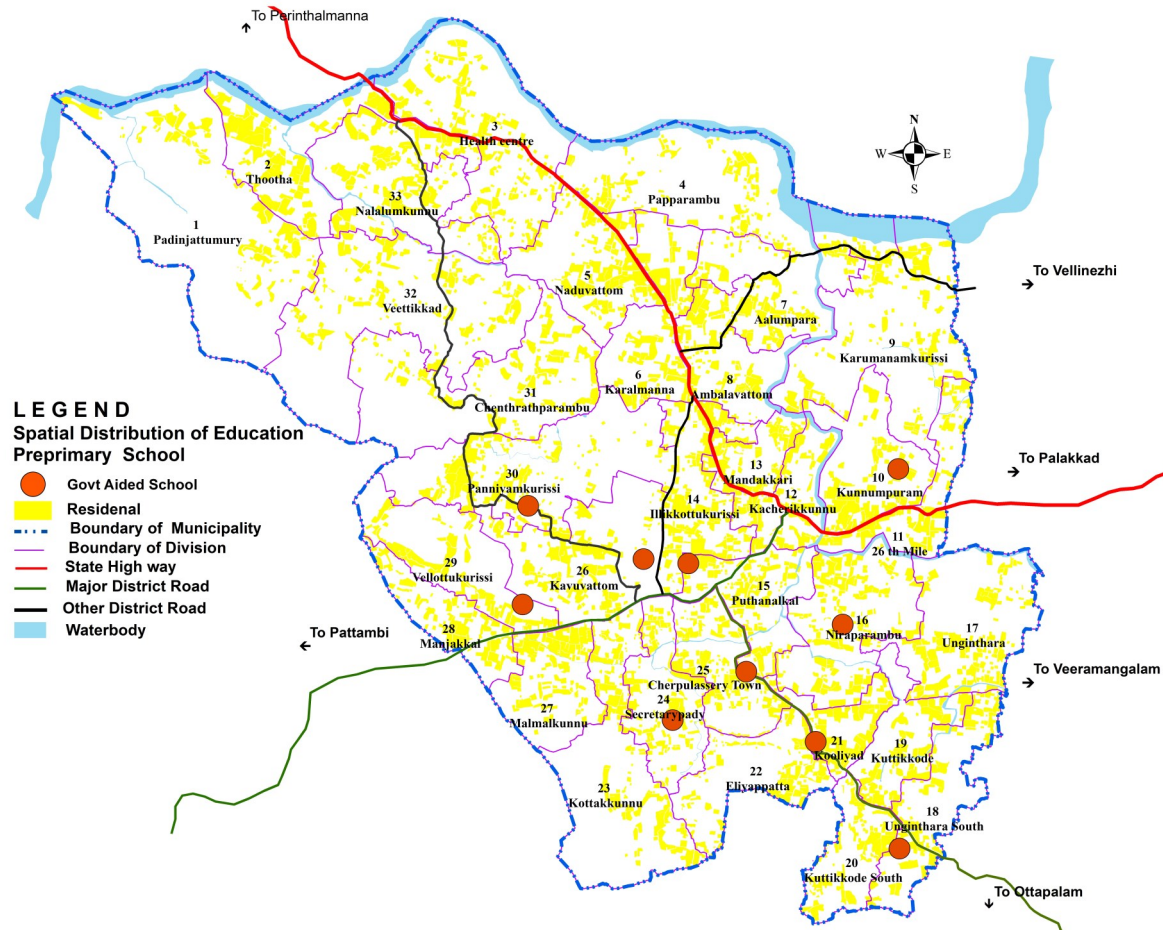


Fig.12.1 Spatial Distribution of Pre-primary schools in Cherpulassery Municipality

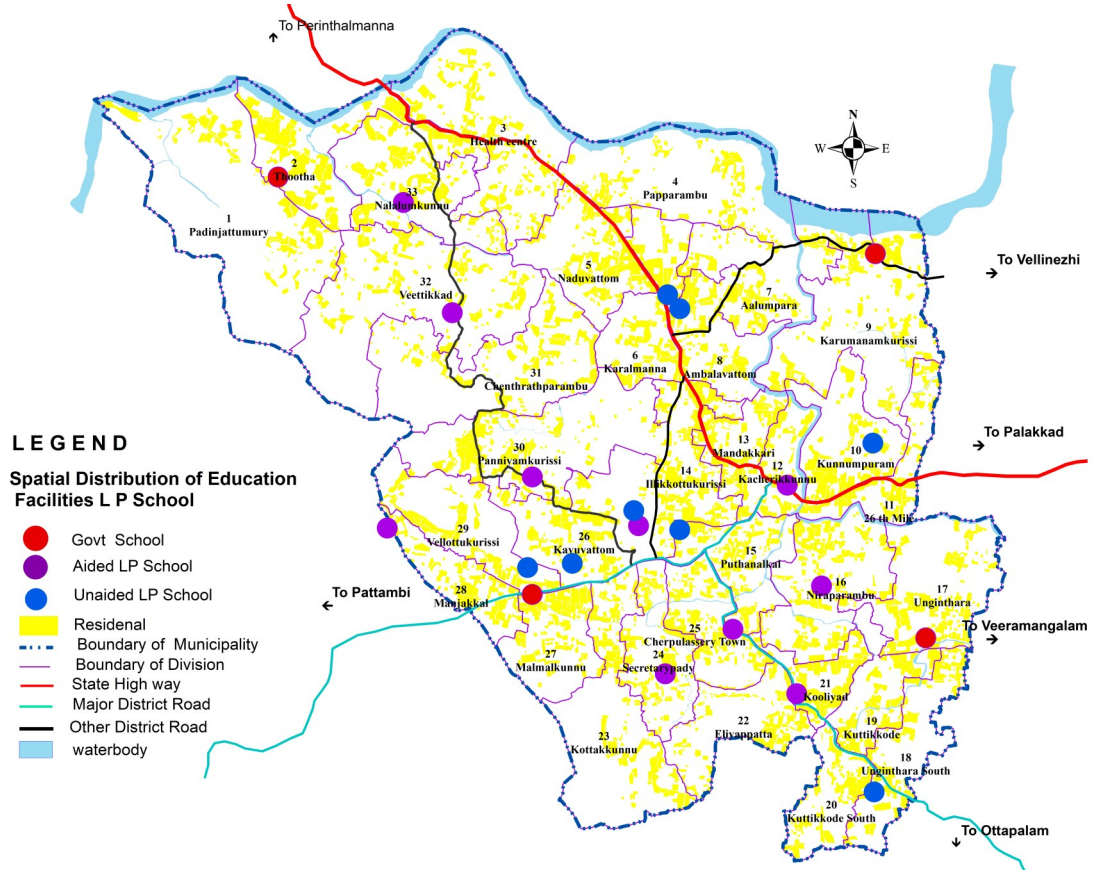


Figure 12.2 Spatial Distribution of Primary Schools

Table 12.3 Details of Primary Schools and Students Enrolled

Sl No	Name of School	No. of Students
1	Thekkumuri LPS Karingara	146
2	ALPS Vadakkumuri	55
3	BVALPS Thekkumuri	81
4	GLPS School Veeramangalam	41
5	GLPS School Cherpulassery	19
6	APLS Panniyamkurussi west	63
7	AMLPS Eirumbalassery	50
8	ALPS Cherpulassery	103
9	ALPS Panniyamkurissi east	77
10	South ALPS Vazhakunnath	84
11	ADLPS 10th mile	146
12	AMLPS Elipetta	84
13	GLPS Karumanamkurissi	30
14	ALP Kacherikunnu	50
15	Salafi school	110
16	Alpha English school	127
17	Jai hind English school	172
18	Sabari central school	633
19	General english medium school	148
20	Kuttikode E.M.School	183
21	National english school	70
22	NNUPS Karalmanna	408

Source: Primary Survey

Among the total number of primary schools within the Municipality, 14 % are by Government, 54 % are by aided and 32 % are under private ownership. Fig.12.3 shows the share of primary schools by ownership.

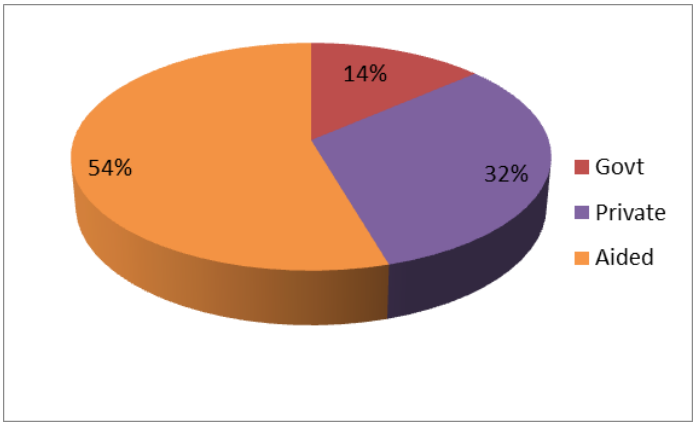


Fig.12.3 Share of Primary Schools by Ownership

The shares of primary school students in different categories are shown in figure 12.4 and which depicts that only 9 % of primary school students are studying in government schools, 44 % are in aided schools and 47 % are in private schools.

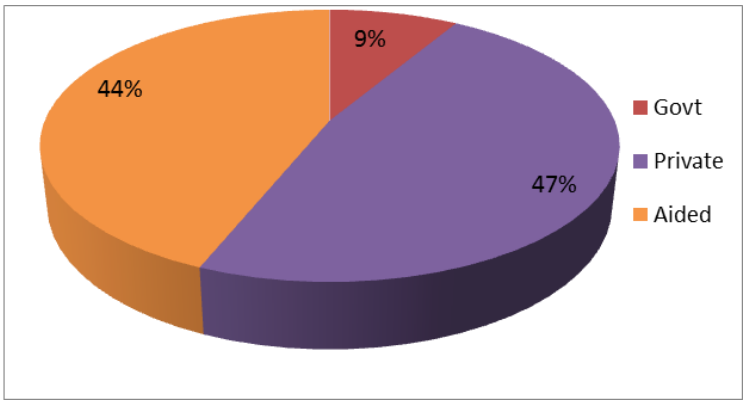


Fig.12.4 Percentage Share of Students Enrolled in Different Category of Primary Schools

Despite a larger share of aided schools in the Municipality, the share of students enrolled in private schools outnumber the aided ones. The skewed preference for private schools may be due to better infrastructure, quality of education, better logistics etc. A similar pattern may be observed in government schools versus other schools.

National Achievement Survey 2017-18 states that the performance of students in government schools of the state is significantly higher than that of aided schools in standard 3 & 5. In this scenario, it could be easily gauged that the quality of education through curriculum and pedagogy cannot have more weightage in shift of students to private and aided schools; instead it could potentially be more aligned to the infrastructure and logistics gap they face. Keeping *accessibility* & *affordability* in mind, urban planning interventions are very much pertinent and deem much more attention in this aspect.

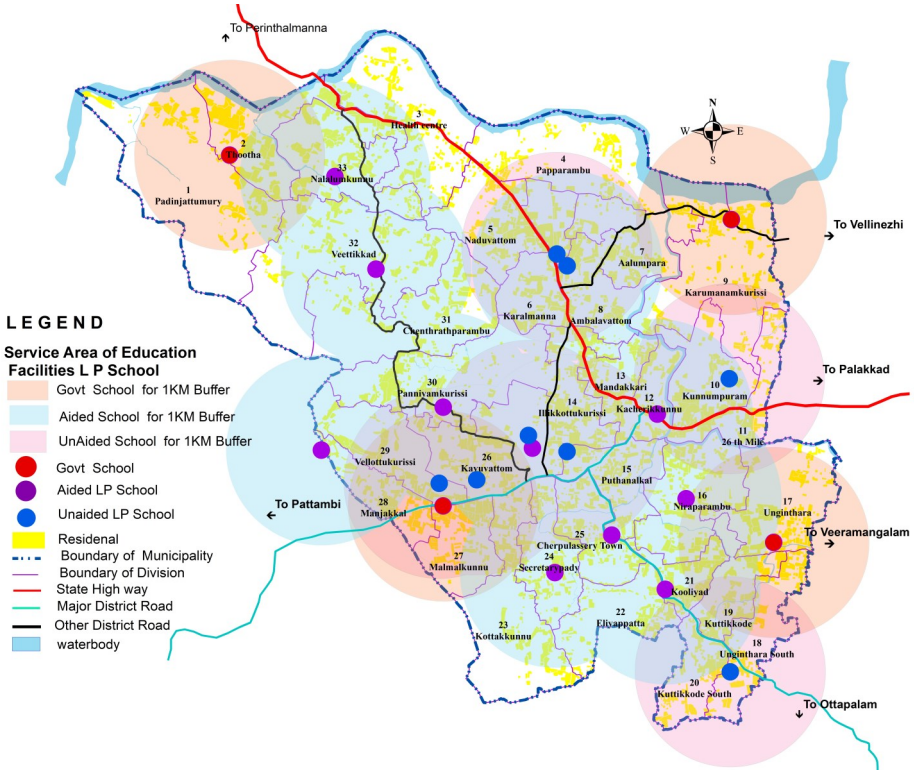


Fig.12.5 Service area of Existing LP schools

A spatial analysis of the existing assets with an objective aimed at ease of *accessibility* were performed in alignment with Kerala G.O. (P)98/12/GED dated 28/03/2012 giving due cognisance to section 6 of Right to education Act 2009. A buffer analysis of one km radius on existing primary schools was performed as service area of each school. Fig.12.5 reveals the service area gap of the existing assets. Health centre & Papparambu wards are the divisions that are least covered by the service area of existing assets. Fig 12.6 reveals that the health centre ward is being covered by schools in neighbouring local body.

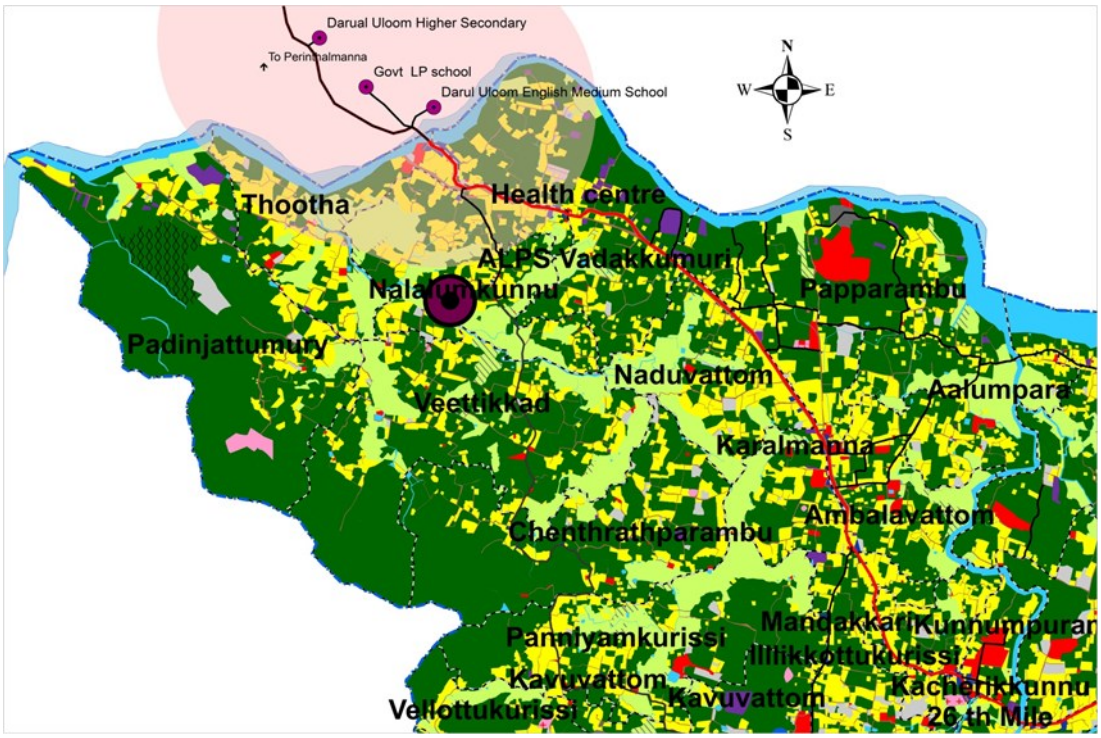


Fig.12.6 Service area of schools in neighbouring Local body

12.1.2 Upper Primary Schools

There are eight upper primary schools in Cherpulassery municipality of which two are government run while the rest are managed by private groups. Figure 12.7 shows the shares of upper primary school by ownership. The share depicts that 25% each are under government and aided ownership, while remaining 50% are with private ownership.

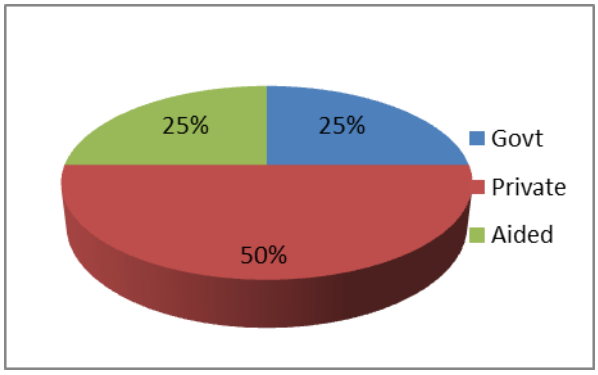


Fig .12.7 Percentage share of Upper-primary Schools by ownership

The figure 12.8 shows the share of upper primary students enrolled under each ownership category. The figure depicts that 34 % of upper primary students are studying in government Schools, 21% are in aided schools and 45 % are in private schools. The table 12.4 shows the details of upper primary schools and enrolments. Fig.12.9 shows Spatial distribution of Upper Primary schools in Cherpulassery Municipality.

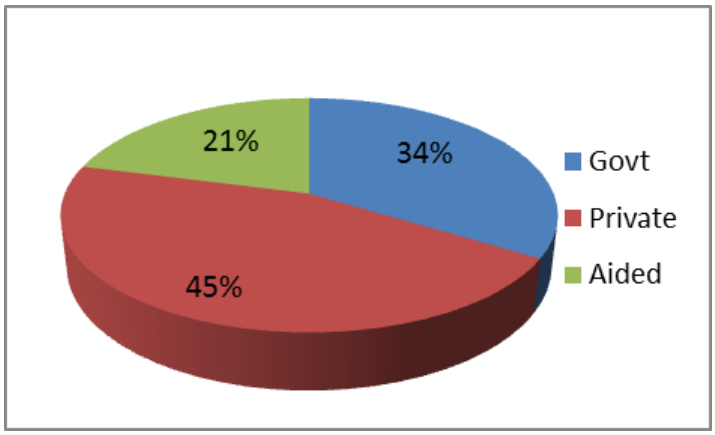


Fig.12.8 Share of upper primary students in school ownership wise

Table 12.4 Details of Upper primary school and Enrolments

Sl No	Name of School	No. of Students
1	NNUPS Karalmanna	445
2	AUPS Karumanamkurussi	77
3	GUPS Cherpulassery	313
4	Vivekanandha Vidhayaniketha school	163
5	Alpha English school	127
6	Sabari central school	633
7	Kuttikode E.M.School	183
8	General english medium school	276

Source: Primary Survey



A UP School Karumanamkurussi

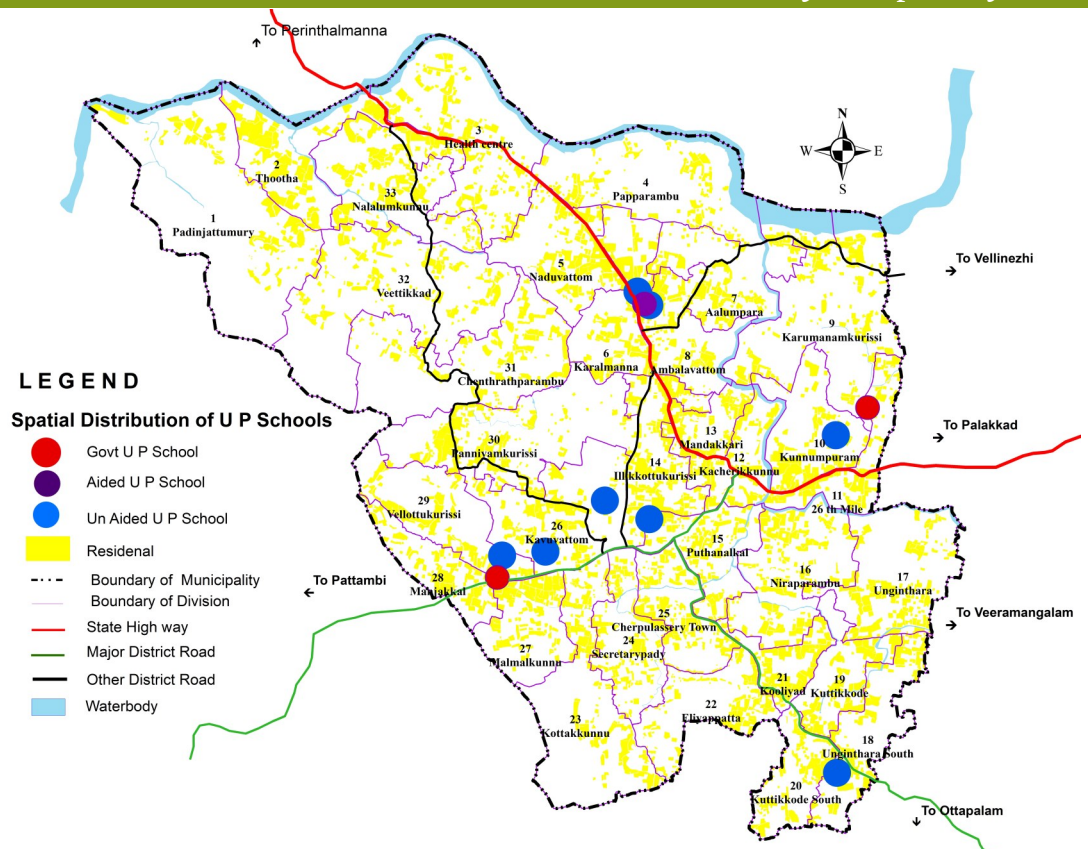


Fig.12.9 Spatial Distribution of Upper Primary schools in Cherpulassery Municipality

A spatial analysis of the existing assets with an objective aimed at ease of *accessibility* were performed in alignment with Kerala G.O. (P) 98/12/GED dated 28/03/2012 giving due cognisance to section 6 of Right to education Act 2009. A buffer analysis of *three km* radius on existing schools was performed as the service area of each school.

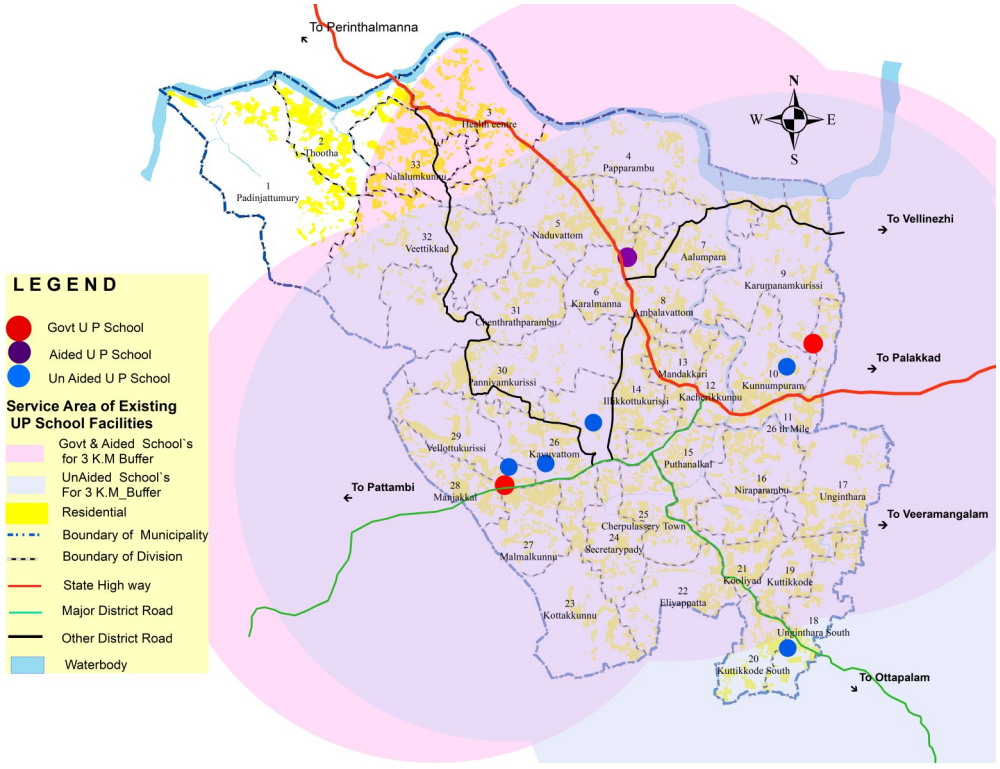


Fig.12.10. Service Area of Upper Primary schools in Cherpulassery Town.

The service area coverage of upper primary schools in Cherpulassery town are shown in figure 12.10 and it depicts that Thootha and Padinjattumury wards are out of coverage areas of the nearest UP schools in Cherpulassery town. However, this gap in coverage is mitigated by the schools in Malappuram district. Fig.12.11 shows the spatial coverage of schools in adjoining local bodies on Cherpulassery town.

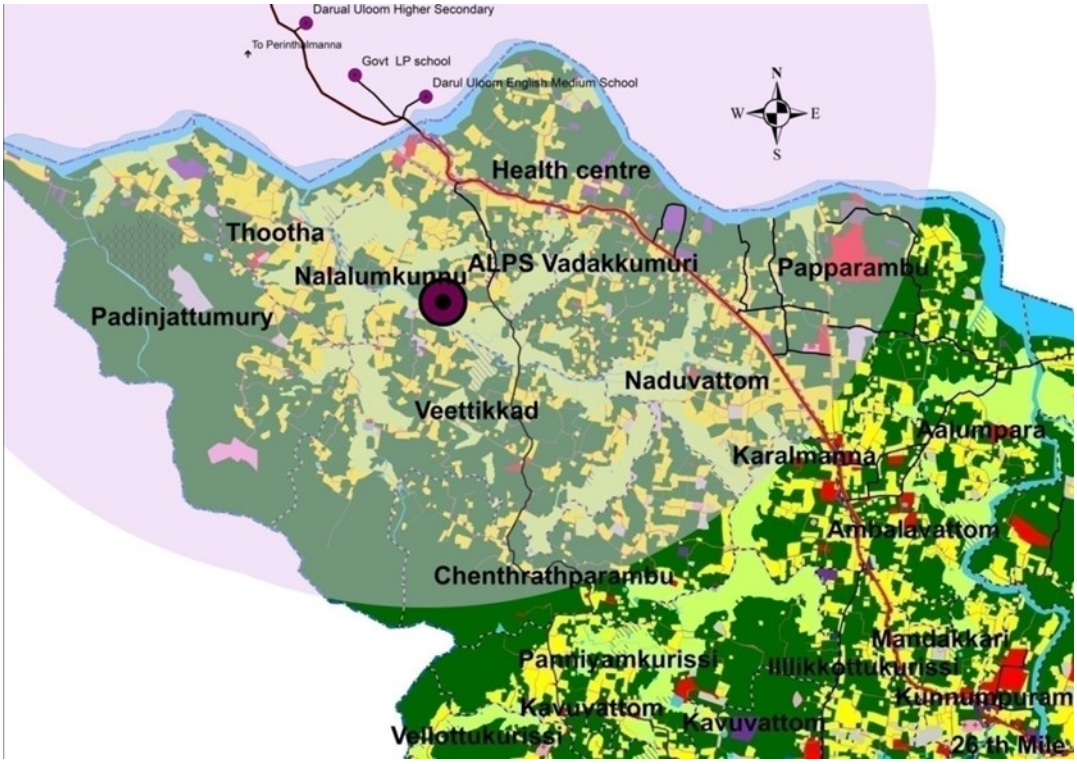


Fig.12.11 Spatial coverage of schools in nearby local bodies

12.1.3 Higher Secondary Schools

There are four higher secondary schools in Cherpulassery municipality of which two are government run while the rest are privately managed. Table 12.5 details the enrolment in the schools. It is evident that a majority of students are dependent on government schools. National achievement survey 2017-18 asserts that there is no significant difference between the performance of class eight students in government and private, which could reinforce the existing trend in Cherpulassery. The spatial distribution of higher secondary school are shown in figure 12.12.

Table 12.5 Details of HS schools in Cherpulassery

Sl No	Name of School	HS	HSS	VHSS
1	GHSS	1936	835	
2	GVHSS			236
3	Sabari central school	248	52	
4	KECM School	109	7	

Source: Primary Survey

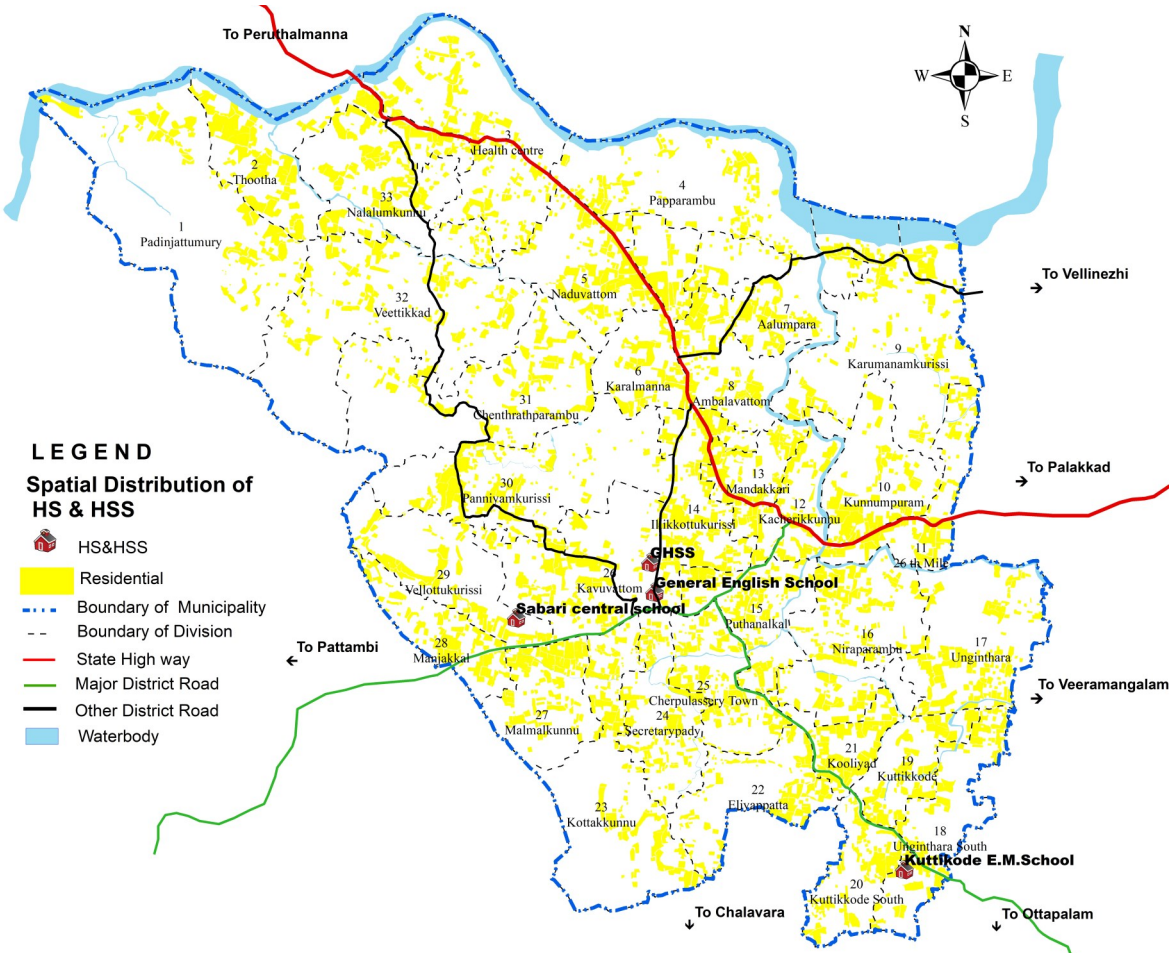


Fig.12.12 Spatial Distribution of Higher Secondary Schools in Cherpulassery Municipality

A spatial analysis of the existing assets with an objective aimed at ease of *accessibility* were performed in alignment with Kerala G.O. (P) 98/12/GED dated 28/03/2012 giving due cognisance to section 6 of Right to education Act 2009. A buffer analysis of *five km* radius on existing schools were performed. It is evident that the service area coverage is sufficient to span the entire municipality. Fig.12.13 shows the service coverage of Higher secondary schools in Cherpulassery town.



GHS School Cherpulassery

Allied infrastructure facilities in school

- All the 24 schools in municipality own their buildings with sufficient number of classrooms and have playgrounds attached along.
- Eleven schools have provisioned ramps for easy access.
- The school infrastructure is decently connected by access roads and has a good supply of water.
- The entire set of schools in Cherpulassery are reported to have separate toilet facilities for both the genders except AMLPS Vadakkumuri.

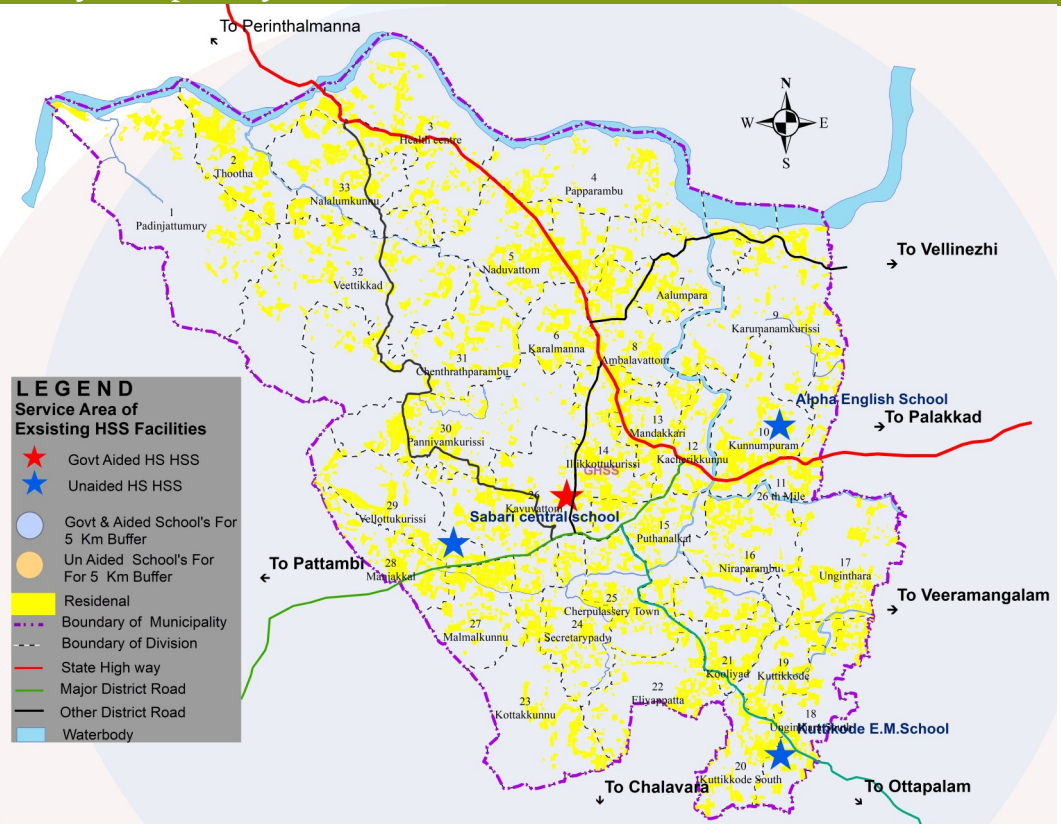


Fig.12.13 Service coverage of Higher Secondary Schools in Cherpulassery Town

- All the high schools and higher secondary schools are equipped with computer labs and are internet ready.

12.1.4 Details of Student Teacher Ratio in Cherpulassery Town

The teacher student ratio shown in table 12.6 and which depict that the maximum ratio comes in primary schools and minimum in vocational higher secondary schools.

Table 12.6 Student Teacher Ratio Across Each Section of School

STUDENT TEACHERS RATIO				
Sl.No	Section	No. of students	No. Of teachers	No. of students for a teacher
1	Pre Primary	676	26	26
2	Primary	3009	82	37
3	Upper primary	2176	83	26
4	High school	2219	94	24
5	Higher secondary	894	30	30
6	VHSS	236	15	16

Source: Primary Survey

12.1.5 Infrastructural Facilities in Schools

The actualization of the goals and objectives of education require the provision, maximum utilization and appropriate management of the facilities. Following table 12.7 gives the status of infrastructural facilities in schools.

Accessibility of schools can be measured by examining whether the schools are approachable by all weather roads, it is found that all the schools have connectivity with

Table 12.7 Status of Infrastructural facilities in Schools

Sl. No	Name of the school	Own Building/ Rented	Sufficient Class Rooms available	Play ground	Separate toilets for girl students(B/G)	Computer lab/Internet facility	Water Availability	Connectivity with motorable road
GOVT.								
1	Govt.Vocational HSS	Own	Yes	Yes	2/3	Yes	Yes	Yes
2	Govt.Higher Secondary School	Own	Yes	Yes	2/3	Yes	Yes	Yes
3	GUP School Cherpulassery	Own	Yes	Yes	6/5	No	Yes	Yes
4	GLP School, Veeramangalam	Own	Yes	Yes	2/3	No	Yes	Yes
5	GLP School, Karumanamkurissi	Own	Yes	Yes	2/3	No	Yes	Yes
AIDED								
1	AMLP School, Eliyapetta	Own	Yes	Yes	1/1	No	Yes	Yes
2	AMLP School, Panniyamkurussi east	Own	Yes	Yes	1/1	No	Yes	Yes
3	AMLP School, Vadakkumuri	Own	Yes	Yes	1/1	No	Yes	Yes
4	ALP School, Cherpulassery	Own	Yes	Yes	2/2	No	Yes	Yes
5	ADLP School , Cherpulassery	Own	Yes	Yes	1/1	No	Yes	Yes
6	AUP School, Karumanamkurissi	Own	Yes	Yes	2/2	No	Yes	Yes
7	ALP School, Cherpulassery South	Own	Yes	Yes	1/1	No	Yes	Yes
8	NNNMUP School ,Karalmanna	Own	Yes	Yes	6/6	No	Yes	Yes
9	ALP School, Panniyamkurussi west	Own	Yes	Yes	1/1	No	Yes	Yes
10	BVALP School, Karalmanna	Own	Yes	Yes	1/1	No	Yes	Yes
11	ALP School, Thekkumuri	Own	Yes	Yes	1/1	No	Yes	Yes
UNAIDED								
1	Alpha School, Cherpulassery	Own	Yes	Yes	13/13	Yes	Yes	Yes
2	KEMCS, Kuttikode	Own	Yes	Yes	10/10	Yes	Yes	Yes
3	Sabari Central School	Own	Yes	Yes	12/12	Yes	Yes	Yes
4	Salafi School	Own	Yes	Yes	8/8	No	Yes	Yes
5	General English Medium	own	yes	yes	6/6	yes	yes	yes
6	Vivekanandha Vidyanikethan	Own	Yes	Yes	4/4	No	Yes	Yes
7	Jai Hind english Medium School	Own	Yes	Yes	4/4	Yes	Yes	Yes
8	National English Medium School	Rent	yes	yes	2/2	Yes	Yes	Yes

Source: Primary Survey

motorable road.

It is known to all that the essential facility like water needs to be made available in the schools for making school environment hygienic and clean. It is seen that water facility is provided in all schools. It can be seen that all the institutions have their own buildings however class rooms in aided and unaided schools are in much better condition than government schools at all levels. Situation regarding availability of playground are found to be satisfactory. It is seen that most of the secondary & higher secondary schools are having computer lab facility whereas only few of primary and of upper primary schools have computer facility in it .

12.2 COLLEGES

There are five privately managed arts and science colleges in the town, which offers PG courses, however the municipality is bereft of any Government run arts and science college in the town. Table 12.8 details about the colleges in town.

Table 12.8 Details of Arts and Science Colleges in Cherpulassery Municipality

Sl No	Name of College	Ownership	Mixed/Women's	No Of Students	No of teachers	Other staffs	Courses offered (Degree, Post Graduate).
1	College of Science & Technology	Private	Women's	368	28	7	B.A, B.Sc, B.com, BBA, BCA, M.com
2	Sreedharmasastha Women's College	Private	Mixed	175	5	1	Plus-one & Two, (Commerce & Humanities) B.A. & B.com
3	Ideal Arts & Science College	Private	Mixed	1,207	56	12	B.A, B.Sc, B.com, BBA, M.A., Msc, M.com
4	MES College	Private	Mixed	857	23	3	Plus-one & Two, B.A B.com, Bsc & BBA
5	Islamic women's College	Private	Mixed	210	8	1	Plus-one & Two, B.A (English) & Arabic TTC

Source: Primary Survey

12.3 PROFESSIONAL COLLEGES

Cherpulassery hosts a little more than couple of privately owned professional colleges. A total of four educational institutions, offer a wide variety of vocational choices with maximum intake in polytechnic colleges. Table 12.9 lists out further details.

Table 12.9 Details of Professional Colleges

Sl No	Name of College	Owner-ship	Mixed/ Women	No. of students	No. of teachers	Other staffs	Courses offered (Degree, Post Graduate).
1	Ideal College	Private	Mixed	350	18	19	B.Ed, TTC , Civil, Mechanic
2	Navodhaya Nursing institute	Private	Mixed	54	4	2	Lab Technician, Nursing, Pharmacist, Pre-TTc
3	ICS Education	Private	Mixed	32	3	1	CTTC, PGDCA, DCA, Office Automation, DEO
4	Malabar Polytechnic	Private	Mixed	887	44	24	Electrical and Electronic Engineering, Mechanical & Civil Engineering

Source: Primary Survey



Fig.12.14 Malabar Polytechnic College

12.4 ASSESSMENT OF EXISITING INFRASTRUCTURE WITH PLANNING STANDARD

A tabular assessment of existing educational infrastructure against Urban planning standards are tabulated in Table 12.10.

Table 12.10 Comparison of Educational Institutions with Planning Standards

Type	Existing (2011)	Required (2011)	Gap
Population	39,241	39,241	
1. Nursery: 1 for every 2500	9	16	7
2. Primary: 1 for every 5000	18	8	0
3. HS: 1 for every13000	4	3	0
4. HSS: 1 for every 13000	3	3	0
5. Arts and Science College: 1 for every 80000	2	1	0
6. Polytechnic College :1 for every 36000	1	1	0
7. Professional college : 1 for every250000	0	1	1
8. ITI/ITC : 1 for every 35000	1	1	0
9. TTC : 1 for every 120000	2	1	0
6. Technical institution: 1 for every 100000	1	1	0
7. School for handicapped: 1 for every 45000	0	1	1

The assessment shows the gap in nursery institutions, while professional college and school for handicapped show a gap of one each. Given the relatively high literacy rate of Cherpulassery municipality compared to Palakkad district, it is essential that these gap be bridged to sustain the momentum.

12.5 PROBLEMS AND POTENTIALS

The potentials and problems of the education sector is described here under

- Inadequate recreational facilities at the primary school level.
- Professional government college and school for handicapped are absent in the municipality and there is a huge gap in nursery institutions.
- Ramp provisions for accessibility in schools and colleges merits attention. This would be a positive drive in the wake of *Accessible India Campaign*.
- Government colleges can increase the *affordability* criterion of populace in Cherpulassery municipality.
- Renovations in school infrastructure can garner more enrolment in government run schools.
- Career guidance/counselling centres could be set up to direct the students in a better direction.

12.6 INFERENCE

Even though Cherpulassery has a mix of educational institutions with large numbers offering space for primary, secondary and higher secondary educational institutions, the service coverage area of these institutions appears to be least in the northern and north eastern divisions of the Urban local body. In some cases, this is being mitigated by the service coverage of neighbouring local bodies. Given the passage of SH bisecting the northern regions of Cherpulassery, a protracted spread of settlements could be safely assumed on either sides.

It becomes imperative to consider this growth aspect and plan the spatial distribution of entire spectrum of educational institutions evenly. Undivided attention needs to be given for skill development to capitalise on the demographic dividend that Cherpulassery is undergoing, particularly with respect to Agriculture and MSME. This could potentially retain the youth from migration. Measures in KMBR with respect to ramps and other accessible infrastructure needs to be implemented effectively to make the accessibility of educational institutions *universal*.

13. HEALTH

The World Health Organization (WHO) holds Health as an attainable standard when there are right set of institutional arrangements and environmental conditions. While the committee on economic, social and cultural rights 2000 set out four criteria viz., Availability, Accessibility, Acceptability & Quality, it would be prudent from an urban planning perspective to focus and facilitate primarily on accessibility, acceptability and quality given the context of spatial planning.

Kerala as such enjoys a good health status amongst the states in India. Easy accessibility, coverage of medical care facilities, high literacy rate etc. could be attributed to the state of affairs in Kerala. However, a generalized view has its own limitations when it comes to specific areas especially municipality/towns, thus meriting a closer scrutiny.

13.1 EXISITING SCENARIO

The study of existing scenario is an over view of the availability of health infrastructures and spatial distributions within the planning area. The infrastructure facilities may be categorised based on the ownerships, type of treatment and status of institution, and studies also have to be based on the same. So detailed studies are initiated based on the availability of institutions, its spatial distribution in the manner of categorisation by ownership, type of treatment and status of institutions present within the municipal area.

13.1.1 Health Institutions Based on Ownership

The existing health institutions within the Municipal area are under the ownership of Government, co-operative, and private which are analysed in an availability and spatial manners.

13.1.1.1 Institutions under Government Sector

There are 9 numbers of institutions functioning under government sector within the town and in which 7 numbers are allopathic, one each under Ayurveda and Homoeopathic institutions. The main hospital within the town is a Government hospital, Cherpulassery which is an allopathic institution with 45 number of beds located in ward 15 and this hospital deals about 500 patients per day. The remaining 6 allopathic institutions are public health centres located in wards 3, 9, 30, 16, 22 and 2 respectively. There is one dispensary in ayurveda that functions within the town located in ward 15, and engages about 45 out patients per day, but there are no inpatients facilities for this institution. Similarly one homoeopathic dispensary is located in ward 15 admitting about 70 out patients per day while it lacks inpatient facilities. The details of govern-

ment institutions under health sector are shown in table 13.1. The spatial distribution of health institutions under Government sector are shown in figure 13.1



Community Health Centre, Cherpulssery

Table 13.1 Details of Health Institutions under Government Sector

Sl.No.	Name	Category	Average No of out patients/ day	No of Doctors	No. of Nurses	other staff	No of Beds	Ward location
A.	Allopathic							
1	Community Health Centre, Cherpulassery	Hospital	500	5	12	21	45	15
2	PHC Sub-centre Shappupadi	Clinic	45	1	2	1	Nil	3
3	IPP Sub-centre Kurumanamkurussi	Clinic	38	1	2	1	Nil	9
4	IPP Sub-center Panniyamkurussi	Clinic	40	1	2	1	Nil	30
5	RCH Sub centre Alumkunnu	Clinic	50	1	2	1	Nil	16
6	IPP Sub centre, Eliyapetta	Clinic	25	1	2	1	Nil	22
7	Family Welfare Centre,Thootha	Clinic	30	1	2	1	Nil	2
B.	Ayurveda							
8	Govt Ayurvedha Dispensary	Clinic	45	1	1	_	Nil	15
C.	Homoeo							
9	Govt Homoeo Dispensary	Clinic	70	1		1	Nil	15

Source: Primary Survey

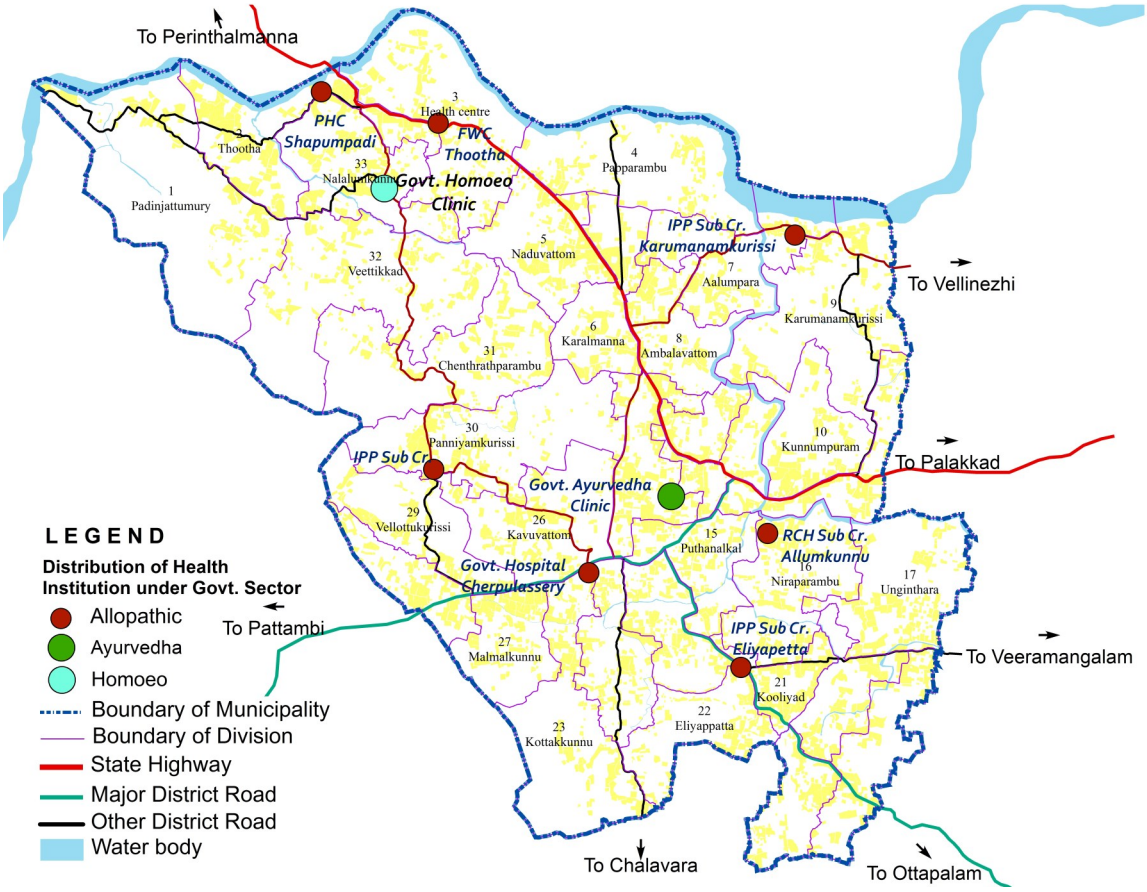


Fig.13.1 Spatial Distribution of Health Institutions under Government Sector

13.1.1.2 Health Institutions under Co-operative Sector

A co-operative hospital under allopathic sector is also located in ward 15 of the municipality with inpatient facility of 49 beds by engaging about 450 patients per day. The details of co-operative hospital are shown in table 13.2.



Co-operative Hospital Cherpulassery

Table 13.2 Health Institutions under Co-operative Sector

Sl.No.	Name	Category	Average No of out patients/ day	No of Doctors	No. of Nurses	other staff	No of Beds	Ward location
A.	**Allopathic**							
1	Co-operative Hospital	Hospital	450	8	30	23	49	15

Source: Primary Survey

13.1.1.3 Health Institutions under Private Sector

The private sector also contributes a major role in health sector within the Cherpulassery Municipality. There are 21 numbers of health institutions under private ownership functioning within the municipal area. The details of private health institutions are depicted in table 13.3, in which 16 nos. of institutions are under allopathic, of which one functions as hospital with 25 numbers of bed strength, and the rest 15 function as clinics.

The ayurvedic private institutions total to 3 numbers within the municipal area , in which only one is functioning as hospital with 10 numbers of bed strength and remaining two are having clinical facilities. Similarly two numbers of private homoeopathic institutions are located within the Municipality, in which one is functioning as hospital with 10 numbers of bed strength and remaining one is functioning as clinic. The figure 13.2 shows the spatial distribution of health institutions under private sector.

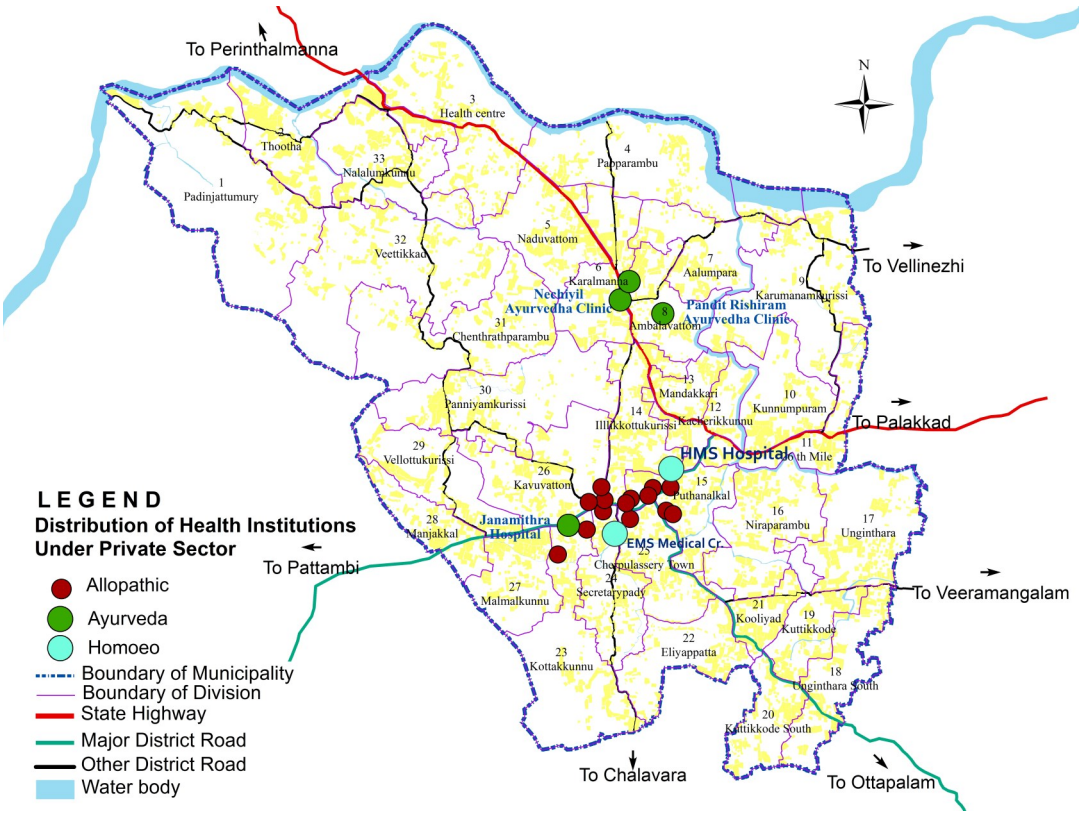


Fig.13.2 Spatial Distribution of Health Institutions under Private Sector

Table 13.3 Health Institutions under Private Sector

Sl.No.	Name	Category	Average No of out patients/day	No of Doctors	No. of Nurses	other staff	No of Beds	Ward location
A.	Allopathic							
1.	Karunya Hospital	Hospital	20	2	5	1	25	24
2.	Dental Hospital,	Clinic	15	1	1		Nil	25
3	Bio care Puthnakal	Clinic	90	12	2	2	Nil	15
4.	Amma clinic	Clinic	15	5	5	4	Nil	23
5	Cherpulassery Poly Clinic	Clinic	125	10	4	4	Nil	15
6 .	Mariya Speciality Dental Clinic	Clinic	12	1	2		Nil	15
7.	Modern Medicare & Diabetic Center	Clinic	30	1	3	4	Nil	26
8	Valluvanad Medical Center	Clinic	32	5	3	3	Nil	2
9	Nirmala Dental Clinic	Clinic	7	1	1		Nil	15
10	Nandanam Dental Clinic	Clinic	4	1	-	-	Nil	15
11	Unity Speciality Dental Clinic	Clinic	5	2	-	-	Nil	15
12	Divine Dental Clinic	Clinic	7	1	-	-	Nil	15
13	Thankam Dental Solutions	Clinic	5	1	-	-	Nil	15
14	Smile World Dental Clinic	Clinic	5	2	-	1	Nil	26
15	Zains Eye Clinic	Clinic	7	1	-		Nil	24
16	White Dental Clinic	Clinic	3	1	-	-	Nil	26
B.	Ayurvedha							
17	Janamithra Hospital	hospital	7	2	2	2	10	23
18	PaditRishiramAyurvedha	Clinic	-	-	-	-	Nil	8
19	NechiyilAyurvedha	Clinic	15	2	2	2	8	6
C.	Homoeo							
20	HMS Hospital	Hospital	25	3	-	3	10	14
21	EMS Medical Centre	Clinic	10	1	-		Nil	24

Source: Primary Survey

13.1.2 Health institutions with type of treatment

The health institutions within the municipal area largely follow treatment types such as allopathic, ayurvedic and homeopathic. They are analyzed hereafter.

13.1.2.1 Allopathic institutions.

The Municipal area contains 24 numbers of allopathic treatment institutions, in

which 7 numbers are under government, one number under co-operative sector and remaining 16 numbers are under private ownership. The details of allopathic hospitals are shown in table 13.4 .

Table 13.4 Health Institutions in Allopathic Sector

Sl.No.	Name	Catego-ry	Average No of out patients/ day	No of Doc-tors	No . of Nurs-es	other staff	No of Beds
A.	Government						
1	Community Health Centre, Cherpulassery	Hospital	500	5	12	21	45
2	PHC Shappupadi	Clinic		1	2	1	Nil
3	IPP sub center Kurumanamku-russi	Clinic		1	2	1	Nil
4	IPP Subcenter Panniyamkurussi	Clinic		1	2	1	Nil
5	RCH Sub centre Alumkunnu	Clinic	50	1	2	1	Nil
6	IPP Sub Centre Eliyapetta	Clinic	25	1	2	1	Nil
7	Family Welfare Centre, Thootha	Clinic	30	1	2	1	Nil
B.	Co-operative						
8	Co-operative Hospital, Cherpu-lassery	Hospital	447	8	30	23	49
C.	Private						
9	Karunya Hospital	Hospital	20	2	5	1	25
10	Dental Hospital,	Clinic	15	1	1		Nil
11	Bio care Puthanakal	Clinic	90	12	2	2	Nil
12	Amma clinic	Clinic	15	5	5	4	Nil
13	Cherpulassery Poly Clinic	Clinic	125	10	4	4	Nil
14	Mariya Specialty Dental Clinic	Clinic	12	1	2		Nil
15	Modern Medicare & Diabetic Center	Clinic	30	1	3	4	Nil
16	Valluvanad Medical Center	Clinic	32	5	3	3	Nil
17	Nirmala Dental Clinic	Clinic	7	1	1		Nil
18	Nandanam Dental Clinic	Clinic	4	1	-	-	Nil
19	Unity Specialty Dental Clinic	Clinic	5	2	-	-	Nil
20	Divine Dental Clinic	Clinic	7	1	-	-	Nil
21	Thankam Dental Solutions	Clinic	5	1	-	-	Nil
22	Smile World Dental Clinic	Clinic	5	2	-	1	Nil
23	Zains Eye Clinic	Clinic	7	1	-	-	Nil
24	White Dental Clinic	Clinic	3	1	-	-	Nil

Source: Primary Survey

There are three hospitals, each under the ownership of Government, Co-operative, private with inpatient bed strength facilities of 45, 49, 25 respectively.

Out of the 21 numbers, 6 numbers under government and remaining 15 numbers are under private ownership. The spatial distributions of allopathic hospitals are depicted in figure 13.3.



Fig.13.3 Spatial Distribution of Health Institutions in Allopathic Sector

13.1.2.2 Ayurvedic Institutions

There are only 4 numbers of ayurvedic institutions within the municipal area, in which one falls under government and remaining 3 numbers are with private ownerships. The table 13.5 shows the details of ayurvedic institutions.

Table 13.5 Health Institutions in Ayurvedic Sector

Sl.No.	Name	Category	Average No of out patients/day	No of Doctors	No. of Nurses	other staff	No of Beds
A.	Government						
1	Govt Ayurvedha Dispensary	Clinic	45	1	1	_	Nil
B.	Private						
2	Nechiyil Ayurvedha	hospital	15	2	2	2	8
3	Janamithra Hospital	hospital	7	2	2	2	10
4	Padit Rishiram Ayurvedha	Clinic					Nil

Source: Primary Survey

The in patient facilities with bed strength of 10 are available only in one hospital under the private ownership and remaining 3 numbers are having clinical facilities.

The spatial distribution of ayurvedic institutions are depicted in figure 13.4.

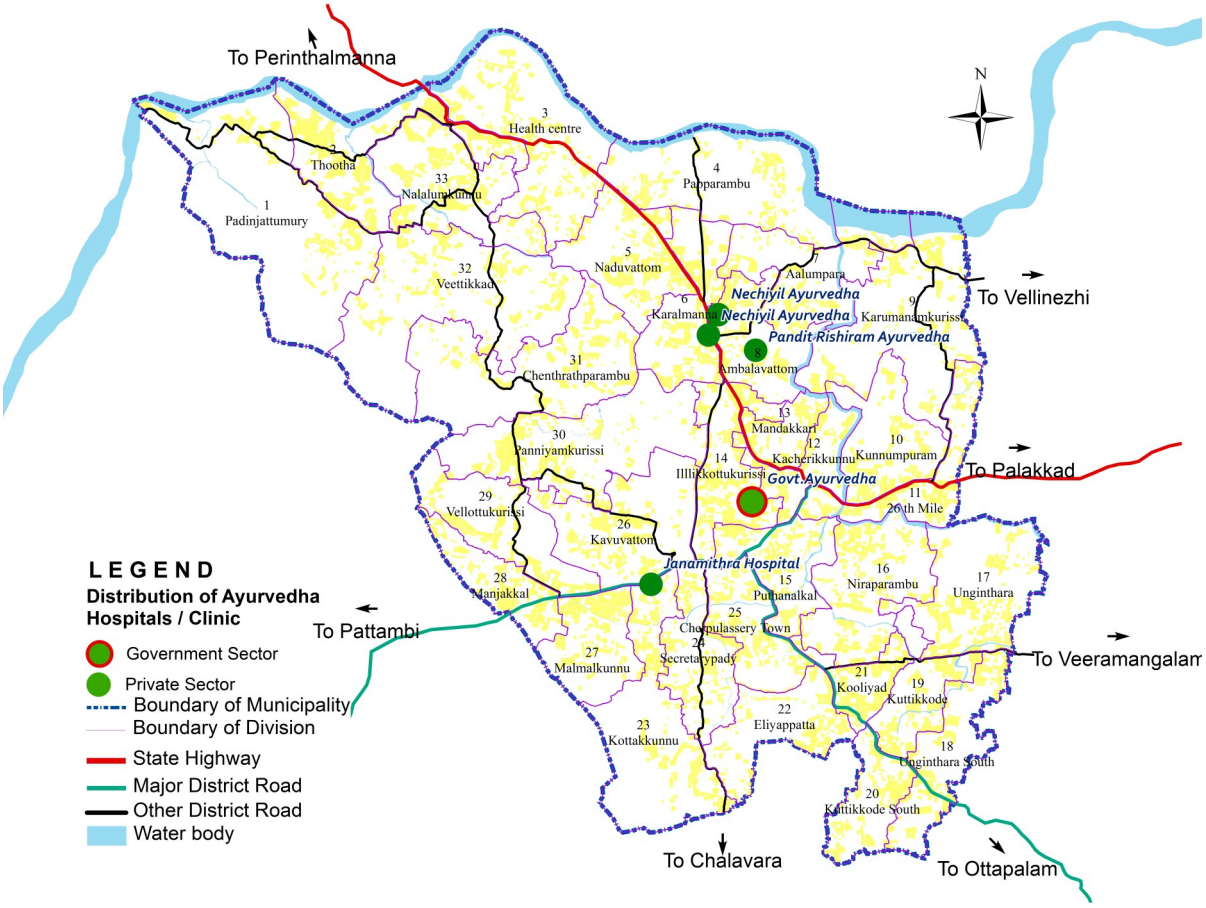


Fig.13.4 Spatial Distribution of Health Institutions in Ayurvedic Sector

13.1.2.3 Homoeopathic Institutions

The municipal area consists of three homoeopathic institutions, in which one falls under Government and remaining two are under private ownership. The table 13.6 depicts the details of homoeopathic institutions within the Cherpulassery Municipality.

Table 13.6 Health Institutions in Homoeo Sector

Sl.No.	Name	Category	Average No of out patients/day	No of Doctors	No. of Nurses	other staff	No of Beds
A.	Government						
1	Govt Homoeo Dispensary	Clinic	70	1	1	1	Nil
C.	Private						
2	HMS Hospital	Hospital	25	3	1	3	10
3	EMS Medical Centre	Clinic	10	1	1		Nil

Source: Primary Survey

There is only one institution having inpatient facility with bed strength of 10 beds under the ownership of private while remaining two are having clinical facilities. The spatial distribution of homoeopathic institutions is shown in figure 13.5.

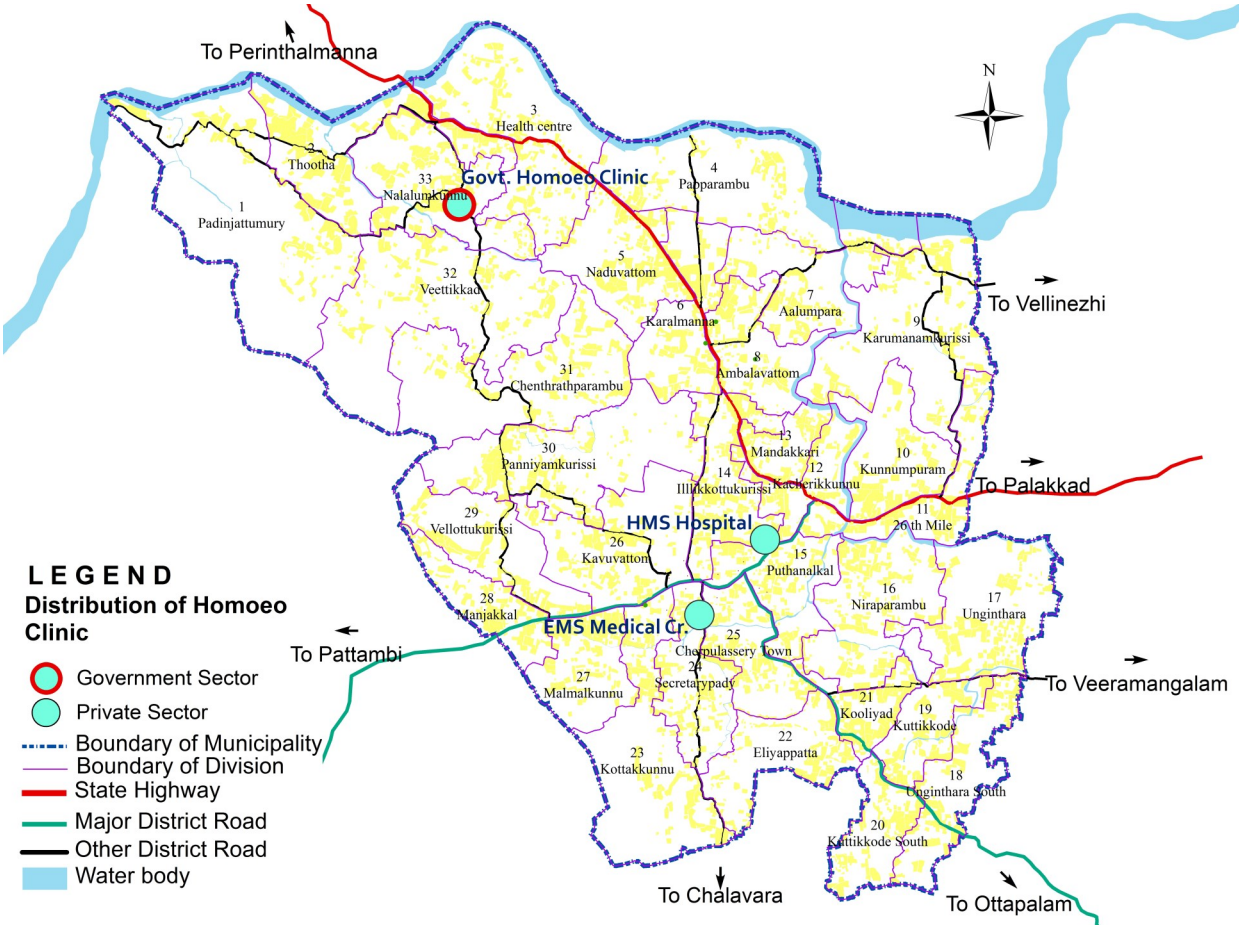


Fig.13.5 Spatial distribution of Health institutions in Homoeopathic Sector

13.1.3 Health Institutions under Functionary Status

The existing health institutions within the municipal area may be categorized based on the functionary status as hospitals, primary health centres, and clinics. There are five hospitals within the municipality, of which two are allopathic under the ownership of Government and co-operative sector; 1 each are ayurvedic and homoeopathic under private ownerships. There are 6 numbers of primary health centers under government sectors within the municipality. The municipality contains 20 numbers of clinic, in which 15 numbers are allopathic under the private ownership, 3 are ayurvedic with one under government and remaining two in private, two numbers are homoeopathic under government and private respectively .The table 13.6 shows the functionary status of the healthy institutions.

13.1.4 Overview of Health Institutions

There are 31 health institutions spread over the Cherpulassery municipal area, in which 9 are government institutions, one under co-operative sector and 21 nos. are

private ownerships.

According to the type of treatment, 24 numbers of institutions are allopathic, 4 numbers are ayurvedic and 3 are under homeopathic. At a functionary status level, 5 numbers are hospitals, 6 numbers are primary health centres and 20 numbers are clinics. The figure 13.6 depicts the overview as spatial distribution of health institutions within the Cherpulassery Municipality.



Fig13.6 Overview of Spatial distribution of health infrastructure in Cherpulassery

On an accessibility criterion, the CHC, PHC may suffice in offering basic medications. However, these are subject to staff strength, their availability & logistics that cater to institutions. Moreover, the distribution of first line of medical facilities should be evenly spread across dense habitations. In Cherpulassery town most of the Healthcare institutions are located in the CBD area.

Apart from this, for multi-specialty services the town also depends on Moulana hospital Perinthalmanna, KIMS, Al-Shifa hospital Perinthalmanna, EMS hospital, Edapal Hospital Pvt Ltd, etc which is about 15 km from Cherpulassery.

13.2 EPIDEMIC WITHIN CHERPULASSERY

The major epidemics that occurred in the municipal area are dengue, H1N1, and Chikunguniya. The table 13.7 shows the details of major epidemics reported within Cherpulassery.

Table 13.7 Major Epidemic within Cherpulassery

Name of the disease	Number of persons affected	% of Curing	Prominent location
Dengue cases2013/2014/2015/2016	12/6/8/17	100	Marayamangalam,Adakkaputhur,Mangalamkunnu, Eliyapatta,Panniyamkurussi,Karalmanna
H1N1-2013/2014/2015	0/2/6/7	100	Alumkunnu, Mandakkari
Chikunguniya-2013/2014/2015/2016	18/10/16/15	100	Eliyapatta,Panniyamkurussi,Karalmanna

Source: Socio-economic Survey ,2016

All three are viral infections transmitted through insects or airborne transmission. Fourty three persons were infected with dengue during the period 2013 to 2016 and was prominent in locations at Marayamangalam, Adakkaputhur and Mangalamkunnu within the Municipality. While the H1N1 affected 15 persons during the years 2013, 2014 and 2015 at locations Alumkunnu and Mandakkari of Municipal area. Similarly, 51 persons were affected by chikungunya disease during the period from 2013 to 2016 and were prominent at Eliyapetta, Panniyamkurissi and Karalmanna.

13.3 PALLIATIVE CARE UNITS

There are 42 patients requiring continuous medical care with various diseases within the municipality and are categorised as shown in Table 13.8.

Table 13.8 Details of Patients Having Continuous Medical Care

Sl. No.	Details of Patients	Total
1	Cancer Patients	23
2	Dialysis Patients	8
3	Spinal Injury Patients	8
4	Patients Ingest Morphin	1
5	Patients with Ryle tube	1
6	Trakeostomi	1

Source: Primary Survey

The bed ridden patients within the municipality are 200, and its details are shown in table13.9.

Table 13.9 Details of Bedridden Patients

Sl. No.	Details of Patients	Total
1	Patients below 60yrs	23
2	Patients above 60yrs	134
3	undergoing Physiotherapy treatment	35
4	Patients in critical condition	8

Source: Primary Survey

The Palliative care facilities are available at health centers at Veeramagalam, Kutikode, Eliyapatta, Kamanamkurussi, Vadakkumuri, Alumpara, and Panniyamkurussi.

13.4 COMPARISON WITH PLANNING STANDARDS

As per National Urban Health Mission baseline data (2018), Population in the Cherpulassery town is 44,339. Accordingly one Community Health Centre, two primary health centres and nine sub-centres are required to cater the populace. The available bed strength in CHC is 45. Following table 13.10 gives comparison with planning standards.

Table 13.10 Comparison with Planning Standards

	Existing 2018	Required 2018
Population	44,339	44,339
1.PHC Sub centre 1 for every 5,000 population	6	9
2.One PHC for every 20,000 – 30,000 population	0	2
3. One CHC for every 50,000-60,000 population	1	1
3. CHC (number of beds): 1 bed for 2,000	45	30
4. Taluk hospital: 1 for every Taluk	-	-
5. Super speciality hospital : 1 for every 1,00,000 population	-	-
5. Multi-speciality hospital :1 for every 1,50,000 population	-	-

13.5 INFERENCE

- For higher order medical facilities, people of this municipality are dependent on Palakkad, Thrissur and Malappuram (Perinthalmanna) districts .
- In Govt. institutions the infrastructure condition is not satisfactory; many of them lack sufficient space, clinical laboratory with advanced modern facilities, medicines, furniture, sanitation and proper waste disposal system.
- Existing health services in the government sector requires considerable up gradation for improving their capacity to provide desired level of service to the people. Proper infrastructural developments should be provided in allopathic, ayurvedic and homeopathic sectors. For better treatment people are depending on the super speciality hospital in the neighbouring district.
- An integrated programme has to be framed with various sectors so as to provide best services to the neighbouring local bodies as well as the regions.

14. HOUSING

Housing is a key input in economic, social, and civic development. It is integral to the wellbeing of a family that makes it formal household with a stake in economic and social development. On the social side, housing is, after food and medical care, the first need of vulnerable populations following natural and man-made disasters. Safe homes and neighbourhoods, in which residents are satisfied with housing conditions and public services, help build social stability and security. With the rapid urbanization, one of the biggest challenges will be providing affordable housing to city dwellers, especially to the economically weaker sections.

14.1 HOUSEHOLDS & HOUSEHOLD SIZE

Census of India defines - A 'household' is usually a group of persons who normally live together and take their meals from a common kitchen unless the exigencies of work prevent any of them from doing so. Persons in a household may be related or unrelated or a mix of both. The important link in finding out whether it is a household or not, is a common kitchen.The size of a household is the total number of persons in a household.There may be one member households, two member households or multi-member households.

As per Census 2011, there are 8,440 households in Cherpulassery town and the average house hold size is 4.65 which are higher than the district average of 4.41. As per 2018 statistics no. of dwelling units is 8,724 comprising a population of 44,339. Table 14.1 shows the decadal variation of population and HH size in Cherpulassery town. The trend in household size has been steadily decreasing from 6 in 1971 to 4.65 in 2011 indicating the shifting of preference from joint families to nuclear families.

Table 14.1 Decadal Variation of Population and HH Size in Cherpulassery Town

Year	Population	No. Of HH	HH size
1971	21380	3564	6.00
1981	25302	4308	5.87
1991	30490	5333	5.72
2001	34593	6619	5.23
2011	39241	8440	4.65

Source: Census 1971, 1981, 1991, 2001 & 2011

14.2 EXISITNG HOUSING STOCKS

The term 'housing' in advanced nations refers to a dwelling unit standard type, mostly an independent house or apartment, whereas in a developing country like India, it has different notion. For example, the Census of India refers it to sheltering taken ei-

ther on pavement or in a thatched hut or in a bungalow.

The residential houses are broadly classified into three different categories namely pucca, moderate, and kutcha according to the construction material used and considering the durability of structure. The survey result of households by type of structure is given in Fig. 14.1.

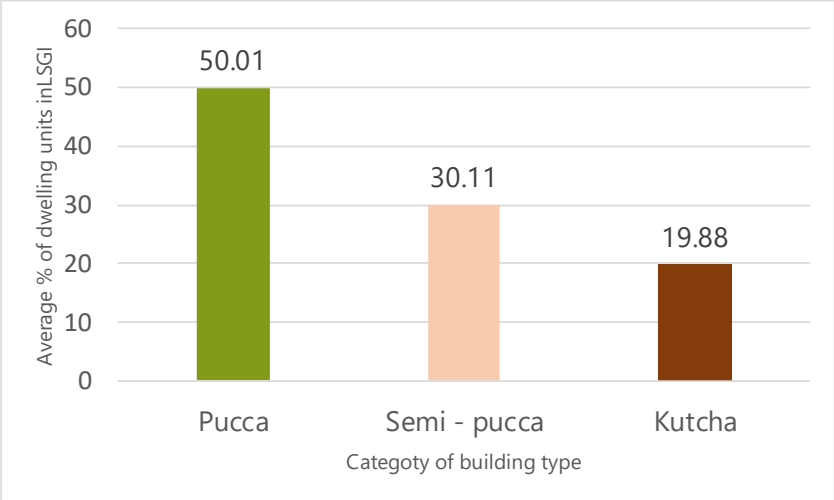


Fig.14.1. Percentage Variation for Each Category of Building Type

Source: Socio-economic Survey, 2016

As per socio economic survey, 50.01% of houses belongs to Pucca and 30.11% belongs to semi-pucca category. This indicates the better living conditions experienced by households of Cherpulassery. Kutcha houses constitute 19.88%, which requires immediate repairs or required to be demolished and rebuilt without which it might be unsafe for habitation. Fig 14.2 shows the ward wise housing type in Cherpulassery.

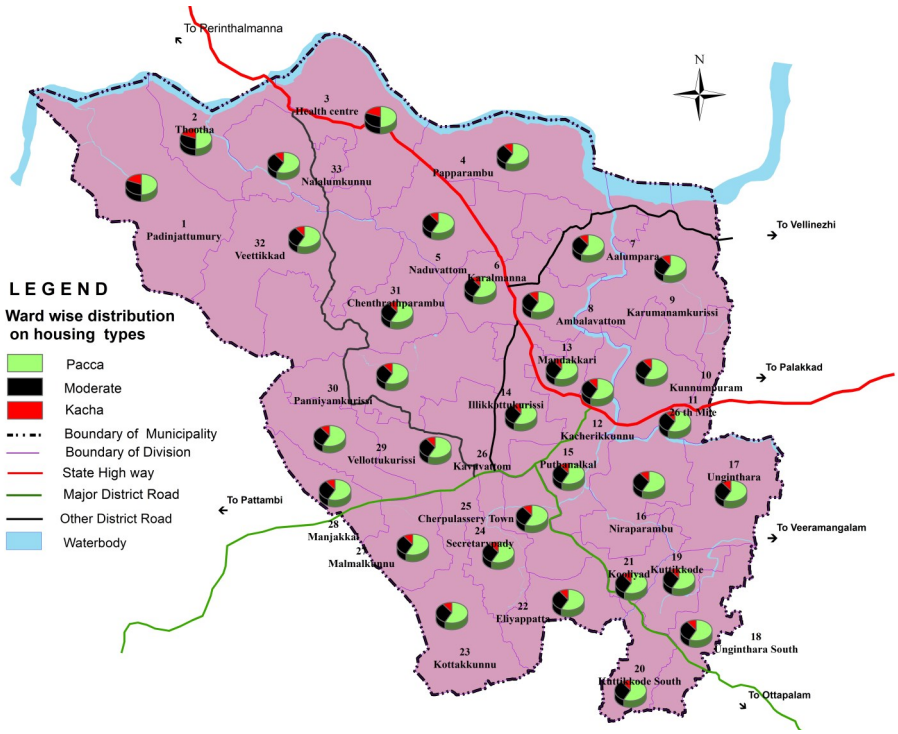


Fig.14.2. Ward wise Housing Type

The distribution of dwelling units by different size class of plinth area is given in figure 14.3. It is clear that majority of the dwelling units have plinth area in the range of 50-75 sq. m which constitutes 38.3 % of total houses, the plinth area size less than 20 sq.m is 0.45% and in range 20-50 sq.m comes 23.07 %. And 38.18 % of households have the plinth area more than 75 sq.m.

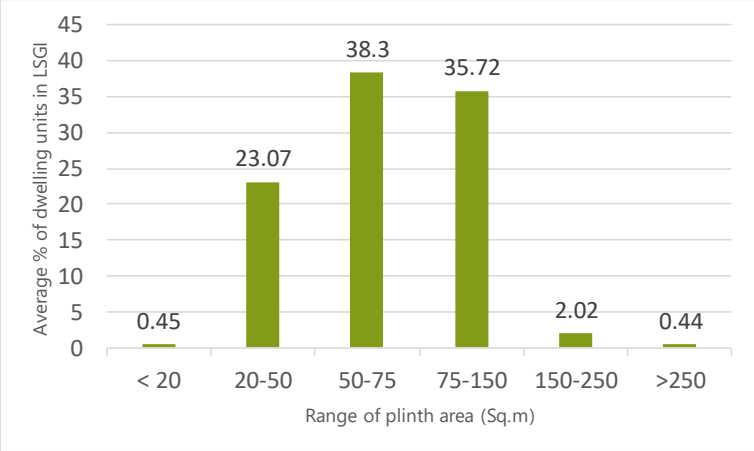


Fig 14.3 Percentage Variation in Different Range of Plinth Area

Source: Socio-economic Survey, 2016

The materials used in roofs, walls and floors are important quality characteristics of a dwelling. Fig. 14.4 gives the distribution of dwelling unit by its floor type. In Cherpulassery ordinary tiles / cement flooring are the common materials used for floor construction which constitutes 92.97% of the houses, 5.13% of houses have mosaic/marble flooring and remaining 1.90 % are with earthen flooring.

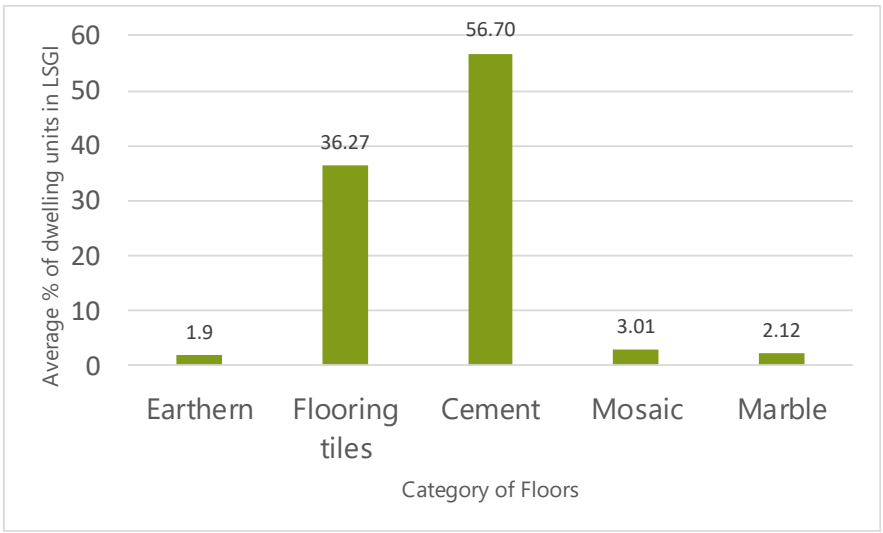


Fig 14.4 Percentage Variation in Types of Floor in Cherpulassery Town

Source: Socio-economic Survey, 2016

While considering dwelling units by its wall type, earth blocks and burnt bricks are the most common materials used for walls. The percentage variation for different types of walls of houses in this Panchayat is depicted in figure 14.5. It is observed that

66.97% dwelling units are made up of Plastered brick walls and 26.54% dwellings are with plastered earth blocks.

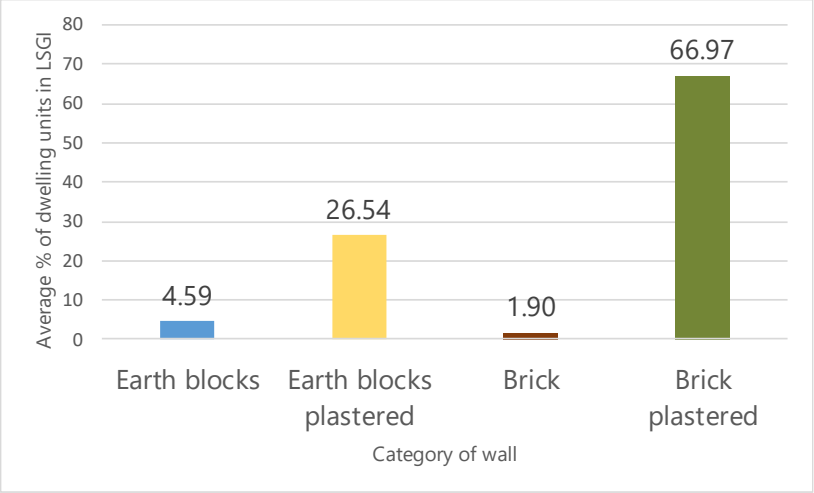


Fig.14.5 Percentage Variation in Types of Wall in Cherpulassery Town

Source: Socio-economic Survey, 2016

From the Fig 14.6, it is observed that majority of the housing units in Cherpulassery are having concrete roofing i.e. it constitutes 55.31% of the total. Ordinary Tiles is the next most commonly used roofing material. 43.46% of housing units are with tiled roofing and 1.23% of housing units make use of asbestos cement sheets for roofing.

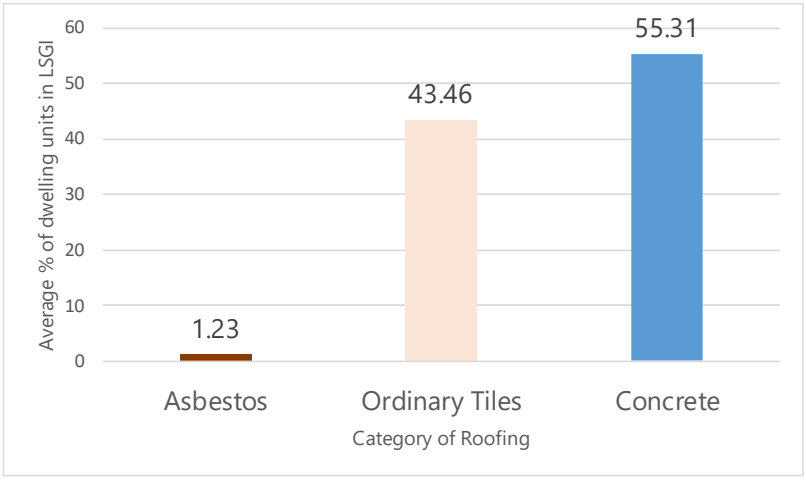


Fig.14.6 Percentage Variation in Types of Roofing Materials in Cherpulassery Town.

Source: Socio-economic Survey, 2016

14.3 LAND HOLDINGS AND HOUSING TENURE STATUS

Land tenure is the legal regime in which land is owned by an individual, who is said to "hold" the land. It determines who can use land, for how long, and under what conditions. Fig 14.7 gives the land tenure status of the households in the Municipality. The tenure type considered are owned and others. From the survey it is known that most of households have secured tenure status. In other words, 99.66% households had own Land.

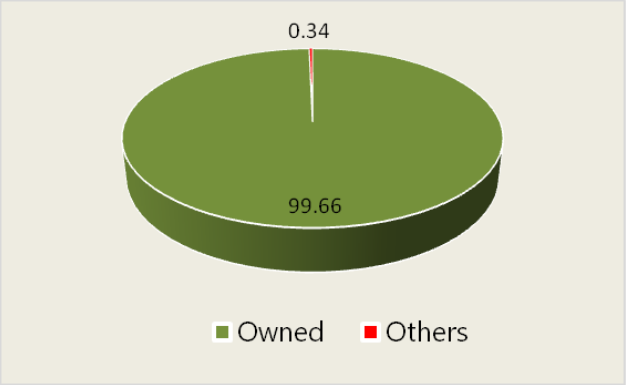


Fig.14.7. Land Tenure Status of Households in Cherpulassery

Source: Socio-economic Survey, 2016

Fig 14.8 shows the percentage variation for different plot size in Cherpulassery. From socio-economic survey, it can be seen that majority of the housing plots ,39.92% belongs to range of 6-10 cents. The second major category is 11-25 cents, 29.00% households belongs to the same. 20.05% are having plot area less than 5 cents and only 6.16% HHs have plot area in the range more than 50 cents. The average value of plot size for the Municipality is obtained as 18 cents.

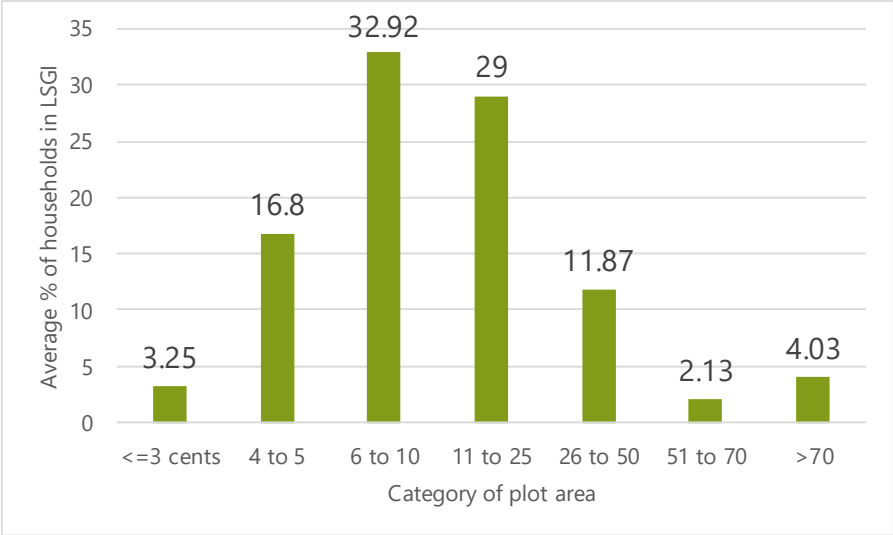


Fig.14.8 Percentage Variation in Different Plot Area in Cherpulassery Town

Source: Socio-economic Survey, 2016

Housing tenure expresses the relationship that determines the legal right to live in a dwelling. This relationship is embodied in the financial arrangements under which the right was obtained. According to the types of dwellings, dwellings can be disaggregated into: "detached houses", "flats/units/apartments" and "semi-detached/row or terrace houses/townhouses". On the other hand, the most common types of housing tenure are: rented and owner-occupied.

From fig 14.9, It can be seen that majority of households in Cherpulassery had the most secured tenure status. In other words, more than 99.22% households had own dwelling units. The share of tenure type rented accommodation is only 0.56%.

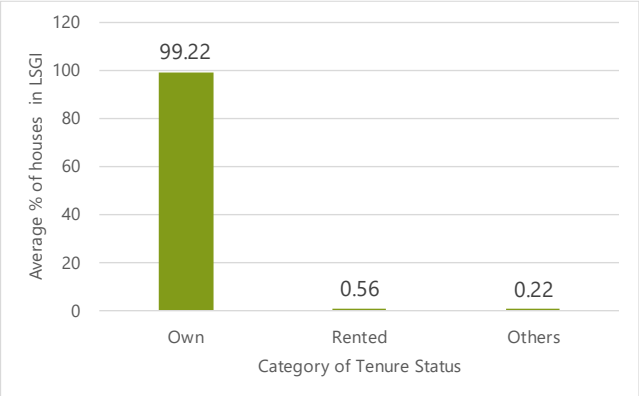


Fig.14.9 Percentage Variation in housing tenure Status in Cherpulassery Town

Source: Socio-economic Survey, 2016

14.4 SLUMS/ SCHEDULED CASTE COLONIES

There is no slum in Cherpulassery Municipality. The SC colonies are areas which require special attention as the living conditions are comparatively poor. There are 49 Scheduled caste colonies within the Municipality. In majority of them housing condition is not satisfactory. Almost all the houses possess individual toilet and leach pit arrangements while there are no facilities for solid waste disposal. Details of scheduled caste colonies are given in table 14.2 and their spatial distribution are shown in fig 14.10.

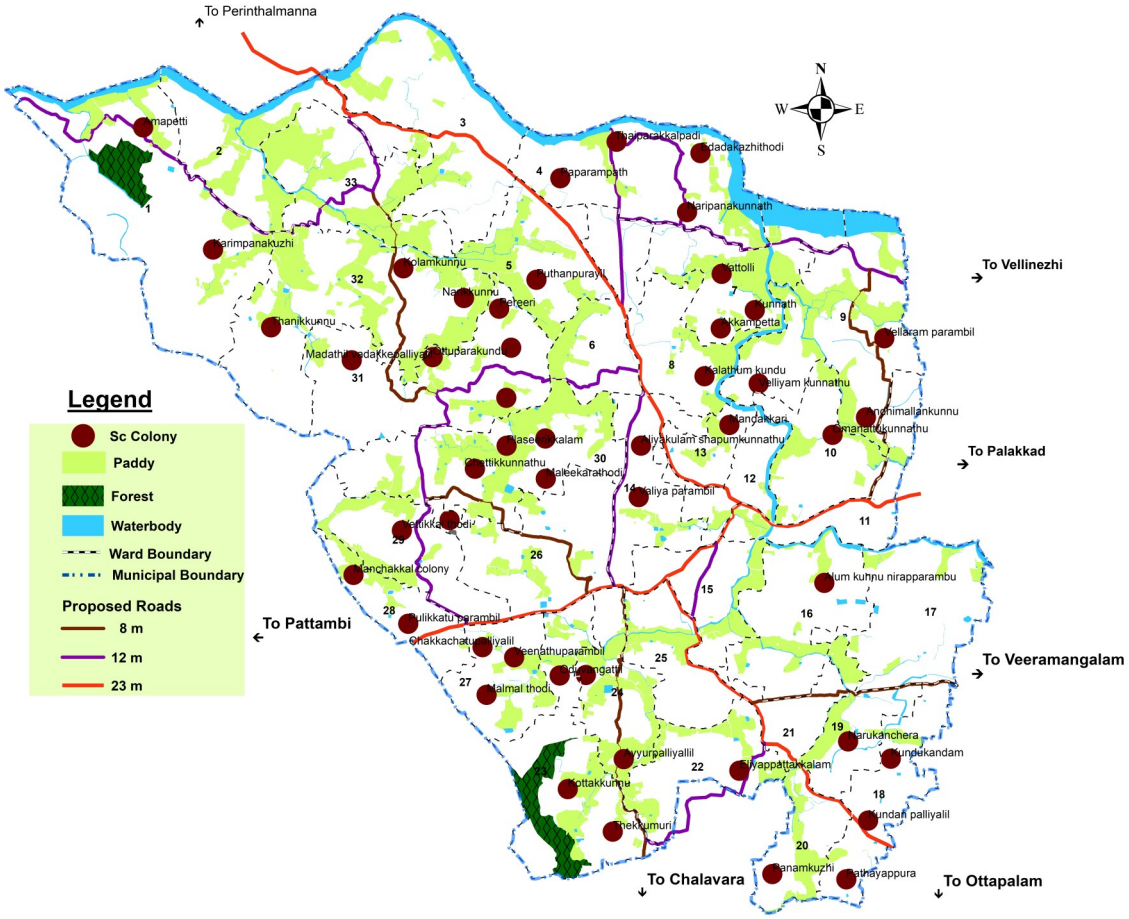


Fig.14.10 Spatial Distribution of SC Colonies in Cherpulassery Town

Table 14.2 Details of Scheduled Caste Colonies within Cherpulassery Town

Sl.No.	Name of Colony	Location/WARD	No of Families	Population		
				Male	Female	Total
1	Edadakkazhithodi	4	12	27	39	66
2	Papparambhath	4	10	24	30	54
3	Kunnath	7	10	16	20	36
4	Kalathum kundu	8	22	43	58	101
5	Akkampetta	7	10	23	30	53
6	Vellaram parambil	9	12	32	38	70
7	Velliyam kunnathu	9	10	26	33	59
8	Mandakkari	13	13	35	49	84
9	Valiya parambil	14	14	35	41	76
10	Alum kunnu nirapparambu	16	30	75	84	159
11	Eliyappattakkalam	22	23	50	61	111
12	Thekkumuri	23	11	24	36	60
13	Kottakkunnu	23	10	25	33	58
14	Malmal thodi	27	15	66	55	121
15	Vettikkal thodi	29	16	39	48	87
16	Pulikkatu parambil	28	13	39	50	89
17	Chettikkunnathu	30	32	80	95	175
18	Plaseerikkalam	30	11	26	29	55
19	Chendrathu parambil	31	14	52	60	112
20	Pereeri	31	20	40	53	93
21	Cheri	31	10	22	29	51
22	Kolamkunnu	32	10	25	35	60
23	Narikkunnu	32	10	28	39	67
24	Thanikkunnu	32	11	35	40	75
25	Kundan palliyalil	18	11	32	43	75
26	Pathayappura	18	30	70	82	152
27	Amapetty	1	9	18	24	42
28	Naripattakunnu	4	8	19	26	45
29	Vattolli	7	7	22	28	50
30	Omanattukunnathu	10	6	21	25	46
31	Andhimallankunnu	9	10	26	30	56
32	Kundukandam	18	7	19	26	45
33	Kallamallikodiyathu	24	8	21	29	50
34	Ayyurpalliyallil	24	6	21	30	51
35	Oduvangattil	23	9	22	29	51
36	Veenathuparambil	27	11	30	41	71
37	Chakkachatupalliyalil	27	6	22	28	50
38	Koyanipalliyalil	30	10	24	36	60
39	Bhagavathyparambil	26	5	20	28	48
40	Ottuparakundu	31	8	25	31	56
41	Madathil vadakkepalliyalil	31	6	22	28	50
42	Panamkuzhi	20	5	19	22	41
43	Narukanchera	19	6	16	25	41
44	Manchakkal colony	28	10	22	28	50
45	Karimpanakuzhi	1	7	17	23	40
46	Thaiparakkalpadi	4	7	20	24	44
47	Puthanpurayil	5	6	21	26	47
48	Maleekarathodi	30	7	16	21	37
49	Aliyakulam shapumkunnathu colony	14	7	22	28	50

Source: Primary Survey

14.5 SCHEMES AND PROGRAMMES

However, as housing is one of the basic needs of a human being, possession of it would become an important element of achieving security of living; the benefits of housing, however, extend beyond achieving the security. This sometimes prompts governments to intervene in the provision of housing by several means. The constructions that were undertaken by the households through different schemes are given under.

Pradhan Mantri Awas Yojana (PMAY)

Prashan Mantri Awas Yojana is essentially a public housing scheme for the houseless poor families and those living in dilapidated and kutcha houses with a component for providing house sites to the landless poor as well. Details of beneficiaries under this scheme is given below.

Table 14.3 Details of Beneficiaries through IAY

Indira Awas Yojana						
No. of beneficiaries	2010-11	2011-12	2012-13	2013-14	2014-15	2015-2016
General	27	20	38	25	48	32
SC	21	23	36	36	40	50
Total	48	43	74	61	88	82

Source: PMAY Draft Report 2017, Cherpulassery Municipality

EMS housing scheme

EMS total Housing scheme launched by Government of Kerala aims at providing house sites to all landless families and houses to all houseless families coming under the BPL category Cherpulassery Municipality distributed 15 houses through this scheme in the year 2010-2011.

Janakeeyasoothranam

Details of Assistance provided under Janakeeyasoothranam are depicted in the following table.

Table 14.4 Details of Beneficiaries through Janakeeyasoothranam

Year	2012-13	2013-14	2014-15	2015-16
No.of beneficiaries	12	12	4	3

Source: PMAY Draft Report 2017, Cherpulassery Municipality

LIFE Mission

As per LIFE mission programme launched by Govt. of Kerala, there are 218 Application received from house less and land less persons from the Municipal area.

Low cost housing techniques

Low Cost Housing is a new concept which deals with effective budgeting and following of techniques which help in reducing the cost of construction through the use of locally available materials along with improved skills and technology without sacrificing the strength, performance and life of the structure. By promoting the use of low cost housing techniques more people in the municipality will be able to construct houses at affordable cost and thus can reduce housing problem to some extent.

14.6 INFERENCE

Access to adequate housing has long been viewed as a basic human right and is considered to be an integral factor for the enjoyment of other economic, social and cultural rights. It is seen that the household size is found decreasing which may create more housing demand in future. There has been a gradual shift in housing problem in urban areas from the shortage of housing availability to the lack of housing affordability. Land cost and its availability, apart from availability and access to finance, has been becoming important determinant of house prices in cities.

15. RECREATIONAL AND CULTURAL FACILITIES

The term recreational and culture facilities means "indoor or outdoor parks, buildings, sites, or other facilities which are dedicated to recreation and cultural activities administered by public or private non-profit agencies to serve the recreation and cultural needs of community residents. Emphasis shall be on public facilities readily accessible to residential neighbourhoods, including multiple-use community centres which have recreation and cultural activity as their primary purposes, but excluding major sports arenas, exhibition areas, and conference halls used primarily for commercial sports, spectator, or display activities."

15.1 RECREATION - EXISITING FACILITIES

Open space and recreation are areas consisting of parks, green spaces, and other vacant spaces that facilitate activities encouraging public health. The landscape of open space and recreation areas in an urban setting can range from playgrounds to community gardens to highly maintained environments to relatively natural environments. These areas may include city-owned or state-owned areas that are accessible by the general public.

There is a large body of research discussing the benefits of open space and recreational opportunities to citizens and visitors in urban settings. Some studies have categorized the value of open space and recreation from a sociological point of view, suggesting that these areas provide civic and social capital, promote economic development, enhance education, establish green infrastructure, and make positive contributions to public health.

Regardless of how we choose to identify these benefits, it is clear that having and planning for open space and recreation areas in our communities is critical to achieving and maintaining a high quality of life for residents. The urban setting of Cherpulassery is interspersed with Playground, indoor stadium, theatres and auditoriums.

15.1.1 Playground

All the schools in the town are having playground facilities. Playground of GVHSS Cherpulassery located at Kavuvattam in ward 26 with an extent of 1acre is often used as Eleven's football ground as well as stage for public functions. At present there is no common playground for publics within the municipal area. The spatial distribution of school grounds are depicted in figure 15.1.

15.1.2 Indoor Stadium

The municipal area consist only one private indoor stadium under the ownership

of a trust namely "Gramika Trust " located at Ambalavattam in ward 8 with an extent of 16 cents is used for Shuttle tournaments, as well as a stage for public functions. The details of indoor stadium are annexed in table 15.1 and its spatial distribution shown in figure 15.1.

Table 15.1 Details of Indoor Stadium

Sl NO	Facilities	Name	Location/ward	Extent/ capacity	Private/ Public	Remarks
1	Open Play Grounds	GVHSS Cherpulassery Ground	26,Kavuvattom	1Acre	Public	Eleven's Football Ground, Stage
2	Indoor Stadium	Gramika indoor Stadium	8-Ambalavattam	16 cent	Private	Shuttle tournaments, public gatherings

Source: Primary Survey

15.1.3 Theatres and Auditorium

The municipal area consist 3 numbers of cinema theatres namely Plaza theatre in ward14, Grand theatre in ward 25, Devi theatre in ward 26. All the theatres host parking and toilet facilities. The details of theatres are shown in table 15.2.



Grand theatre

Table 15.2 Details of Theatres

Sl No.	Name of Theatre	Location/Ward	Extent/Capacit	Private	Remarks
1	Plaza Theatre	14-Illikkottukurussi	720 Seat	Private	Parking, Toilet
2	Grand Theatre	25-Cherpulassery Town	515 Seat	Private	Parking, Toilet
3	Devi Theatre	26-Kavuvattom	350 Seat	Private	Parking, Toilet

Source: Primary Survey

Similarly, fifteen auditoriums are functioning within the town limits. EMS memorial hall functions as the municipal town hall and is located at ward 26. All other fourteen auditoriums are in private ownership. The table 15.3 depicts the details of private auditoriums. The figure 15.3 shows the spatial distribution of auditoriums.



Al-Ain Auditorium



C M Auditorium

Table 15.3 Details of Private Auditoriums

SI NO	Name	Location/ward	Extent/	Private	Remarks
1	EMS Memorial Municipal Town Hall	26-Kavuvattom	600 men	Public	Hall, Stage , Balcony
2	Ashika Auditorium	14-Ilikkotukurussi	2000 men	Private	2 Conferace Hall, stage, Balcony, 1 Dining Hall, parking
3	Royal Auditorium	14-Ilikkotukurussi	1500 men	Private	Hall, Dining Hall, Stage, Parking
4	Lakshmi Auditorium	26-Kavuvattom	1500 men	Private	Hall, Dining Hall, Stage, Parking
5	Alankar Auditorium	29-Vellottukurus	1000 men	Private	Dining Hall, Stage, Balcony, Parking
6	C M Auditorium	21-Kooliyadu	1000 Men	Private	Hall, Dining Hall, Stage, Parking
7	Al-Ain Auditorium	12-Kacherikku	1500 Men	Private	Hall, Dining Hall, Stage, Parking
8	Saradamba Auditorium	23-Kottakkunnu	900 Men	Private	Hall, Dining Hall, Stage, Parking
9	Sarga auditorium	2- Thootha	700 Men	Private	Hall, Dining Hall, Stage
10	Kunju memorial auditorium	6-Karalmanna	500 Men	Private	Hall, Dining Hall, Stage
11	Devi Auditorium	26-Kavuvattom	1000 men	Private	Hall, Dining Hall, Stage
12	Padmasree Auditorium	26 Kavuvattom	1000 Men	Private	Hall, Dining Hall, Stage
13	Mariyamman Mandapam	7. Alumpara	500 Men	Private	Hall, Dining Hall, Stage
14	Sree Durga	15. Puthanakka	700 Men	Private	Hall, Dining Hall, Stage, Parking

Source: Primary Survey

15.2 EXISTING CULTURAL FACILITIES

A cultural space is recognized as a space or facility that can directly produce and educate some cultural products in everyday life or where citizens can come and appreciate arts and culture: it is not just a place but a space in which the locality and cultural activities are organically connected to constantly for the production and enjoyment of culture. Therefore, its role should inevitably change along with the change of times.

These facilities provide space and support for local cultural resources and programs including museums, archival facilities. Libraries also offer space to individuals and local groups for meetings, events and a wide range of cultural activities.

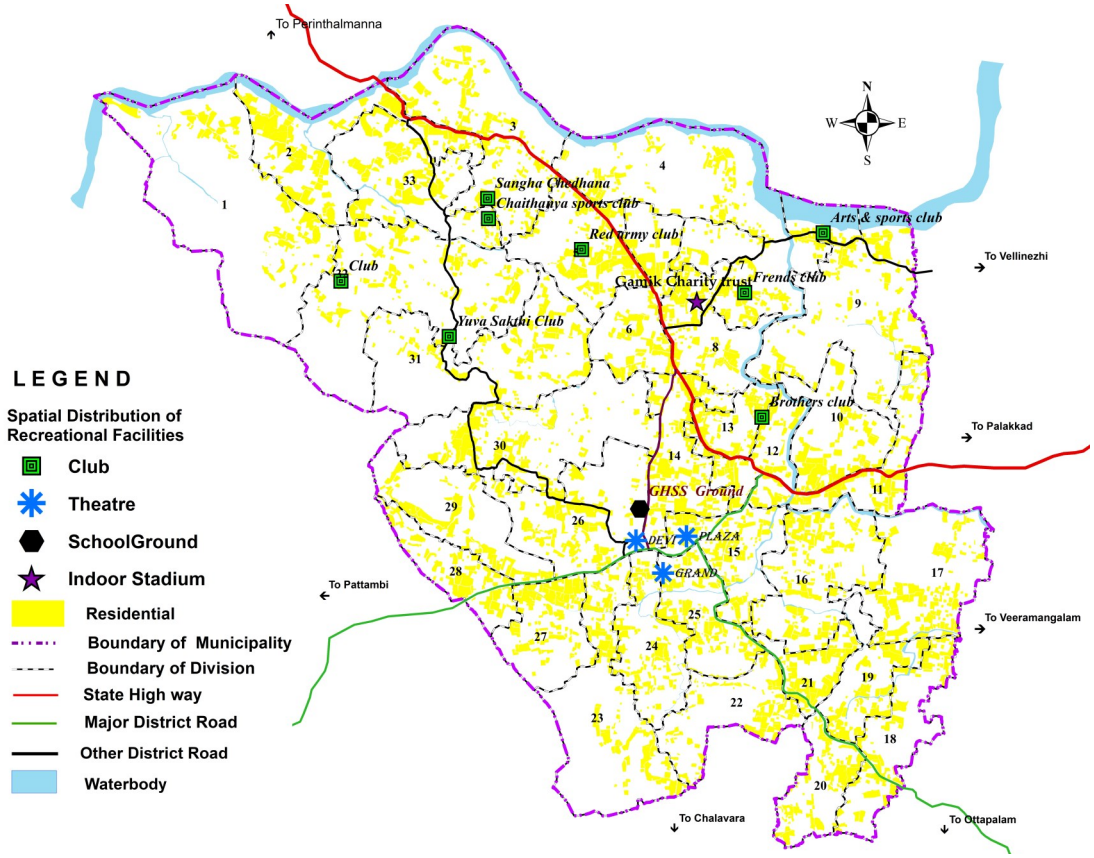


Fig.15.1 Spatial distribution of Indoor Stadium, School Ground, Club and Theatre

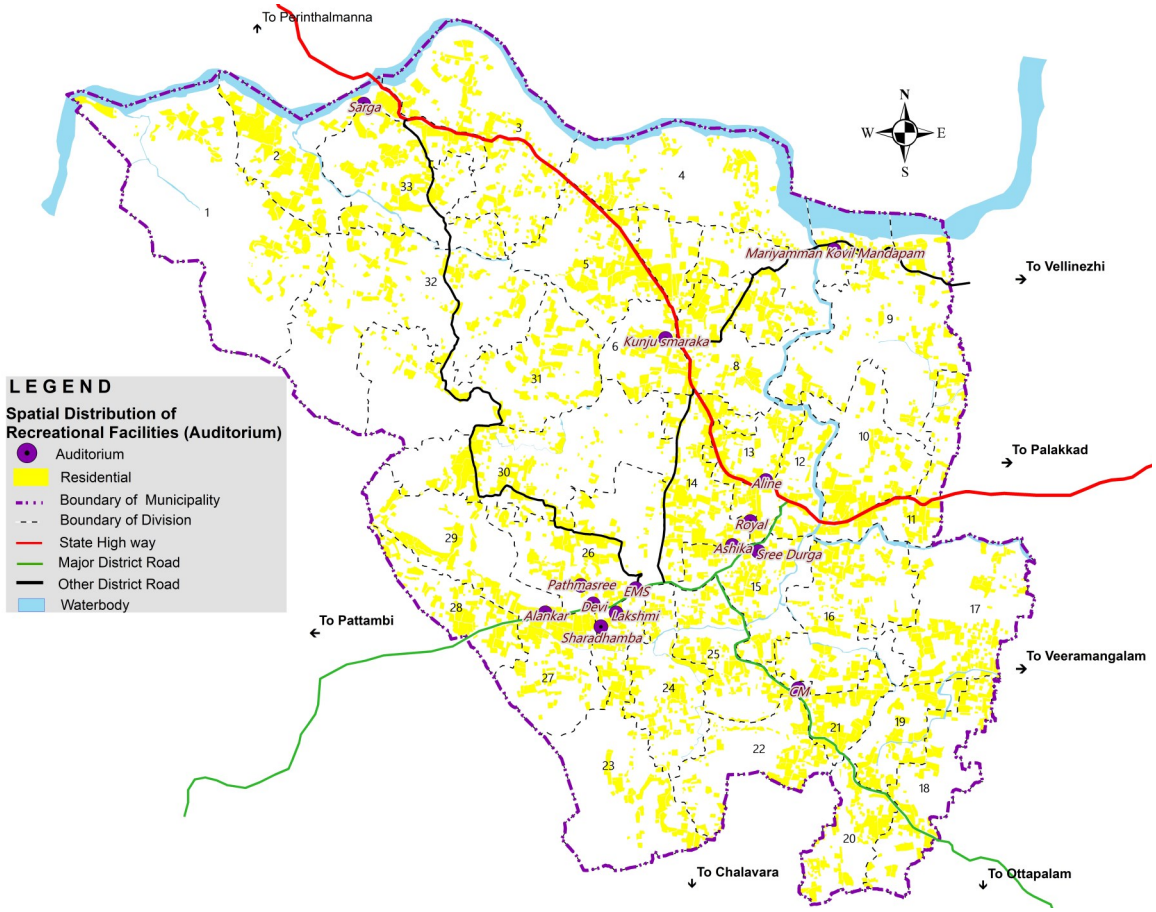


Fig.15.2 Spatial Distribution of Auditoriums

15.2.1. Libraries

Nine libraries exist within the municipal area. The table 15.4 depicts the details of libraries. All the 9 libraries have reading room facilities.



Kannan Master Smaraka vayanasala

Table 15.4 Details of Libraries

Sl.No.	Name	Location/Ward
1	EMS Library	33-Nalamkunnu
2	Changampuzha Vayanasala	32-Vettikkad
3	Kannanmaster Menmorial Library	4-Papparambu
4	Karalmanna Public Library	6-Karalmanna
5	Nanma Public Library	15- Puthanalkal
6	Kunju Nair Trust Library	8-Ambalavattam
7	Central Public Library	30-Panniyamkurussi
8	Kasthurba Library	26-Kavuvattam
9	EMS Public Library	23-Kottakkunnu

Source: Primary Survey

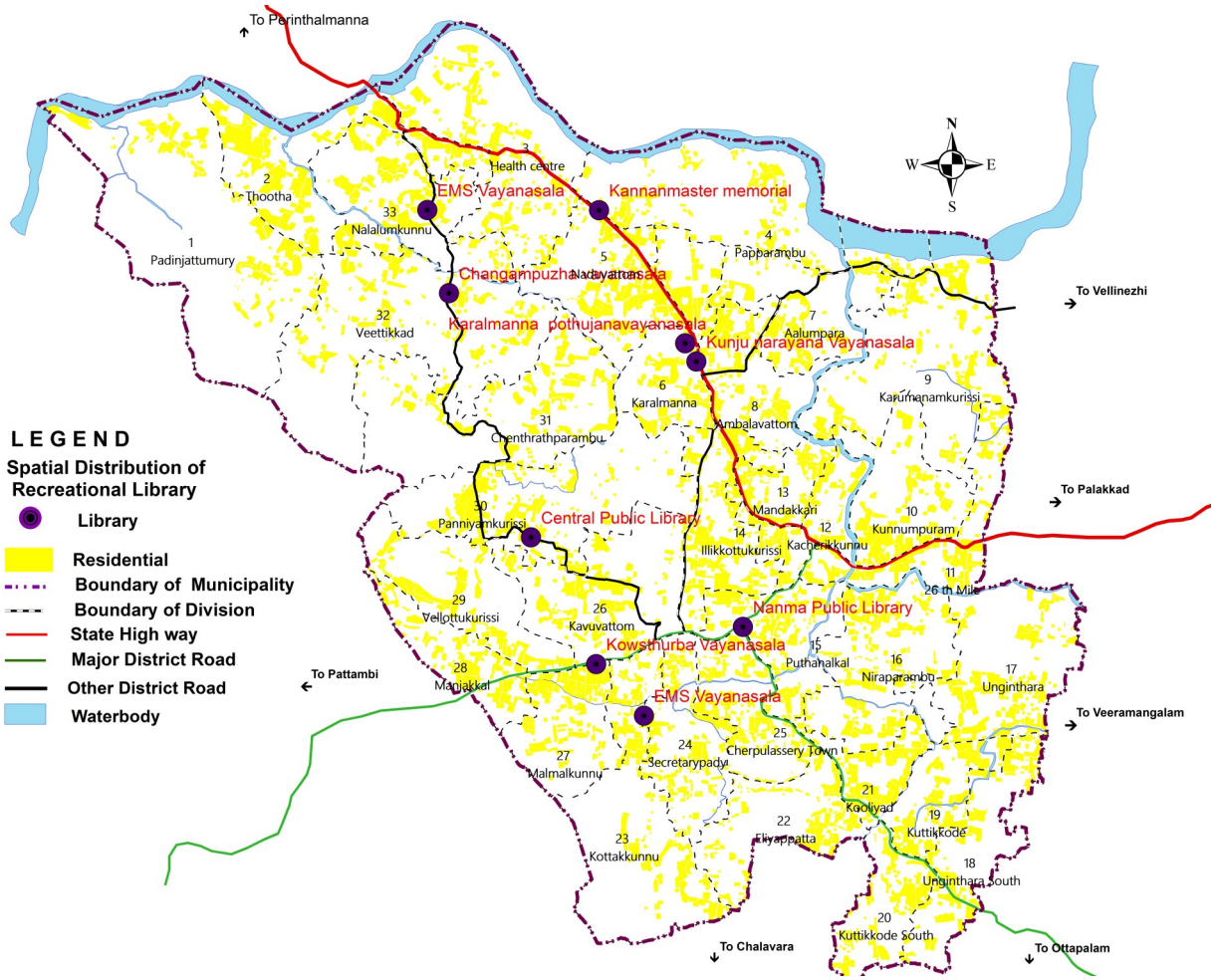


Fig. 15.3 Spatial Distribution of Libraries

15.2.2 Cultural Clubs

The municipal area consists eight number of cultural clubs with various cultural activities by the local communities. Details of cultural clubs are shown in table 15.5. The spatial distribution of cultural clubs are shown in figure 15.4.

Table 15.5 Details of Cultural Clubs

SI NO	Name	Program conducted
1	Club	Reading
2	Yuvasakhthi club	Reading
3	Sangha chedhana club	Reading
4	Read army club	Onam program
5	Arts & sports club	Onam program & annual day
6	Friends Club	Onam program & annual day
7	Brothers club	Reading
8	Chaithanya sports club	Onam program & annual day

Source: Primary Survey

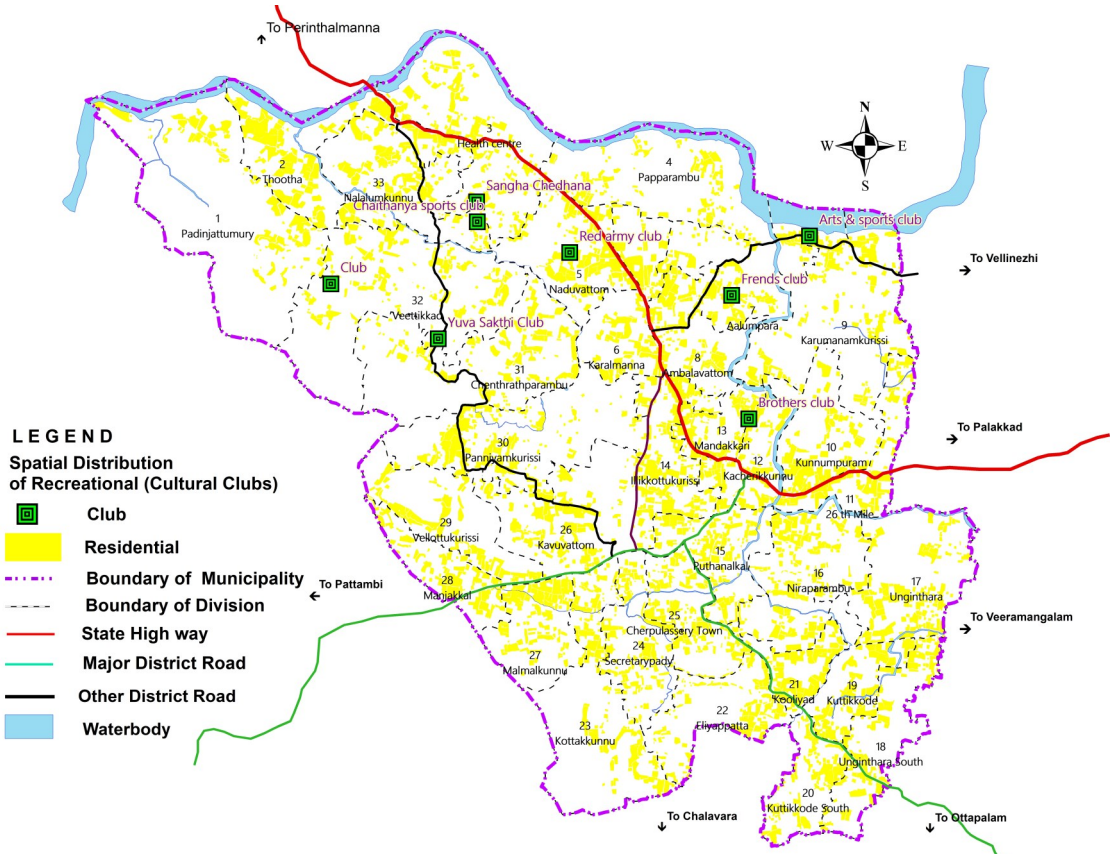


Fig. 15.4 Spatial Distribution of Cultural Clubs

15.3 PLANNING STANDARDS ANALYSIS

The land use break up of Cherpulassery municipality shows a 0.01 sq.km of park and open spaces for a population of 39,241. An indicator that can be used to assess liveability standards for cities as per ministry of urban development is per capita availability of public and recreational spaces.

$$\frac{\text{Total area of public and recreational spaces (in sq.m)}}{\text{Total Population of the town}} = 10000/39241 = 0.255$$

In other words, 0.255 square metre is available per person which is not very encouraging when compared to national urban green space standard of 8 sq.m per person.

So clearly, Cherpulassery is in need for more provisioning in term of open spaces and recreational facilities.

15.4 INFERENCE

The major deficiency associated with the recreation and cultural facilities are the lack of open play grounds and an organised park and open spaces for leisure activities. The programmes have to be framed with the possibilities and potentials within the town to meet the essential requirements of the town as well as to the sub region of the municipality.

16. OTHER CIVIC AMENITIES

This chapter deals about the other amenities of the town which were not discussed in the other chapters such as police station, fuel station, cremation ground. etc Each urban area must have these amenities to serve its civil societies.

16.1 EXISTING FACILITIES

16.1.1 Police Station

The Cherpulassery police station is located at Kacherikunnu in Ward 12 of the municipality .The service area of the police station extends up to the limits of Cherpulassery municipality and the area of neighbouring pachayaths such as Thrikkaderi , Nellaya, Kulukkallur, and Ananganadi with an extent of 41962.35 sq.m. Details of police station in Cherpulassery town are given in table 16.1. And spatial distribution of police station is shown in fig.16.1.



Cherpulassery Police station

Table 16.1 Details of Police Station

Sl No	Name	Location/ Ward	Servicing area	Remarks
1	Police station, Cherpulassery	12-Kacherikunnu	Cherpulasseri Municipality, Thrikkadeeri GP, Nellaya GP, Kulukkalloor GP, Ananganadi GP	Total area of police station limits is 41962.35 sq mtr

Source: Primary Survey

16.1.2. Communication Facilities

The communication facilities providers of the Cherpulassery municipality are mainly post office and telephone services. There are five post offices and one BSNL office that extends their services in the municipal area. Table 16.2 shows the details of communication facilities of the municipality. The figure 16.1 depicts the spatial distribution of communication facilities within the Cherpulassery.

Table 16.2 Details of Communication Facilities

Sl No	Name of Post office
1	Karumanamkurussi Post office
2	Karalmanna post
3	Panniyamkurussi post
4	Thekkumuri Post office
5	Cherpulassery sub post office
Sl No	**Name of office**
1	BSNL Office Cherpulassery Town

Source: Primary Survey

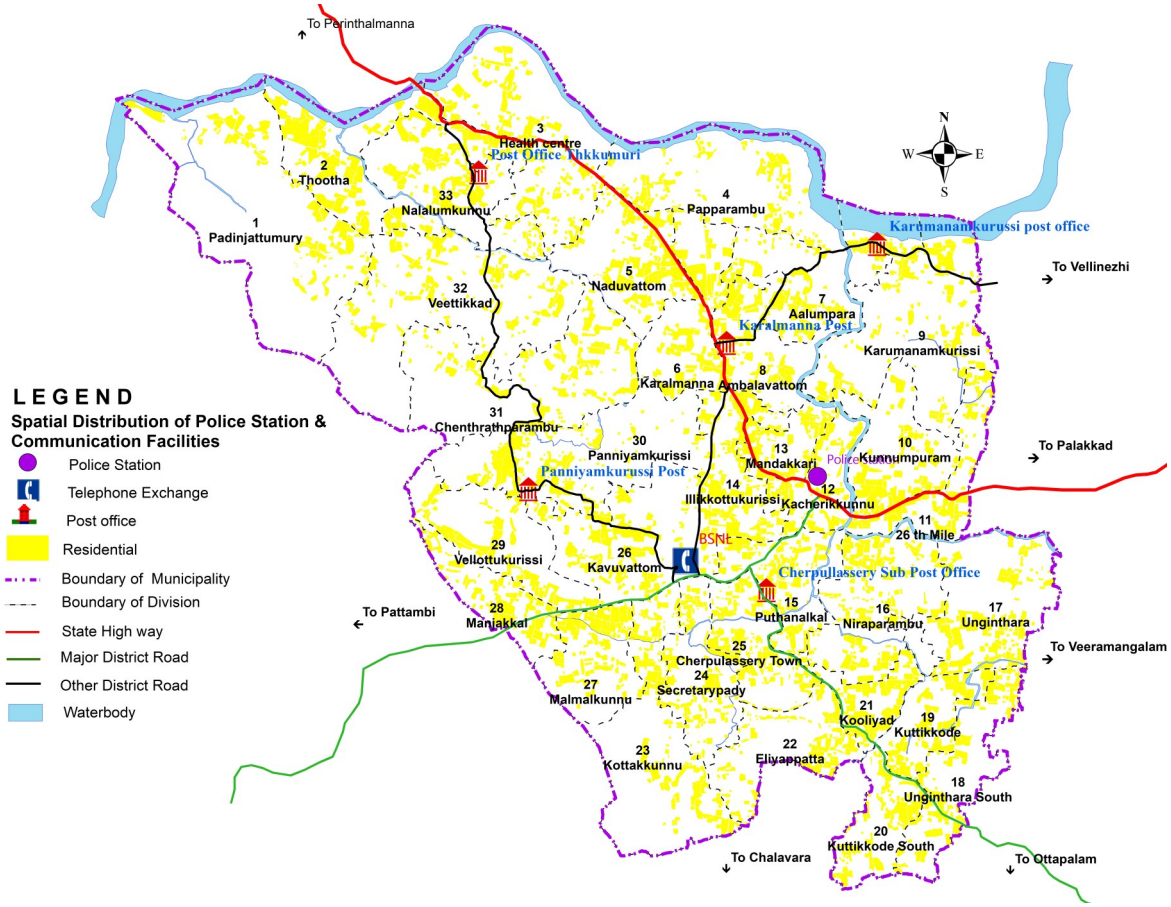


Figure 16.1.Spatial Distribution of Police Station and Communication Facilities

16.1.3 Fuel Stations & Gas Godowns

The needs of fuels for the municipal area are served by 4 numbers of Petrol pumps and one LPG gas godown with distribution centre . The details of fuel stations are depicted in table 16.3.

Table 16.3 Details of Petrol Pumps

Sl.No	Name	Location	Ward	capacity/ service area		Facilities
				Petrol	Diesel	
1	Bharat petrol pump	Manjakkal	28	25000 ltr	35000 ltr	Air checking, Re-filling & Toilet
2	Shastha Fuels	Kavuvattom	26	30000 ltr	40000 ltr	Air checking, Re-filling & Toilet
3	KV Petrolium (HP)	Eliyappatta	22	20000 ltr	30000 ltr	Air checking, Re-filling & Toilet
4	Indian Oil Petrol Pump	Malmalkunnu	27	25,000 ltr	35,000 ltr	Air checking, Re-filling & Toilet

Source: Primary Survey

All the four petrol pumps are having refilling, air checking and toilet facilities.

A gas godown namely Pavithram is located Karumanamkurussi in ward 9 of municipality having a capacity as 12000kg. Details of LPG go down in Cherpulassery town

are given in Table.16.4. The figure 16.2 shows the spatial distribution of petrol pump and gas godown .

Table 16.4 Details of Gas Godown

Sl.No	Name/Number	Location/ Ward	Capacity
1	Pavithram Bharat gas	9-Karumanamkurussi	12000 KG

Source: Primary Survey

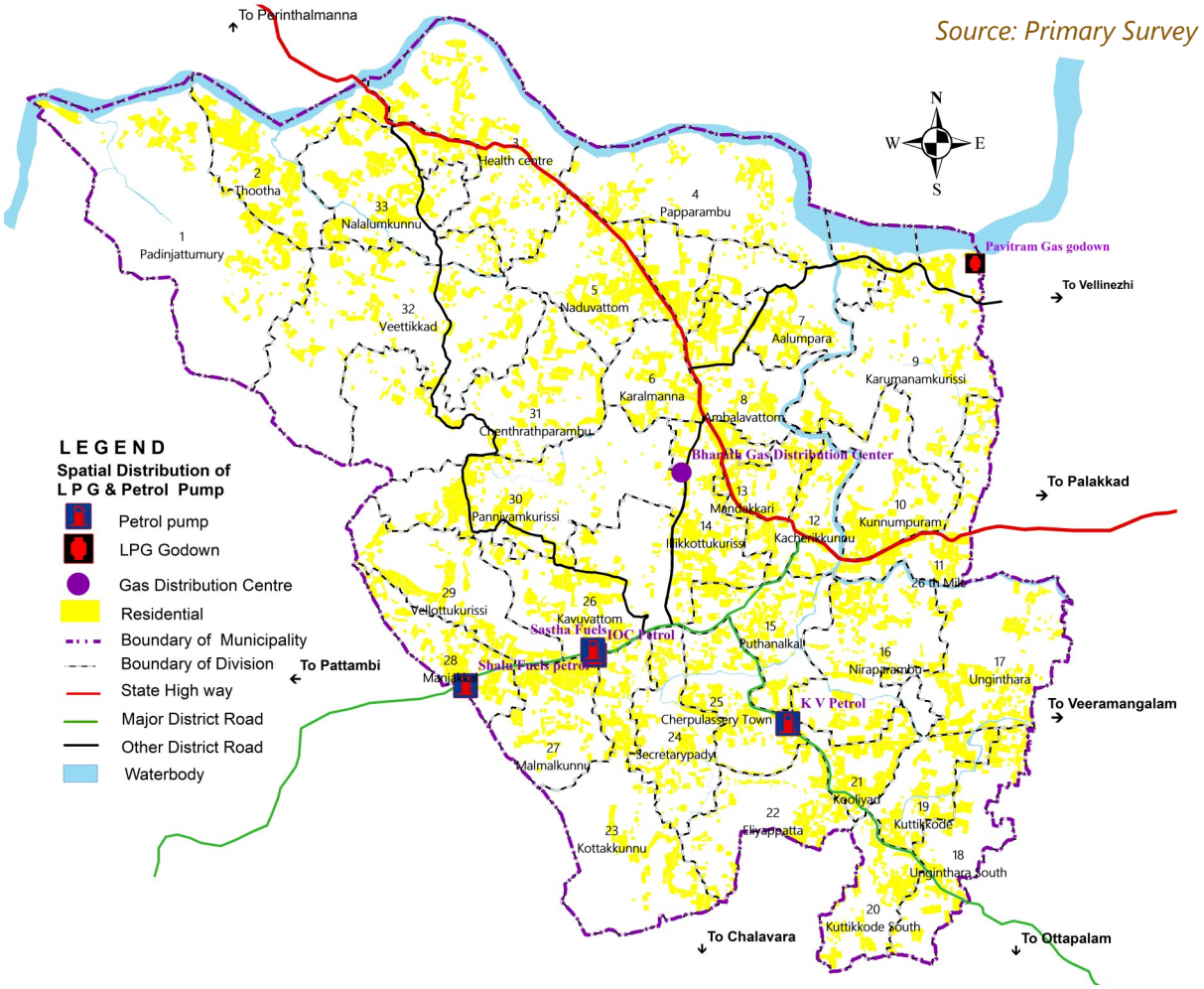


Fig. 16.2 Spatial Distribution of Petrol Pumps and Gas Godown

16.1.4 Fire Station

Fire services have to play pivotal role and be fully prepared in protecting people from fire hazards, building collapses, road accidents and other unforeseen emergencies etc. There is no fire station within the town. The nearest fire station facilities available are -Shoranur at a distance 18.3 km & Palakkad at a distance 28km.

16.1.5 Crematorium and Burial Ground

There is one crematorium owned by the Municipality located in ward-9 Karumannamkurussi. In addition to this there are 11 other burial grounds owned by different communities. Table 16.5 depicts the details of crematorium/burial grounds within the Cherpulassery Town.

Table 16.5 Details of Crematoriums in Cherpulassery

Sl.No	Name	Location	Ward	Extent
1	Kacherikkunu Juma Musjid	12- Kacherikkunnu	Ward - 13	1 Acre
2	Karalmanna Juma Musjid	6- Karalmanna	Ward - 6	1.5 Acre
3	26 mile Juma Musjid	10- Kunnumpuram	Ward -10	80 Cent
4	Madathiparambu Juma Musjid	29- Vellottukurussi	Ward - 29	1 Acre
5	Mayyathumkara Juma Musjid	21- Kooliyad	Ward - 21	1.5 Acre
6	Veeramangalam Panthalumkunnu Juma Musjid	19- Kuttikode	Ward -1 9	2 Acre
7	Kooliyadu Juma Musjid	21- Kooliyad	Ward -21	1.6 Acre
8	Kuttikod Badr Juma Musjid	21- Kooliyad	Ward -21	1 Acre
9	Kuttikod Mohiyudheen Juma Musjid	19- Kuttikode	Ward -19	50 Cent
10	Panniyamkurussi Juma Musjid	29- Vellottukurussi	Ward -29	2 Acre
11	Karumanamkurussi Puzhayoram	9- Karumanmkurussi	Ward -9	45 Cent
12	Paniyamkurussi SC Burial ground	26- Kavuvattom	Ward -26	20 Cent

Source: Primary Survey

16.1.6 Financial Institutions

About 45 financial institutions are available in the municipality, among which 10 scheduled banks, one Treasury of state government, a branch of KSFE and 18 private financial institutions. Table 16.6 shows the details of existing financial institutions present in the municipal area. Also two branches of State Bank of India and its associate are functioning within the town.

Table 16.6 Details of Financial Institutions in Cherpulassery

Financial Institutions	Nos.
State bank of India and Associates	2
Scheduled Commercial Nationalized Bank (Public Sector)	4
Scheduled Commercial Nationalized Bank (Old Gen. Private Sector)	2
Scheduled Commercial Nationalized Bank (New Gen. Private Sector)	2
Regional Rural bank	2
Co-operative bank	11
Insurance	2
District Treasury	1
KSFE	1
Other private financial institutions	18

Source: Secondary Data

16.2 PLANNING STANDARDS

As per URDPFI guidelines one police station is required for every 90,000 population. Cherpulassery police station is looking after security aspects of the Municipality.

According to URDPFI one post office is required for a population of 10,000-15,000. There are five post offices, hence the need is satisfied. According to URDPFI one telephone exchange of 40,000 lines is required for a population of 4 lakh. Presently BSNL telephone exchange office caters the needs of the residents of the Municipal Town. According to URDPFI one petrol pump is required for 150ha of gross residential area in residential zone, one petrol pump for 40 ha of gross industrial area, two petrol pumps in each district centre, and one petrol pump in each community centre. Accordingly 5 petrol pumps are required. As per norms, Bank with extension counter with ATM facility is required for a population of 15,000. Total number of banking institutions are adequate to meet the requirements.

16.3 INFERENCE

Civic amenities are to be provided as per the norm requirements in order to cater the population in the Cherpulassery Municipality.

17. TRAFFIC AND TRANSPORTATION

Transportation helps to shape an area's economic health and quality of life. Not only does the transportation system provide for the mobility of people and goods, it also influences patterns of growth and economic activity by providing access to land. A transportation system may be defined as consisting of the fixed facilities, the flow entities, and the control systems that permit people and goods to overcome the friction of geographical space efficiently in order to participate in a timely manner in some desired activity.

17.1 EXISTING SCENARIO

The transport network of Cherpulassery is predominantly road connectivity to the neighbouring towns like Ottappalam, Shoranur, Perinthalmanna, Pattambi and Mannarkkad with State Highways and Major district roads. The major road network of Cherpulassery town are as follows:

- Cherpulassery – Pattambi road
- SH 53 from Palakkad – Cherpulassery – Perinthalmanna road
- Ottappalam – Cherpulassery road
- Cherpulassery – Karalmanna Bypass road
- Karalmanna – Karumanamkurissi – Vellinezhi road
- Cherpulassery – Panniyamkurissi – Thootha Puzha road
- Eliyapetta (Ottappalam road) – Chalavara road

Cherpulassery Town is a major transit centre to the neighbouring towns and served by public transport system consisting of both State owned Kerala State Road Transport Corporation (KSRTC) and private buses. .

Shoranur railway station, one of the major railway junctions of Kerala State is located at a distance of about 18 km from the centre of the town. The Shoranur – Nilambur railway line passes on the western side of Cherpulassery town.

Although Thootha Puzha passes along the border of the town, there is no scope for inland water transport in the town.The residents of Cherpulassery town depends on Karippur Airport located at a distance of 60 km from the town for their air travel needs.

17.2 VEHICLE POPULATION

Growth trend: The trend in vehicular growth has been phenomenal all over the State and almost the same trend is observed in the case of Palakkad district also. The

growth of motor vehicles in Palakkad district during the period from 2006 to 2016 is given in Table 17.1. It can be seen that the vehicle population in Palakkad district has grown by more than 3.1 times during the last ten years. Temporal variation of growth index of vehicles in Palakkad district is shown in Fig. 17.1.

Table 17.1 Temporal Variation of Growth Index of Vehicles in Palakkad District

Year	No. of Vehicles	Growth Index
2006	217,724	100.00
2007	258,131	118.52
2008	283,308	130.12
2009	312,549	143.55
2010	348,248	159.95
2011	397,134	182.42
2012	445,703	204.71
2013	670,461	307.94
2014	588,140	270.13
2015	647,896	297.58
2016	675,991	310.48

Source: Socio-Economic Review 2017

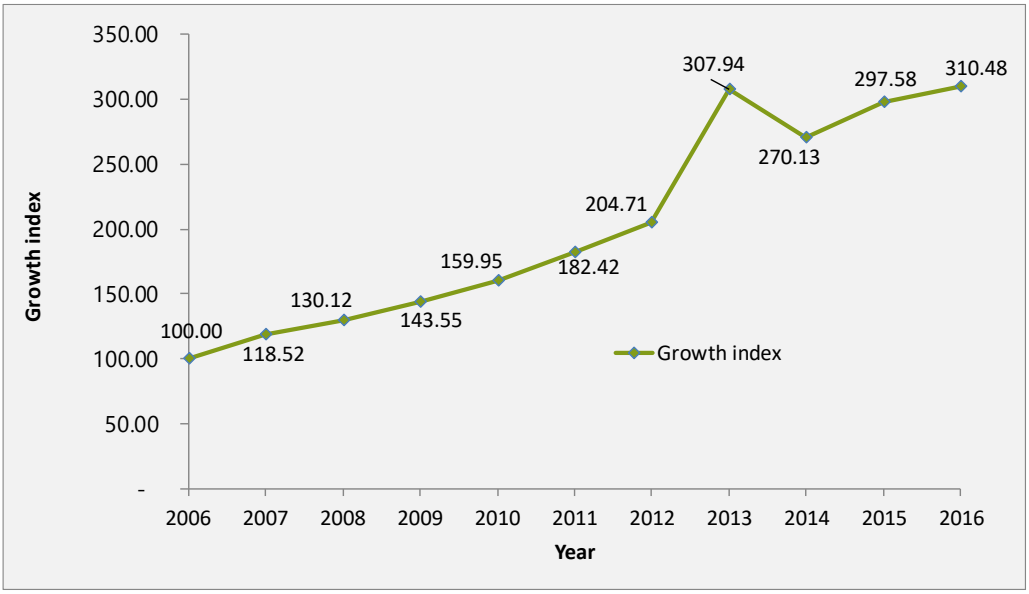


Fig. 17.1. Temporal Variation of Growth Index of Vehicles in Palakkad District.

The table 17.2 shows the types of vehicles and Figure 17.2 shows the percentage share of various types of vehicle. It is revealed that 69 % of total vehicle population is under motor cycle and scooters, followed by 15 % as cars, 7 % as auto-rikshaws and all other vehicles constitute only 9 % of total vehicles.

Table 17.2 Types of Vehicles in Palakkad District

Sl. No.	Type of vehicle	Palakkad District
1	Four wheelers & above	25,395
2	Three wheelers including Tempos	11,769
3	Stages carriages	2,128
4	Contract Carriages /Omni Buses	4,018
5	Cars	99,379
6	Taxis	6,641
7	Jeeps	-
8	Auto rickshaws	44,909
9	Motorised Cycle rickshaws	-
10	Motorised cycles	-
11	Scooter/Motor cycles	466,043
12	Tractors	3,244
13	Tillers	118
14	Trailers	-
15	Others	12,347
	Total	675,991

Source: Socio-Economic Review 2017

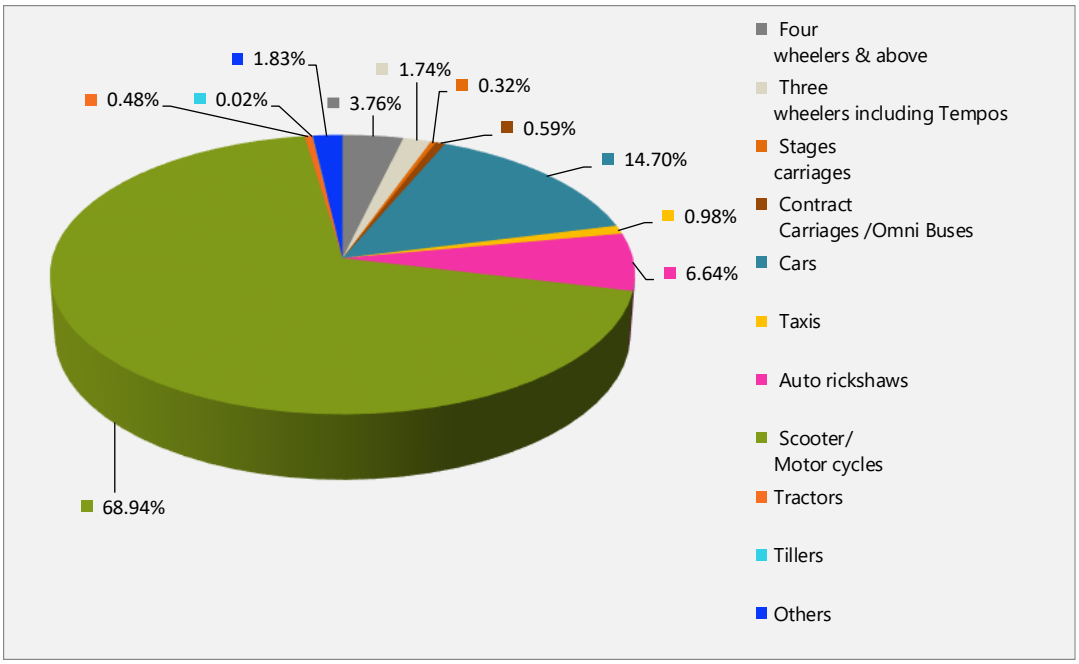


Fig. 17.2 Percentage of Registered Motor Vehicles in Palakkad District in 2015.

17.3 EXISTING ROAD NETWORK

The main existing roads within the Municipality are the State Highway 53 (SH 53), Major District Road (MDR and Other District Road (ODR). The details of these major are shown in table 17.3. Apart from these main roads, roads like Eliyapetta - Chalavara, Karalmanna - Vellinezhi, Thootha – Kulappida, Eliyapetta – Veeramangalam, EMS

road etc are also connected to neighbouring destinations of the municipality. These roads have width less than 4.00 M only. Fig. 17.3. shows the existing road network in Cherpulassery town.

Table 17.3. Details of Major Roads in Cherpulassery Town

Sl.no.	Name of Road	Length (km)
1	SH 53- Palakkad-Perinthalmanna	7
2	Pattambi - Cherpulassery	4.2
3	Cherpulassery-Ottappalam	3.4
4	Karalmannabypass(connecting PattambiPerinthalmanna Road)	1.6

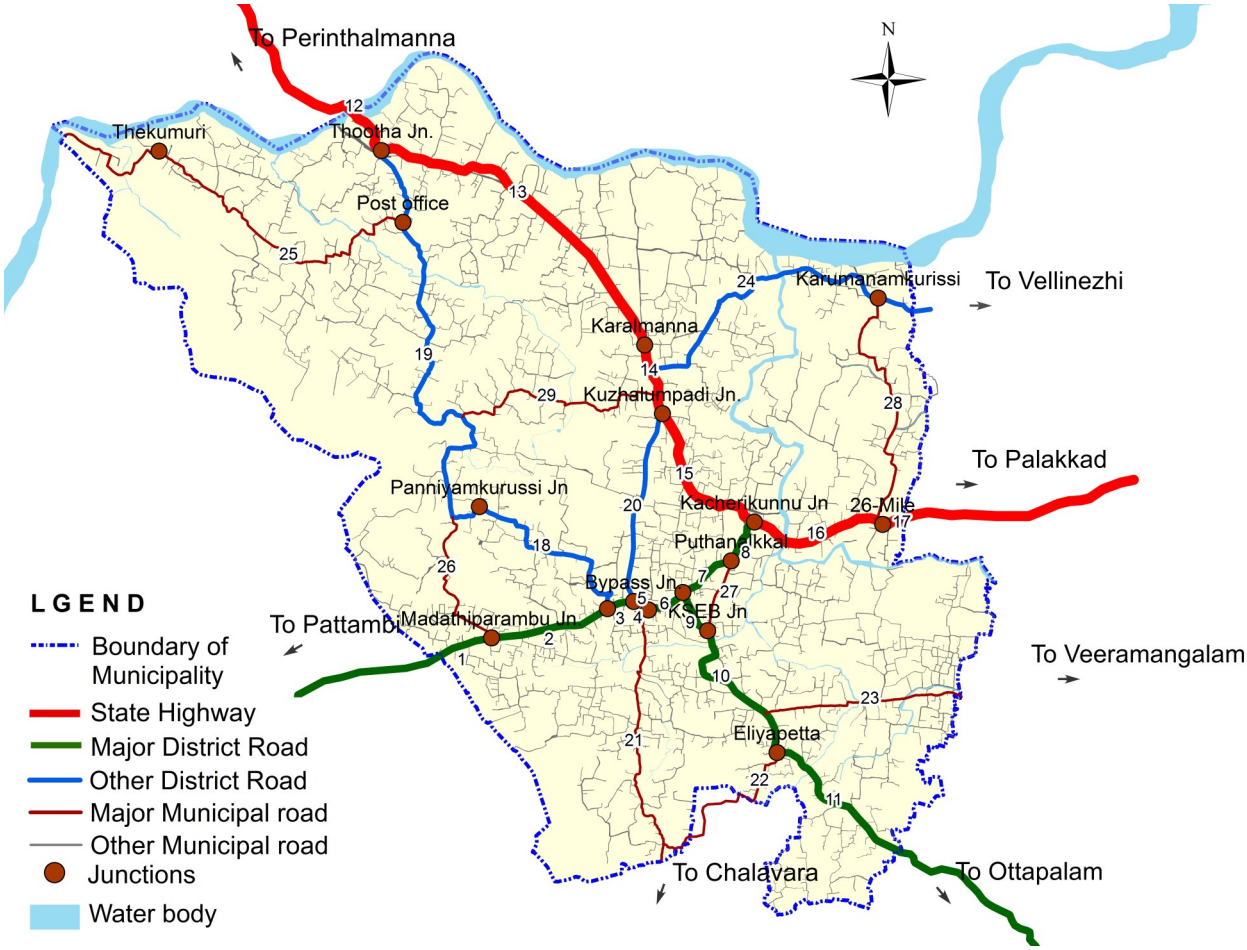


Fig. 17.3 Existing Road Network in Cherpulassery Town

I Pattambi - Cherpulassery Road

1 Pattambi Border - Madathiparambu

2 Madathiparambu - Hospital Jn

3 Hospital Jn - Karalmanna Bypass Jn

4 Karalmanna Bypass Jn - EMS Road Jn

5 EMS Road Jn - Bus Station

6 Bus Station - Central Jn

7. Central Jn - Puthanalkkal Jn

8. Puthanalkkal Jn- Kacherykkunnu

II Cherpulassery to Ottappalam road

9. Central Jn - KSEB JN

10. KSEB JN - Eliyappatta Jn

11. Eliyappatta Jn - Ottappalam Border

III. Palakkad - Cherpulassery - Perinthalmanna road

12. Perinthalmanna Border - Thootha Jn

13. Thootha Jn - Karalmanna Jn

14. Karalmanna Jn - Kuzhalumpadi Jn

15. Kuzhalumpadi Jn - Kacherikkunnu

16. Kacherikkunnu - 26th Mile Jn

17. 26th Mile Jn - Palakkad Border

IV Panniyamkurissi road

18. Hospital Jn - Panniyamkurissi

19. Panniyamkurissi - Thootha Jn

V Bypass Road

20. Karalmanna Bypass Jn - KuzhalumpadiJn

VI EMS Road

21. EMS road Jn - Chalvara Border

VII Chalavara Road

22. Eliyapatta Jn - chalvara Border

VIII Market road

23. Eliyappatta Jn - Veeramangalam (Market Road)

IX Vellinezhi road

24. Karalmanna - Vellinezhi Border
25. Thootha - Thachangad road
26. Post Office Jn - Kulappida border

X Other Roads

27. Madathiparambu - Panniyamkurissi
28. Puthonalikkal Jn - KSEB Jn
29. 26th Mile Jn - Karumanamkurissi
30. Karalmanna - Panniyamkurissi

An understanding of the extent and quality of road network is very important to formulate plans for the future. A detailed inventory of existing road network will be carried out to obtain information like road length, cross-sections, hierarchical pattern of roads, surface condition, intersections, street furniture, parking area, bus bays, drainage condition of road etc. All the roads within and outside the town limits which are of importance to the development of transport network of the town will be covered in the road inventory survey.

Regarding availability of footpath, only 1.2km of road between Hospital Jn and Puthanalkkal Jn on Pattambi – Cherpulassery road had footpath in the entire town. The width of the footpath was found to be between 1.0m and 1.5m and was awfully inadequate and sub-standard.

32km of roads within Cherpulassery were found to be bus routes in which 25 bus stops were located on either side of the roads. 14 bus stops were found to have waiting sheds. They were of ordinary type without any modern facilities and also lack uniformity. Segregated bus bays were not provided in any of the road stretches in the town.

17.4 ROAD INTERSECTIONS

Intersection is an area shared by two or more roads. This area is designated for the vehicles to turn to different directions to reach their desired destinations. Its main function is to guide vehicles to their respective directions. Traffic intersections are complex locations on any highway. This is because vehicles moving in different direction want to occupy same space at the same time. In addition, the pedestrians also seek same space for crossing. Drivers have to make split second decision at an intersection by considering his route, intersection geometry, speed and direction of other vehicles etc. A small error in judgment can cause severe accidents. It also causes delay and it depends on type, geometry, and type of control. Overall traffic flow depends on the performance of the intersections. It also affects the capacity of the road. Therefore,

Table 17.4 Inventory of Major Roads in Cherpulassery Town

HS No.	Homogeneous section		Length (km)	Average Width (m)	Average Shoulder width LHS (m)	Average Shoulder width RHS (m)	Footpath		Landuse	
							LHS(m)	RHS(m)	LHS(m)	RHS(m)
I	**Pattambi - Cherpulasserry road**									
1	Pattambi Border	Madathiparambu	0.5	7	3	3	-	-	C+R	C+R
2	Madathiparambu	Hospital Jn	1.1	7	2	2	-	-	C	C+R
3	Hospital Jn	Karalmanna Bypass Jn	0.2	7.5	2	2	1	1	C	C
4	Karalmanna Bypass Jn	EMS Road Jn	0.1	7.5	3	3	1	1	C	C
5	EMS Road Jn	Bus Station	0.1	7.5	3	3	1	1	C	C
6	Bus Station	Central Jn	0.3	7	3	3	1	1	C	C
7	Central Jn	Puthanalkkal Jn	0.5	9	2	2	1.5	1	C	C
8	Puthanalkkal Jn	Kacherykkunnu	0.4	6	2	2	-	-	O+C	O+C
II	**Cherpulasserry to Ottappalam road**									
9	Central Jn	KSEB JN	0.4	5	4	4	-	-	C	C
10	KSEB JN	Eliyappatta Jn	1.2	5	4	4	-	-	C+R+AG	C+R+AG
11	Eliyappatta Jn	Ottappalam Border	1.8	5	4	4	-	-	C+R+O+E	C+R+O+E
III	**Palakkad - Cherpulasserry - Perinthalmanna road**									
12	Perinthalmanna Border	Thootha Jn	0.3	7	3.5	3.5	-	-	R+C	R+C
13	Thootha Jn	Karalmanna Jn	2.9	7	3.5	3.2	-	-	R+O	R+O
14	Karalmanna Jn	Kuzhalumpadi Jn	0.7	7	3	3	-	-	R + C	R + C
15	Kuzhalumpadi Jn	Kacherikkunnu	1.5	7	3	3	-	-	R + C	R + C
16	Kacherikkunnu	26th Mile Jn	1.2	7.5	4	4	-	-	R+O	R+O
17	26th Mile Jn	Palakkad Border	0.3	7.5	4	4	-	-	R+O	R+O
IV	**Panniyamkurissi road**									
18	Hospital Jn	Panniyamkurissi	2	3	1.5	1.5	-	-	R+AG+E	R+AG+E
19	Panniyamkurissi	Thootha Jn	4.9	3	1.5	1.5	-	-	R+O+AG	R+O+AG
V	**Bypass road**									
20	Karalmanna Bypass Jn	Kuzhalumpadi Jn	1.6	4.5	3.5	3.5	-	-	E+O	C+R+O

Table 17.4.Continuied..

HS No.	Homogeneous section		Length (km)	Average Width (m)	Average Shoulder width LHS (m)	Average Shoulder width RHS (m)	Footpath		Landuse	
							LHS(m)	RHS(m)	LHS(m)	RHS(m)
VI	**EMS Road**									
21	EMS road Jn	Chalvara Border	2.5	4.5	1	1	-	-	C+O+R	C+O+R
VII	**Chalavara road**									
22	Eliyapatta Jn	Chalvara Border	1.9	4.5	1	1	-	-	R+O	R+O
VII	**Market road**									
23	Eliyappatta Jn	Veeramangalam (Market Road)	2.5	3.5	1	1	-	-	R+O	R+O
VIII	**Vellinezhi road**									
24	Karalmanna	Vellinezhi Border	3.9	3.5	0.5	0.5	-	-	R+O	R+O+E
IX	**Thootha - Thachangad road**									
25	Post Office Jn	Kulappida border	4.2	3.5	1	1	-	-	AG+C+R	AG+C+R
X	**Other roads**									
26	Madathiparambu	Panniyamkurissi	1.4	3	1	1	-	-	R+O+AG	R+O+AG
27	Puthonalikkal Jn	KSEB Jn	0.7		3		1	1	KSEB	O+R
28	26h Mile Jn	Karumanamkurissi	2.4	3	0.5	0.5	-	-	R+O	R+O
29	Karalmanna	Panniyamkurissi	1.3	3	1	1	-	-	AG+C+R	AG+C+R

LHS:- Left Hand Side , RHS:- Right Hand Side

Note :- C - Commercial, R - Residential O - Open space, AG – Agricultural, E—Eductional,

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC,2018

both from the accident perspective and the capacity perspective, the study of intersections very important for the traffic study especially in the case of urban scenario. Fig. 17.4. shows the locations of major road intersections in Cherpulassery town. Details of major road intersections in Cherpulassery town is in Table 17.5.



Fig. 17.4. Location of Major Road Intersections in Cherpulassery Town

Table 17.5 Details of Major Roads Intersections in Cherpulassery Town

Sl. No.	Name of intersection	No. of arms
1	Madathiparambu Jn	3
2	Hospital Jn	3
3	Bypass Jn	3
4	EMS Jn	3
5	Central Jn	3
6	Puthanalkkal Jn	3
7	Kacherikkunnu Jn	3
8	Kuzhalumpadi Jn	3
9	Karalmanna College Jn	3
10	Thootha Jn	3
11	Eliyappatta Jn	3

A brief profile of the intersections as here under;

Madathiparambu junction

Madathiparambu junction is located on Pattambi-Cherpulassery road close to the municipal border. It is a three arm intersection with the third arm leading to Panniyamkurissi. Pattambi road has two lane road width while the road to Panniyamkurissi has narrow width. Medium level commercial activities and an educational institution are located in the influence area of the junction creating substantial pedestrian activities. Bus stop located close to the junction occasionally create traffic problems.

The junction handled a peak hour traffic flow of 1,749 PCU with major traffic movements along Pattambi-Cherpulassery road. Traffic movements towards and from Panniyamkurissi side were in the range of 30 to 97 PCU only and indicate low cross movements. Fig. 17.5. and Table 17.6. shows the Peak hour traffic flow at Madathiparambu Junction.

Table 17.6. Peak Hour Traffic flow at Madathiparambu Junction in Cherpulassery

Sl. No.	Type of vehicle	1.Pattambi to Palakkad	2. Pattambi to Panniyamkurissi	3. Panniyamkurissi to Pattambi	4. Panniyamkurissi to Palakkadu	5. Palakkad to Panniyamkurissi	6. Palakkad to Pattambi	Total
1	KSRTC bus	1	-	-	-	-	-	1
2	Private Bus	24	-	-	-	-	21	45
3	Other Buses	3	2	-	-	4	9	18
4	Mini Bus/ Tempo	4	3	-	2	4	2	15
5	Car/ van/ Jeep	177	14	15	29	20	114	369
6	Passenger auto	132	19	13	32	33	100	329
7	Two wheeler	725	21	13	53	46	473	1,331
8	Mutli axled Truck	-	-	-	-	-	1	1
9	Truck	9	-	-	1	-	12	22
10	Mini truck/ tempo	16	-	-	1	1	23	41
11	Goods auto	14	3	1	2	1	15	36
12	Bi-cycle	-	4	-	-	1	-	5
13	Others	-	-	-	-	-	-	-
	Total (No)	1,105	66	42	120	110	770	2,213
	Total (PCU)	827	59	36	97	97	634	1,749

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC,2018



Madathiparambu junction

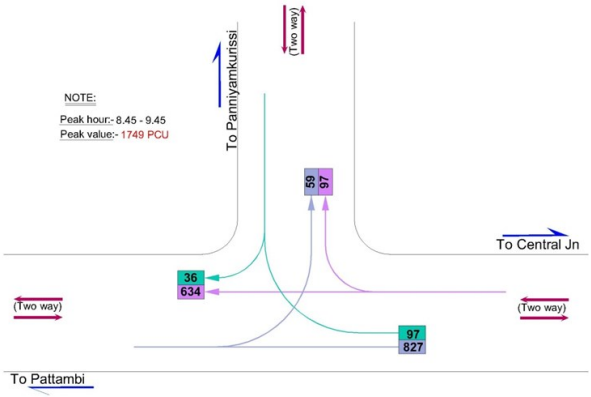


Fig. 17.5 Peak Hour Traffic flow at Madathiparambu junction in Cherpulassery town.

Hospital Junction

Hospital junction located on Pattambi-Cherpulassery road is a three arm intersection with the third arm leading to Panniyamkurissi. Pattambi road has two lane road width while the road to Panniyamkurissi has narrow width at the entry point lacking adequate turning radii. Major traffic generating points like Taluk Hospital, Municipal office and an important temple are located close to the junction generating large volume of parking and pedestrian activities. An auto stand and bus stop is located at the middle of the junction complicating traffic congestion at the junction during peak hours. The junction handled a peak hour traffic flow of 1,701 PCU with major traffic movements along Pattambi-Cherpulassery road. Although traffic movements towards and from Panniyamkurissi side were quite low in the range of 13 to 63 PCU traffic conflicts during such movements are causing considerable traffic problems at the junction area. Fig.17.6. and Table 17.7 shows the Peak hour traffic flow at Hospital Junction.



Hospital junction

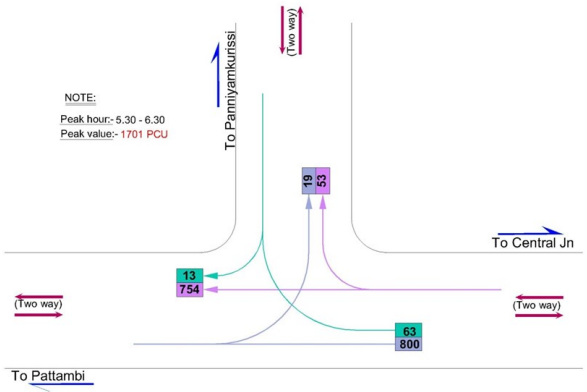


Fig.17.6 Peak Hour Traffic flow at Hospital junction in Cherpulassery town

Bypass Junction

Bypass junction located on Pattambi-Cherpulassery road is a three arm intersection with the third arm leading to Kuzhalumpadi on Perinthalmanna road. This arm serves as a bypass known as Karalmanna bypass connecting Pattambi road and Perinthalmanna road and enable vehicles to move from Pattambi to Perinthalmanna without

Table 17.7. Peak Hour Traffic flow at Hospital Junction in Cherpulassery Town

Sl. No.	Type of vehicle	1. Pattambi to Palakkad	2.Pattambi to Panniyamkurussi	3. Panniyamkurussi to Pattambi	4. Panniyamkurussi to Palakkad	5.Palakkad to Panniyamkurussi	Palakkad to Pattambi	Total
1	KSRTC bus	1	-	-	-	-	1	2
2	Private Bus	21	-	-	1	1	22	45
3	Other Buses			-	-	-	1	1
4	Mini Bus/ Tempo	1	-	-		-	2	3
5	Car/ van/ Jeep	211	5	1	8	10	220	455
6	Passenger auto	198	6	6	28	24	205	467
7	Two wheeler	508	12	12	43	31	399	1,005
8	Mutli axled Truck	-	-					-
9	Truck	9	-	-	-		9	18
10	Mini truck/ tempo	15	-	-	1		11	27
11	Goods auto	20	2				11	33
12	Bi-cycle				1		-	1
13	Others						-	-
	Total (No)	984	25	19	82	66	881	2,057
	Total (PCU)	800	19	13	63	53	754	1,702

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

touching the central area of Cherpulassery town. Pattambi road has two lane road width, while the Karalmanna bypass has narrow width at the entry point. The junction is located in the core of CBD area of the town with location of large number of commercial establishments and the bus station nearby.

Large volume of parking and pedestrian activities are witnessed at the junction during most part of the day. Traffic regulatory measures are totally absent at this junction to regulate conflicting movements of traffic which cause traffic congestion during peak hours. The junction handled a peak hour traffic flow of 2,365 PCU with major traffic movements along Pattambi-Cherpulassery road. There are considerable movements (543 PCU) towards and from Karalmanna side which create traffic congestion at the junction during peak hours. Fig. 17.7. and Table 17.8. shows the Peak hour traffic flow at Bypass Junction.

E.M.S. Road Junction

EMS road junction located on Pattambi-Cherpulassery road is a three arm intersection with the third arm known as EMS road leading to Chalavara. Pattambi road has more than two lane capacity while the EMS road has narrow width at the entry point.

The junction is located in the core of CBD area of the town with location of large



Bypass junction

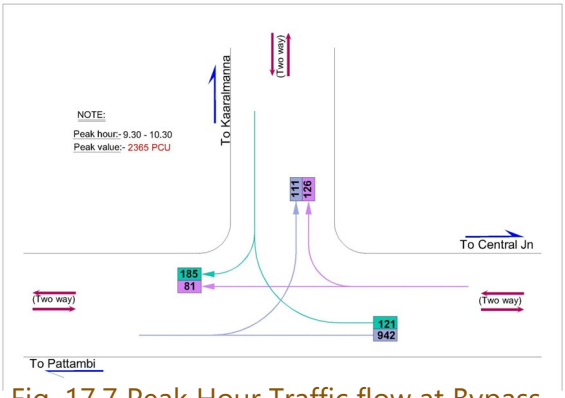


Fig. 17.7 Peak Hour Traffic flow at Bypass junction in Cherpulassery Town

Table 17.8 Peak Hour Traffic flow at Bypass Junction in Cherpulassery

Sl. No.	Type of vehicle	1 Pattambi to Cherpulassery	2 Pattambi to Karalmanna	3 Karalmanna to Pattambi	4 Karalmanna to Cherpulassery	5 Cherpulassery to Karalmanna	6 Cherpulassery to Pattambi	Total
1	KSRTC bus	1	-	-	-	-	-	1
2	Private Bus	28	-	-	-	-	28	56
3	Other Buses	12	-	2	-	-	7	21
4	Mini Bus/ Tempo	5	2	-	-	1	3	11
5	Car/ van/ Jeep	268	40	49	32	30	176	595
6	Passenger auto	228	25	51	45	45	272	666
7	Two wheeler	428	56	133	88	84	446	1,235
8	Mutli axled Truck	-	-	-	-	-	-	-
9	Truck	5	4	-	-	1	16	26
10	Mini truck/ tempo	34	2	5	-	2	19	62
11	Goods auto	31	-	1	-	1	24	57
12	Bi-cycle	-	-	-	-	-	-	-
13	Others	1	-	1	-	-	-	2
	Total (No)	1,041	129	242	165	164	991	2,732
	Total (PCU)	942	111	185	121	126	881	2,365

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

number of commercial establishments and the bus station nearby. EMS road also has relatively high level of commercial activities for a length of about 200m. Large volume of parking and pedestrian activities are witnessed at the junction during most part of the day. To avoid conflicting movements of traffic at the junction, right turning movements from Pattambi arm to Chalavara arm and from Chalavara arm to Palakkad arm have been prohibited by placing a barricade at the main road.

The junction handled a peak hour traffic flow of 1,991 PCU with major traffic movements along Pattambi-Cherpulassery road. However, traffic movements to and from Chalavara are also found to be substantial with 269 PCU of movements even though right turning movements are banned at the junction. Fig.17.8. and Table 17.9 shows the Peak hour traffic flow at E.M.S road junction.



EMS Junction

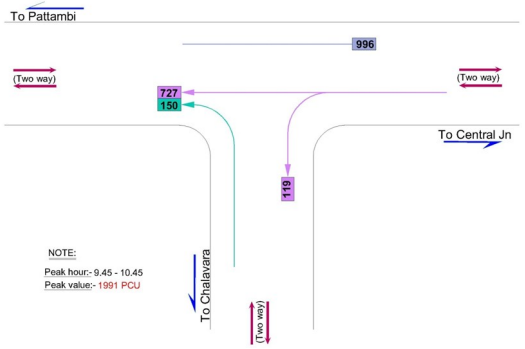


Fig.17.8. Peak Hour Traffic flow at E.M.S. Road

Table 17.9 Peak Hour Traffic flow at E.M.S. road Junction in Cherpulassery

Sl.No.	Type of Vehicle	1 Chalavara to Palakkad	2 Chalavara to Pattambi	3. Pattambi to Chalavara	4. Pattambi to Palakkad	5. Palakkad to Chalavara	6. Palakkad to Chalavara	Total
1	KSRTC bus	-	-	-	-	-	-	-
2	Private Bus	-	-	-	20	16	1	37
3	Other Buses	-	-	-	-	1	-	1
4	Mini Bus/Tempo	-	1	-	2	4	1	8
5	Car/Van/Jeep	-	25	-	194	212	25	456
6	Passenger auto	-	93	-	320	206	38	657
7	Two Wheeler	-	49	-	639	302	70	1060
8	Multi axled Truck	-	-	-	-	2	-	2
9	Truck	-	1	-	3	9	4	17
10	Mini truck/tempo	-	-	-	40	22	-	62
11	Goods auto	-	3	-	30	23	4	60
12	Bi-Cycle	-	-	-	-	2	-	2
13	Others	-	-	-	-	2	-	2
	Total (No)	-	172	-	1,248	801	143	2,364
	Total (PCU)	-	150	-	996	727	119	1,991

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Central Junction

Being the meeting point of three major roads namely Pattambi road, Palakkad/ Mannarkkad road and Ottappalam road, Central junction is the commercial hub of Cherpulassery Town with location of commercial activities all along the three roads. Large volume of parking and pedestrian activities are present on all arms of the junction during most part of the day. Although all the roads have more than two lane width within the junction area, conflicting movements of traffic have made the junction a congested one with traffic bottlenecks occurring quite frequently. To and fro traffic movements on all the directions have been segregated by making use of temporary dividers. The bell mouth between Ottappalam and Cherpulassery arms is found to be inadequate causing problems for vehicular movements. Again it is compounded by the light elevation of Cherpulassery arm of the intersection.

The junction handled a peak hour traffic flow of 1,774 PCU with high traffic movements of 802 PCU along Pattambi-Palakkad road. About 600 PCU of traffic movements were observed between Ottappalam and Pattambi direction and 360 PCU between Ottappalam and Palakkad direction.Fig.17.9. and Table 17.10. shows the Peak hour traffic flow at Central junction.



Central Junction

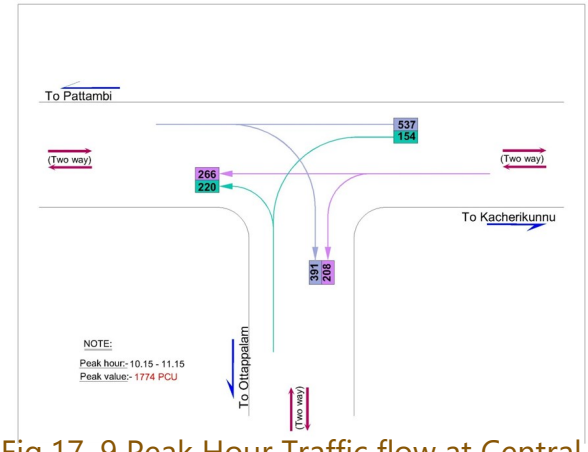


Fig.17. 9 Peak Hour Traffic flow at Central junction in Cherpulassery Town

Table 17.10. Peak Hour Traffic flow at Central Junction in Cherpulassery

Sl. No.	Type of vehicle	1 Ottappalam to Palakkad	2 Ottappalam to Pattambi	3 Pattambi to Ottappalam	4 Pattambi to Palakkad	5 Palakkad to pattambi	6 palakkad to Ottapalam	Total
1	KSRTC bus	-	-	-	1	-	-	1
2	Private Bus	-	24	18	30	25	-	97
3	Other Buses	-	-	2	-	-	-	2
4	Mini Bus/ Tempo	2	-	-	-	-	-	2
5	Car/ van/ Jeep	46	43	89	115	60	58	411
6	Passenger auto	41	49	110	160	63	58	481
7	Two wheeler	81	62	152	293	70	111	769
8	Mutli axled Truck	-	-	-	-	-	1	1
9	Truck	2	7	7	2	4	6	28
10	Mini truck/ tempo	6	1	11	6	5	3	32
11	Goods auto	8	2	18	7	13	9	57
12	Bi-cycle	1	-	-	-	-	-	1
13	Others	-	-	-	-	-	-	-
	Total (No)	187	188	407	614	240	246	1,882
	Total (PCU)	154	220	391	537	266	208	1,774

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Puthanalkal junction

Located on a horizontal curve of Cherpulassery – Palakkad road, Puthanalkkal junction is a three arm intersection from where a link road connecting Ottappalam

road deviates from. The famous PuthanalkkalBhagavathy temple is located close to the bell mouth of Ottappalam and Cherpulassery arms. Commercial activities are almost absent at the junction leading to relatively low pedestrian and parking demand. The main road is a two lane road while the link road has intermediate lane width. The junction handled a peak hour traffic flow of 1,162 PCU with major share of traffic movements of about 1,000 PCU along Cherpulassery-Palakkad road. Only 161 PCU of traffic movements were observed to and from Ottappalam. Fig.17.10. and Table 17.11. shows the Peak hour traffic flow at Puthanalkal junction.



Puthanalkal Junction

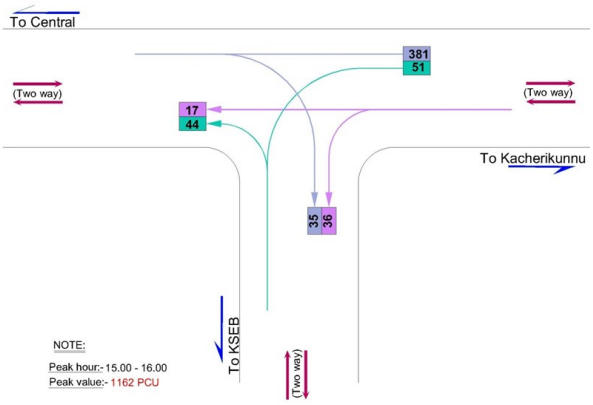


Fig.17.10. Peak hour traffic flow at Puthanalkal junction in Cherpulassery town

Table 17.11. Peak Hour Traffic flow at Puthanalkal junction in Cherpulassery

Sl. No.	Type of vehicle	1.Ottappalam to Palakkad	2. Ottappalam to Cherpulasserry	3. Cherpulasserry to Ottappalam	4.Cherpulasserry to Palakkad	5.Palakkad to Cherpulasserry	6. Palakkad to Ottappalam	Total
1	KSRTC bus	-	-	-	1	1	-	2
2	Private Bus	-	-	-	30	24	-	54
3	Other Buses	1	-	2	1	1	-	5
4	Mini Bus/ Tempo	-	-	-	1	4	-	5
5	Car/ van/ Jeep	12	3	7	92	132	10	256
6	Passenger auto	9	23	12	58	108	4	214
7	Two wheeler	36	33	19	143	383	35	649
8	Mutli axled Truck	-	-	-	1	3	-	4
9	Truck	1	-	-	6	8	1	16
10	Mini truck/ tempo	1	-	-	18	30	-	49
11	Goods auto	4	1	-	12	19	1	37
12	Bi-cycle	-	-	-	-	-	-	-
13	Others	-	-	-	-	-	-	-
	Total (No)	64	60	40	363	713	51	1,291
	Total (PCU)	51	44	35	381	617	36	1,162

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Kacherikunnu Junction

Meeting point of three major roads namely Cherpulassery road, Perinthalmanna road and Palakkad/ Mannarkkad road, it is a critical intersection located on State Highway from Palakkad to Perinthalmanna. Located at an elevation from Cherpulassery and Palakkad arms, Perinthalmanna road slopes upwards from the junction creating visibility problems for vehicles from all directions and making it an accident prone location. Medium level commercial activities are found on all the arms of the junction and a mosque located at the bell mouth of the junction between Cherpulassery and Perinthalmanna protrudes in to the junction affecting turning radius for both light and heavy vehicles. The junction lack traffic control devices to streamline movement of vehicles through different directions creating traffic congestion at peak hours. These are compounded by location of bus stops in the junction area itself on all the arms where buses are parked frequently for picking up and dropping passengers.

The junction handled a peak hour traffic flow of 2,108 PCU with the highest traffic movements of about 845 PCU along Cherpulassery-Palakkad road, followed by 654 PCU between Palakkad and Perinthalmanna and slightly less equal traffic movements between Cherpulassery and Perinthalmanna directions. Fig.17.11. and Table 17.12. shows the Peak hour traffic flow at Puthanalkal junction.



Kacherikunnu Junction

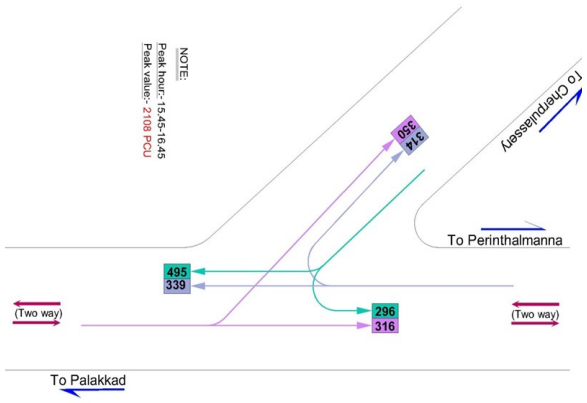


Fig.17.11. Peak Hour Traffic flow at Kacherikunnu junction in Cherpulassery Town

Kuzhalumpadi Junction

Karalmanna bypass originating from Cherpulassery – Pattambi road meets the Palakkad – Perinthalmanna at this junction creating a three arm intersection. As there are relatively low level of commercial activities at the junction area, parking and pedestrian activities were also found to be quite minimal. There are no traffic control devices to regulate conflicting movements of vehicles which occasionally cause traffic bottlenecks. Karalmanna bypass originating from Cherpulassery – Pattambi road meets the Palakkad – Perinthalmanna at this junction creating a three arm intersection. As there are relatively low level of commercial activities at the junction area, parking and pedes-

Table 17.12. Peak hour traffic flow at Kacherikunnu junction in Cherpulassery.

Sl. No.	Type of vehicle	1. Mannarkkad to Perinthalmanna	2.Mannarkkad to Cherpulasserry	3. Cherpulasserry to Mannarkkad	4. Cherpulasserry to Perinthalmanna	5. Perinthalmanna to Cherpulasserry	6. Perinthalmanna to Mannarkkad	Total
1	KSRTC bus	-	1	-	1	-	1	3
2	Private Bus	-	9	17	11	1	13	51
3	Other Buses	-	-	3	1	-	1	5
4	Mini Bus/ Tempo	2	-	2	2	1	2	9
5	Car/ van/ Jeep	183	157	111	100	38	74	663
6	Passenger auto	103	94	65	61	26	48	397
7	Two wheeler	250	263	154	138	62	140	1,007
8	Mutli axled Truck	-	-	1	-	3	2	6
9	Truck	2	2	9	6	7	10	36
10	Mini truck/ tempo	5	4	11	7	9	13	49
11	Goods auto	5	3	1	5	4	7	25
12	Bi-cycle	-	-	-	-	1	-	1
13	Others	-	-	-	-	1	1	2
	Total (No)	550	533	374	332	153	312	2,254
	Total (PCU)	433	428	365	306	156	310	1,996

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

trian activities were also found to be quite minimal. There are no traffic control devices to regulate conflicting movements of vehicles which occasionally cause traffic bottle-necks.

The junction handled a peak hour traffic flow of 954 PCU with major share of traffic movements (632 PCU) occurring between Perinthalmanna and Palakkad directions. Substantial traffic movements (300 PCU) were observed between Cherpulassery and Perinthalmanna directions also. Fig.17.12. and Table 17.13. shows the Peak hour traffic flow at Kuzhalumpadi junction.



Kuzhalumpadi Junction

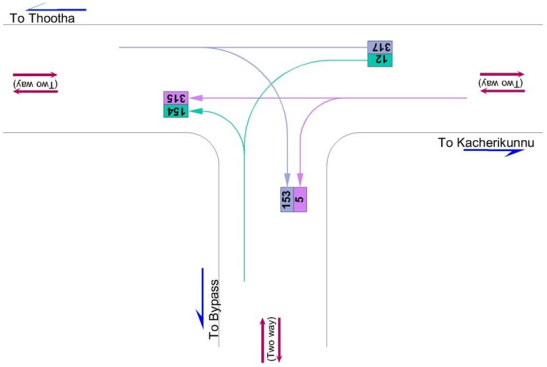


Fig.17.12 Peak hour traffic flow at Kuzhalumpadi junction in Cherpulassery town

Table 17.13 Peak hour traffic flow at Kuzhalumpadi Junction in Cherpulassery

Sl. No.	Type of vehicle	1 Palakkad to Perinthalmanna	2 Palakkad to Cherpulasserry	3 Cherpulasserry to Palakkad	4 Cherpulasserry to Perinthalmanna	5 Perinthalmanna to Cherpulasserry	6 Perinthalmanna to Palakkad	Total
1	KSRTC bus	1	-	-	-	-	1	2
2	Private Bus	10	-	-	1	-	14	25
3	Other Buses	1	-	-	-	-	1	2
4	Mini Bus/ Tempo	-	-	-	1	-	1	2
5	Car/ van/ Jeep	104	3	4	35	37	72	255
6	Passenger auto	35	1	4	58	58	48	204
7	Two wheeler	144	2	8	92	106	174	526
8	Mutli axled Truck	2	-	-	2	1	1	6
9	Truck	10	-	-	-	-	9	19
10	Mini truck/ temp	11	-	-	-	-	13	24
11	Goods auto	10	-	-	1	-	9	20
12	Bi-cycle	4	-	-	-	-	-	4
13	Others	-	-	-	-	-	-	-
	Total (No)	332	6	16	190	202	343	1,089
	Total (PCU)	315	5	12	154	153	317	954

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Karalmanna College Junction

Located on Palakkad –Perinthalmanna road, college junction is a three arm intersection from where road to Cherpulassery College of Science and Technology leads to. Minor commercial activities are observed in the influence area of the junction. The main road has a two lane road width while the college road has a narrow road width at the entry point and merges at an acute angle.

The junction handled a peak hour traffic flow of 970 PCU with bulk of the traffic movements (830 PCU) occurring between Perinthalmanna and Palakkad directions. Traffic movements to and from the college were found to be negligible. Fig.17.14. and Table 17.14. shows the Peak hour traffic flow at Puthanalkal junction.



Karalmanna College Junction

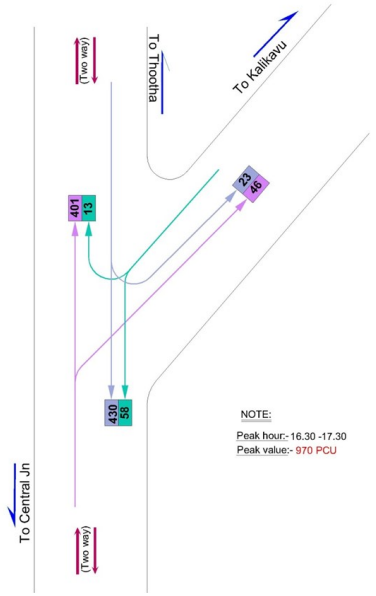


Fig.17.13 Peak hour traffic flow at Karalmanna college junction in Cherpulassery Town

Table 17.14 Peak hour traffic flow at Karalmanna college junction in Cherpulassery

Sl. No.	Type of vehicle	1 Palakkad to Kalikavu	2 Palakkad to Perinthalmanna	3 Perinthalmanna to Palakkad	4 Perinthalmanna to Kalikavu	5 Kalikavu to Perinthalmanna	6 Kalikavu to Palakkad	Total
1	KSRTC bus	-	-	1	-	-	-	1
2	Private Bus	-	10	10	-	-	-	20
3	Other Buses	-	9	4	1	-	3	17
4	Mini Bus/ Tempo	-	1	2	-	1	-	4
5	Car/ van/ Jeep	4	132	136	4	2	7	285
6	Passenger auto	14	50	57	6	1	21	149
7	Two wheeler	48	163	171	18	12	37	449
8	Mutli axled Truck	-	3	6	-	-	-	9
9	Truck	-	14	11	-	-	-	25
10	Mini truck/ tempo	1	14	18	-	1	-	34
11	Goods auto	-	4	13	-	-	1	18
12	Bi-cycle	5	-4	-1	2	1	2	5
13	Others	-	-	1	-	-	-	1
	Total (No)	72	396	429	31	18	71	1,017
	Total (PCU)	46	401	430	23	13	58	970

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Thootha Junction

Thootha junction is located on a horizontal alignment of Palakkad – Perinthalmanna road, near the district border. It is K shaped four arm intersection with the other two arms leading to Panniyamkurissi and Thekkemuri respectively. As these two arms are sloping upwards from the junction, the vehicles coming from these arms place themselves in safety risk while moving into the main road due to visibility problems. Devoid of major commercial facilities, parking and pedestrian activities were also found to be quite low except for an auto stand located within the junction area.

The junction handled a peak hour traffic flow of 806 PCU with bulk of the traffic movements (669 PCU) occurring between Perinthalmanna and Palakkad directions. Traffic movements to and from other two arms were found to be negligible. Fig.17.15 and Table 17.15. shows the Peak hour traffic flow at Puthanalkal junction.

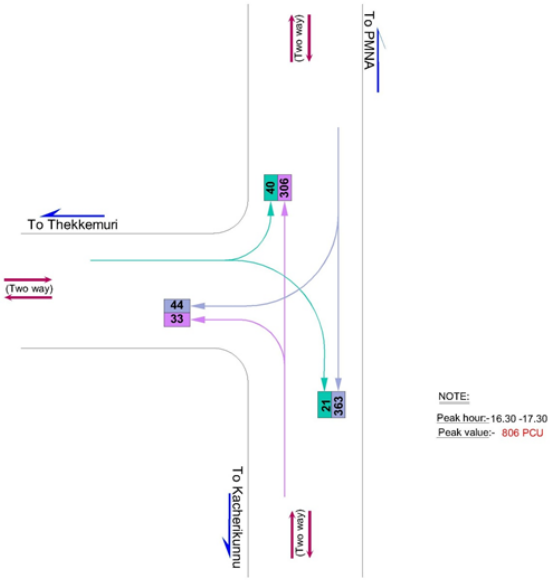


Fig.17.14 Peak hour traffic flow at Thootha junction in Cherpulassery town

Table 17.15. Peak hour traffic flow at Thootha junction in Cherpulassery.

Sl. No.	Type of vehicle	1 Palakkad to Perinthalmanna	2 Palakkad to Thekkemuri	3 Thekkemuri to Palakkad	4 Thekkemuri to Perinthalmanna	5 Perinthalmanna to Thekkemuri	6 Perinthalmanna to Palakkad	Total
1	KSRTC bus	-	-	-	-	-	1	1
2	Private Bus	10	-	-	-	1	10	21
3	Other Buses	7	-	-	1	1	3	12
4	Mini Bus/ Tempo	1	2	1	2	2	1	9
5	Car/ van/ Jeep	93	7	7	10	10	91	218
6	Passenger auto	28	4	4	8	12	84	140
7	Two wheeler	123	14	9	13	16	116	291
8	Mutli axled Truck	3	-	-	-	-	4	7
9	Truck	14	3	-	2	1	9	29
10	Mini truck/ tempo	7	-	2	1	-	18	28
11	Goods auto	4	3	1	1	2	14	25
12	Bi-cycle	2	-	-	1	-	-	3
13	Others	-	-	-	-	-	-	-
	Total (No)	292	33	24	39	45	351	784
	Total (PCU)	306	33	21	40	44	363	806

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Eliyapetta Junction

Eliyapetta junction is a three arm Y shaped intersection located on a horizontal alignment of Cherpulassery - Ottappalam road. Third arm of the junction leads to Chalavara and further to Shoranur. Substantial commercial activities are prevalent at the junction, breeding parking and pedestrian activities. The junction handled a peak hour traffic flow of 1,320 PCU with bulk of the traffic movements (1,156 PCU) occurring between Cherpulassery and Ottappalam directions. Traffic movements to and from other Chalavara were found to be quite low with about 165 movements. Fig. 17.15 and Table 17.16. shows the Peak hour traffic flow at Puthanalkal junction.



Eliyapetta Junction

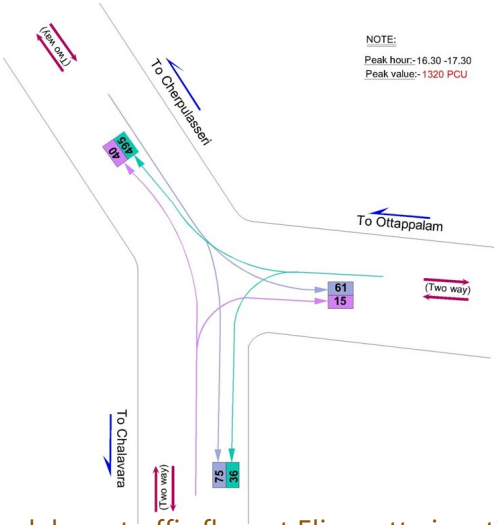


Fig.17.15 Peak hour traffic flow at Eliyapetta junction in Cherpulassery town

Table 17.16. Peak hour traffic flow at Eliyapetta junction in Cherpulassery

Sl. No.	Type of vehicle	1 Chalavara to Ottappalam	2 Chalavara to Cherpulasserry	3 Cherpulasserry to Chalavara	4 Cherpulasserry to Ottappalam	5 Ottappalam to cherpulasserry	6 Ottappalam to Chalavara	Total
1	KSRTC bus	-	-	-	1	-	-	1
2	Private Bus	-	1	3	12	6	-	22
3	Other Buses	-	-	-	1	4	-	5
4	Mini Bus/ Tempo	-	-	-	1	-	1	2
5	Car/ van/ Jeep	4	5	19	201	156	9	394
6	Passenger auto	5	17	21	168	134	12	357
7	Two wheeler	9	19	42	252	234	17	573
8	Mutli axled Truck	-	-	-	4	-	-	4
9	Truck	-	-	-	17	10	-	27
10	Mini truck/ tempo	1	2	1	28	12	2	46
11	Goods auto	-	2	3	11	10	1	27
12	Bi-cycle	-	-	-	-	-	-	-
13	Others	-	-	-	-	-	-	-
	Total (No)	19	46	89	696	566	42	1,458
	Total (PCU)	15	40	75	661	495	35	1,320

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

17.5 CHARACTERISTIC STUDIES OF TRANSPORTATION NETWORK

The characteristics studies of transportation network carried to ascertain the intra-city and inter-city travel characteristics, parking demand, pedestrian flow, goods movement, traffic flow pattern, level of service and volume-capacity of different roads. The analyses of such characteristics are detailed hereunder.

17.5.1 Traffic Volume Survey

Knowledge of the traffic volume using a road network is important to understand the efficiency at which the system works and the general quality of service offered to road users. Classified traffic volume counts were carried out at (i) outer cordon points, (ii) mid blocks on important corridors, and (iii) important intersections. The traffic flows were converted into Equivalent Passenger Car Units (PCU) by using conversion factors as suggested by Indian Roads Congress (IRC).

Traffic volume at outer cordon points

Link volume counts on outer cordon points would be required for establishing inter-city goods as well as passenger movement covering external-internal, internal-external and external-external trips. Outer cordon points on MDR, SH and NH would be considered for volume count survey. The survey will be carried out continuously for a period ranging between eight hours to 24 hours on a normal working day depending on the importance of the road and intensity of traffic. On National Highways and State

Highways, the traffic volume will be conducted for a period of 16 hours.

Volume survey was conducted at the middle point of each of the homogeneous sections in Cherpulassery Town. Peak hour traffic volume estimated for various homogeneous sections in Cherpulassery Town is given in Table 17.17. and expressed as a flow diagram in Fig. 17.16.



Fig. 17.16. Peak Hour Traffic Volume on Major Road Stretches in Cherpulassery Town.

Distribution of vehicles passing through the four outer cordon points in Cherpulassery Town during the 16 hour period between 06.00 Hrs and 22.00 Hrs are given in Table 17.18. The maximum traffic volume of 15,460 PCU was observed on the Pattambi road, followed by about 12,103 PCU at Palakkad road. Perinthalmanna road had traffic volume of 11,384 PCU and Ottappalam road had 10,364 PCU. Traffic flow through outer cordon locations are graphically shown in Fig. 17.17.

It could be seen that Cherpulassery - Pattambi road carried the peak hour traffic volume ranging between 1,100 PCU on Central Jn – Puthanalkkal section and 2,100 PCU on Bypass – EMS road Jn.

Pattambi Cherpulassery road had the highest peak hour volume of 2,069 PCU between Karalmanna Bypass Jn. & EMS Road Jn. and the least volume of 972 PCU between Central & KSEB Jn.

Table 17.17 Peak Hour Traffic Volume on Major Road Stretches in Cherpulassery Town.

HS No.	Name of homogeneous section		KSRTC bus	Private Bus	Other Buses	Mini Bus/ Tempo	Car/ van/ Jeep	Passenger auto	Two wheeler	Mutli axled Truck	Truck	Mini truck/ tempo	Goods auto	Bi-cycle	Others	Total (No.)	Total (PCU)
I. Pattambi - Cherpulasserry road																	
1	Pattambi Border	Madathiparambu	1	45	14	9	320	264	1,232	1	21	39	33	4		1,983	1,555
2	Madathiparambu	Hospital Jn	1	45	16	12	340	297	1,297	1	22	41	32	1		2,105	1,654
3	Hospital Jn	Karalmanna Bypass Jn	2	45	1	3	449	455	981		18	27	31	1		2,013	1,669
4	Karalmanna Bypass Jn	EMS Road Jn	1	56	19	9	506	590	1,046		22	55	56		1	2,361	2,069
5	EMS Road Jn	Bus Station		37	1	7	431	564	1,011	2	16	62	57	2	2	2,192	1,841
6	Bus Station	Central Jn	1	97	2		307	382	577		20	23	40			1,449	1,412
7	Central Jn	Puthanalkkal Jn	1	55		2	279	322	555	1	14	20	37	1		1,287	1,164
8	Puthanalkkal Jn	Kacherykkunnu	2	38	4	5	406	246	617	4	24	31	13	1	1	1,392	1,254
II. Cherpulasserry to Ottappalam road																	
9	Central Jn	KSEB JN		42	2	2	236	258	406	1	22	21	37	1		1,028	972
10	KSEB JN	Eliyappatta Jn	1	22	5	1	381	340	547	4	27	43	26			1,397	1,270
11	Eliyappatta Jn	Ottappalam Border	1	18	5	2	370	319	512	4	27	43	22			1,323	1,206
III. Palakkad - Cherpulasserry - Perinthalmanna road																	
12	Perinthalmanna Border	Thootha Jn	1	21	12	6	204	132	268	7	26	26	21	3		727	752
13	Thootha Jn	Karalmanna Jn	1	20	14	4	274	114	364	9	25	33	17	(2)	1	874	866
14	Karalmanna Jn	Kuzhalumpadi Jn	2	25	2	2	248	199	516	6	19	24	20	4		1,067	937
15	Kuzhalumpadi Jn	Kacherikkunnu	2	25	2	7	395	238	590	5	25	34	21	1	2	1,347	1,204
16	Kacherikkunnu	26th Mile Jn	2	39	4	6	525	310	807	3	23	33	16		1	1,769	1,535
17	26th Mile Jn	Palakkad Border	1	31	7	9	322	238	389	19	43	45	40			1,144	1,207

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Table 17.17 Continued.

HS No.	Name of homogeneous section		KSRTC bus	Private Bus	Other Buses	Mini Bus/ Tempo	Car/ van/ Jeep	Passenger auto	Two wheeler	Mutli axled Truck	Truck	Mini truck/ tempo	Goods auto	Bi-cycle	Others	Total (No.)	Total (PCU)
IVPanniyamkurissi road																	
18	Hospital Jn	Panniyamkurissi	-	2	-	-	24	64	98	-	-	1	2	1	-	192	147
19	Panniyamkurissi	Thootha Jn	-	1	2	7	34	28	52	-	6	3	7	1	-	141	138
V. Bypass road																	
20	Karalmanna Bypass Jn	Kuzhalumpadi Jn	-	-	2	3	151	166	361	-	5	9	2	-	1	700	543
VI. EMS Road																	
21	EMS road Jn	Chalvara Border	-	1	-	2	50	131	119	-	5	-	7	-	-	315	269
VII. Chalavara road																	
22	Eliyapatta Jn	Chalvara Border	-	4	-	1	37	55	87	-	-	6	6	-	-	196	164
VIII. Market road																	
23	Eliyappatta Jn	Veeramangalam (Market Road)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IX. Vellinezhi road																	
24	Karalmanna	Vellinezhi Border	-	-	4	1	17	42	115	-	-	2	1	10	-	192	139
X. Thootha - Thachangad road																	
25	Post Office Jn	Kulappida border	-	1	2	7	34	28	52	-	6	3	7	1	-	141	138
XI. Other roads																	
26	Madathiparambu	Panniyamkurissi	-	-	6	9	78	97	133	-	1	2	7	5	-	338	289
27	Puthonalikkal Jn	KSEB Jn	-	-	3	-	32	48	123	-	2	1	6	-	-	215	164

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Table 17.18 Distribution of 16 Hour Inbound Outbound Traffic at Outer Cordon Points in Cherpulassery Town.

Sl.No	Type of vehicle	Ottappalam road (6 to 10)			Pattambi road (6 to 10)			Perinthalmanna road (6 to 10)			Palakkad road (6 to 10)		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
1	KSRTC bus	7	4	11	7	11	18	5	14	19	9	9	18
2	prvt bus	120	131	251	260	241	501	167	136	303	196	212	408
4	Other buses	23	25	48	31	23	54	30	19	49	35	16	51
6	Mini bus/ tempo	20	26	46	30	63	93	13	34	47	35	26	61
7	Car	1195	1,469	2,664	2,245	1,508	3,753	1,358	1,509	2,867	1,534	1,731	3,265
8	Pass auto	999	1,238	2,237	1,852	1,642	3,494	641	485	1,126	673	1,032	1,705
9	Two wheeler	2472	2,715	5,187	5,138	3,985	9,123	1,995	2,259	4,254	2,267	2,470	4,737
10	MAT	6	15	21	14	4	18	89	125	214	65	91	156
11	Truck	107	160	267	133	42	175	395	202	597	209	281	490
12	Mini-truck/ tempo	176	233	409	215	206	421	294	335	629	214	292	506
13	Goods auto	165	185	350	272	239	511	182	172	354	77	222	299
14	Bi-cycle	7	-	7	4	5	9	2	-	2	-	-	-
16	Others	2	-	2	8	2	10	4	3	7	1	2	3
	Total (No)	5,299	6,201	11,500	10,209	7,971	18,180	5,175	5,293	10,468	5,315	6,384	11,699
	Total (PCU)	4,699	5,666	10,364	8,696	6,765	15,460	5,848	5,537	11,384	5,435	6,669	12,103

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

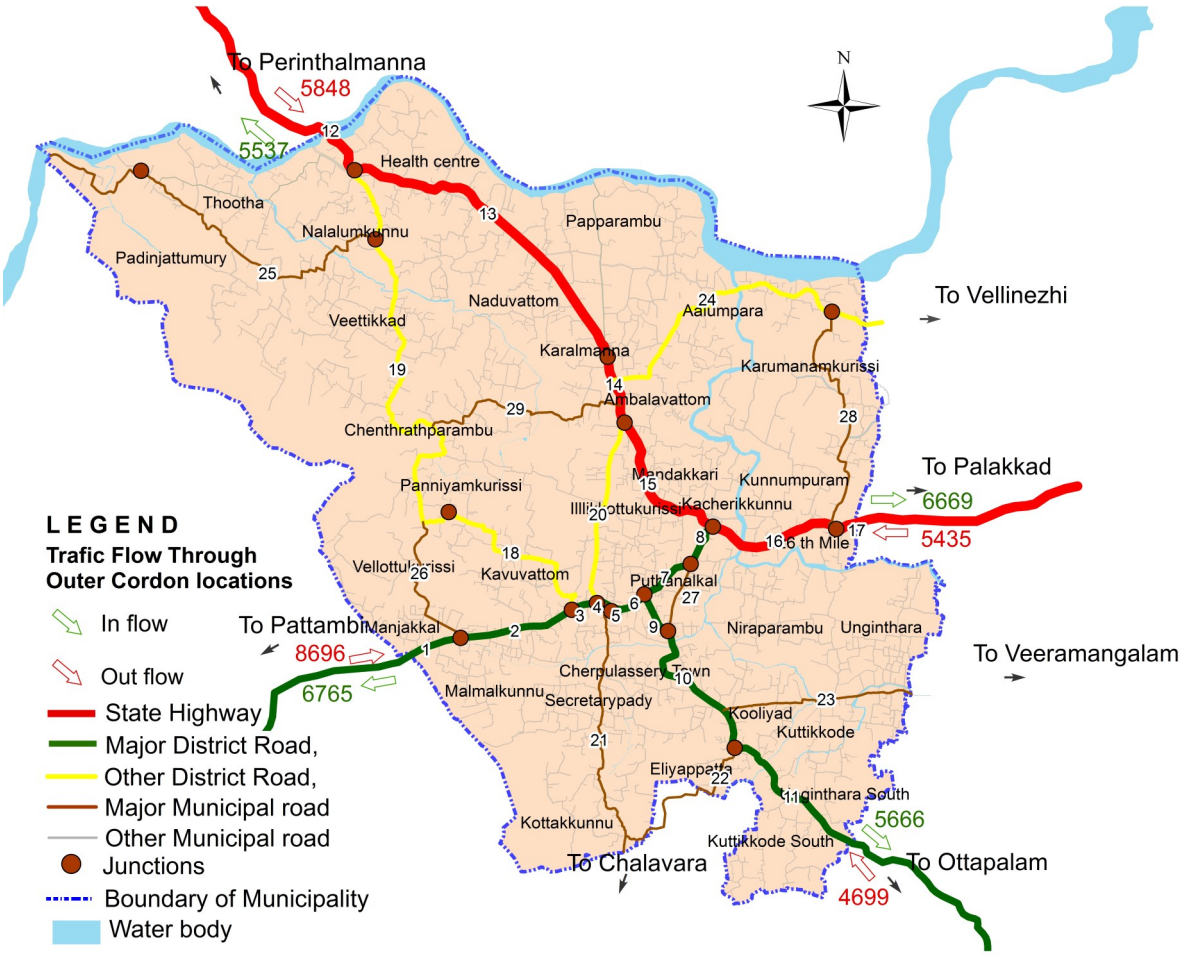


Fig. 17.17 Traffic flow through outer cordon locations in Cherpulassery town

On Palakkad-Cherpulassery-Perinthalmanna road, the highest peak hour volume of 1,535 PCU was observed between Kacherikkunnu and 26th mile Jn and the lowest volume of 752 PCU on Thootha Jn - Perinthalmanna Border.

Apart from these three major roads, all other roads had peak hour traffic volume less than 600 PCU.

Within the CBD area of the town circumscribed by KSEB Jn on Ottappalam road, Puthanalkkal Jn on Palakkad road and Hospital Jn on Pattambi road, the traffic volume ranged between 1,000 and 2,100 PCU.

Traffic volume at Intersections

The capacity of urban roads to a great extent depends on capacity of intersections. Thus the intersections have an important role to play in efficient and smooth traffic flow in the network. The volume count at selected intersections will be carried out for four hours in the morning between 7.30 AM and 11.30 AM and for four hours in the evening between 3.30 PM and 7.30 PM to ascertain the morning and evening peak hour traffic demands. Table 17.19 shows the peak hour traffic volume at major road intersections of Cherpulassery town. Total volume, composition of traffic and turning characteristics will be recorded for different types of vehicles by trained field staff for

each intersection separately. The traffic flows will be converted into equivalent Passenger Car Units (PCU) by using conversion factors as suggested by Indian Roads Congress (IRC).

Table 17.19 Peak hour traffic volume at major road intersections in Cherpulassery town

Sl. No.	Name of intersection	No. of arms	Peak hour traffic (PCU)	Peak hour	
1	Madathiparambu Jn	3	1,749	8.45	9.45
2	Hospital Jn	3	1,701	17.30	18.30
3	Bypass Jn	3	2,365	9.30	10.30
4	EMS Jn	3	1,991	10.00	11.00
5	Central Jn	3	1,774	10.30	11.30
6	Puthonikkal Jn	3	1,162	8.00	9.00
7	Kacherikkunnu Jn	3	1,996	17.00	18.00
8	Kuzhalumpadi Jn	3	954	17.30	18.30
9	Karalmanna College Jn	3	970	16.30	17.30
10	Thootha Jn	3	806	16.30	17.30
11	Eliyappatta Jn	3	1,320	16.45	17.45

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

It could be seen that Bypass Jn recorded the highest peak hour traffic volume of 2,365 PCU, followed by 1,996 PCU at Kacherikkunnu Jn and 1,991 PCU at EMS Road Jn. Three intersections namely Central Jn, Madathiparambu Jn and Hospital Jn had Peak Hour Traffic Volume between 1,700 and 1,800 PCU. While Eliyapetta Jn had traffic volume of 1,320 PCU, other three intersections namely Kuzhalumpadi, College and Thootha junctions on Perinthalmanna road had the lowest traffic in the range of 800 to 1,000 PCU.

Traffic volume/Capacity study

Capacity utilization of the road stretches is measured by volume-to-capacity ratio (V/C Ratio). It is the ratio of volume of traffic plying on the road stretch to the capacity of the road stretch. For working out the capacity of different road sections, the information compiled during the road inventory survey was compared with the specifications of IRC-106-1990 (Guidelines for capacity on urban roads). While working out the capacities due consideration was given to carriage-way width, junctions, parking, lateral clearance, shoulder, surface condition etc.

The traffic volume observed at different road stretches were compared with the capacity of road sections, to calculate the volume-capacity ratio (V/C ratio) of different road sections within the study area. The volume capacity ratio of major corridors within the Cherpulassery Town is given in Table 17.20.

It is seen that the entire Cherpulassery - Pattambi road had exceeded or about to exceed the capacity of the road with VCR exceeding one or close to one at all the homogeneous sections.

Apart from this, the road between Kacherikkunnu Jn and 26th mile Jn on Palakkad road was also found to have exceeded the base year traffic capacity. Fig. 17.19. exhibits the over utilized roads in Cherpulassery Town.

Table 17.20 Volume Capacity Ratio of Major Road Stretches in Cherpulassery Town

HS No.	Name of homogeneous section		Capacity (PCU)	Volume (PCU)	Volume-capacity ratio
I	**Pattambi - Cherpulasserry road**				
1	Pattambi Border	Madathiparambu	1,500	1,555	1.04
2	Madathiparambu	Hospital Jn	1,500	1,654	1.10
3	Hospital Jn	Karalmanna Bypass Jn	1,500	1,669	1.11
4	Karalmanna Bypass Jn	EMS Road Jn	1,500	2,069	1.38
5	EMS Road Jn	Bus Station	1,500	1,841	1.23
6	Bus Station	Central Jn	1,500	1,412	0.94
7	Central Jn	Puthanalkkal Jn	1,500	1,164	0.78
8	Puthanalkkal Jn	Kacherykkunnu	1,500	1,254	0.84
II	**Cherpulasserry to Ottappalam road**				
9	Central Jn	KSEB JN	1,500	972	0.65
10	KSEB JN	Eliyappatta Jn	1,500	1,270	0.85
11	Eliyappatta Jn	Ottappalam Border	1,500	1,206	0.80
III	**Palakkad - Cherpulasserry - Perinthalmanna road**				
12	Perinthalmanna Border	Thootha Jn	1,500	752	0.50
13	Thootha Jn	Karalmanna Jn	1,500	866	0.58
14	Karalmanna Jn	Kuzhalumpadi Jn	1,500	937	0.62
15	Kuzhalumpadi Jn	Kacherikkunnu	1,500	1,204	0.80
16	Kacherikkunnu	26th Mile Jn	1,500	1,535	1.02
17	26th Mile Jn	Palakkad Border	1,500	1,207	0.80
IV	**Panniyamkurissi road**				
18	Hospital Jn	Panniyamkurissi	900	147	0.16
19	Panniyamkurissi	Thootha Jn	900	138	0.15
V	**Bypass road**				
20	Karalmanna Bypass Jn	Kuzhalumpadi Jn	1,200	543	0.45
VI	**EMS Road**				
21	EMS road Jn	Chalvara Border	900	269	0.30
VII	**Chalavara road**				
22	Eliyapatta Jn	Chalvara Border	1,200	164	0.14

HS No.	Name of homogeneous section		Capacity (PCU)	Volume (PCU)	Volume-capacity ratio
VII	**Market road**				
23	Eliyappatta Jn	Veeramangalam (Market Road)	900	-	-
VIII	**Vellinezhi road**				
24	Karalmanna	Vellinezhi Border	900	139	0.15
IX	**Thootha - Thachangad road**				
25	Post Office Jn	Kulappida border	900	138	0.15
X	**Other roads**				
26	Madathiparambu	Panniyamkurissi	900	289	0.32
27	Puthonalikkal Jn	KSEB Jn	900	164	0.18
28	26h Mile Jn	Karumanamkurissi	900	-	-
29	Karalmanna	Panniyamkurissi	900	-	-

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018



Fig.17.18 Over utilized roads in Cherpulassery Town

Speed and delay study

To assess the average journey speed during peak hours, speed and delay survey was conducted along major roads in Cherpulassery Town. A summary of the observations regarding distance, journey time, delay time and speed is presented in Table 17.21.

The average travel speed within Cherpulassery town limits was found to be 31 kmph while the same within the CBD areas was around 25kmph. The journey speed in Pattambi - Cherpulassery road varied between 10 and 33kmph and on Ottappalam road, it was between 22 and 39kmph. Palakkad - Cherpulassery– Perinthalmanna road witnessed a travel speed ranging between 29 and 44kmph.

The major delay to free flow of traffic was the conflicting movements at intersections on most of the road stretches, pedestrian cross movements, bad condition of roads, inadequate width of road and location of bus station at the CBD areas.

Parking survey

Parking accumulation and duration survey was carried out at all the major road stretches where the parking accumulations are found to be high. The survey was carried out for a period of four hours during the peak periods. Registration plate method was used to collect data on parking duration and accumulation of all categories of vehicles on major parking corridors.

Table 17.21 Speed and Delay Characteristics on Major Road in Cherpulassery Town

Sl.No	Homogeneous section		Length (Km)	Average Journey time (Sec)	Delay (Sec)	Delay cause	Speed (Km/Hr)	
							With delay	Without delay
I	Pattambi - Cherpulassery road							
1	Pattambi Border	Madathiparambu	0.50	80.47			22.37	22.37
2	Madathiparambu	Hospital Jn.	1.10	117.13			33.81	33.81
3	Hospital Jn.	Karalmannad Bypass Jn	0.20	71.74			10.04	10.04
4	Karalmanna Bypass Jn	EMS Road Jn	0.10	32.21			11.18	11.18
5	EMS Road Jn.	Bus Station	0.10	10.17			35.40	35.40
6	Bus Station	Central Jn	0.30	51.64	15.23	Intersection	20.91	29.66
7	Central Jn.	Puthanalkkal Jn	0.50	69.66			25.84	25.84
8	Puthanalkkal Jn.	Kacherykkunnu	0.40	65.97			21.83	21.83
II	Cherpulassery to Ottappalam road							
9	Central Jn.	KSEB Jn.	0.40	36.23			39.75	39.75
10	KSEB Jn.	Eliyappatta Jn	1.20	188.82			22.88	22.88
11	Eliyappatta Jn.	Ottappalam Border	1.80	191.08			33.91	33.91
III	Palakkad - Cherpulassery - Perinthalmanna road							
12	Perinthalmanna Border	Thootha Jn	0.30	53.76			20.09	20.09
13	Thootha Jn.	Karalmanna Jn.	2.90	233.84			44.65	44.65
14	Karalmanna Jn.	Kuzhalumpadi Jn.	0.70	86.76			29.05	29.05
15	Kuzhalumpadi Jn.	Kacherykkunnu	1.50	136.50			39.56	39.56
16	Kacherykkunnu	26th Mile Jn.	1.20	110.88			38.96	38.96
17	26th Mile Jn.	Palakkad Border	0.30	27.72			38.96	38.96
All Roads			13.50	1564.58	15.23		31.06	31.37
Roads in CBD Areas			2.70	388.77	15.23		25.00	26.02

The locations of parking survey are marked in Fig.17.19. Table 17.22. give the parking accumulation of vehicles observed at various locations in Cherpulassery Town. It could be seen that Cherpulassery town as a whole had peak parking accumulation of 373 vehicles at 11.30 AM in the morning. Bulk of them (72%) were found to be two wheelers. The road stretch between Bypass and Bus station on both sides had the maximum accumulation of 151 vehicles consisting mostly of two wheelers. A total of 107 vehicles were found to be parked on both sides of road between Bus Station and Central Jn, followed by 89 vehicles Ottappalam road between Central Jn and KSEB Jn.

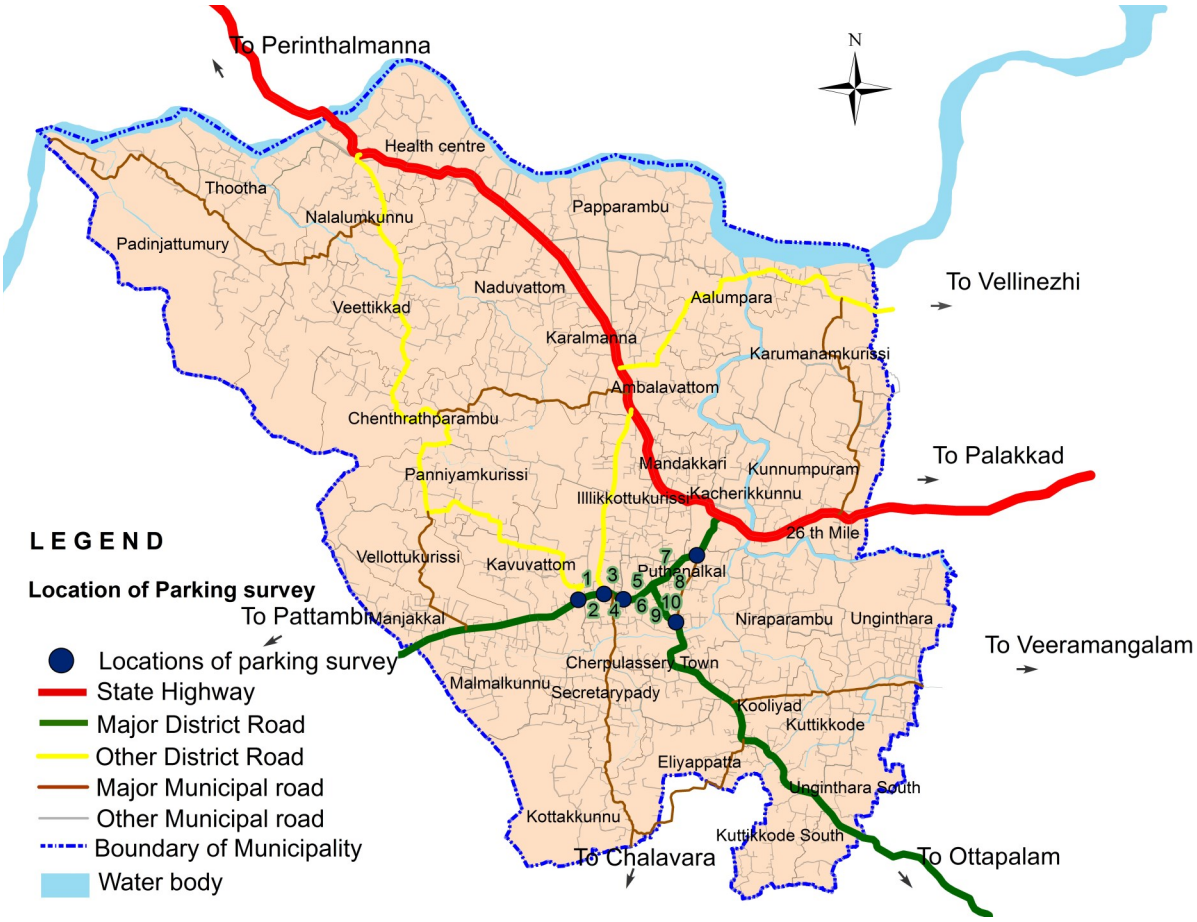


Fig.17.19 Locations of Parking Survey in Cherpulassery Town

The duration of parking of different type of vehicles at selected areas of the town are presented in Table 17.23. It could be seen that most of the vehicles (74%) parked in the major parking corridors parked for duration of less than 30 minutes. About 12% each of the vehicles were parked for duration of 30 to 60 minutes and 5% for a duration of 60 to 90 minutes. Only about 9% of the vehicles parked for more than 90 minutes.

Pedestrian survey

Pedestrian surveys were conducted at major locations where the pedestrian cross movements and lateral movements were found to be high. Locations selected for pedestrian survey are shown in Fig. 17.20. The surveys were carried out for a period of

Table 17.22 Parking Accumulation of Vehicles Observed at Various Location in Cherpulassery Town.

Time	Hospital Jn to Bypass Jn		Bypass Jn to Bus Stand Jn		Bus stand to Central Junction		Puthanikal to central Junction		Central Jn to KSEB Jn	
	(200m LHS)	(200m RHS)	(200m LHS)	(200m RHS)	(300m LHS)	(300m RHS)	(500m LHS)	(500m RHS)	(400m LHS)	(400 m RHS)
9.30	18	29	77	42	20	35	14	15	12	2
10.00	8	0	3	28	28	0	2	9	32	17
10.30	22	31	73	14	22	66	13	27	35	41
11.00	10	16	139	28	34	0	9	9	24	0
11.30	34	20	0	12	47	60	5	14	48	41
12.00	8	20	11	30	41	0	20	19	5	6
12.30	21	0	84	14	33	54	1	0	52	38
13.00	10	29	46	28	29	0	11	17	22	22
13.30	21	16	123	28	35	44	7	10	40	34
14.00	32	25	90	0	39	1	5	7	41	42
14.30			82	0	27	49	26	26	0	10
15.00	29	14	81	43	46	0	32	20	72	46
15.30	19	21	92	47	41	63	33	28	13	5
16.00	12	19	107	1	38	1	28	33	55	20
16.30	3	9	106	34	47	65	0	0	9	2
17.00	17	26	108	43	83	1	44	32	46	26
17.30		10	64		67	66	37	30	10	4
18.00	13	28	53	41	47	3	0	0	55	27
18.30	24	0	102	42	50	104	56	42	11	2
19.00	1	0	76	28	66	84	11	33	25	18
19.30	38	28	51	21	53	56	13	25	19	15
20.00	25	1	57	17	42	29	11	21	18	12

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Table 17.23 Duration of Parking of Different Types of Vehicles at Selected areas of the Cherpulassery Town.

Duration	Hospital Jn to Bypass Jn				Bypass Jn to Bus Stand Jn				Bus Stand to Central Junction				Puthanikal to central Junction				Central Jn to KSEB Jn			
	(200m LHS)		(200m RHS)		(200m LHS)		(200m RHS)		(300m LHS)		(300m RHS)		(500m LHS)		(500m RHS)		(400m LHS)		(400m RHS)	
	Total	%	Total	%	Total	%	Total	%	Total	%	Toatal	%	Total	%	Total	%	Total	%	Total	%
<30	166	77.93	216	80.00	199	60.67	245	76.80	245	71.22	233	69.76	205	80.71	172	77.83	317	79.45	170	72.96
30-60	20	9.39	30	11.11	42	12.80	36	11.29	51	14.83	48	14.37	29	11.42	24	10.86	41	10.28	26	11.16
60-90	7	3.29	9	3.33	30	9.15	14	4.39	30	8.72	13	3.89	8	3.15	8	3.62	13	3.26	14	6.01
90-120	3	1.41	10	3.70	41	12.5	4	1.25	16	4.65	6	1.80	6	2.36	6	2.71	7	1.75	6	2.58
120-150	7	3.29	3	1.11	14	4.27	5	1.57	1	0.29	11	3.29	4	1.57	5	2.26	6	1.50	5	2.15
150-180	1	0.47	1	0.37	1	0.30	6	1.88	1	0.29	7	2.1	1	0.39	2	0.90	5	1.25	2	0.86
180-210	5	2.35	1	0.37	1	0.30	5	1.57	-	-	6	1.80	1	0.39	2	0.90	3	0.75	6	2.58
210-240	2	0.94	-	-	-	-	1	0.31	-	-	9	2.69	-	-	1	0.45	4	1.00	1	0.43
240-270	-	0	-	-	-	-	2	0.63	-	-	1	0.30	-	-	-	-	2	0.50	2	0.86
270-300	1	0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.25	1	0.43
>300	1	0.47	-	-	-	-	1	0.31	-	-	-	-	-	-	1	0.45	-	-	-	-
Total	213	100.00	270	100.00	328	100.00	319	100.00	344	100.00	334	100.00	254	100.00	221	100.00	399	100.00	233	100.00

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

four hours during the period between 8.00 AM and 12.00 noon in the morning and/or between 4.00 PM and 8.00 PM in the evening.

Cross movements: Pedestrian cross movements observed at these locations are given in Table 17.24. It could be seen that CBD area of the town surrounding Bus station had the maximum pedestrian crossings of 1,167, followed by Madathiparambu area with 510 movements, Central Junction area with 422 movements and Hospital area had about 200 movements. Other parts of the town do not have considerable pedestrian movements.

Table 17.24 Peak Hour Pedestrian Cross Movement at Cherpulassery Town.

Sl. No.	Survey location	Peak hour			Pedestrian movements
1	Madathiparambu -Pattambi road	8.30	-	9.30	64
1	Madathiparambu -Palakkad road	9.45	-	10.45	446
2	Hospital Jn - Palakkad road	17.00	-	18.00	60
2	Hospital jn - Panniyamkurissi road	17.00	-	18.00	136
3	Bypass Jn - Palakkad road	9.00	-	10.00	474
3	Bypass Jn - Karalmanna road	9.00	-	10.00	693
4	Central Jn - main road	9.15	-	10.15	236
4	Central Jn - Ottappalam road	9.15	-	10.15	186
5	Kacherikkunnu - Perinthalmanna road	18.00	-	19.00	66
5	Kacherikkunnu -Cherpulasserry road	18.00	-	19.00	32
5	Kacherikkunnu - Mannarkkad road	18.00	-	19.00	44
6	Karalmanna Jn - Main raoad	16.30	-	17.30	70
7	Thootha Jn - Palakkad road	17.30	-	18.30	54

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Pedestrian vehicle conflicts: It reflects the intensity of pedestrian-vehicle conflicts on a link and is represented by PV^2 values where P is the number of pedestrians crossing a link during peak hour and V is the number of vehicles passing through the link during peak hour. For a road section with refuge, a value of PV^2 greater than 2x108 and for a road section without refuge, PV^2 value greater than 108 indicates a higher level of conflicts and warrants grade-separated pedestrian facilities. It implies that a divided carriageway could be considered to have reduced impact of PV^2 value by 50%.

Pedestrian vehicle conflicts observed at various locations in Cherpulassery Town are presented in Table 17.25. It could be seen that the main road at Bypass Junction had the highest pedestrian vehicles conflicts, followed by the main road at Madathiparambu Junction. All the arms of Central Junction and main road at Hospital Jn also had the PV^2 value exceeding the threshold limit which warrants suitable interferences.

Table 17.25 Pedestrian Vehicle Conflict Observed at Various Locations

Sl. No.	Survey location	Pedestrian movements	Peak Traffic volume	PV^2	
1	Madathiparambu -Pattambi road	64	1,555	1.55	x10^8
1	Madathiparambu -Palakkad road	446	1,654	12.20	x10^8
2	Hospital Jn - Palakkad road	60	1,669	1.67	x10^8
2	Hospital jn - Panniyamkurissi road	136	147	0.03	x10^8
3	Bypass Jn - Palakkad road	474	2,069	20.29	x10^8
3	Bypass Jn - Karalmanna road	693	543	2.04	x10^8
4	Central Jn - main road	236	1,164	3.19	x10^8
4	Central Jn - Ottappalam road	186	972	1.76	x10^8
5	Kacherikkunnu - Perinthalmanna ro	66	1,204	0.96	x10^8
5	Kacherikkunnu -Cherpulasserry roa	32	1,254	0.50	x10^8
5	Kacherikkunnu - Mannarkkad road	44	1,535	1.04	x10^8
6	Karalmanna Jn - Main raoad	70	937	0.61	x10^8
7	Thootha Jn - Palakkad road	54	752	0.31	x10^8

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018



Fig.17.20 Location selected for pedestrian survey in Cherpulassery Town

17.5.2 Public Transport Operations.

Bus Terminals.

Public transport services are met by both KSRTC and private buses in Cherpulassery Town. These services are operated from Municipal bus stand located at the central area of Cherpulassery Jn on Pattambi – Cherpulassery – Palakkad/ Perinthalmanna road (fig 17.21).

Bus routes and number of trips operated

Data compiled from KSRTC Depot and Private bus operators Association at Cherpulassery reveal that between 06.00am and 09.00pm, 327 buses are operated from/ through the bus stand in Cherpulassery town with about 887 trips per day. The highest number of bus trips are operated to Pattambi with 177 trips, followed by 147 trips to Palakkad side, 119 trips to Ottappalam side, 103 trips towards Perinthalmanna and 84 trips to Shornur side. Bus transport routes in Cherpulassery town are marked in Fig. 17.21 and in table 7.26.

Table 17.26 Details of Bus Routes and Services in Cherpulassery Town

Sl. No.	Name of bus route		No. of trips
1	Pattambi side	Shornur side	5
2		Ottappalam side	15
3		Palakkad side	11
4		Mannarkkad side	20
5		Perinthalmanna side	13
6		Cherpulassery	177
7	Shornur side	Ottappalam side	13
8		Palakkad side	5
9		Mannarkkad side	27
10		Perinthalmanna side	16
11		Cherpulassery	84
12	Ottappalam side	Palakkad side	5
13		Mannarkkad side	13
14		Perinthalmanna side	33
15		Cherpulassery	119
16	Palakkad side	Mannarkkad side	2
17		Perinthalmanna side	28
18		Cherpulassery	147
19	Mannarkkad side	Perinthalmanna side	4
20		Cherpulassery	47
21	Perinthalmanna side	Cherpulassery	103
Total			887

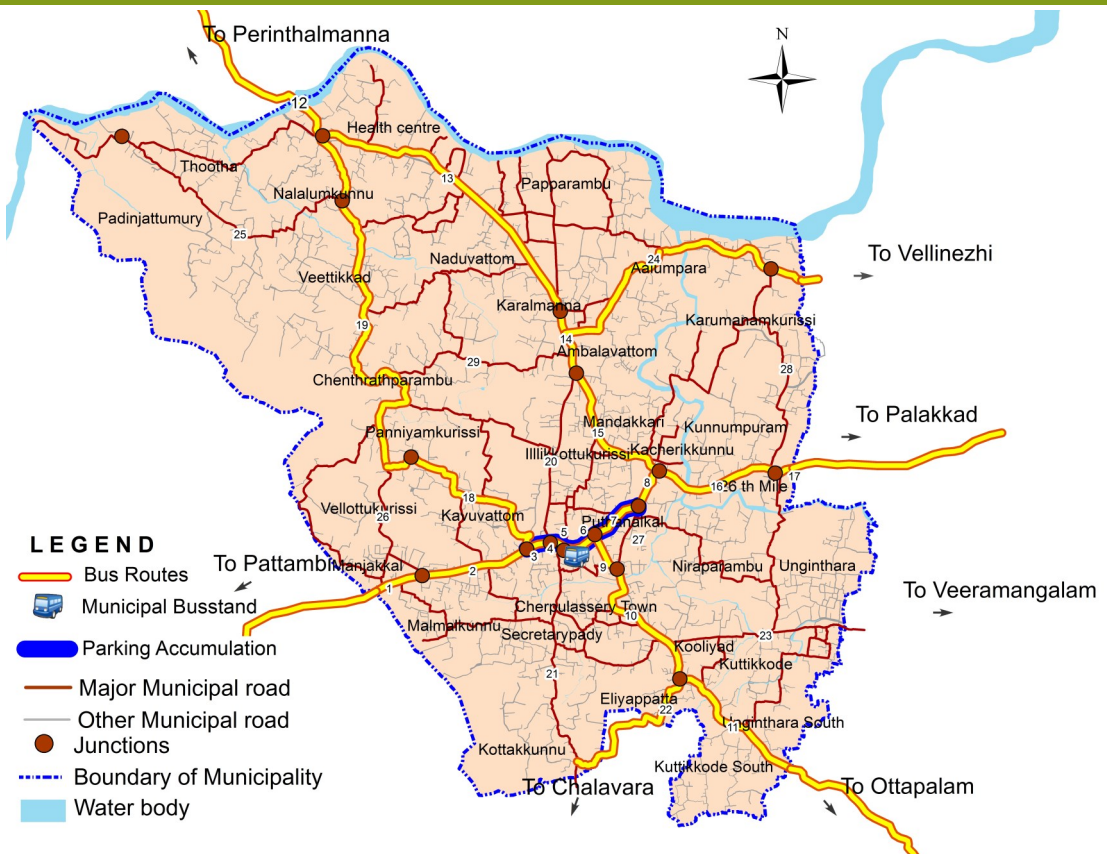


Fig.17.21 Bus routes and parking accumulation in Cherpulassery Town

Access and egress of buses at bus terminals

A count of buses entering/ exiting the Cherpulassery bus stand were made during normal working day between 06.00 am and 09.00 pm and it was observed that 847 entries and 887 exits were made during the period. The access-egress patterns of buses at the bus station are shown in Table .17.27.

Table 17.27. Ingress and Egress of Buses at Cherpulassery Bus Station.

Time		In	Out	Total
6.00	7:00	26	21	47
7.00	8:00	84	74	158
8.00	9:00	76	88	164
9.00	10:00	66	73	139
10.00	11:00	71	71	142
11.00	12:00	65	75	140
12.00	13:00	59	64	123
13.00	14:00	46	67	113
14.00	15:00	65	56	121
15.00	16:00	55	58	113
16.00	17:00	58	65	123
17.00	18:00	65	64	129
18.00	19:00	63	59	122
19.00	20:00	33	31	64
20.00	21:00	15	21	36
Total		847	887	1,734



Cherpulassery Municipal Bus Stand

Extend of bus passengers at major roads

Existing patronage for public transport buses on major travel corridors is shown in table 17.28. Pattambi – Cherpulassery road had the highest peak hour bus passengers with 4,116 between Central Jn and Bus Station, followed by 2,400 between Bypass and EMS road Jn and 2.350 between Central and Puthanalkkal Jn. Ottappalam road had peak hour bus passengers of 1,800 between Central and KSEB Jn while Palakkad – Perinthalmanna had bus passengers ranging between 800 and 1,800. Other roads in the town did not carry any bus passengers.

Table 17.28 Peak Hour Bus Passengers on Major Road Stretches in Cherpulassery Town

HS No.	Homogeneous section		KSRTC buses	Private buses	Total Buses	No. of bus passengers
I	**Pattambi - Cherpulassery road**					
1	Pattambi Border	Madathiparambu	1	45	46	1,932
2	Madathiparambu	Hospital Jn	1	45	46	1,932
3	Hospital Jn	Karalmanna Bypass Jn	2	45	47	1,974
4	Karalmanna Bypass Jn	EMS Road Jn	1	56	57	2,394
5	EMS Road Jn	Bus Station	-	37	37	1,554
6	Bus Station	Central Jn	1	97	98	4,116
7	Central Jn	Puthanalkkal Jn	1	55	56	2,352
8	Puthanalkkal Jn	Kacherykkunnu	2	38	40	1,680
II	**Cherpulassery to Ottappalam road**					
9	Central Jn	KSEB JN	-	42	42	1,764
10	KSEB JN	Eliyappatta Jn	1	22	23	966
11	Eliyappatta Jn	Ottappalam Border	1	18	19	798
III	**Palakkad - Cherpulassery - Perinthalmanna road**					
12	Perinthalmanna Border	Thootha Jn	1	21	22	924
13	Thootha Jn	Karalmanna Jn	1	20	21	882
14	Karalmanna Jn	Kuzhalumpadi Jn	2	25	27	1,134
15	Kuzhalumpadi Jn	Kacherikkunnu	2	25	27	1,134
16	Kacherikkunnu	26th Mile Jn	2	39	41	1,722
17	26th Mile Jn	Palakkad Border	1	31	32	1,344
IV	**Panniyamkurissi road**					
18	Hospital Jn	Panniyamkurissi	-	2	2	84
19	Panniyamkurissi	Thootha Jn	-	-	-	-
V	**Bypass road**					
20	Karalmanna Bypass Jn	Kuzhalumpadi Jn	-	-	-	-
VI	**EMS Road**					
21	EMS road Jn	Chalvara Border	-	-	-	-
VII	**Chalavara road**					
22	Eliyapatta Jn	Chalvara Border	-	1	1	42
VII	**Market road**					
23	Eliyappatta Jn	Veeramangalam (Market Road)	-	4	4	168
VIII	**Vellinezhi road**					
24	Karalmanna	Vellinezhi Border	-	-	-	-
IX	**Thootha - Thachangad road**					
25	Post Office Jn	Kulappida border	-	1	1	42
X	**Other roads**					
26	Madathiparambu	Panniyamkurissi	-	-	-	-
27	Puthonalikkal Jn	KSEB Jn	-	-	-	-
28	26h Mile Jn	Karumanamkurissi	-	-	-	-
29	Karalmanna	Panniyamkurissi	-	-	-	-

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Accident prone locations

Accident data for the last three years namely 2013, 2014 and 2015 were collected from State Crime Records Bureau, Thiruvananthapuram to assess the accident scenario in Cherpulassery Town, locations of accidents, and accident severity. Details of accident reported according to accident severity during the last three years are given in Table 17.29.

Table 17.29 Growth in Accidents in Cherpulassery Town

Year	No. of accidents				No. of casualities			
	Fatal	Grievous	Simple	Total	Fatal	Grievous	Simple	Total
2013	4	13	14	31	4	13	22	39
2014	8	12	13	33	8	12	27	47
2015	5	22	9	36	5	22	11	38

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

It could be seen that 31 accidents were reported in the year 2013, which increased to 33 in 2014 and 36 in 2015. In the case of accident victims, the increase was from 39 to 47 between 2013 and 2014 and decrease to 38 during 2015. About two third of the total accidents were found to be grievous ones, followed by simple ones (25%) in the year 2015. Fatalities were reported in the case of 14% of accidents.

Major accident prone locations in Cherpulassery Town are given in Table 17.30. It could be seen that the highest number of 18 accidents were reported at the central area of Cherpulassery town, followed by five accidents at Karalmanna and four accidents in Thootha and in that order. Accident prone locations are marked in Fig. 17.22.

Table 17.30 Major Accident Prone Areas in Cherpulassery Town

Sl. N	Accident prone location	No. of accidents
1	Cherpulasserry	18
2	Karalmanna	5
3	Thootha	4
4	10th mile	2
5	Madathiparambu	2
6	26th mile	1
7	Eliyapetta	1
8	Kacherikkunnu	1
9	Karumanamkurussi	1
10	Naduvattom	1
11	Nayarpadi	1
12	Panniyamkurussi	1
	Total	38

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018



Fig. 17.22 Accident prone locations in Cherpulassery Town

17.5.3 Base year intercity travel characteristics

Base year inter-city travel characteristics of passenger and goods movements were obtained by conducting origin-destination survey on a sample basis at four outer cordon locations in Cherpulassery Town. During the O-D survey, buses were not stopped due to practical difficulty and hence, O-D pattern of buses were estimated from O-D pattern of other vehicle types.

As the origin-destination survey was conducted on a sample basis, in order to get the total number of vehicles passing through the outer cordon locations, traffic volume survey was also conducted simultaneously at these locations.

Sample size of vehicles/ Passengers interviewed

A total of 3,221 vehicles of various categories were interviewed as part of O-D survey which constituted 6.5 per cent of the total vehicles passing through the survey locations. Sample size of vehicles interviewed at various survey stations according to vehicle type are given in Table 17.31.

Table 17.31 Sample Size of Vehicle Interviewed at Outer Cordon Survey Location in Cherpulassery Town

Sl. No	Type of vehicle	No. of total Vehicles		No. of sample Vehicles		Sample size	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
All locations							
1	Mini-bus/car	6,430	6,366	518	687	8.06	10.79
2	Pass. Auto	4,165	3,993	118	160	2.83	4.01
3	Two Wheeler	11,872	11,429	413	388	3.48	3.39
4	MAT/Truck	1,018	920	107	184	10.51	20.00
5	Mini-truck	899	1,066	116	140	12.9	13.13
6	Goods auto	696	818	164	226	23.56	27.63
	Total	25,080	24,592	1,436	1,785	5.73	7.26
1. Ottappalam road							
1	Mini-bus/car	1,215	1,495	141	223	11.6	14.92
2	Pass. Auto	999	1,238	22	56	2.2	4.52
3	Two Wheeler	2,472	2,715	69	64	2.79	2.36
4	MAT/Truck	113	175	26	68	23.01	38.86
5	Mini-truck	173	233	15	35	8.52	15.02
6	Goods auto	165	185	32	80	19.39	43.24
2. Pattambi road							
1	Mini-bus/car	2,275	1,571	114	141	5.01	8.98
2	Pass. Auto	1,852	1,238	52	63	2.81	5.09
3	Two Wheeler	5,138	3,985	171	129	3.33	3.24
4	MAT/Truck	147	46	29	21	19.73	45.65
5	Mini-truck	215	206	39	63	18.14	30.58
6	Goods auto	272	239	46	32	16.91	13.39
3. Perinthalmanna road							
1	Mini-bus/car	1,371	1,543	147	147	10.72	9.53
2	Pass. Auto	641	485	18	19	2.81	3.92
3	Two Wheeler	1,995	2,259	98	95	4.91	4.21
4	MAT/Truck	484	327	15	26	3.1	7.95
5	Mini-truck	294	335	34	24	11.56	7.16
6	Goods auto	182	172	47	53	25.82	30.81
4. Palakkad road							
1	Mini-bus/car	1,569	1,757	116	176	7.39	10.02
2	Pass. Auto	673	1,032	26	22	3.86	2.13
3	Two Wheeler	2,267	2,470	75	100	3.31	4.05
4	MAT/Truck	274	372	37	69	13.50	18.55
5	Mini-truck	214	292	28	18	13.08	6.16
6	Goods auto	77	222	39	61	50.65	27.48

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Zoning pattern adopted for the study

For a meaningful analysis of O-D survey data, the study region was divided into 15 traffic zones, the boundaries of the zone corresponding to the boundary of one or more wards. In a similar way, outside study region was divided into 19 traffic zones,

which include the immediate surrounding areas, adjoining Districts and neighbouring States. The traffic-zoning pattern adopted for the study is given in Table 17.32. and geographically shown in Fig. 17.23.

Table 17.32 Zoning Pattern Adopted for the Study in Cherpulassery Town

O/D	Name of zone	Places					
1	Padinjattumuri	Wards	1				
2	Thootha area	Wards	2	3			
3	Vettikkadu area	Wards	32	33			
4	Kaaralmanna area	Wards	4	5	6		
5	Ambalavattam area	Wards	7	8	13		
6	Karumanakurissi area	Wards	9	10	11		
7	Kacherikkunnu	Wards	12				
8	Cherupulassery Town	Wards	14	15	25		
9	Panniyamkurissi area	Wards	29	30	31		
10	Malmalkunnu area	Wards	26	27	28		
11	Kottakkunnu area	Wards	23	24			
12	Kuttikode area	Wards	18	19	20	21	22
13	Nirapparambu area	Wards	16	17			
14	Ottappalam side Within Palakkad District	Thrikkaderi, Panamanna, Ottappalam					
15	Chalavara side Within Palakkad District	Arumkunnathkavu, Karattukurissi, Kayiliyad, Chalavara					
16	Pattambi side within Palakkad district	Nellaya, Pengattiri, Vallappuzha					
17	Perinthalmanna side within Palakkad district						
18	Mannarkkad side within Palakkad district	Kulakkad,Thiruvazhiyode, Sreekrishnapuram					
19	Ottappalam side other than Palakkad District	Thozhupadam, Pambady, Thiruvilwamala					
20	Chalavara side other than Palakkad District	Cheruthuruthy, Vadakkancherry, Mannoothy					
21	Pattambi side other than Palakkad District	Kunnamkulam, Valanchery, Ponnani					
22	Perinthalmanna side other than Palakkad District	Anamangad, karinkallathani, Amminikkad					
23	Mannarkkad side other than Palakkad District						
24	Ottappalam side outside Kerala State	Erode					
25	Chalavara side outside Kerala State						
26	Pattambi side outside Kerala State						
27	Perinthalmanna side outside Kerala State						
28	Mannarkkad side outside Kerala State	Coimbatore					

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

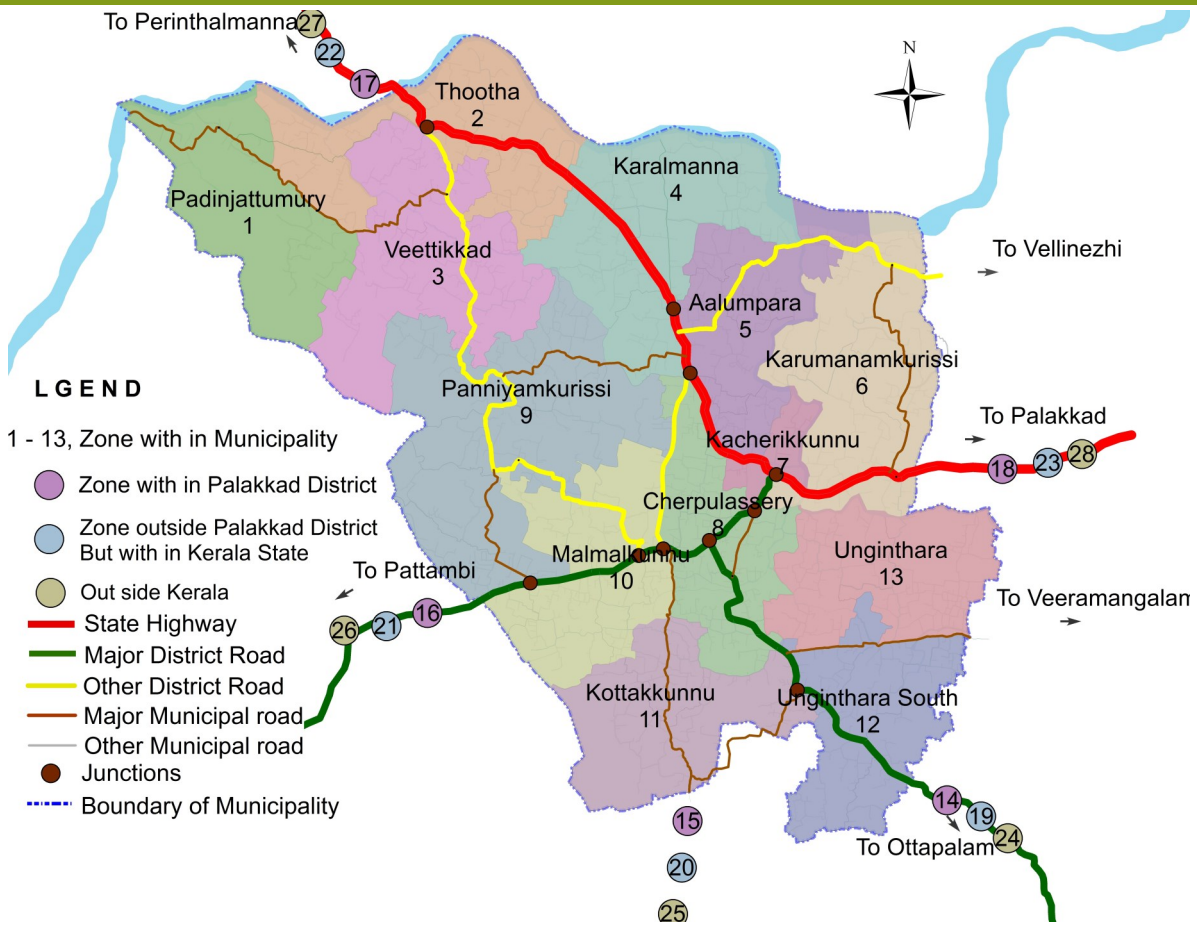


Fig.17.23 Zoning pattern adopted for the study in Cherpulassery Town

17.5.4 Characteristics of Inter City Passenger Traffic

Modal split

The inter-city passenger transport in Cherpulassery Town is predominantly met by road based KSRTC buses, private buses, mini-buses, and a host of personalized vehicles like four-wheelers, two-wheelers etc. An analysis of the O-D survey data collected from outer cordon survey locations revealed that an estimated 1.36 lakh inter-city passenger trips were performed in the study region on a reference day consisting of 63,000 bus passenger trips (46%), 30,000 two-wheeler trips (22%). 24,000 car trips (18 %) and 19,000 auto trips (14%). It could be inferred that public transport had a significant role in meeting the inter-city passenger demand. Table 17.33. and Fig. 17.24. gives the modal split of inter-city passenger traffic in Cherpulassery Town.

Table 17.33 Modal Split of Intercity Passenger Traffic in Cherpulassery Town

Sl. No.	Mode of travel	No. of passengers	% of passengers
1	Bus	62,641	45.93
2	Minibus/ Car	23,995	17.59
3	Autorikshaw	19,366	14.20
4	Two wheeler	30,379	22.28
	Total	136,381	100.00

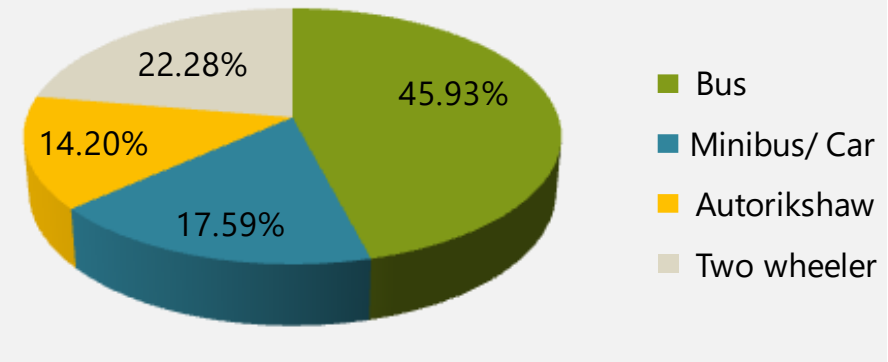


Fig. 17.24 Modal split of intercity passenger traffic in Cherpulassery Town

Purpose wise Trip Distribution

Characteristics of passenger trips according to purpose of trips was analyzed and it was found out that highest number of the trips (46 per cent) of the trips were carried out for work related purposes, followed by 22% social purpose trips. Medical, education and Shopping trips were made by 6%, 5% and 3% of passengers respectively. Trip purpose wise distribution of inter-city passengers is given in Table 17.34. and in figure 17.25.

Table 17.34 Modal split of intercity passenger traffic in Cherpulassery Town– based on purpose of trip

Sl. No.	Purpose of trip	No. of passengers	Percent of passengers
1	Work	62,851	46.09
2	Business	7,172	5.26
3	Education	7,121	5.22
4	Social and recreation	29,854	21.89
5	Tourism	2,900	2.13
6	Medical	8,265	6.06
7	Shopping	4,096	3.00
8	Others	14,121	10.35
	Total	1,36,380	100.00

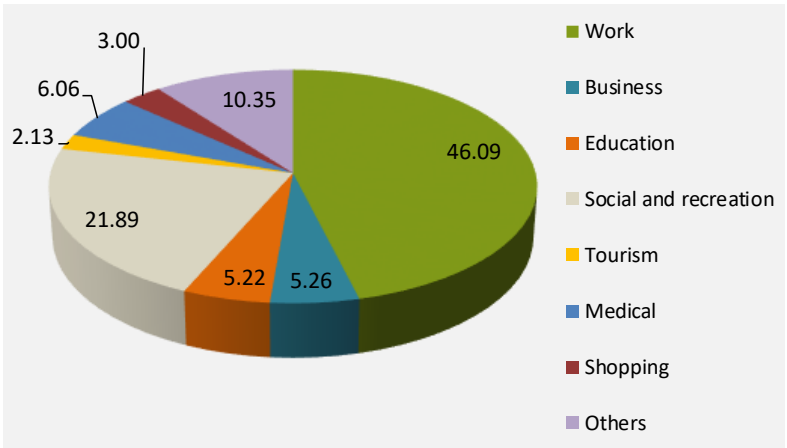


Fig. 17.25 Purpose wise trip distribution in Cherpulassery Town

Origin-Destination of Passenger Trips

A total of 1.36 lakh passenger trips were performed as inter-city trips in the study region on a reference day. The major traffic generating zone within the study region was the Town area with 46,000 trips, followed distantly by Thootha area with 3,000 trips, Karalmanna area and Karumanamkurissi area with 2,100 trips each. In the case of external zones, Pattambi side of Palakkad district had the maximum generation of trips (23,000), followed by Mannarkkad side with 17,000 trips, Ottappalam side with 14,000 trips, and Chalavara side with 3,400 trips. Other districts and States together had a share of only 23,000 trips in the trip generation, of which Perinthalmanna side had the dominant share of 19,000 trips. The origin-destination of passenger trips is shown in table 17.35. Desire lines of inter-city passenger traffic is shown in Fig. 17.26.

In the case of trip attraction also, Town zone had the maximum with about 50,000 trips. Thootha area had trip attraction of 2,800 trips, Karalmanna had about 2,200 trips and Kacherikkunnu with 1,800 trips. Of the zones located outside Cherpulassery Town but within Palakkad district, Pattambi side had the maximum attraction of 21,000 trips, followed by Mannarkkad side with 18,000 trips, and Ottappalam with 14,000 trips each. Other districts and States together had attracted more than 20,500 trips of which Perinthalmanna had the lion share of 17,000 trips.

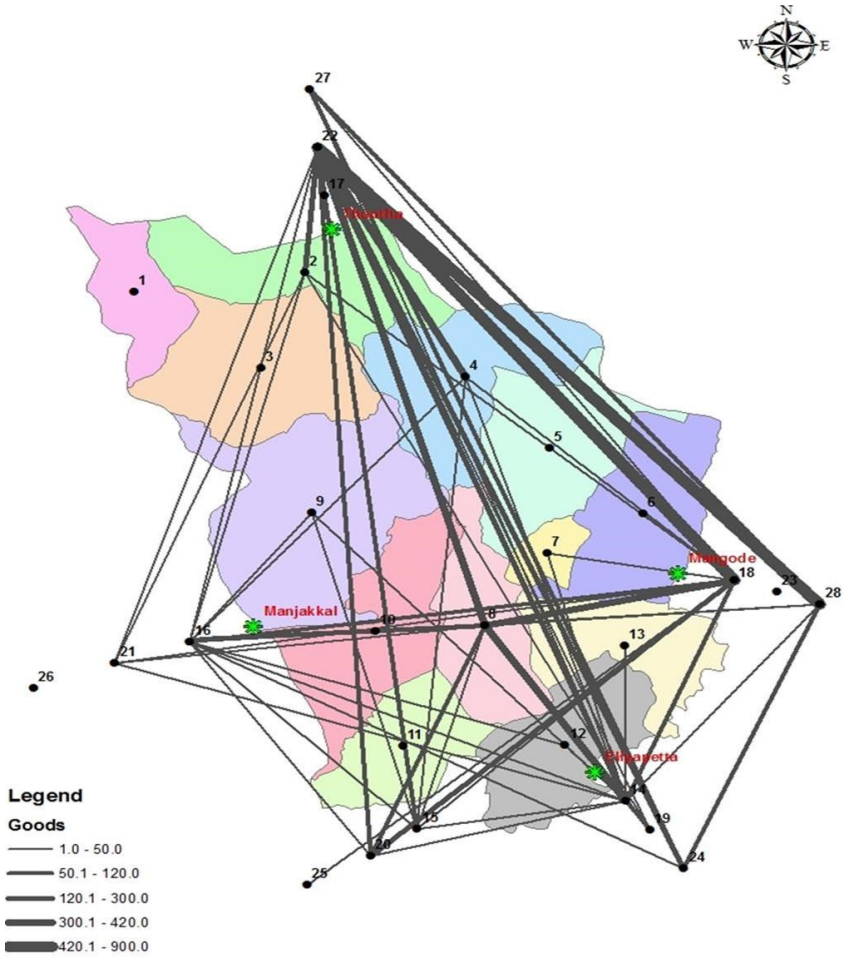


Fig. 17.26 Desire lines of inter-city Passenger Traffic

Table 17.35 Distribution of Inter-city Passenger Traffic in Cherpulassery Town

O/D	Name of zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
1	Padinjattumuri	-	-	-	-	-	-	-	-	-	-	-	-	-	105	149	19	-	-	-	23	78	133	-	145	-	-	-	-	653
2	Thootha area	-	-	-	-	-	-	-	-	-	-	-	-	-	290	-	690	-	612	54	-	-	1,314	-	-	-	-	-	-	2,960
3	Vettikkadu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Kaaralmanna area	-	-	-	-	-	-	-	-	-	-	-	-	-	57	-	194	-	389	-	-	98	1,409	-	-	-	-	-	-	2,147
5	Ambalavattam area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Karumanakurissi area	-	-	-	-	-	-	-	-	-	-	-	-	-	376	199	258	-	1,228	-	34	-	-	-	-	-	-	-	-	2,096
7	Kacherikkunnu	-	-	-	-	-	-	-	-	-	-	-	-	-	72	-	146	-	104	-	-	-	91	-	-	-	-	-	-	413
8	Cherupulassery Town	-	-	-	-	-	-	-	-	-	-	-	-	-	9,077	2,337	16,549	-	10,048	319	169	130	7,393	-	-	-	-	-	-	46,021
9	Panniyamkurissi area	-	-	-	-	-	-	-	-	-	-	-	-	-	186	-	58	-	103	-	-	-	19	-	-	-	-	-	-	367
10	Malmalkunnu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-	-	-	-	-	73
11	Kottakkunnu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Kuttikode area	-	-	-	-	-	-	-	-	-	-	-	-	-	125	-	54	-	21	-	-	-	-	-	-	-	-	-	-	199
13	Nirapparambu area	-	-	-	-	-	-	-	-	-	-	-	-	-	240	23	-	-	-	-	-	-	-	-	-	-	-	-	-	263
14	Ottappalam side Within Palakkad District	15	599	-	-	-	-	319	10,226	-	-	-	172	-	-	-	789	-	328	-	-	-	1,615	-	-	-	-	-	-	14,062
15	Chalavara side Within Palakkad District	-	262	-	113	-	-	29	1,926	-	-	-	15	-	-	-	234	-	286	-	-	117	467	-	-	-	-	-	-	3,449
16	Pattambi side within Palakkad district	107	804	-	263	-	445	715	16,442	-	114	105	358	170	1,090	123	-	-	1,547	45	109	-	768	-	87	-	-	-	35	23,328
17	Perinthalmanna side within Palakkad Dist.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Mannarkkad side within Palakkad Dist.	-	530	-	-	-	-	700	10,808	-	-	-	72	-	309	319	1,282	-	-	39	344	798	2,191	-	-	-	-	-	-	17,391
19	Ottappalam side other than Palakkd Dist.	-	-	-	-	-	-	-	121	15	-	-	-	-	-	-	-	-	87	-	-	-	174	-	-	-	-	-	-	396
20	Chalavara side other than Palakkd Dist.	-	-	-	-	-	35	-	762	-	-	-	-	-	-	-	-	-	234	-	-	-	334	-	-	-	-	-	-	1,364
21	Pattambi side other than Palakkd Dist.	-	-	-	-	-	-	-	504	-	-	-	11	-	148	-	-	-	552	-	-	-	326	-	-	-	-	-	-	1,542
22	Perinthalmanna side other than Palakkd Dist.	61	625	-	2,052	-	229	73	9,575	35	-	-	308	83	1,691	626	375	-	2,180	124	189	116	-	68	112	-	-	-	325	18,847
23	Mannarkkad side other than Palakkd District	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Ottappalam side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	164	-	-	-	-	-	-	206
25	Chalavara side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Pattambi side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Perinthalmanna side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	21
28	Mannarkkad side outside Kerala State	-	-	-	-	-	-	-	116	-	-	-	-	-	-	-	-	-	-	-	-	112	291	-	-	-	-	63	-	582
Total		**182**	**2,819**	**-**	**2,428**	**-**	**709**	**1,836**	**50,482**	**49**	**114**	**105**	**935**	**253**	**13,767**	**3,776**	**20,723**	**-**	**17,738**	**581**	**868**	**1,491**	**16,689**	**68**	**345**	**-**	**-**	**63**	**360**	**1,36,381**

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

Pattern of inter city passenger trips

The O-D pattern of inter-city passenger traffic revealed that out of 1.36 lakh inter-city passenger trips, more than 84% were external to internal and internal to external trips. External – external trips to the tune of 21,000 were performed through the study region and they constituted 16% per cent of the total trips. It could be inferred that Cherpulassery town had higher level of interaction with the neighbouring towns/ settlements with low level of through traffic. Pattern of inter-city passenger trips are given in Table 17.36.

Table 17.36. Pattern of Inter-city Passenger Trips in Cherpulassery Town

Sl No	Pattern of movement	No. of passengers	Percent of passengers
1	Internal to Internal		
2	Internal to External	55,192	40.47
3	External to Internal	59,913	43.93
4	External to External	21,277	15.60
Total		136,382	100.00

17.5.5 Inter-city goods Traffic

Volume of goods at outer cordon points

A total of 5,417 goods vehicles passed through the four outer cordon locations of Cherpulassery Town, of which the maximum of 1,794 passed Perinthalmanna road, 1,451 through Palakkad road, 1,125 through Pattambi road and 1,047 through Ottappalam road on a reference day (from table 17.18).

Modal Split of Goods Traffic

A total of 4,071 goods vehicles were found to be involved in carrying goods traffic to and from the study region, consisting of 1,374 trucks, 1,427 mini-trucks and 1,270 goods autos. The quantum of goods handled by these goods vehicles was 5,462 tonnes. Trucks carried the maximum volume of goods traffic (69.15%), followed by mini-trucks (23.16%). The remaining 7.69% of goods traffic was handled by goods autos. Table 17.37 shows the model split of inter-city goods traffic in Cherpulassery town.

Table 17.37 Modal split of inter-city goods traffic in Cherpulassery Town

Sl.No	Type of Vehicle	No.Of vehicles	Quantum (MT)	Share(%)
1	MAT/Truck	1,374	3,777	69.15
2	Mini-truck/tempo	1,427	1,265	23.16
3	Goods auto	1,270	420	7.69

Composition of Goods Carried

Out of the 5,462 MT of inter-city goods traffic observed through outer cordon survey stations, construction materials as a whole were carried in large quantities to the extent of 24% of total goods traffic in the region, followed by 11% of food items, 7% of industrial goods and 6% of consumer items. Commodity wise distribution of goods traffic in tonnes are given in Table 17.38.

Table 17.38 Commodity wise Distribution of Goods Traffic in Cherpulassery Town

Sl.No	commodity	Vehicle type			Total	% share
		Truck	Mini-truck	Auto		
1	Food items	514	316	80	910	10.96
2	Wood	128	183	32	343	4.14
3	Fisheries	32	5	3	40	0.48
4	Stone,coals	575	82	37	694	8.36
5	Industrial Materials	412	123	46	581	7.00
6	Petroleum Products	295	-	-	295	3.55
7	Building materials	1,043	167	77	1,287	15.50
8	Consumer Items	259	128	75	462	5.57
9	Rubber related products	57	22	19	98	1.18
10	Others	462	239	52	752	9.06
	Total	3,777	1,265	420	5,462	65.79

O-D Goods Transportation

Inter-city movement of goods to the tune of 5,462 MT was carried out over the study region. The major traffic generator of goods traffic within the study region was the Town area with 700 tonnes most of them bound for other districts within the State. Thootha area had generated goods traffic to the tune of 240 MT, followed by 150 MT of Karalmanna area. Among the zones outside the study region but within Palakkad district, traffic generation was high from Mannarkkad side with 1,014 tonnes, Pattambi side (360 tonnes) and Ottappalam side with 330 tonnes. Other districts and States together had generated 2,511 tonnes of goods traffic, of which other districts generated 1,500 MT and other States 1,000 MT. The Origin-Destination matrix of inter-city goods traffic is shown in table 17.39 and Desire lines of inter-city goods traffic is shown in Fig. 17.27.

Similarly in the case of goods traffic attraction, Town area had the dominant share with 950 tonnes. Among the external zones, while Mannarkkad side of Palakkad side attracted 611 MT, Ottappalam side of Palakkad district had attracted about 500 MT and Pattambi side had attracted about 200 MT. All other districts and States together attracted only 2,600 tonnes and major share was held by Perinthalmanna side with 1,800 MT.

Table 17.39 Distribution of Inter-city Goods Traffic in Cherpulassery Town

O/D		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
1	Padinjattumuri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Thootha area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	16	-	-	34	182	-	-	-	-	-	-	240
3	Vettikkadu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Kaaralmanna area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	137	-	-	-	-	-	-	149
5	Ambalavattam area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Karumanakurissi area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	40	-	-	-	-	-	-	-	-	-	-	47
7	Kacherikkunnu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Cherupulassery Town	-	-	-	-	-	-	-	-	-	-	-	-	-	210	19	65	-	63	65	49	5	207	-	-	-	-	-	13	697
9	Panniyamkurissi area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Malmalkunnu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
11	Kottakkunnu area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Kuttikode area	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
13	Nirapparambu area	-	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
14	Ottappalam side Within Palakkad District	-	-	-	7	-	0	11	207	10	-	-	11	-	-	-	20	-	27	-	-	-	26	-	-	-	-	11	-	329
15	Chalavara side Within Palakkad District	-	-	-	7	-	-	-	29	17	-	-	-	-	-	-	5	-	-	-	-	-	18	-	-	-	-	-	-	76
16	Pattambi side within Palakkad district	-	2	-	8	-	-	-	174	46	-	-	12	-	30	1	-	-	44	-	2	-	32	-	2	-	-	-	6	360
17	Perinthalmanna side within Palakkad district	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Mannarkkad side within Palakkad district	-	6	-	-	-	-	13	252	-	0	-	-	-	31	9	62	-	-	-	7	6	628	-	-	-	-	-	-	1,014
19	Ottappalam side other than Palakkd District	-	3	-	-	-	-	-	37	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	43
20	Chalavara side other than Palakkd District	-	-	-	-	-	-	-	74	-	-	-	-	-	-	-	10	-	157	-	-	-	63	-	-	-	-	-	-	304
21	Pattambi side other than Palakkd District	-	3	-	-	-	-	-	5	-	-	-	-	-	12	-	-	-	3	-	-	-	-	-	-	-	-	-	-	22
22	Perinthalmanna side other than Palakkd District	-	99	-	230	-	-	-	193	-	-	-	-	-	158	58	10	-	228	2	12	1	-	-	14	-	-	-	205	1,210
23	Mannarkkad side other than Palakkd District	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Ottappalam side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	147	-	-	-	-	86	88	334
25	Chalavara side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	7
26	Pattambi side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Perinthalmanna side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-	16	-	-	-	-	-	32	-	-	-	-	70
28	Mannarkkad side outside Kerala State	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	441	-	-	-	-	83	-	527
Total		-	113	-	252	-	0	24	970	73	0	-	23	-	495	87	205	-	611	67	71	47	1,883	-	48	-	-	180	311	5,462

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

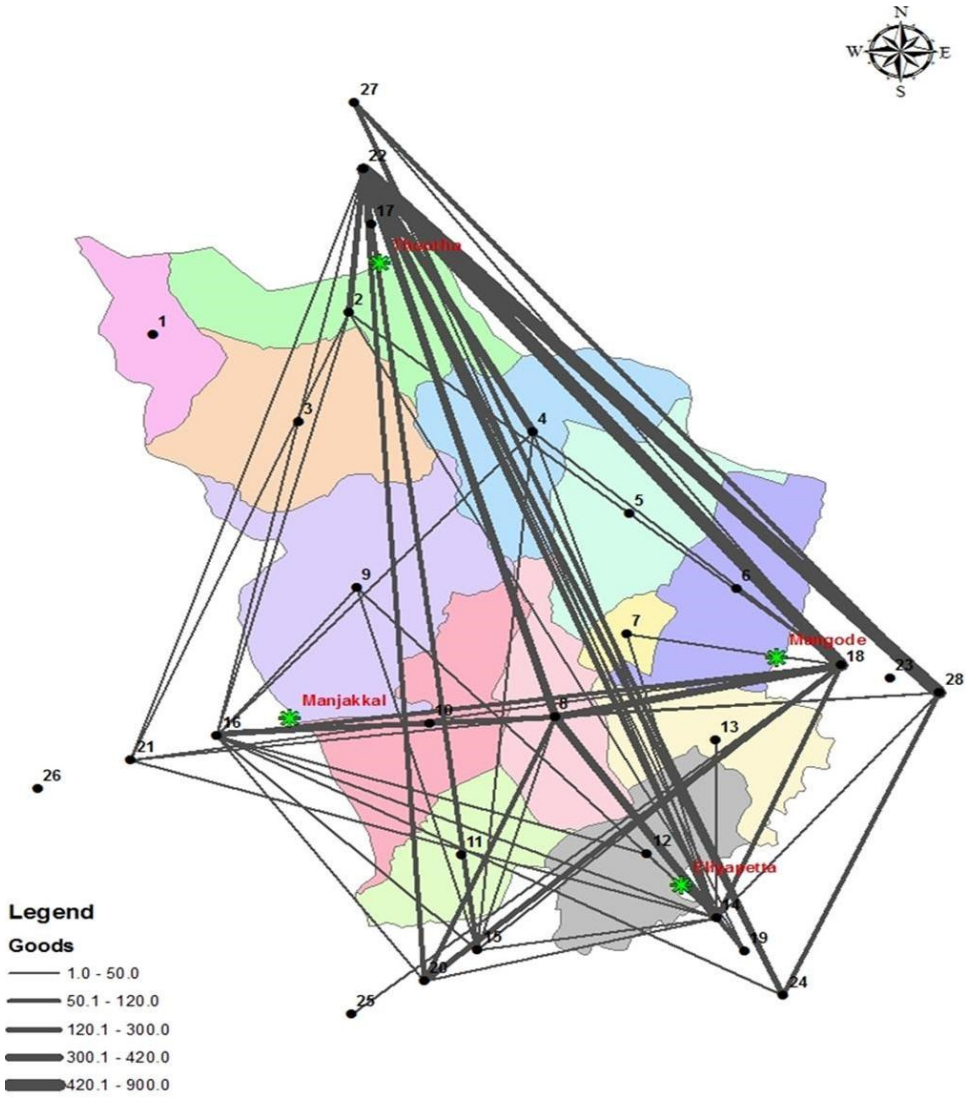


Fig.17.27 Desire lines of inter-city goods traffic

Pattern of goods traffic

A further study of the goods traffic pattern observed within the study region vis-a-vis the outside study region revealed that 1,165 tonnes of traffic originated from the study region and 1,456 tonnes of traffic terminated in the study region. More than 2,800 MT of traffic (52%) are of divertible nature, which, are passing through the CBD area of the town due to non-availability of bypass. Table 17.40 shows the pattern of inter-city goods movements in Cherpulassery town.

Table 17.40 Pattern of Inter-city Goods Movements in Cherpulassery Town

Sl.No	Pattern of movements	Quantum (MT)	Share(%)
1	Internal to internal	0	0
2	Internal to External	1,165	21.34
3	External to internal	1,456	26.66
4	External to External	2,840	52.01

17.5.6 Inter-city Vehicular Movements

Pattern of inter-city vehicular movements through Cherpulassery Town is obtained by analyzing the origin-destination movements of vehicular traffic at the outer cordon survey locations. It could be seen that 14,132 PCU of through vehicles passed along Cherpulassery Town, of which highest movements of 2,694 PCU were observed between Perinthalmanna side and Mannarkkad side, followed by 1,888 PCU of movement between Perinthalmanna and Ottappalam/ Chalavara, 1,159 PCU between Pattambi and Mannarkkad. Movement pattern of inter-city vehicles through various exit points of Cherpulassery Town are presented in Table 17.41 and Fig. 17.28.

Table 17.41 Inter-city Vehicular Movements in Cherpulassery Town

O/D	1	2	3	4	5	6	Total
	Cherpulassery Town	Ottappalam side	Chalavara side	Pattambi Town	Perinthalmanna side	Mannarkkad side	
1.Cherpulasserry Town		3,123	828	4,037	3,232	2,912	14,132
2. Ottappalam side	3,103			251	598	128	4,080
3. Chalavara side	980			98	242	251	1,571
4. Pattambi side	5,152	313	72		271	651	6,459
5. Perinthalmanna side	3,724	748	300	129		1,569	6,470
6.Mannarkkad side	2,639	134	200	508	1,125		4,606
Total	15,598	4,318	1,400	5,023	5,468	5,511	37,318

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

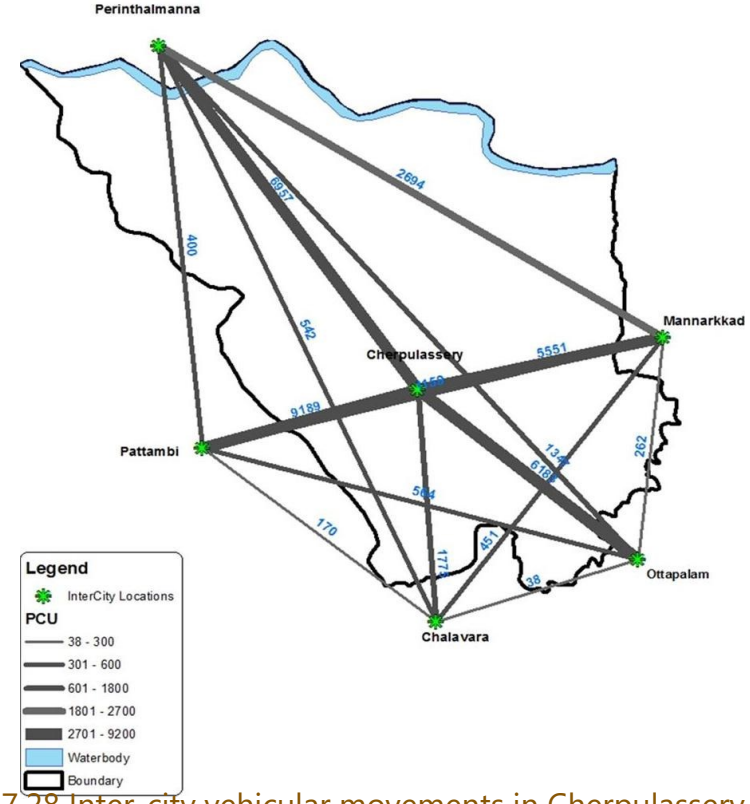


Fig.17.28 Inter-city vehicular movements in Cherpulassery Town

Intermediate Public Transport (IPT) operations

IPT modes consist of auto-rikshaws and taxis. There are 11 auto stands and three taxi stands located within the municipal limit of Cherpulassery Town. The share of IPT modes especially auto-rikshaws in the city road network comes around 21% and varies from 13% to 42% during peak hours (Table 7.42). Concentration of IPT modes is found to be as high as 26% in the CBD areas of Cherpulassery Town. The share of IPT passengers in the inter-city passenger traffic was only 14%. Table 17.42. shows the Extend of IPT operations in Cherpulassery town.

Table 17.42 Extend of IPT operations in Cherpulassery Town

HS No.	Homogeneous section		Total vehicles	No. of autos	% Share
I	Pattambi - Cherpulasserry road				
1	Pattambi Border	Madathiparambu	1,983	264	13.31
2	Madathiparambu	Hospital Jn	2,105	297	14.11
3	Hospital Jn	Karalmanna Bypass Jn	2,013	455	22.60
4	Karalmanna Bypass Jn	EMS Road Jn	2,361	590	24.99
5	EMS Road Jn	Bus Station	2,192	564	25.73
6	Bus Station	Central Jn	1,449	382	26.36
7	Central Jn	Puthanalkkal Jn	1,287	322	25.02
8	Puthanalkkal Jn	Kacherykkunnu	1,392	246	17.67
II	Cherpulasserry to Ottappalam road				
9	Central Jn	KSEB JN	1,028	258	25.10
10	KSEB JN	Eliyappatta Jn	1,397	340	24.34
11	Eliyappatta Jn	Ottappalam Border	1,323	319	24.11
III	Palakkad - Cherpulasserry - Perinthalmanna road				
12	Perinthalmanna Border	Thootha Jn	727	132	18.16
13	Thootha Jn	Karalmanna Jn	874	114	13.04
14	Karalmanna Jn	Kuzhalumpadi Jn	1,067	199	18.65
15	Kuzhalumpadi Jn	Kacherikkunnu	1,347	238	17.67
16	Kacherikkunnu	26th Mile Jn	1,769	310	17.52
17	26th Mile Jn	Palakkad Border	1,144	238	20.80
IV	Panniyamkurissi road				
18	Hospital Jn	Panniyamkurissi	192	64	33.33
19	Panniyamkurissi	Thootha Jn			
V	Bypass road				
20	Karalmanna Bypass Jn	Kuzhalumpadi Jn	700	166	23.71
VI	EMS Road				
21	EMS road Jn	Chalvara Border	315	131	41.59
VII	Chalavara road				
22	Eliyapatta Jn	Chalvara Border	196	55	28.06
VII	Market road				
23	Eliyappatta Jn	Veeramangalam (Market Road)			

Table 17.42 (cont.) Extend of IPT operations in Cherpulassery Town

HS No.	Homogeneous section		Total vehicles	No. of autos	% Share
VIII	Vellinezhi road				
24	Karalmanna	Vellinezhi Border	192	42	21.88
IX	Thootha - Thachangad road				
25	Post Office Jn	Kulappida border	141	28	19.86
X	Other roads				
26	Madathiparambu	Panniyamkurissi	338	97	28.70
27	Puthonalikkal Jn	KSEB Jn	215	48	22.33
28	26h Mile Jn	Karumanamkurissi	_	_	_
29	Karalmanna	Panniyamkurissi	_	_	_
Total			27,747	5,899	21.26
CBD areas			12,435	2,868	23.06

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018

17.6 TRAFFIC PROJECTION

The fundamental principle of urban transportation planning is to formulate a long -term transportation plan serving the community in the future. Thus it becomes necessary to forecast the future travel pattern for the horizon year. Traffic projection helps in evaluating the shortfall in the pattern of road network and accordingly plan the road network improvements, augment the facilities such as providing new roads, developing missing links, bypass road etc. This section gives an overview of various techniques available for traffic projections and the methodology adopted for this study.

17.6.1 Method of traffic projection

For projecting the future demand, various methods of traffic projection including statistical, econometrical and mathematical models are available. These could be judiciously utilized depending upon the level of accuracy warranted and the extent of database available. Various methods of traffic projection employed in the transport planning include;

- Growth factor method
- Regression method based on economic indicators like population, per-capita income growth rate and growth rate in industrial sector and land use parameter.
- Interpolation method based on past trend in traffic growth rates

The relationship established between the various economic indicators for passenger and goods traffic movement can be used to estimate the future demand in an area. Also the growth rate of vehicular population in the area over the years will give a good estimate of the future trips. The traffic volume on links from the past years can be used to establish a growth rate for prediction of the future volume on links.

17.6.2 Techniques adopted for projection

Traffic projections were carried out according to the growth rates worked out on the following basis:

- Growth rate based on realistic estimates using influencing parameters.
- Studies conducted by NATPAC in different towns of similar size in Kerala in the past,
- Growth rate of vehicular population in the region over the years and
- Variation of AADT on major roads from biannual counts made by PWD periodically.

The table 17.43 shows the estimated growth rate.

Table 17.43 Estimated Growth Rate

Methods	Annual growth rate (%)
Studies conducted by NATPAC in similar towns in Kerala in the past (Peak hour traffic growth)	3 to 6
Growth rate of Motor vehicles registration in Palakkad district during 2014-15	10
Biannual traffic count on major roads by PWD during 2007-08 (growth in AADT)	13.5

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018, Socio—Economic review, 2017, PWD

The impact of annual traffic growths on peak hour traffic were estimated based on the peak hour factors on daily traffic. On the basis of a critical evaluation of the above growth rates and also factors such as moderation in traffic growth over the years due to development in transportation sector, the following growth rates (Table 17.44) were adopted for the study area for different categories of roads viz. arterial, sub-arterial and collector roads.

Table 17.44 Growth Rate Adopted for Traffic Projection in Cherpulassery Town

Sl. No.	Hierarchy of road	Traffic growth rate (%)	
		Up to 2027	Beyond 2027
1	Arterial	5	4
2	Sub-Arterial	4	3
3	Tertiary	3	2

17.6.3 Projected link volume on existing network

Table 17.45 presents the estimated daily traffic and Volume-capacity ratio for different horizon years on various road stretches in Cherpulassery Town. It can be seen that all the major road corridors like Pattambi road, Perinthalmanna road, and Mannarkkad road would be severely congested in the horizon year with the anticipated traffic more than the capacity of the roads under "do-nothing option" **(**Figure 17.29.).

Table 17.45 Projected Volume Capacity Ratio in Cherpulassery Town

HS No.	Homogeneous section		Capacity (PCU)	2017		2027		2037	
				Traffic Volume (PCU)	Volume/ Capacity Ratio	Traffic Volume (PCU)	Volume/ Capacity Ratio	Traffic Volume (PCU)	Volume/ Capacity Ratio
I	**Pattambi - Cherpulasserry road**								
1	Pattambi Border	Madathiparambu	1,500	1,555	1.04	2,532	1.69	3,748	2.50
2	Madathiparambu	Hospital Jn	1,500	1,654	1.10	2,694	1.80	3,988	2.66
3	Hospital Jn	Karalmanna Bypass Jn	1,500	1,669	1.11	2,719	1.81	4,024	2.68
4	Karalmanna Bypas	EMS Road Jn	1,500	2,069	1.38	3,370	2.25	4,989	3.33
5	EMS Road Jn	Bus Station	1,500	1,841	1.23	2,999	2.00	4,439	2.96
6	Bus Station	Central Jn	1,500	1,412	0.94	2,300	1.53	3,405	2.27
7	Central Jn	Puthanalkkal Jn	1,500	1,164	0.78	1,895	1.26	2,805	1.87
8	Puthanalkkal Jn	Kacherykkunnu	1,500	1,254	0.84	2,043	1.36	3,024	2.02
II	**Cherpulasserry to Ottappalam road**								
9	Central Jn	KSEB JN	1,500	972	0.65	1,582	1.05	2,342	1.56
10	KSEB JN	Eliyappatta Jn	1,500	1,270	0.85	2,068	1.38	3,061	2.04
11	Eliyappatta Jn	Ottappalam Border	1,500	1,206	0.80	1,964	1.31	2,907	1.94
III	**Palakkad - Cherpulasserry - Perinthalmanna road**								
12	Perinthalmanna Bo	Thootha Jn	1,500	752	0.50	1,225	0.82	1,813	1.21
13	Thootha Jn	Karalmanna Jn	1,500	866	0.58	1,411	0.94	2,088	1.39
14	Karalmanna Jn	Kuzhalumpadi Jn	1,500	937	0.62	1,526	1.02	2,259	1.51
15	Kuzhalumpadi Jn	Kacherikkunnu	1,500	1,204	0.80	1,960	1.31	2,902	1.93
16	Kacherikkunnu	26th Mile Jn	1,500	1,535	1.02	2,500	1.67	3,700	2.47
17	26th Mile Jn	Palakkad Border	1,500	1,207	0.80	1,966	1.31	2,910	1.94
IV	**Panniyamkurissi road**								
18	Hospital Jn	Panniyamkurissi	900	147	0.16	198	0.22	241	0.27
19	Panniyamkurissi	Thootha Jn	900	138	0.15	138	0.15	138	0.15
V	**Bypass road**								
20	Karalmanna Bypas	Kuzhalumpadi Jn	1,200	543	0.45	803	0.67	1,079	0.90
VI	**EMS Road**								
21	EMS road Jn	Chalvara Border	900	269	0.30	361	0.40	440	0.49
VII	**Chalavara road**								
22	Eliyapatta Jn	Chalvara Border	1,200	164	0.14	243	0.20	326	0.27
VII	**Market road**								
23	Eliyappatta Jn	Veeramangalam (Market Road)	900	-	-	-	-	-	-
VIII	**Vellinezhi road**								
24	Karalmanna	Vellinezhi Border	900	139	0.15	187	0.21	228	0.25
IX	**Thootha - Thachangad road**								
25	Post Office Jn	Kulappida border	900	138	0.15	185	0.21	225	0.25
X	**Other roads**								
26	Madathiparambu	Panniyamkurissi	900	289	0.32	388	0.43	473	0.53
27	Puthonalikkal Jn	KSEB Jn	900	164	0.18	220	0.24	269	0.30
28	26h Mile Jn	Karumanamkurissi	900	-	-	-	-	-	-
29	Karalmanna	Panniyamkurissi	900	-	-	-	-	-	-

Source: Traffic & Transportation Study for Cherpulassery Town by NATPAC, 2018



Fig.17.29 Over Utilized Roads in Cherpulassery Town in 2037

The projected traffic on the existing road network implies that the existing road network would not be able to handle the traffic in the horizon years without up gradation of the transport infrastructure facilities. Augmentation of the capacity of the existing road network by strengthening/widening and the construction of missing links, flyovers, bypasses and link roads is a must considering the dramatic increase in the traffic volume.

17.7 INFERENCE

Cherpulassery town faces traffic congestion in Central areas of the town. Insufficient width in most of the road stretches, especially between Hospital Jn. And Puthanalkkal Jn. Absence of adequate turning radii at the major intersections in the town namely Hospital Jn., Bypass Jn., EMS road Jn., and Central Jn.

Due to poor surface condition and lack of signals systems in the junctions, the vehicles cross the junctions without any order which creating accidents and traffic blocks.

Increasing number of personalized vehicle creating parking problems. Lack of parking spaces and encroachment of road space for parking in the central area of town between Bypass Jn. and Central Jn. There are huge pedestrian and street vending activities experienced on the problematic road stretch which act as the major external interferences in the smooth operations of traffic flow in the town.

Movement of inter-city bus traffic on congested urban road due to the location of bus stand within the central area of the town. In the absence of adequate link roads and bypasses, all the traffic have to pass through the congested CBD area of the town.

The Cherpulassery town has good interactions with neighbouring towns like Ottapalam, Shoranur, Pattambi, Perinthalmanna and Mannarkkad. The State highway (SH 53) from Palakkad to Perinthalmanna passes through the peripheral of the CBD area with a length of about 7 km.

A comprehensive transportation network has to be prepared so as to ensure the smooth flow of traffic within the Cherpulassery Municipality .

18. SPECIAL CONCERN AREA

Urban poverty poses the problems of shelter, water, sanitation, health, education, social security and livelihoods along with special needs of vulnerable groups like women, children and aged people. Social inequality remains a core challenge to the urban growth agenda. Enabling transformation will require investing in all-inclusive solutions to education, financial inclusion, welfare and employment challenges that confront the poor. Most of them are involved in informal sector activities where there is constant threat of eviction, removal, confiscation of goods and almost non- existent social security cover. Tackling poverty and inequality is most needed in order to make the cities sustainable i.e. inclusive, productive, efficient and manageable.

18.1 SOCIAL BACKWARDNESS & POVERTY

Social backwardness is a situation when a section of people are placed at a disadvantageous position thereby delimiting their life chances. This ultimately results in economic backwardness as the group is denied opportunities and face unequal treatment in all walks of life. Social backwardness is also the result of poverty to a large extent. Social backwardness which results from poverty is likely to be aggravated by considerations of their caste. This shows the relevance of both caste and poverty in determining factor of social backwardness of citizens. Poverty by itself is not the determining factor of social backwardness. Poverty is relevant in the context of social backwardness. Hence study of Social backwardness of Cherpulassery town is done based on BPL population and Scheduled caste and Scheduled tribe population.

18.1.1 BPL Index

Below Poverty Line (BPL) is an economic benchmark and poverty threshold used by Government of India to indicate the economic backwardness and to identify individuals and households in need of government assistance. Kerala is one of the states that had formulated its own criteria. In Kerala, there are nine parameters taken, and a family that lacks four or more parameters are classified as BPL. (Table 18.1)

Table 18.1 List of Parameters for Classification of BPL

Sl. No	Parameters
1	No land or less than 5 cents of land
2	No house or dilapidated house
3	No sanitary latrine
4	Family without colour television
5	No regular employed person in the family
6	No access to safe drinking water
7	Women headed household or presence of widows or divorcee
8	SC and ST
9	Mentally retarded or disabled member in the family

Source: BPL Census Kerala, 2009

In Cherpulassery Town , 1997 families have been classified as BPL as per the survey conducted on 2009. BPL index of wards 6, 11, 3, 5, 17, 16, 2, 10 and 1 equal to or

greater than one in Cherpulassery Municipality. As per the account of ICDS, in 2018 BPL count is 3550. The existing economic standard of people as obtained from the socio economic survey is that the average monthly income is Rs 12,555 and the average monthly expenditure per house is Rs 12,303. This gives an insight into the economic status of the people of Cherpulassery Municipality. The earning capacity is very less.

18.1.2 SC/ST Population Index

Palakkad is a socially backward district. According to the 2011 census, SC/ST population constitutes 16.11% of the total population in the district out of which 14.37% are SC's and the remaining 1.74% are ST's. SC population of Cherpulassery Town constitutes nearly 11.19 % of the total population. There is no ST Population notified in the Municipality. The temporal variation of SC population from 1981 to 2011 is given in Fig. 18.1. The trends have shown that both the SC population has been very much fluctuating.

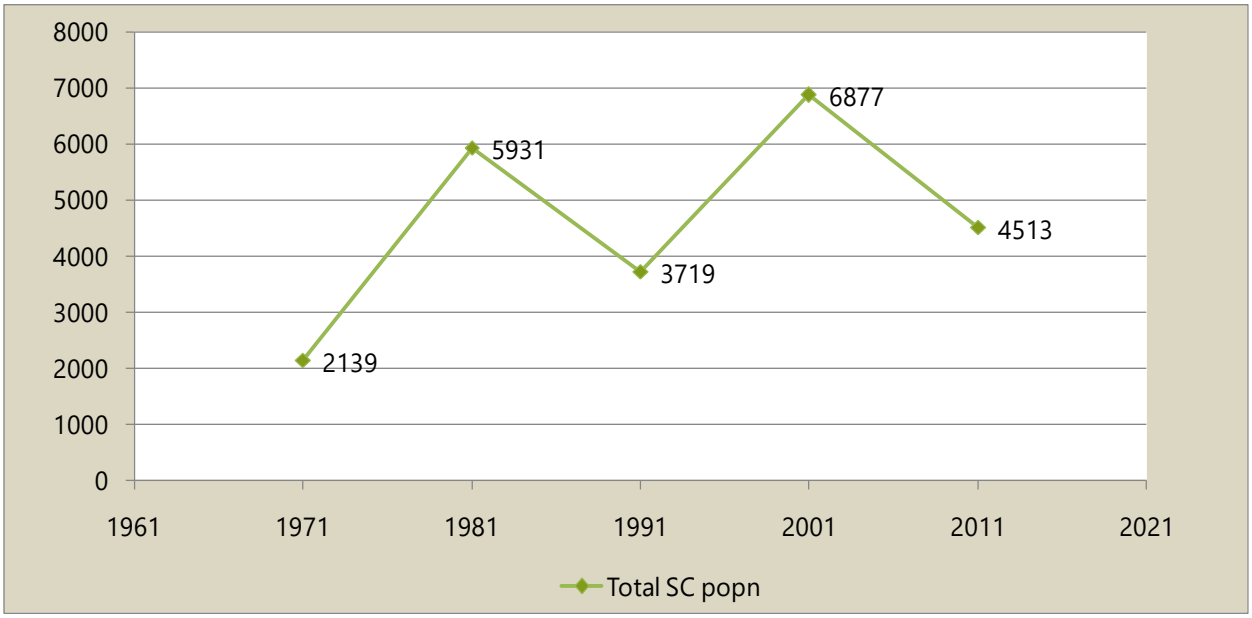


Fig.18.1 Temporal Variation of SC Population

Source: Census1971,1981,1991,2001,2011

The ward wise SC population concentrations in the Municipality are given in Fig 18.2. The SC population is mainly concentrated along the north-west side and north-east side of the Municipal town. The Ward 31 (Chenthrathparambu), Ward 30 (Panniyamkurissi), Ward 27 (Malamalkunnu), ward 18 (Unginthara South) and ward 32 (Veettikkad) are having the maximum SC concentration. BPL concentration is observed in the wards having higher concentration of SC's, indicating the social backwardness of the group. Agricultural labourers were also observed to be predominant in these wards.

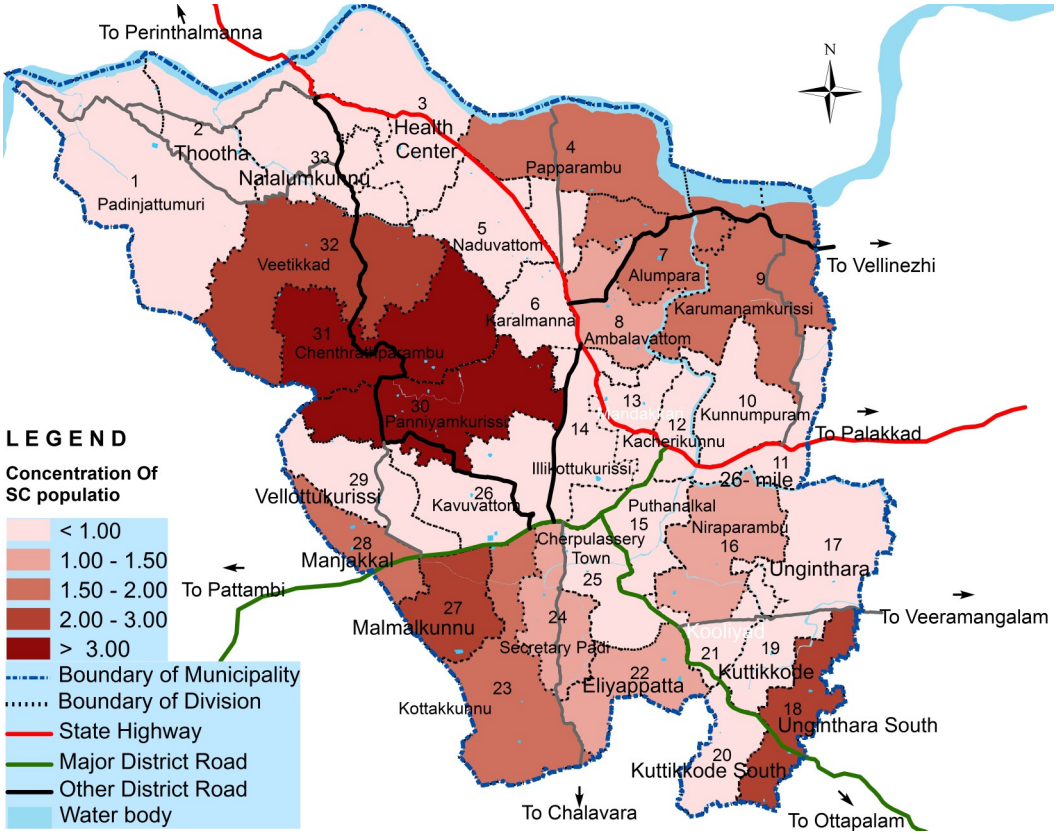


Fig 18.2 Ward wise SC population concentration (Source: CDS)

18.1.3 General condition of SC population

There are 49 SC colonies within the municipality comprising of 561 families and 67% of the total SC population are residing in these colonies. According to the socio-economic survey, 98.6% of the houses in these colonies are electrified. However the toilet facility is available in only 71 % of houses and 66.33 % of houses have accessibility to Potable Water.

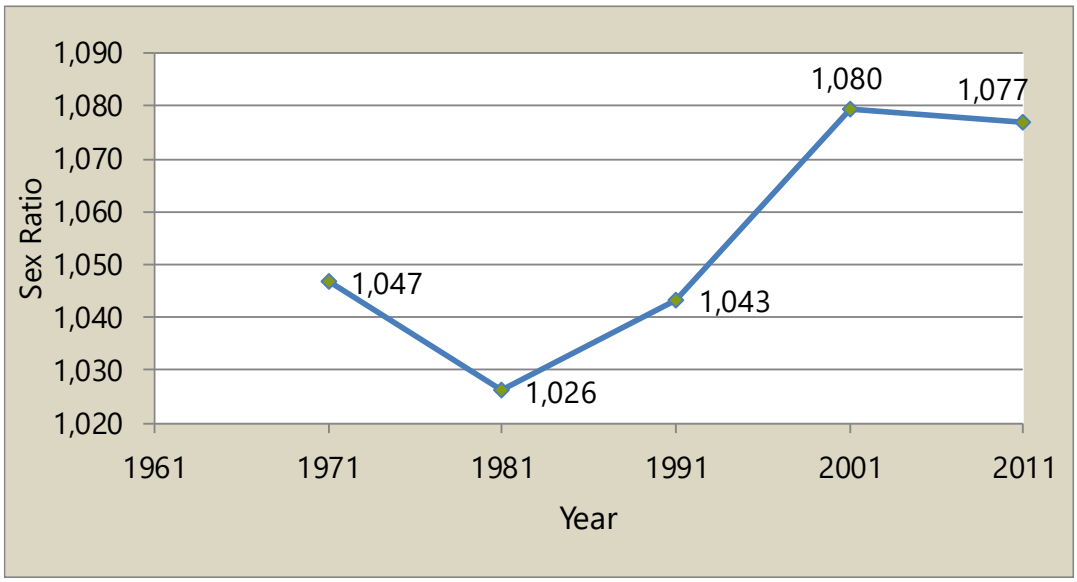


Fig.18.3 Temporal Variation of SC sex ratio

Source: Census1971,1981,1991,2001,2011

Sex Ratio

Compared to the overall sex ratio of the municipality, the sex ratio of SC is higher at 1,077. The sex ratio among the SC's have shown slight decline during 2001-2011. The variations of sex ratio for SC's over the last four decades are given in Fig 18.3.

18.1.4 Scheduled Caste Colonies

SC colonies are areas which require special attention as the living conditions are comparatively poor. The BPL distribution shows that most of them are concentrated away from the urban centres where agricultural labourers and cultivators are predominant. So there is a need to provide basic infrastructure facilities to each colony to upgrade the living condition. The BPL population and SC/ST population are concentrated more or less in the same wards where there is high concentration of agricultural labourers and cultivators. But the high income population occupied those lands where land value is more, which is linked with accessibility. According to the socio-economic survey, 99.6% of the houses in these colonies are electrified. However the functional toilet facility is available in 95% of these houses. Details of SC colonies are shown in table 18.2.

Table 18.2 Details of SC colonies

SL No	Details	Count
1	Total number of Colonies	49
2	Number of houses	561
3	Population	
	Male	1474
	Female	1846
4	Sewage Facilities	Nil
	Sanitation	
	Toilet facilities available	49
	Sanitary latrine	49
5	Water	
	Available all over the year	Nil
	Available for more than 6 months	Nil
	Available for less than 6 months	49
	Pipe connection	49
	Well	46
6	Electricity	
	Electrified	49
	Street light	31
7	Road facility	49
8	New house needed	49
9	Rennovation of house requirement	49

Source: Municipal office, Cherpulassery

18.2 POVERTY ALLEVIATION PROGRAMMES

Urban Poverty alleviation involves:

1. upgrading the physical environment in poor settlements by providing basic services such as water, sanitation, waste collection, storm drainage, access roads and street lighting;
2. regularizing security of land tenure and housing; and
3. Instituting a social support program focused on promoting sustainable livelihoods through the accumulation of natural, physical, human, social, financial as well as institutional and knowledge/information assets.

The State Poverty Eradication Mission (SPEM)-Kudumbasree, started in the year 1998, aims at eradicating absolute poverty within 10 years under the leadership of the Local Self Govts in Kerala. As per the Section 284 of the Kerala Municipality Act 1994, 2% of the income of each ULB is to be spent for Urban Poverty Alleviation Programme. The ULBs are transferring such amount to the CDS annually, as its share for UPA budget. The other sources of income to the CDS for UPA activities, include the transfer from GOK under Kudumbasree centrally sponsored UPA programmes and institutional finance for Self Help Groups.

18.2.1 Urban Poor programs in Cherpulassery

Kudumbasree/UPA cell functions in Cherpulassery Municipality also. A Community Development Society (CDS) and, under that, 33 Area Development Societies (ADS) and 317 nos. of neighbourhood groups /SHG s consisting of 2500 members are functioning in Cherpulassery. There are 38 group enterprises and 20 nos of individual enterprises are functioning within the Municipality. Details of Kudumbasree enterprises are shown in table 18.3.

Several programs are undertaken by the Kudumbasree sub units for poverty alleviation through women's empowerment. Number and distribution of women self-help groups in Cherpulassery is shown in table 18.4.

Table 18.3 Details of Kudumbasree Enterprises

SL No	Enterprises	count
1	Coconut oil	1
2	Construction	6
3	Curry powder	2
4	Mud pot	2
5	Rice powder, Payasam	1
6	Tailoring	32
7	Pickle powder	4

Source: Kudumbasree CDS office, Cherpulassery

Table 18.4 Ward wise Details of Self Helps Group

Ward No.	Name of ward	No.of Self Help Groups
1	Padinjattumury	6
2	Thootha	11
3	Health centre	6
4	Papparambu	14
5	Naduvattom	21
6	Karalmanna	9
7	Aalumpara	10
8	Ambalavattom	7
9	Karumanamkurissi	16
10	Kunnumpuram	6
11	26 th Mile	7
12	Kacherikkunnu	10
13	Mandakkari	10
14	Illlikkottukurissi	13
15	Puthanalkal	9
16	Niraparambu	15
17	Unginthara	8
18	Unginthara South	8
19	Kuttikkode	11
20	Kuttikkode South	7
21	Kooliyad	5
22	Eliyappatta	7
23	Kottakkunnu	14
24	Secretarypady	9
25	Cherpulassery Town	8
26	Kavuvattom	7
27	Malmalkunnu	12
28	Manjakkal	6
29	Vellottukurissi	3
30	Panniyamkurissi	5
31	Chenthrathparambu	12
32	Veettikkad	11
33	Nalalumkunnu	14

Source: Kudumbasree CDS office, Cherpulassery

18.2.2 Major Poverty Alleviation Interventions

Pradhan Manthri Awas Yojana (PMAY- Urban)

The aim as "Housing for All" Mission for Urban area is being implementing during 2015-2022. The mission implementing through four verticals giving option to beneficiaries, Urban Local Bodies (ULB) and State Governments, as under:-

i. "In Situ" slum redevelopment

ii. Affordable housing through Credit Linked Subsidy

iii. Affordable Housing in Partnership

iv. Subsidy for beneficiary-led individual house construction.

Out of the above, Affordable Housing through Credit Linked Subsidy is implementing through Banks/Financial Institutions, under the mission. The beneficiary can take advantage under only one component, from above. The mission will be effective from 17.06.2015 to 31.03.2022.The mission will spend an amount of 9.21 crores for 222 beneficiaries during 2016-2017. The expenditure and details of PMAY contain in table 18.5.

Table 18.5 Expenditure and Details of PMAY

PMAY Scheme	2016-2017	2017-2018
For SC		
No. of beneficiaries	62	49
Fund Granted	12500000	NIL
Expenditure	12500000	NIL
For GENERAL		
No. of beneficiaries	377	172
Fund Granted	79613392	NIL
Expenditure	79610000	NIL

Source: PMAY Draft Report 2017, Cherpulassery Municipality

LIFE Mission

Government of Kerala launched a mission named LIFE (Livelihood Inclusion and Financial Empowerment) as one of the component of Navakeralam Mission envisages a comprehensive housing scheme for all the landless and homeless in the State. The mission is not just confined for providing housing alone but also financial empowerment ensuring livelihood means. The government has set a target of rehabilitating all landless and homeless within the next five years.

As per the survey conducted in 2018 there are 218 families in Cherpulassery comes under House/land less category. The ward wise distributions of these families are shown in table 18.6.

18.3 SOCIAL SECURITY & WELFARE, WOMEN AND CHILD DEVELOPMENT

Social security is primarily a social insurance program providing social protection or protection against socially recognized conditions, including poverty, old age, disability, unemployment and others. Women, children, disabled and the aged are the most vulnerable sections of our society for historic and social reasons. The table 18.6 shows also the ward wise distribution of disabled children, adults and palliatives. Reha-

Table 18.6 Ward wise Details of Land / House less Families

Ward No.	Name of ward	No of Land / house less families	Disabled Children (0-6)	Disabled (Age>6)	Palliative
1	Padinjattumury	8	0	22	3
2	Thootha	6	0	14	1
3	Health centre	3	0	17	8
4	Papparambu	2	2	37	5
5	Naduvattom	16	0	0	0
6	Karalmanna	9	0	23	8
7	Aalumpara	7	0	35	7
8	Ambalavattom	6	0	16	2
9	Karumanamkurissi	1	0	21	1
10	Kunnumpuram	1	0	17	1
11	26 th Mile	2	0	0	0
12	Kacherikkunnu	9	0	0	0
13	Mandakkari	14	0	20	3
14	Illlikkottukurissi	15	0	26	3
15	Puthanalkal	27	0	11	3
16	Niraparambu	5	1	14	0
17	Unginthara	6	0	17	4
18	Unginthara South	6	1	23	3
19	Kuttikkode	10	0	12	2
20	Kuttikkode South	2	0	16	6
21	Kooliyad	3	1	31	1
22	Eliyappatta	7	0	14	1
23	Kottakkunnu	1	0	10	1
24	Secretarypady	3	1	17	3
25	Cherpulassery Town	9	0	20	1
26	Kavuvattom		3	39	11
27	Malmalkunnu	12	0	21	3
28	Manjakkal	3	0	0	0
29	Vellottukurissi	2	1	30	3
30	Panniyamkurissi	6	1	17	1
31	Chenthrathparambu	6	0	7	3
32	Veettikkad	4	0	24	3
33	Nalalumkunnu	7	0	18	0

Source: ICDS, Cherpulassery Municipality

bilitation of victims is also a considerable factor for the planning area. Accident and crime data of Cherpulassery Municipality for the year 2011, 2012, 2013 are shown in Table 18.7.

Table 18.7 Accidents & Crimes Data in Cherpulassery Municipality

SL No	Details of crime	No. of cases		
		2016	2017	2018
1	Theft	10	12	6
2	Robbery	2	2	2
3	Cheating	9	6	8
4	Violence against women	78	72	41
5	Accident	68	63	70
6	Suicide			
7	Attempt to Murder	1	1	1
8	Murder	0	0	1
9	Petty cases	844	841	587
10	Riots	22	14	18

Source : Police Station ,Cherpulassery

18.3.1 Social Welfare Programmes and Infrastructures

Social welfare schemes are introduced with the objective of benefiting various marginalised sections of the society. There are many schemes in place with central and state assistance. These schemes give ample support for aged, handicapped or orphan people, by way of pension provisions, insurance coverage and other benefits. For securing the lives of the poorest of the poor families, the Government of Kerala has introduced the Social Security Pension Schemes. Currently, seven types of social security pensions are being distributed through local bodies. The types of Pensions are agricultural labour pension, destitute pension, Widow Pension, old age pension, disability pension etc. The details of pension schemes and no of beneficiaries in Cherpulassery Municipality are shown in Table 18.8.

Table 18.8 Pension schemes and Number of Pensioners

Sl No	Type of Pension	No. of Beneficiaries			
		2015-16	2016-17	2017-18	2018-19
1	Unmarried women above 50 years	525	881	706	572
2	Agriculture labour Pension	2229	3611	2825	2189
3	Special Disabled Pension	975	1613	1417	1316
4	Old age Pension	4515	7892	7675	6897
5	Widow Pension	3713	6361	5315	4507

Source: Municipal office, Cherpulassery

Table No 18.9 Details of Expenditure of Pension Funds

Sl No	Type of Pension	Total amount disbursed			
		2015-16	2016-17	2017-18	2018-19
1	Unmarried women above 50 years	227880	1811590	2135500	2400400
2	Agriculture labour Pension	715830	6298770	8006200	8271100
3	Special Disabled Pension	441900	3049350	4450800	5715500
4	Old age Pension	2187120	18098905	26703500	28633800
5	Widow Pension	1805120	13120270	16160900	18818100

Source: Municipal office, Cherpulassery

Table 18.9 shows amount spent for each scheme during the period from 2015 to 2019. Social degrading of women is a primary concern in all societies.

Even though many advances were made in economical and social aspects, children living in lower class families still suffer from mental and health problems. To reduce such problems among inhabitants, Cherpulassery municipality is doing supply of balanced diet. To ensure health of children, youngsters, pregnant women, lactating mothers etc supply of such food items through anganawadis are helping a lot.

There are many socio-economic developmental activities conducted in the municipality which includes Pension schemes, Asraya schemes, helping schemes for physically and mentally challenged persons etc. The depth of these problems prompts continuation of these schemes in the twelfth five year plan also.

ICDS Projects

I.C.D.S. is an integrated approach for the development of women and children from disadvantaged sections across their life cycle. ICDS Programme was conceived in Kerala in 1975 with an integrated delivery package of early child hood services so that their synergistic effect can be taken full advantage of by the schemes. The Scheme targets the most vulnerable groups of population including children up to 6 years of age, pregnant women and nursing mothers belonging to poorest of the poor families and living in disadvantaged areas including backward rural areas, tribal areas and urban slums. The identification of beneficiaries is done through surveying the community and identifying the families living below the poverty line.

The scheme envisages the holistic development of women and children. A package of services is being rendered to women and children through ICDS Projects. The grass root level service delivery points are anganwadi centres. ICDS projects provide supplementary nutrition, NHED, immunization and awareness on different subjects etc to women. These projects also provide a package of service for the development of children such as Non formal preschool education, Supplementary nutrition, Immunization, Health check-up, Referral services, Health and nutrition education for the development of children.

Such as Non formal preschool education, Supplementary nutrition, Immunization, Health check-up, Referral services, Health and nutrition education. Various welfare schemes of ICDS programmes are under SNP, the Supplementary nutrition programme for Children and SABALA scheme for Adolescent girls (11-18), for their empowerment, especially in the tribal areas. Under this Scheme training is accorded to the adolescent girls regarding Education, Personal hygiene and other skill development programmes

Children

- Supplementary Nutrition Programme (SNP)
- Immunisation
- Pre-School Education
- Health Check-up
- Referral Service
- Balika Samridhi Yojana (BSY)

Women

- Take home ration scheme (THRS)

There are 531 No's of beneficiaries under the age group of 6 months to 3 years and 659 No's of beneficiaries under the age group of 3 to 6 years. Under SABALA scheme there are 969 No's of beneficiaries. IGMSY (Indira Gandhi Mathruthva Sahayog Yojana), is a conditional Maternity benefit scheme for pregnant and lactating women. A benefit of Rs. 6000/- was given under this scheme. This Scheme for promoting health & nutrition improvements to pregnant and lactating women is being implemented only in Palakkad District. There are 259 No's of beneficiaries in Pregnant woman I category and 244 No's in the lactating woman category.

18.3.2 Status of Anganawadi

Aganwadi's are the grass root level service delivery point of social welfare activities. Anganwadi center is the focal point for delivery of services which is managed by an Anganwadi Worker, assisted by a Helper. Both are honorary workers selected from local community. As per the criteria, there should be one anganwadi for 1000 population. There are a total of 37 anganwadis of which 34 are working in their own buildings. Although Anganwadis are having toilets, all toilets are not baby friendly. Spatial distribution of anganwadis in Cherpulassery Municipality are shown in Fig 18.4. Details of Anganwadis are shown in Table 18.10.



Anganawadi at Karalmanna

Table 18.10 Details of Anganwadi

Sl No	Ward.No.	Name & Location	Extent in Cent	No. Of Children	No. Of Worker	Owned/Rented	Compound Wall	Electricity	Drinking Water	Toilet	Kitchen
1	1	Oliyathupara	3	10	2	Owned	2 side	Yes	Yes	Yes	Yes
2	1	Kattukandam	3	17	2	Owned	No	Yes	Yes	Yes	Yes
3	2	Karimkara	3	12	2	Owned	Yes	Yes	Yes	Yes	Yes
4	3	Moochithottam	3	10	2	Owned	Yes	Yes	No	Yes	Yes
5	3	SaskarikaNilayam	3	15	2	Owned	Yes	Yes	Yes	Yes	Yes
6	4	Naripattakunnu	4	20	2	Owned	Yes	Yes	Yes	Yes	Yes
7	6	Karalmanna	7	10	2	Owned	No	Yes	Yes	Yes	Yes
8	6	Vakayil Kundu	No	10	2	Rented	No	No	No	No	No
9	7	Alumpara	3	10	2	Owned	No	Yes	No	Yes	Yes
10	8	Shappumkunnu	1.5	8	2	Owned	Yes	No	No	Yes	Yes
11	9	Karumanamkurissi-I	3	14	2	Owned	1 side	Yes	Yes	Yes	Yes
12	9	Karumanamkurissi-II	3.5	20	2	Owned	2 side	Yes	Yes	Yes	Yes
13	10	Athanikkal	3	16	2	Owned	Yes	Yes	No	Yes	Yes
14	13	Kacherikunnu	4	15	2	Owned	Yes	Yes	No	Yes	Yes
15	14	Ellikollukurussi	Nil	9	2	Rented	No	No	No	No	No
16	15	MundiyamParambu	4	15	2	Owned	Yes	Yes	Yes	Yes	Yes
17	15	Cherpulassery	3	20	2	Owned	No	No	Yes	Yes	Yes
18	16	Alumkunnu	5	20	2	Owned	Yes	Yes	Yes	Yes	Yes
19	17	Unginthara anganwadi	3	21	2	Owned	Yes	No	Yes	Yes	Yes
20	17	Mannumkuzhi	4	28	2	Owned	No	No	Yes	Yes	Yes
21	18	Mundampalliyal	4	21	2	Owned	Yes	Yes	Yes	Yes	Yes
22	19	Kuttikkode	5	17	2	Owned	Yes	No	No	Yes	Yes
23	20	Karattukurissi	3.75	15	2	Owned	No	No	Yes	Yes	Yes
24	21	Aliyapatta	3	24	2	Owned	Yes	Yes	Yes	Yes	Yes
25	22	Aramkunnathukavu	3	10	2	Owned	No	No	Yes	Yes	Yes
26	23	Tachamparampath	4	11	2	Owned	Yes	Yes	No	Yes	Yes
27	24	Pandumangalam	3	12	2	Owned	No	Yes	Yes	Yes	Yes
28	26	Darmasasta	3	25	2	Owned	Yes	Yes	Yes	Yes	Yes
29	26	Chettikunnu	4	12	2	Owned	Yes	Yes	Yes	Yes	Yes
30	27	Malmalthodi	4	12	2	Owned	Yes	Yes	Yes	Yes	Yes
31	29	Vellottukurussi	2.5	15	2	Owned	Yes	Yes	Yes	Yes	Yes
32	29	Vadakkekara	2	11	2	Owned	No	No	No	Yes	Yes
33	30	Panniyamkurussi	5	20	2	Owned	Yes	Yes	Yes	Yes	Yes
34	31	Naduvattom	4	9	2	Owned	Yes	Yes	No	Yes	Yes
35	32	Thekkumury	4.5	10	2	Owned	Yes	Yes	Yes	Yes	Yes
36	33	Vadakkumury	3	12	2	Owned	Yes	Yes	No	Yes	Yes
37	33	Vadakkumury	Nil	10	2	Rented	No	No	No	No	No

Source: ICDS, Cherpulassery Municipality

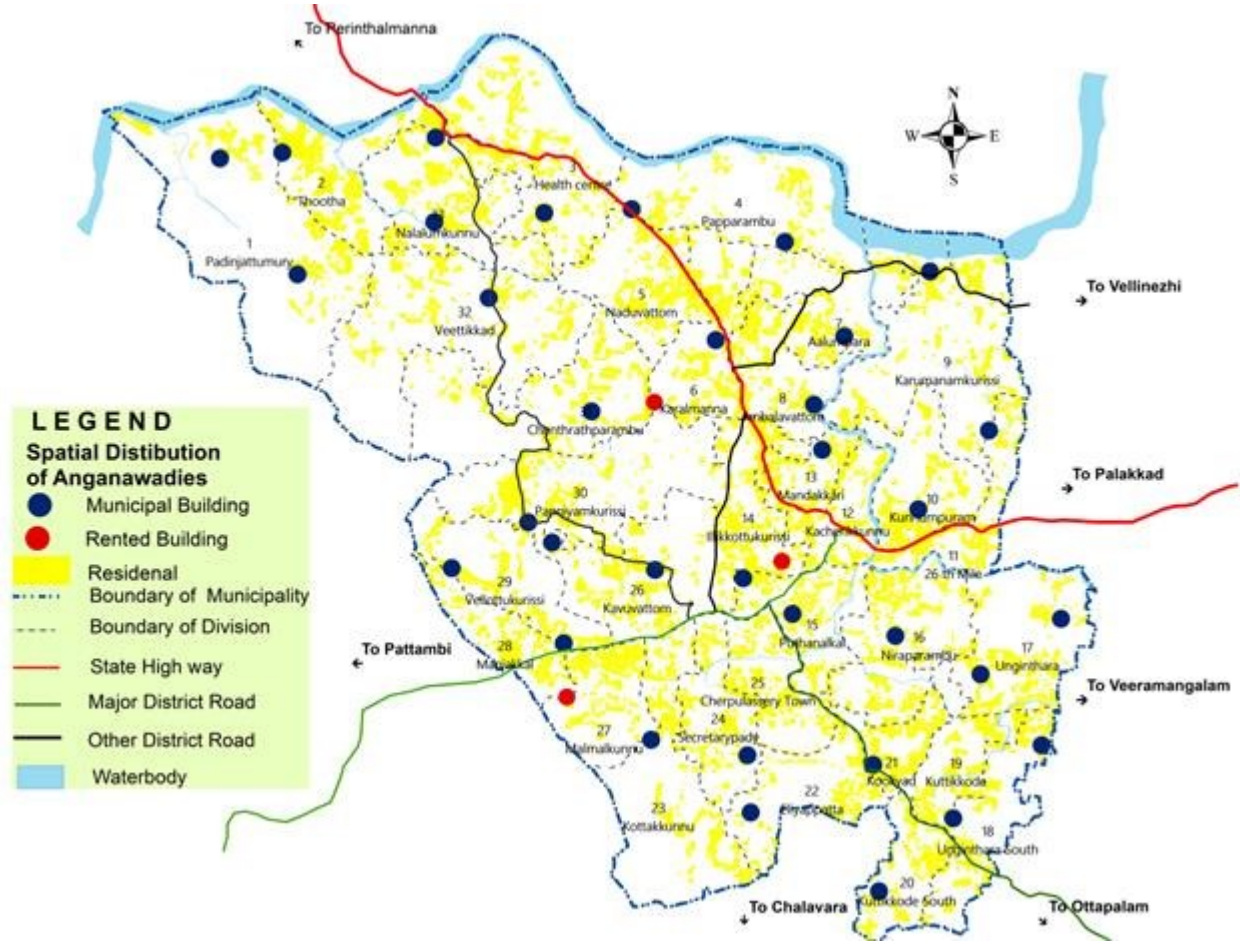


Fig 18.4 Spatial Distribution of Anganwadis

18.4 INFERENCE

The SC populations are mainly concentrated in wards having greater concentration of agricultural labourers and cultivators. Socially backward communities are mostly engaged in primary activities like agriculture. Government's financial assistance for education at all levels and reservations in educational institutions was found effective as their education status has also improved over the years. In spite of several initiatives taken towards poverty alleviation, there are several critical issues and challenges remaining unsolved.

53 % of families of Cherpulassery Municipality is below poverty line. There are certain areas of concern in the development of BPL population including Animal husbandry, Agriculture has a good potential in Cherpulassery Municipality. Therefore the development programmes in these sectors should be given priority to include the BPL

population especially the SC/ST and other socially weaker sections of the society. Also, infrastructure facilities including safe drinking water, electricity, solid waste disposal system etc. should be provided in the BPL concentration areas. Furthermore, measures should be taken for the rehabilitation of weaker sections like landless/homeless, elderly, disabled and other disadvantaged people.

A special program has to be framed by integrating the various programs of central and state governments so as to get maximum benefits to weaker sections of the Municipality.

19. ENVIRONMENT & ECOLOGICALLY SENSITIVE AREAS

Environment is one of the most vital element of an area. They are regions which harbour a great diversity of endemic species and at the same time have been significantly impacted and that are likely to be altered by human activities. Healthy environment maintains the nature's balance as well as helps in growing, nourishing and developing all the living things on the earth. Management of natural resources and preservation of ecological balance are perceived today as essential elements of urban development. The planning efforts are intended not only to correct the damages resulting from uncontrolled urbanization and industrialization, but to address ecosystem degradation in the countryside.

19.1 EXISTING SCENARIO

Ecologically Sensitive Areas (ESAs) are to be viewed as areas where human activities will continue, but be prudently regulated under the Environment (Protection) Act, 1986. Ecologically sensitive areas in Cherpulassery include forest, Paddy fields, surface water sources and Sacred groves. Cherpulassery provides a scenic beauty due to the presence of lush green paddy fields, hillocks with forest, natural streams and ponds.

19.1.1 Forest

The forest land area located as Veettikadan Mala at North-west part and as Kottakunnu at South-west part of the Municipality. These are under vested forest under section 3 of the Kerala Private Forests (Vesting and Assignment) Act 1971 aiming to the management of ecologically fragile lands with a view to maintaining ecological balance and conserving bio-diversity. In Cherpulassery, about 1.16% of the total land is under forest with an area of 37 Ha as shown in fig. 19.1.

19.1.2 Paddy Fields

The paddy lands perform a number of ecological functions as feeders of water aquifers and retain the ground water level of the area. Destruction and permanent conversion of this ecosystem will threaten the water security. Another function of paddy field is from offering food security and biodiversity conservation. Paddy fields in Cherpulassery constitutes 410 ha which is 12.86% of the total area. The main environmental problem is due to paddy reclamation. Paddy fields are being converted for non-agricultural activities. Increased cost of cultivation, labour shortage and less profit leads to crop shift from paddy to other crops. In Cherpulassery about 35 Ha of paddy land is kept vacant as non cultivated area, which constitute 0.35% of total land area of the municipality. The fig 19.2 shows the spatial distribution of paddy fields within the municipality.



Fig. 19.1 Spatial Distribution of Forest

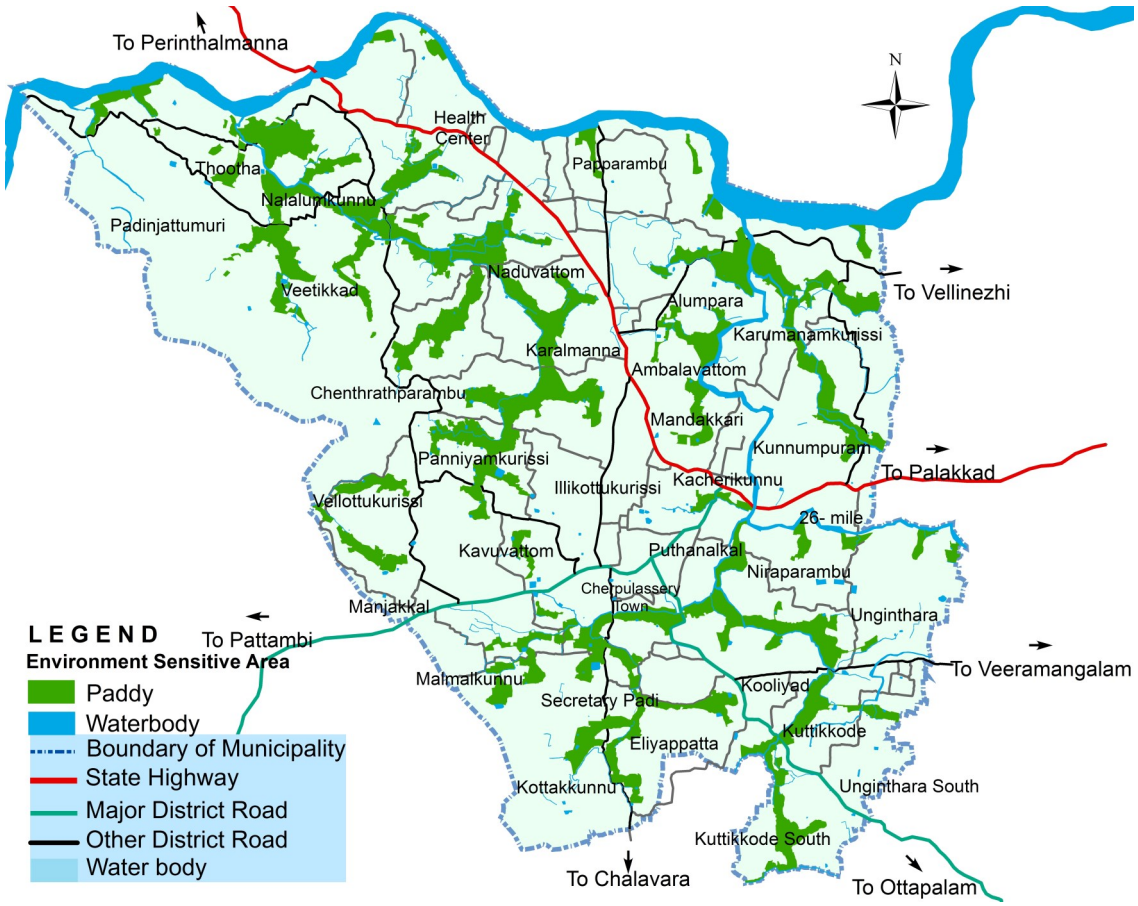


Fig. 19. 2 Spatial Distribution of Paddy Fields

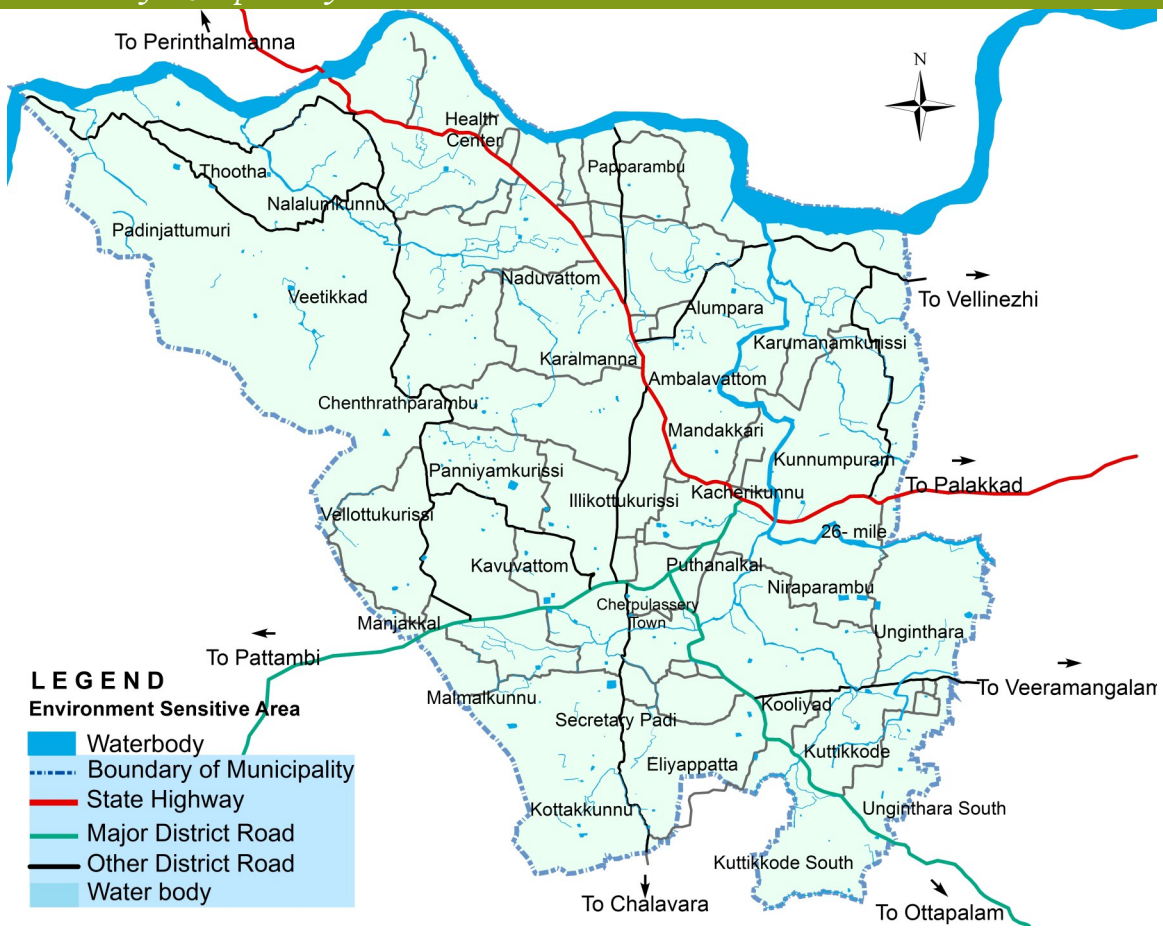


Fig.19. 3 Spatial Distribution of Water Courses

19.1.3 Sacred Groves

Sacred groves (kavukal) are seen through out Kerala, having varied forms, cultural practices and belief systems. The size of these groves ranges from few sq.m area to a few sq. km. area of undisturbed forest patch and the vegetation ranges from a few trees of a species, to a single species covering the whole area and a consortium of trees of different species. Even though the groves are more or less disturbed and reduced in size, many of them are still rich in biodiversity. The vegetation in the groves is highly varied, viz. mangroves, fresh water swamps, or other tropical forest. Deities worshipped in the groves are also varied and based on the nature of the deity, sacred groves are known under different names.





Sacred Groves in Cherpulassery

19.1.4 Surface Water Sources

Surface waters play a very important role in economics and the functioning of ecosystems. The major water bodies flowing through the Cherpulassery town are Thoothapuzha through northern boundary and Kakathodu through north-east part and joined with Thoothapuzha at Vadakumuri. The area which constitutes with water bodies within the municipal area is 125 Ha and it accounts as 3.92% of the total area of town. The other important rivulets are namely Koramba and Pattikam. Among the several ponds existing within the municipality, 5 ponds are owned by Municipality.

19.1.5 Ground Water

Ground water has long been regarded as the pure form of water compared to surface water, because of purification of the former in the soil column through anaerobic decomposition, filtration and ion exchange. The groundwater resources are being utilized for drinking, irrigation and industrial purposes. There is growing concern on deterioration of groundwater quality due to geogenic and anthropogenic activities. Groundwater, being a vulnerable resource, must be carefully managed to maintain its purity within standard limits. So, quality assessment and management are to be carried out hand-in-hand to have a pollution free environment and for a sustainable use.

19.1.6 Ground Water Table & Quality

There is only one ground water monitoring well within the Municipal area which is an open well located at Puthanalkkal Bhagavathy Temple premises. The hydrograph of the observation well is shown in the Figure 19.4. As per the latest statistics the average water level seen as 6.68 mbgl. Ground water level gets decreased during summer season and it leads to acute water shortage problems. The trend analysis shows that water level in ground water monitoring well of the region is going down considerably. The details of quality of ground water is shown in table 19.1.

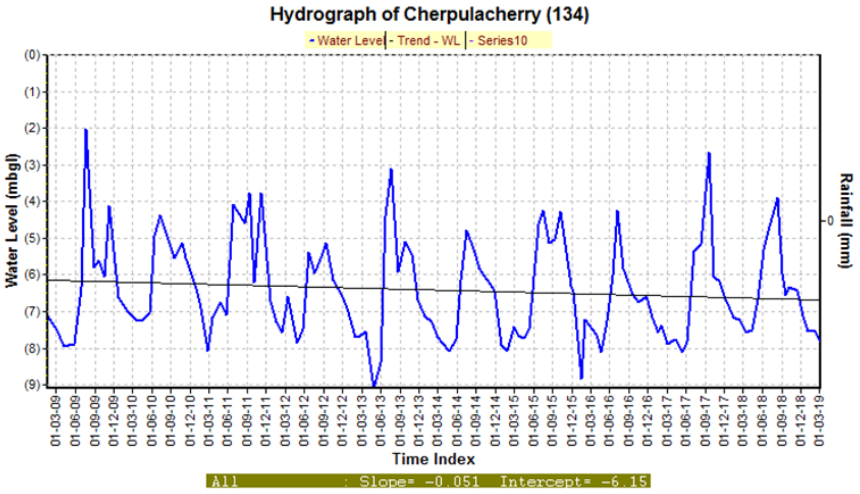


Fig.19.4 Hydrograph of Observation Well Located at Puthanalkal Bhagavathy Temple premises

Table 19.1 Details of Quality of Ground Water

Sl. No.	Parameter	Obtained Value	Permissible limit for Drinking Purpose
1	P^H	9	6.5-8.5
2	Total Dissolved Solids (TDS)	85	500
3	Total hardness as CaCo3	70	200
4	Calcium Hardness (Ca)	22	75
5	Magnesium hardness (Mg)	7.3	0.1
6	Sulphates(SO_4)	17.8	200
7	Nitrates (NO_3)	0	45
8	Chlorides(Cl)	37	250
9	Alkalinity (mg/L)	150	200
10	Iron(Fe)	0	200

Source: Ground Water Department Office, Palakkad

19.2 POLLUTION

As populations grow, the quality of the environment, will play an increasingly important role in public health with respect to issues ranging from solid waste disposal, provision of safe water and sanitation, and injury prevention, to the interface between urban poverty, environment and health. Unsustainable patterns of transport and land use cause a number of significant, and interrelated environment and health hazards.

The intensity of the pollution in terms of air, water and noise is evaluated in order to clearly understand the level and causes of pollution existing within town so that appropriate strategies are put in place to tackle the problem of pollution. The Kerala State Pollution Control Board (KSPCB) is responsible for monitoring water and air quality. It includes under its purview, testing of both surface water and ground water and testing the ambient air quality.

19.2.1 Water Pollution

Water pollution is one of the major environmental issue that looms as a Damocles sword. The discharge of untreated sewage is the single most important cause for the contamination of surface and ground water sources. Aquatic ecosystems are badly affected when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful components.

Table 19.2 shows the quality of water obtained from Thoothapuzha. The amount of BOD in the water is 6.98 mg/l which is higher than the desirable limit. Also the total coliform in the water is 312 no/100ml which is also higher than the desirable limit. The

results show high contamination by E-Coli, a major cause of food borne and water borne diseases. Not a health threat in itself, it is used to indicate presence of potentially harmful bacteria. The presence of coliform in water is a strong indication of sewage or animal waste contamination.

Table 19.2 Quality of Water Obtained from Thootha

2012	pH	BOD (mg/l)	DO (mg/l)	TC (no/100 ml)
Max	7.9	7.8	1.6	600
Min	7.1	6.3	0.2	2
Mean	7.54	6.98	1.08	312
Std dev	0.3	0.58	0.72	218
Des: Limit	6.5-8.5	2	6	50

Source: Water & Air Quality Directory-2012, State Pollution Control Board

19.3 INFERENCE

The paddy land essentially acts as green open space and also functions as reservoir of water during rains preventing floods and fast run off. Likewise, the dry cultivation area and vested forest area also provides the necessary green cover in the Municipality. The sacred groves are unique eco-systems with wide variety of trees, plants and also they are home for various reptiles, birds and animals. Changes in this land use shall reduce the green cover and hence shall adversely affect the environmental quality. Effective conservation measures need to be taken for preserving the ecologically sensitive areas in the Municipality. Existing paddy fields, water bodies, and sacred groves need to be conserved. Existing water bodies has to be protected by preventing discharge of sewage and dumping of solid waste into it. Effective conservation measures needs to be taken for preserving the ecologically sensitive areas in the municipality.

20. Disaster Management

20.1 INTRODUCTION

Mankind's relationship with nature has gone through numerous stages beginning with survival issues in ancient times and spanning the rise of mastery over nature since the industrial age. However, the quick, massive and intensive growth patterns of humans have adversely affected nature, making them more vulnerable to disasters. A disaster can cause a huge impact including broad-scale destruction of physical infrastructure, livestock, loss of life, population displacement and disruption of economic activity. Thus it can change the whole people's life structure by taking all commodities and cutting them off from other food supplies, leading to loss of lives and livelihood. It exposes and challenges the power structure of an affected society, disrupting livelihood strategies and deconstructing social arrangements. The most common hazards across the world are landslides, earthquakes, cyclones, tsunamis, floods, forest fires etc. However, India is prone to various severe disasters every year. Geographical characters play a major role in every facet of disasters over the years. In recent years, several parts of India have experienced devastating disaster events. Alike Uttarakhand was affected by massive floods and landslides leading to unparalleled damage to life and property. Kerala encountered numerous amount of landslides causing a great impact on livelihood. The cost of our blind exploitation of natural resources without showing reverence for the delicate balance of nature has severely harmed us and is ongoing relentlessly. Understanding our connections is crucial fro living sustainably as we face challenges from nature. The choices we make today shape the world for future generation.

In August 2018, Kerala experienced its worst flooding since 1924. The state of Kerala received 164% more rainfall than the normal monsoon. Triggered by abnormally heavy rainfall, the devastating flood and associated landslides affected 5.4 million people and in the loss of 488 lives. The deluge has created unprecedented damage to eight districts in Kerala.

The extent of the destruction to the homes was excessive forcing 14.51 lakhs people from 3.91 lakhs families must leave their homes and enter relief camp offered by the state government. The terrible flood caused thousands of homes, shops, commercial buildings and public buildings to be entirely or partially destroyed.

All disaster are not natural. Natural disasters are often made severe because of human behavior. Now we accept that these human actions themselves have created conditions for disaster events. Each disaster gives an opportunity to learn from it. In light of devastating experience, we had gone through in 2018. The present report focuses on disaster management plans for Cherpulassery municipality region, emphasizing flood and landslide mitigation measures.

20.2 NATURAL HAZARD PROFILE OF PALAKKAD DISTRICT

The district has been vulnerable, in varying degrees, to a large number of natural disasters on account of its unique geo-climatic conditions (Tropical Savanna Climate (Köppen Climate Classification Aw)). The region falls under multiple hazard zone and is highly vulnerable to floods, droughts, earthquakes, landslides, lightning and forest fires. The following Table 20.1 shows the hazard seasonality of various disasters based on past occurrences.

Table 20.1 Hazard Seasonality of Palakkad district (*Source: DDMA, 2015)*

Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Drought												
Forest Fire												
Lightning												
Flood												
Earthquake												

Table 20.2 shows a matrix of past disasters that occurred in the Palakkad district. The data befits to a period of 2010 - 2014 as sourced from District disaster management plan 2015.

Table 20.2 Matrix of past disasters in Palakkad district (*Source: DDMA, 2015*

Sl no	Disaster	Flood	Earthquake	Land slide	Drought	Lightning
1	No. of affected villages	135	3	2	6 taluks	1
2	Population affected	6980	0	0	0	0
3	Cultivated area affected (Ha)	8073.29	0	0	11313	0
4	Estimated area of crop loss	766,822,220	0	0	976,337,500	0
5	No. of houses damaged	6734	0	0	0	0
6	Estimate cost of houses	221lakh	0	0	0	0
7	No. of casualties	19	0	0	0	0

20.2.1 Flood

A flood is an overflow of water from water bodies, such as a river, lake, or ocean, in which the water overtops or breaks levees, resulting in some of that water escaping its usual boundaries, or it may occur due to an accumulation of rainwater on saturated

ground in an aerial flood .

A study by the National Centre for Earth science studies (NCESS) in 2010 revealed that 12.66% of the area under Palakkad district is prone to the risk of flooding which would be 567 sq.km. In 2018 the district received 2378 mm of rainfall, far exceeding the annual average which is around 2110 mm, which raised the benchmark of runoff water resulting in floods along with localized landslides aggravating the condition. As per the study report of Central Water Commission (CWC) on Kerala Floods 2018, 08th and 09th of August 2018 witnessed a sharp rise in inflow of water to the Malampuzha Reservoir. Despite absorbing nearly 50% of the inflow, the impounding structure had to shell out 48 million cubic meters of water resulting in the inundation of low-lying areas and aggravating the situation in floodplains of Palakkad. Another instance of similar nature with lesser inflow occurred during 15th to 17th of August 2018 sustaining the flood conditions. Taluk-wise details of past flood events of Palakkad are mentioned in Table 20.3.

Table 20.3 Taluk wise details of past flood events in Palakkad district (*Source: DDMA, 2015)*

Taluk	Details	Flood				
	Year	2010	2011	2012	2013	2014
Chittur	No of affected villages	20	22	0	21	23
	Population Affected	648	740	1820	1128	20
	No. Of Houses Damaged	162	185	455	282	5
	Estimated cost of house damages in Rs.	525190	778445	1084180	769750	0
	No. Of casualty	0	0	0	1	0
Pattambi	No of affected villages	0	0	0	0	16
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	0	0	0	0	84
	Estimated cost of house damages in Rs.	0	0	0	0	612272
	No. Of casualty	0	0	0	0	0
Mannarkad	No of affected villages	25	25	25	25	19
	Population Affected	598	611	536	557	322
	No. Of Houses Damaged	275	295`	202	289	88
	Estimated cost of house damages in Rs.	589300	463700	430000	678200	115400
	No. Of casualty	4	1	0	0	0

Pa-lakkad	No of affected villages	30	0	0	0	0
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	390	310	168	335	20
	Estimated cost of house damages in Rs.	2533600	970180	380400	1937480	122100
	No. Of casualty	0	0	0	0	0
Ot-tapalam	No of affected villages	41	41	41	41	23
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	181	561	163	379	67
	Estimated cost of house damages in Rs	375000	1585000	799290	3365350	329930
	No. Of casualty	1	3	0	0	0
Alathur	No of affected villages	0	0	0	0	0
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	656	224	274	202	482
	Estimated cost of house damages in Rs.	10 Lakh	7 Lakh	15 Lakh	8 Lakh	25 Lakh
	No. Of casualty	3	0	1	0	5

The map (Fig 20.1) representing the Flood-affected area of Palakkad generated from Kerala state Disaster Management Authority inputs is given below.

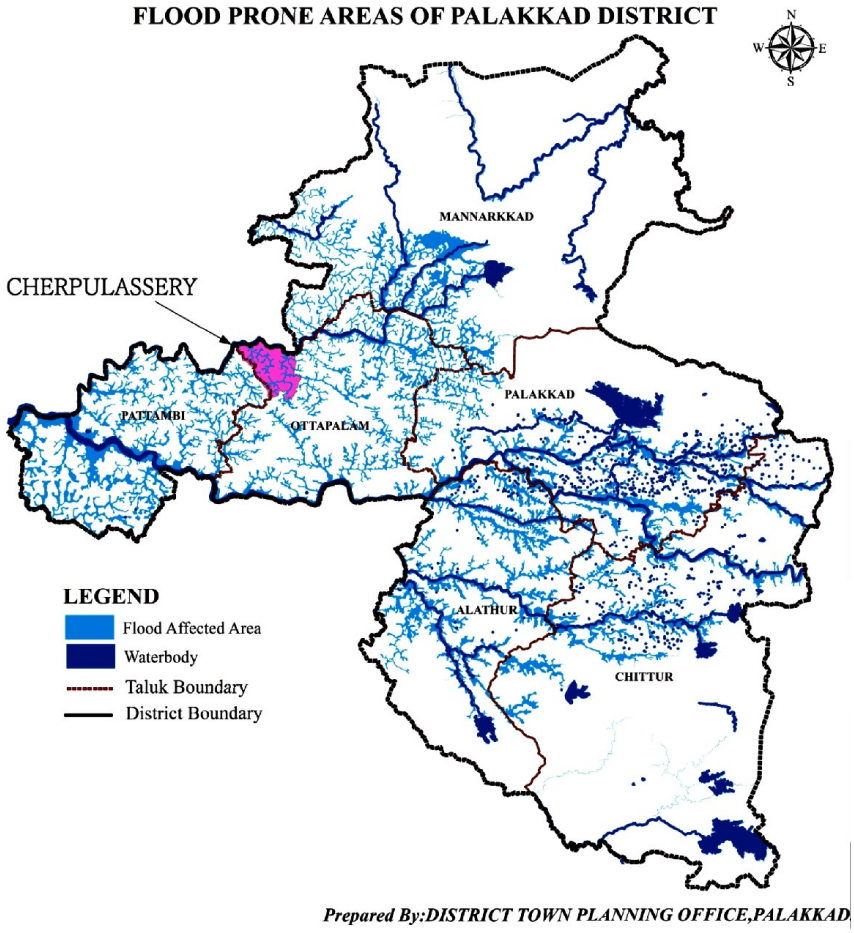


Fig 20.1 Flood-affected areas of Palakkad

20.2.2 DROUGHT

Drought is a recurrent phenomenon in Palakkad. Even though Palakkad has the maximum number of rivers, rivulets, dams and canals in the State, the district experiences severe drought every summer. As per JSA report, Despite getting more than 2,300 mm rain annually, The district has little progress in reusing and recharging infrastructure, developing watersheds, or catching rainwater and intensive afforestation. Thus district is ranked 219th rank in terms of water conservation. According to SEOC, a large portion of Chittur taluk and portions of Palakkad and Alathur taluks are severely drought-prone and the worst-hit sector is agriculture with an estimated economic loss of 97 crores. Apart from depleting potable water sources, many regions, particularly the eastern part of the district, are exposed to serious groundwater contamination, which intensifies the drinking water scarcity. The state of kerala experiences seasonal drought conditions every year during summer months. The seasonal drought of Palakkad district every year bring about water scarcity mainly reflected in rivers and lowering of the water table. This adversely affects the rural and urban drinking water supply. Based on State's DRM analysis , It is evident that Cherpulassery is moderately drought susceptible, majorly on the drinking water side. The drought susceptibility map of Palakkad district is shown in Fig. 20.2.

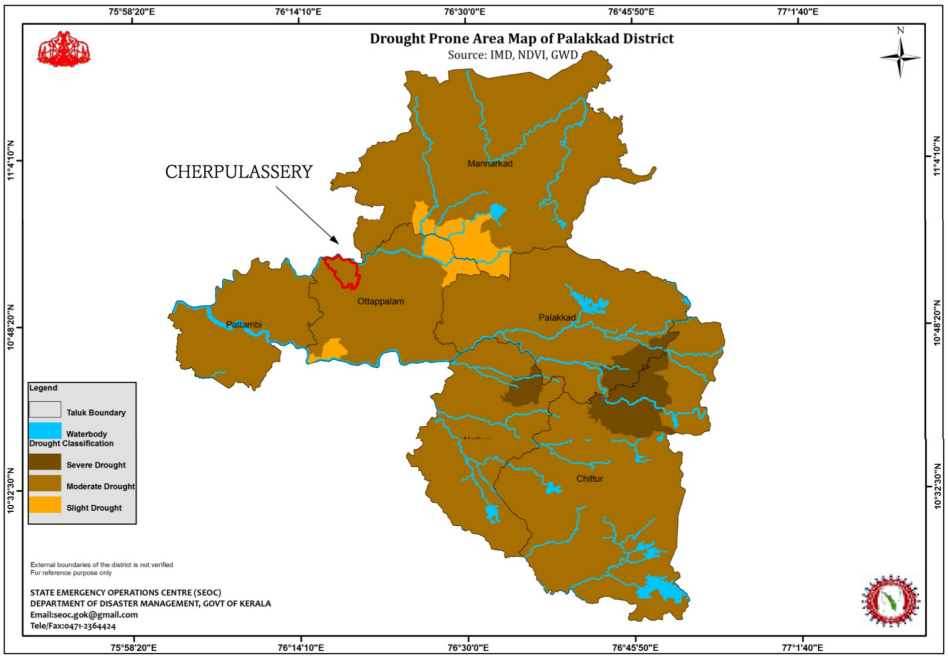


Fig 20.2. Drought prone areas of Palakkad

20.2.3 LANDSLIDE

Landslides are frequent in the localized regions of the Western Ghats where the slope is steep, and soil is oversaturated as a result of prolonged rainfall. The impact of these events varies from small parcels to large tracts with the large ones involving loss of life and property getting highlighted and investigated in detail. Studies by NCESS show

that most of the events are of debris flow type triggered by excess rainfall and are influenced by terrain factors like slope, overburden thickness, land use, relative relief, disposition of streams etc.. The recent events of Landslide in Palakkad (Table 20.4) indicate consistency with the past trends in spatial location. The spatial representation showing landslide susceptible zones is given in Fig. 20.3

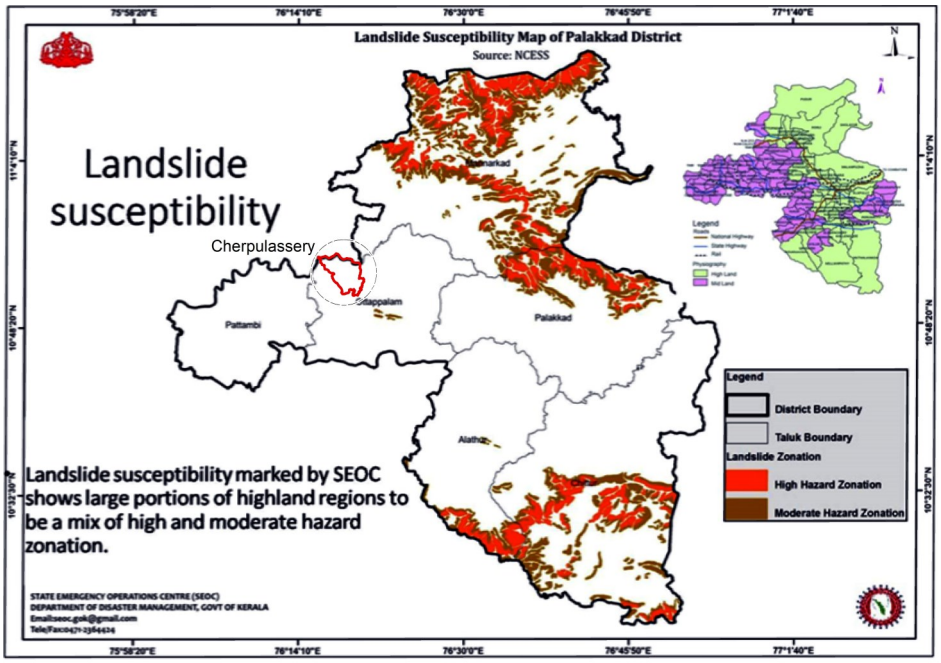


Fig. 20.3. Landslide Susceptibility map of Palakkad

Table 20.4 Review of recent landslides in Palakkad on the 12th ,13th of June 2018 (Mannarkkad,Alathur)(*Source: NLSM, GSI)*

Parameters	Event 1	Event 2	Event 3	Event 4
Name of the Land	Paypullu	Kundampotti-Vattapara	Mannannaka-yam	Kadappara
Village	Palakayam village	Palakayam village	Ki-zhekkencherr y Village	Ki-zhekkencherr y Village
Land use	High Height plantation	High Height plantation in runout area, Rubber plantation, Forest at source	High Height Plantation	High Height Plantation
Hydrological condition	Dry at source region and flowing at toe area	Flowing	Flowing	Flowing
Triggering factor	Rainfall	Rainfall	Rainfall	Rainfall

People affected	One single storied house fully damaged, one partially damaged	Nil	Nil	Nil
Geo-scientific causes	Natural slope had been benched for cash crops thereby blocking natural drainage. Heavy antecedent rainfall for 3days preceding the event resulted in building up excess pore water pressure and reduction of strength on saturation. Landslide was initiated as planar failure along rock-overburden	Initiated as rockslide dislodging huge boulders that size up to 3m×3m×2m. It further graded into a debris flow collecting more debris and soil, following a natural stream path	Incessant rainfall for 3 days resulted in built up of cleft water pressure initiating rock slide. It further graded into a debris flow collecting more debris and soil, following a natural stream path and joined a higher order stream	Initiated as shallow rotational failure due to super saturation of slope debris following incessant rain for 3 days. It further graded into a debris flow collecting more debris and soil, following a natural stream path and joined a higher order stream.

(Source: NLSM,GSI)

20.2.4 EARTHQUAKE

Palakkad district falls in seismic zone III and has experienced minor tremors in the past. The seismic data of Palakkad district for a period of 20 years (1989-2008) is presented in Table 20.5. A spatial representation showing earthquake susceptible areas based on past occurrences is given in Fig. 20.4.

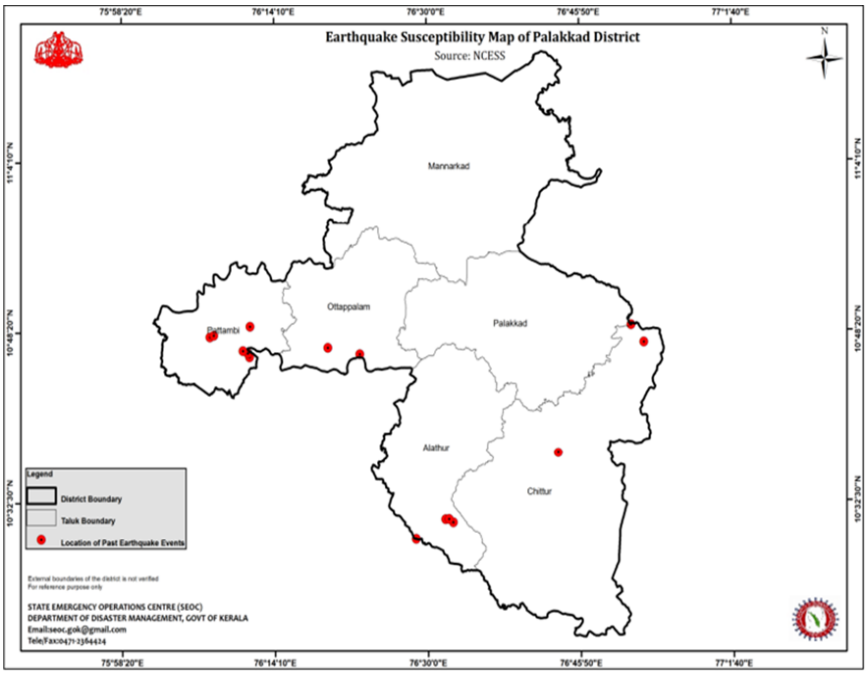


Fig 20.4. Earthquake-prone areas of Palakkad

Table 20.5. Historical Earthquakes reported from Palakkad

Sl.no	Date	Location		Magnitude
		N°	E°	
1	02/12/1994	10.75	76.25	4.3
2	25/08/2001	10.76	76.25	2.8
3.	17/04/2004	10.81	76.13	1.6
4.	18/04/2004	10.69	76.66	1.5
5.	27/02/2006	10.80	76.57	1.0
6	01/03/2006	10.86	76.32	2.0
7.	25/03/2006	10.76	76.34	1.6
8.	03/06/2006	10.79	76.38	1.6
9.	07/09/2006	10.46	76.57	1.2
10.	30/04/2007	10.83	76.47	0.9
11.	04/05/2007	10.83	76.47	<1
12.	01/12/2008	10.69	76.52	2.3

20.2.5 LIGHTNING

Lightning being a random event, it is impossible to map its spatial probability of occurrence to an aerial extent. Accidents induced by ground conduction from trees and lack of awareness aggravate the condition, intensifying the number of fatalities and property losses. The months of October, November and December have the highest lightning rates, according to data. The most likely time for lightning to strike during the day is between 15:00 and 19:00. The lightning susceptible regions based on past experiences is shown in Fig 20.5.

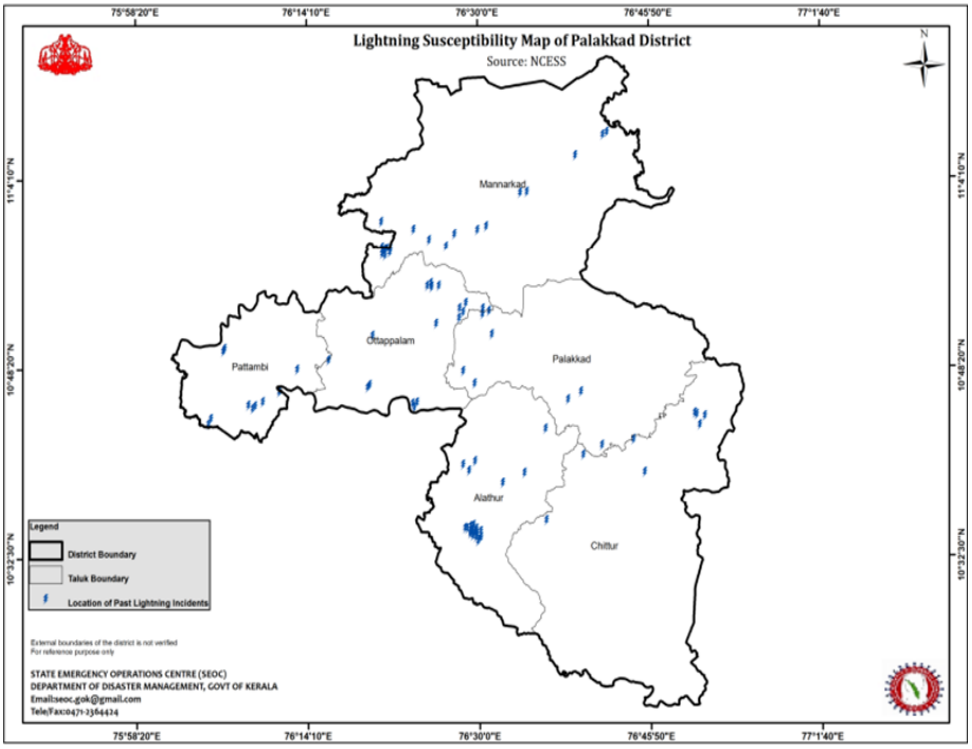


Fig 20.5. Lightning-prone areas of Palakkad

20.3 INPUTS FROM THE REPORT 'MODIFICATION STRATEGY OF SETTLEMENT PATTERN IN THE CONTEXT OF FLOODS 2018: PALAKKAD DISTRICT'

The district of Palakkad received unprecedented spell of rains during the south-west monsoon period. Landslips in the highlands added to the woes of affected populace. A whole picture of the Palakkad district is as shown in the Fig. 20.6. Visually, it can be gleaned that Palakkad has been hit by Floods as well as landslides. Pattambi & Palakkad Taluk took the major hit in floods, while Mannarkkad, Alathur, Chittur & Ottappalam taluks took the major hit by Landslides.

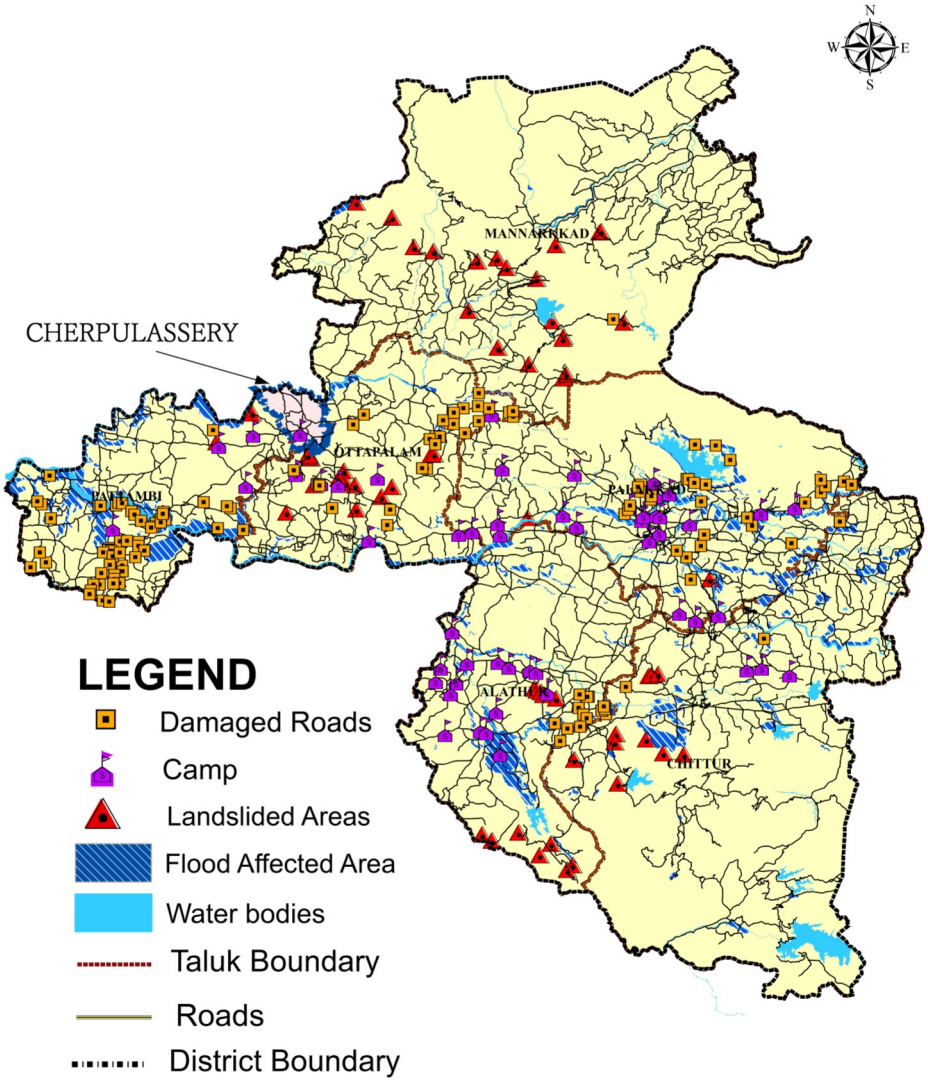


Fig. 20.6 Spatial Demarcation of Damages Occurred During 2018 Mega Flood

Source: from Modification strategy of Settlement pattern in the Context of Flood 2018: Palakkad District

On a whole, around 180 sq.km area was affected by floods alone. Plantation and agriculture took the major hit. Residential areas were affected both by floods and landslides. Transport infrastructure viz, Roads and bridges were partially and fully damaged in various parts of the district. Cherpulassery lies in Ottappalam Taluk. Spatial depiction of flood damages (Taluk level) in Ottappalam is shown below Fig. 20.7.

Landslides reported at Chalavara , Ananganadi, Thrikkadeeri, Ambalappara, Kadambazhipuram. Fig. 20.8 gives the extent of flood affected areas in each Local body in the Ottappalam taluk. Shoranur Municipality reported flood affected area as 2.662 sq.km. (highest in the taluk). While analyzing the spatial extent flooded area (0.157 sq.km.) is comparatively less. However disaster preparedness is necessary for the town, which help people to avoid impending disaster threats; and also enables to put plans, resources and mechanisms in place to ensure that those who are affected receive adequate assistance.

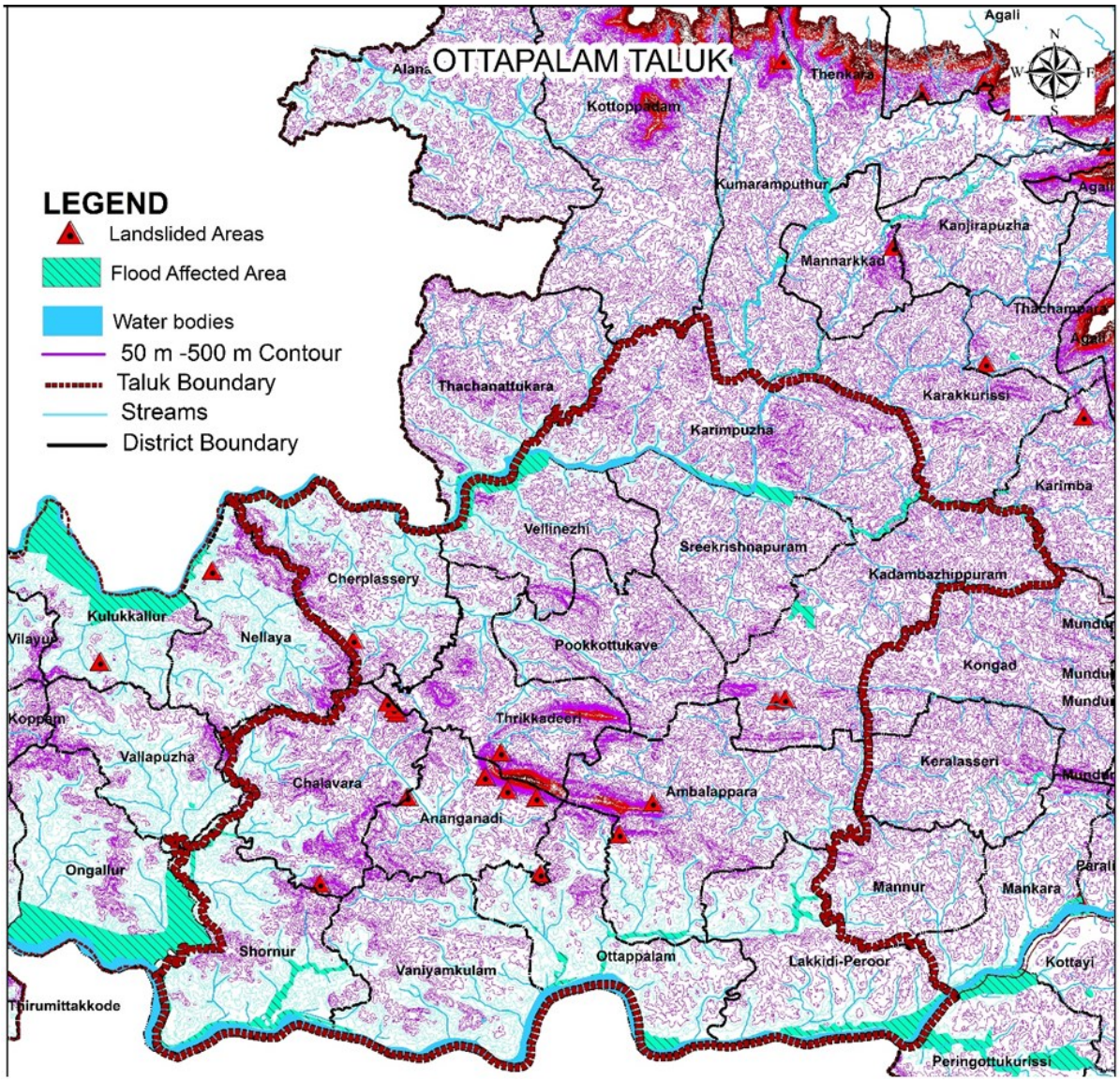


Fig. 20.7 Spatial Depiction of Flood Damages in Ottapalam Taluk

Source: from Modification strategy of Settlement pattern in the Context of Flood 2018: Palakkad District

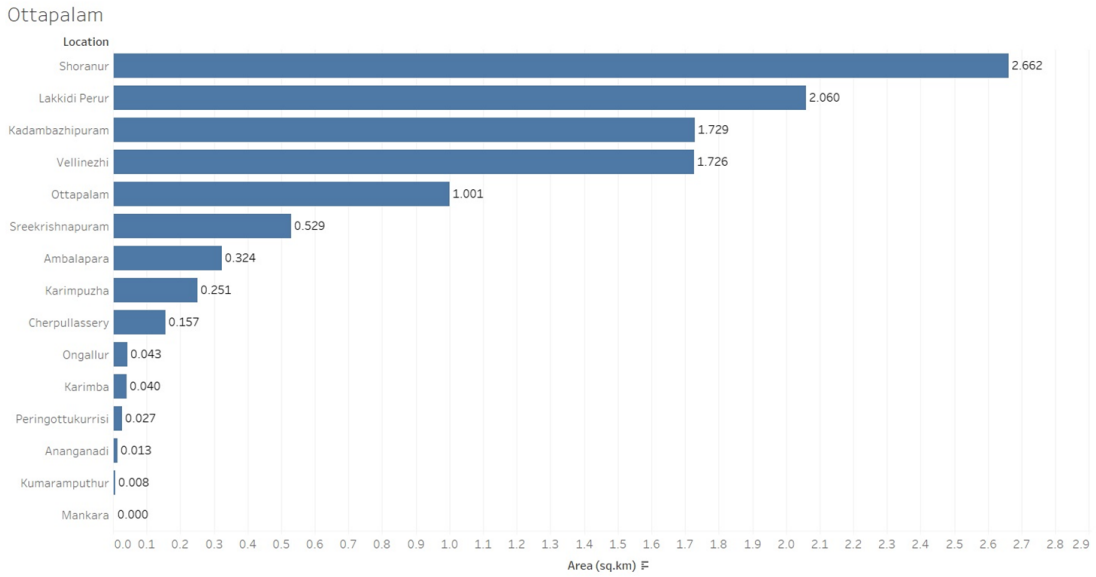


Fig. 20.8 Spatial Extent of Flood Damages (Local body wise) in Ottapalam Taluk

20.4 IMPACT ANALYSIS OF MEGA FLOOD 2018 & 2019

A whole picture of the Cherpulassery Municipality is as shown in the figure. 20.9 Visually, it can be gleaned that Cherpulassery has been hit by Floods as well as land-slides. A summary of the damages in figures are as shown below (Fig 20.9).

- **Flood**

The major water bodies flowing through the Cherpulassery town are Thoothapuzha through northern boundary. 'Kakathodu' through north-east part and joined with Thoothapuzha at Vadakumuri. The other important rivulets are Koramba and Pattikam are the other two major rivulets flows through the south- west part of the Municipal area. Also, most of the paddy fields are located on the floodplains of aforesaid water courses. The heavy monsoon brought widespread flooding in the Municipal area also. Spatial analysis shows that, flood affected area (during 2018 &'19) also overlaps the flood plains. Inadequate storm water drainage and filling of traditional water storage reservoirs, which increased the pluvial flood risks. An increase in flood plain occupancy and reclamation of water bodies and wetlands also lead to increase in flood damages.

- **Landslides**

Landslides are frequent in the localised regions of Western Ghats region where slope is steep, and soil is over saturated as a result of prolonged rainfall. The impact of these events varies from small parcels to large tracts with the large ones involving loss of life and property getting highlighted and investigated in detail. The heavy monsoon triggered landslide and 'Soil-piping' in south-west hilly area of the Municipality- 'Kottakkunnu' (ward-23) during 2018. About 13 families were rehabilitated to reliefcamp.

No any piping incidents were reported in this area before. Studies by geology department reveals that the event is triggered by excess rainfall and are influenced by human activities as clearing land for agriculture and overgrazing. Reduced protection of the soil by vegetation leads to Irregular infiltration, which favors piping erosion. The succeeding year 2018 also witnessed landslide and soil piping issues in the same location.

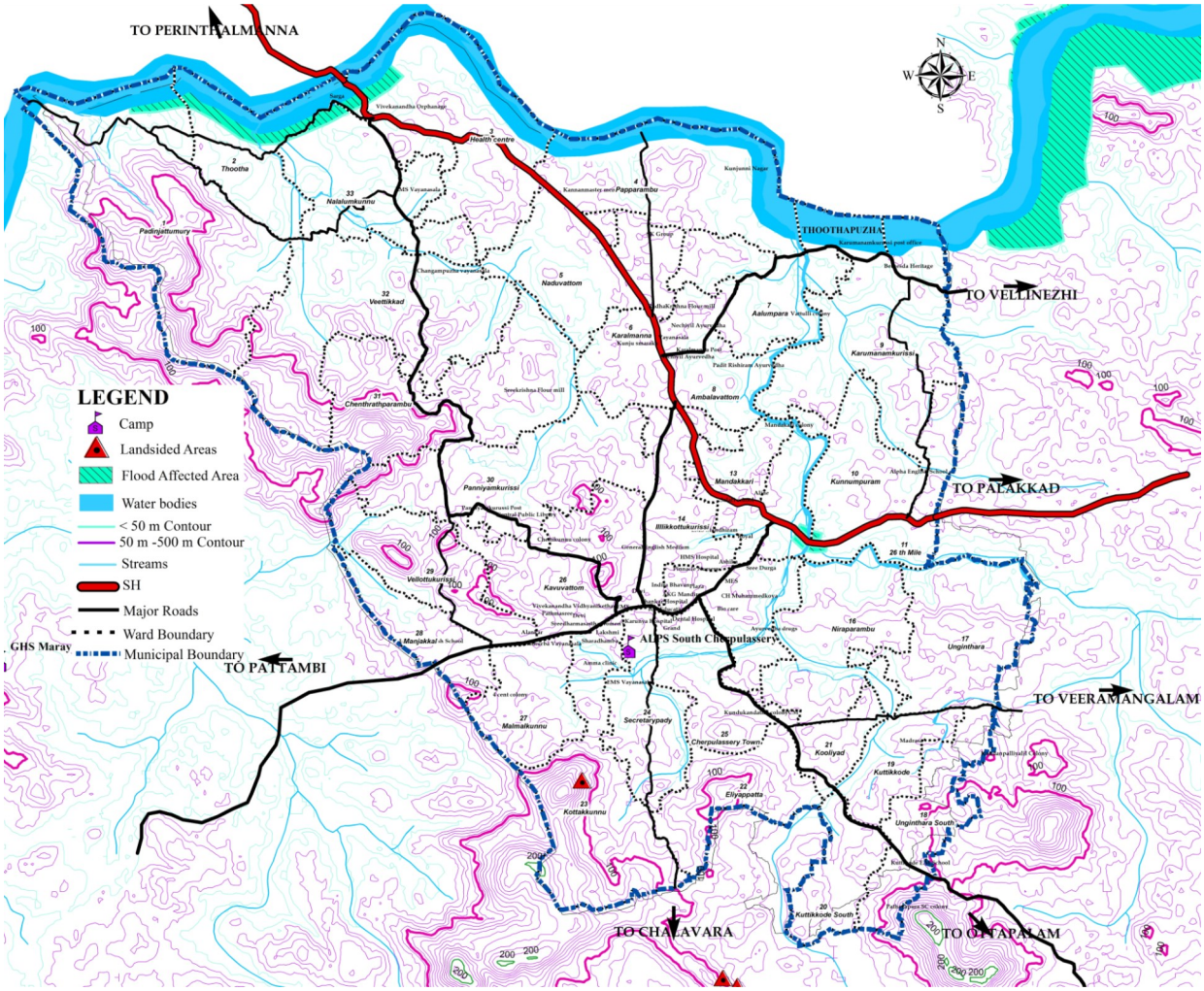


Fig 20.9 Spatial Demarcation of Damages Occurred in Cherpulassery During 2018 Mega Flood



Landslide



Land Subsidence



Soil Piping

20.4.1 Population Affected

In 2018, a total of 69 families were affected by flood and heavy rainfall in which about 13 families including 48 members were rehabilitated to relief camp. And as many as 56 families were shifted to relatives homes as their houses were flooded. In 2019 , 80 families were affected by inundation. No human fatalities were reported during flood events in 2018 & 2019.

20.4.2 Housing

One of the major sectors which was impacted severely is Housing. In 2018, a total of 69 houses in Cherpulassery have been affected by floods and heavy rain. A total of 3 houses damaged completely and 30 houses were severely damaged.

During the year 2019 also a total of 80 families were affected by flood, land slide and heavy rain as given Table 20.6.

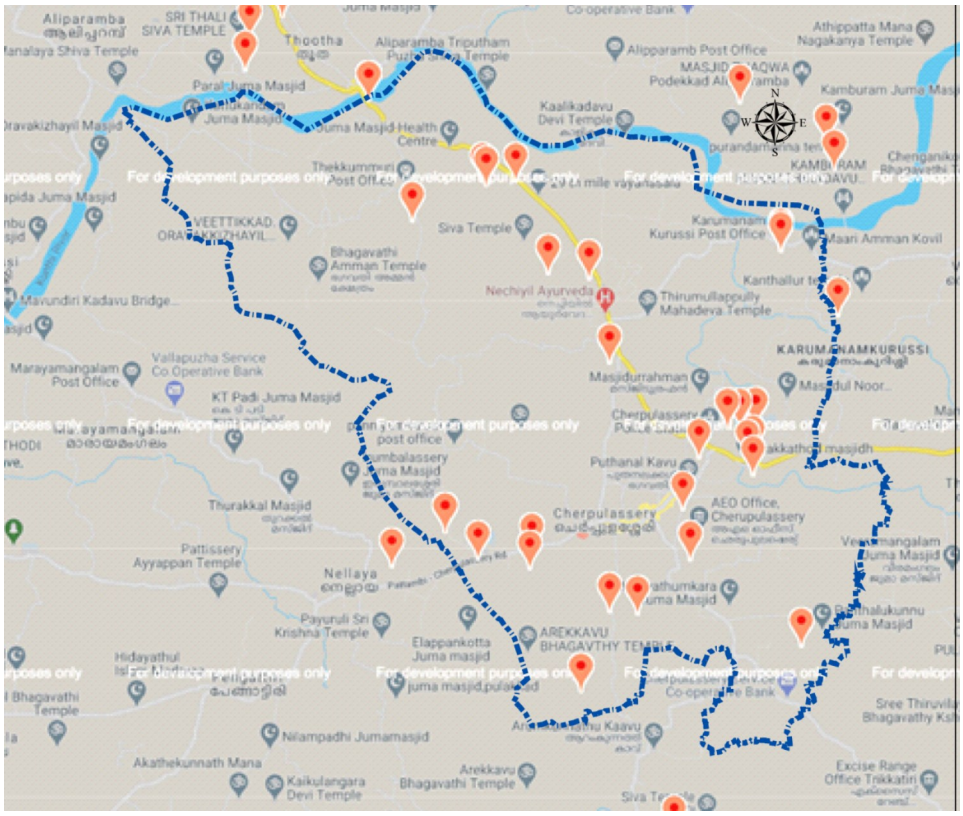


Fig 20.10 Location of Damaged Houses 2018

Source: https://rebuild.lsgkerala.gov.in/rebuild2018/

Table 20.6 Families affected 2019

Ward No.	Ward name	No. of families affected	Estimated cost of Damages (Rs)
2	Thootha	7	70,000
3	Health centre	1	10,000
4	Papparambu	4	70,000

5	Naduvattom	6	20,000
6	Karalmanna	1	10,000
7	Aalumpara	7	1,00,000
9	Karumanamkurissi	1	70,000
10	Kunnumpuram	3	10,000
11	26 th Mile	16	2,10,000
12	Kacherikkunnu	8	3,90,000
13	Mandakkari	1	10,000
14	Illlikkottukurissi	1	60,000
15	Puthanalkal	6	1,00,000
16	Niraparambu	4	4,00,000
18	Unginthara South	1	10,000
19	Kuttikkode	2	10,000
20	Kuttikkode South	3	30,000
23	Kottakkunnu	2	10,000
27	Malmalkunnu	3	10,000
30	Panniyamkurissi	1	10,000
31	Chenthrathparambu	1	10,000
33	Nalalumkunnu	1	60,000
		80	16,80,000

Wards 2-Thootha, 9-Karumanamkurissi, 11-26th mile, 15-Puthanalkal witnessed floods from overflowing rivers/canal owing to reduced carrying capacity of rivers, lakes, wetlands and porous land. Out of 80 houses 12 had 30% damage, 48 houses had 15% and 20 numbers flooded but no severe damage were reported. Flooded area overlaid on the ward wise population density is given in Fig. 20.11

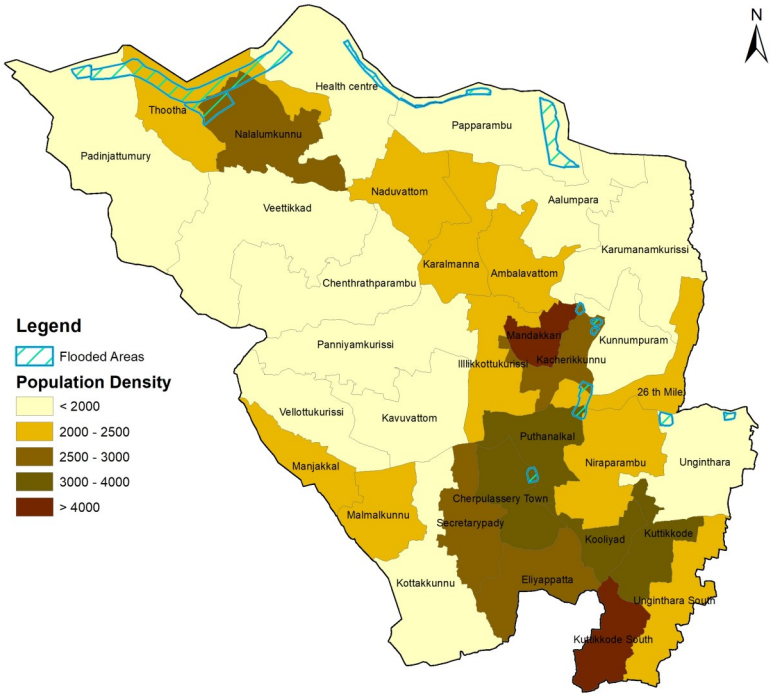


Fig 20.11 Population density vs flooded areas of Cherpulassery Municipality



Flood affected areas in 2018 & 2019



20.4.3 Damages to Connectivity

High quality and durable road infrastructure is a prerequisite for social, economic and industrial development any settlement. The unprecedented heavy rains, storms and floods have caused losses to the connectivity sector as evidenced by damages to roads. All types of roads have been negatively affected. As per reports from the local body a total of 3km has been damaged during 2018 flood. Maintenance amount required is about 18 lakhs rupees. As reported by Municipal engineering wing, a total of 101.45 m has been damaged in Cherpulassery, a colossal amount of Rs. 60,438 would be required to restore the damages.

Also the forceful water currents of the water courses along with debris washed away road embankments, seeped into pavement layers in absence of surface and sub-surface drains, caused damage of culverts, cross structures and protection works.

The unprecedented rainfall which trigged flooding in the state has resulted in heavy loss to Power Sector. Transmission and Distribution Wings suffered heavy loss. Damages in the transmission subsector were caused by the collapse of electric towers, Transformers and poles as a result of erosion of their foundations. Many areas electricity was shutdown to avoid further hazards. mobile connectivity in flood-affected areas are widely disrupted due to wrecked mobile towers mainly owing to power failure.

20.4.4 Other sectors

- **Damages to Agriculture Sector**

Strong winds, rainfall and floods have caused wide spread damages to agriculture sector of the Municipality. Massive flooding and inundation of fields, resulted in rotting of crops and wilting of trees, causing significant losses to farmers. The details of crop losses are given in Table 20.7.

Soils are the key to food security, biodiversity, mitigating and adapting to climate change. Floods often wash away rich, weathered soil. The aftermath of flood brought about severe damages such as surface crusting, surface cracking, loss of soil flora and fauna such as microbes, useful fungi, earthworms, etc. in addition to the loss of nutrients due to leaching, loss of surface soil in many areas. Preliminary observations indicate changes in soil acidity levels in several regions. The actual cost of restoration is estimated to be substantially higher as per discussions with farmers and district level agriculture department officials. Total crop losses are estimated at Rs.36,00,100 with the maximum losses in Banana, coconut and elephant foot yam. The total cultivated area affected by floods during 2019 is estimated as 116 ha as given in the Table 20.8

Table 20.7 Details of Crop Loss in Cherpulassery Town 2018

Sl. No.	Crops affected	Area/ no. of Plants affected (Ha)	Approx. cost of cultivation for calculating estimated crop loss	Estimated crop loss (Rs.)	compensation payable as per norms (Rs)
1	Bunched Banana	5205	400/plant	20,82,000	5,20,500
2	Non-Bunched Banana	2699	300/plant	10,79,600	2,02,425
3	Paddy	0.66	25000/ha	16,500	8,910
4	Elephant foot yam	5.64	250/cent	1,41,000	41,916
5	Coconut Bearing	33	5000/palm	1,65,000	23,099
7	Rubber Taping	116	1000/plant	1,16,000	34,800
Total				36,00,100	8,31,650

Source: Krishi Bhavan Office, Cherpulassery

The floods also resulted in damages to agricultural input stocks, farm equipment and machinery, and damages to community assets and public infrastructure. In addition to these estimates, damages to farm bunds and pumping units were observed.

Table 20.8 Details of Crop Loss in Cherpulassery Town 2019

Sl no	Crops affected	Total area affected (Ha)		No. of Plants / Trees affected (Nos).	No. of farmers affected (Nos).	Estimated crop loss (Rs.)
		Irrigated (Ha)	Unirrigated			
1	Paddy	2	0	0	10	1,20,000
2	Bunched Banana	5	0	12,500	20	50,00,000
3	Non– Bunched Banana	3	0	7,500	12	22,50,000
4	Elephant foot yam	4	0	0	25	2,50,000
5	Tapioca	2	0	0	7	1,50,000
				20,000		77,70,000

Source: Krishi Bhavan Office, Cherpulassery

The images show the crops loss in the Cherpulassery during the flood of 2018 & 2019



Crop Loss in Cherpulassery Town 2018 & 2019

- **Damages to Irrigation and Water Sources**

The flood in August 2018 has severely affected water supply services crippling access to safe drinking water during and after the flood. Water supply schemes were damaged due to silting of sources, damage of intake structures, pump houses and distribution networks, and damages of other structures. Floodwaters affected drinking water sources and sanitation facilities, putting citizens at serious health risk.

Majority of the households have pit/septic toilets (on-plot Sanitation), which has become a major source in contamination of groundwater during floods. The recent flood affected drinking water sources and sanitation facilities have serious health risks as most people use shallow wells for drinking water.

The impact on septic tanks and leach pits exposed long-term vulnerabilities in terms of ground water contamination, vector breeding and releasing pathogens into the environment.

- **Animal Husbandry**

During the 2018 floods the animal husbandry sector suffered massive damages including loss of cattle, buffalo, goat, pig, chicken, duck etc. life and loss to fodder plots, cattle sheds, farms and much more. The loss in this sector accounted for nearly Rs.5 lakh. This includes loss incurred due to death of livestock, destruction of animal sheds, damage to feed, fodder and hay, and infrastructure loss.

20.4.5 CRITICAL INFRASTRUCTURE

This analysis aims at identifying the critical facilities in the Municipality like educational institutions, police stations, hospitals, fire and rescue stations, etc. These facilities play a central role in disaster response and recovery and, hence, it is important to protect these critical facilities to ensure that disruption of public service is minimized during the disaster. The list of the critical facilities includes

- Schools, Colleges and University
- Hospitals
- Police Stations
- Shelter Homes
- Telecom Offices
- Key Government Offices
- Community Centres
- Fire Stations

20.4.5.1 Relief Camp Location and Guidelines

Relief shelters and Rehabilitation camps shall be set up in order to accommodate people affected by a disaster. The camp shall be temporary or permanent in nature, with basic necessities. People in the camp shall be encouraged to return to their respective accommodation once the normalcy has returned. During 2018, 13 families having 48 members were rehabilitated (in South ALP School). There were no relief camps in Cherpulassery municipality during 2019 flood time. The Fig. 20.12 shows the relief camps location and flooded areas of Cherpulassery Municipality

20.4.5.2 Safe Routes

Safe routes and alternate routes have to be mapped and communicated to the citizens through effective media to help the rescue operations. Road network should be proposed to ensure reaching of every nook and corner of the Planning area in case of a calamity. Due to the terrain of the town, apart from the river side, normally flooding will not occur during monsoon. However, the proper drainage network shall be prepared and implemented especially along the arterial roads.

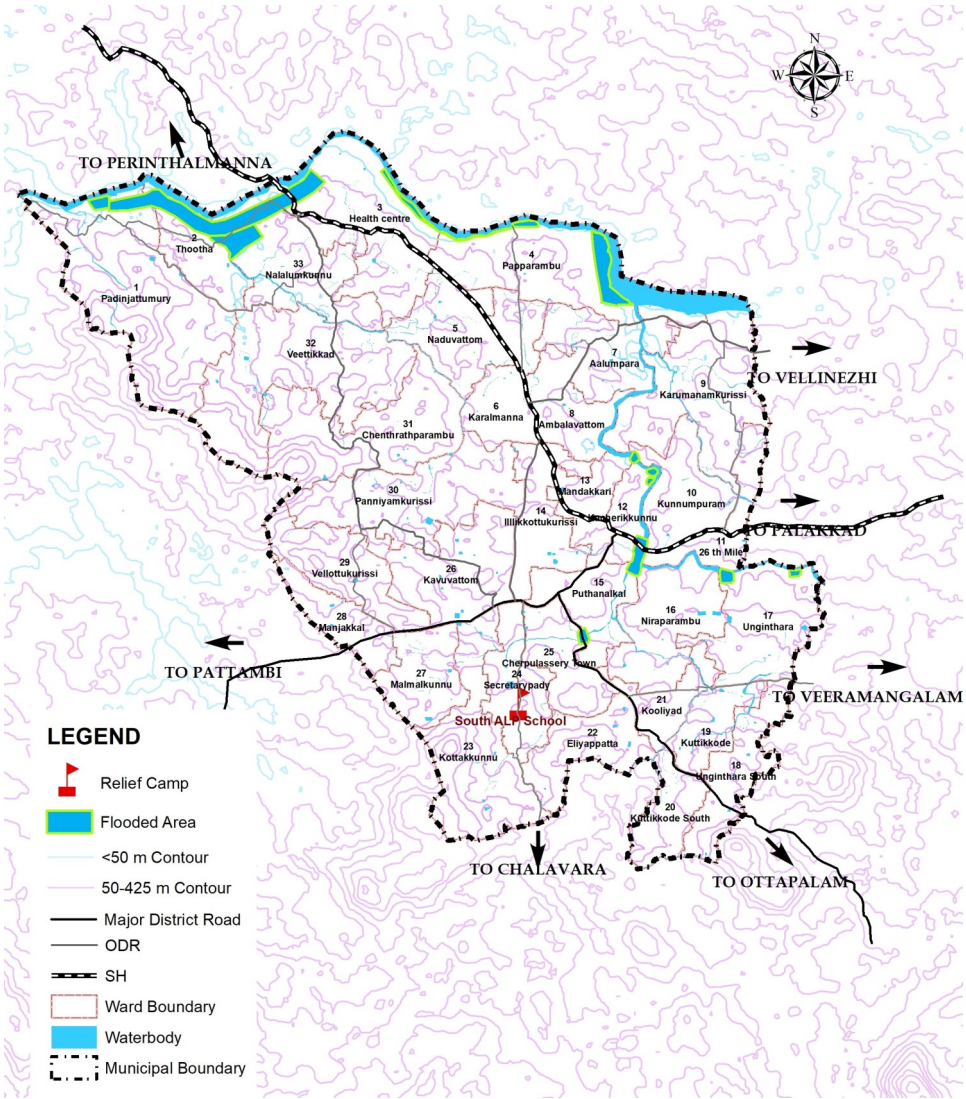


Fig. 20.12 Spatial location of relief camps and flooded areas of Cherpulassery Municipality

20.5 DISASTER MANAGEMENT

It is observed that the more we develop in science and technology, the less we care about protecting and maintaining our environment. Indiscriminate, improper, injudicious use of the environment will result in nature deviating from its original path and cause hazards to all living beings that we cannot defend. In order to keep it in control, proper action plans must be encouraged. Disaster management is a process of effectively preparing for and responding to such disasters. It involves strategically organizing resources to lessen the harm that disasters cause.

The four key stages of activities that are taken up within disaster management are depicted in Fig. 20.13 The four disaster management phases illustrated here do not always occur in isolation or in this precise order. Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster. The cyclical nature of disaster management involving Mitigation, Preparedness, Response and Recovery processes focuses on the ongoing and continual actions to prevent and manage disasters.



Fig 20.13 Disaster Management Cycle

20.5.1 DISASTER MITIGATION

Disasters wipe away what was written on the slate earlier. They give us the opportunity to write back on a clean slate in such a way that it facilitates the building of more resilient communities. This is what mitigation is meant for. Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or to reduce the effects of disasters when they occur. Mitigation specifically refers to actions taken that can lessen the severity of a disaster's impact. The mitigation phase differs from the other phases because it focuses on long-term measures for reducing or eliminating risk. This includes proper planning and implementing what we need in a more eco-friendly way.

Our cities are becoming increasingly impervious to water, not just because of increasing built-up but also because of the nature of materials used (hard, non-porous construction material that makes the soil impervious). To improve the city's capacity to absorb water, new porous materials and technologies must be encouraged or mandated across scales. This can be envisaged by making the cities permeable by promoting the concept of sponge city.

In view of the hazard profile of Cherpulassery Municipality, mitigation measures addressing frequent floods and landslides are discussed below in detail.

20.5.1.1 Flood

The present report focuses to map the susceptible areas of the flood as a mitigation measure incorporating various flood conditioning factors and previous flood experience in a GIS environment.

20.5.1.1.1 Flood Susceptibility Mapping

Floods, which are a natural hazard, need not become a disaster, if we are prepared and are aware of how to deal with them. The first step to this goal is to find the probable areas of the flood. Flood susceptibility is defined as the relative likelihood of a dangerous flood event based on the propensity of a locale or site without considering the temporal probability of the occurrence event. The main purpose of the flood susceptibility mapping technique is to identify areas that are susceptible to flooding using geographic information system (GIS) and available topographical data. As natural hazards are multi-dimensional and multi-disciplinary phenomena that have a strong spatial component, GIS can be effectively applied in the context of flood damage analysis and risk assessment. The use of flood susceptibility mapping is a prerequisite for sustainable risk management, as it can predict the probability of flood occurrence and provide useful information on suitable measures for mitigating future floods.

To assess flood susceptibility, the flood conditioning factors were determined and based on their mutual interaction.. For the present study, a total of 8 conditional factors were created for susceptibility mapping including Rainfall, Slope, Elevation, Flow Accumulation, Drainage Density, Land use , soil and Geomorphology using Arc Map.

Base datasets used:

1. Alos DEM data with 12.5m resolution
2. Geomorphology map from NRSC
3. 2020 Existing Land use
4. Rainfall data of 5 stations (Ottappalam, Mannarkkad, Pattambi, Mannarmala, Perinthalmanna).

20.5.1.1.2 Flood Conditioning Factors

i. Rainfall

The rainfall input is one of the main factors influencing the magnitude of the runoff response during a flood event. Flooding is influenced by a combination of rainfall including amount, intensity, duration and spatial distribution. Therefore floods may be produced by high intensity, short-duration storms, or longer duration, low-intensity rainfall. Entire Kerala witnessed unprecedented spells of rain in 2018 which was the worst to hit the state in a century. A graphical representation showing rainfall details of the 2018 southwest monsoon for Palakkad is given in Fig 20.14.

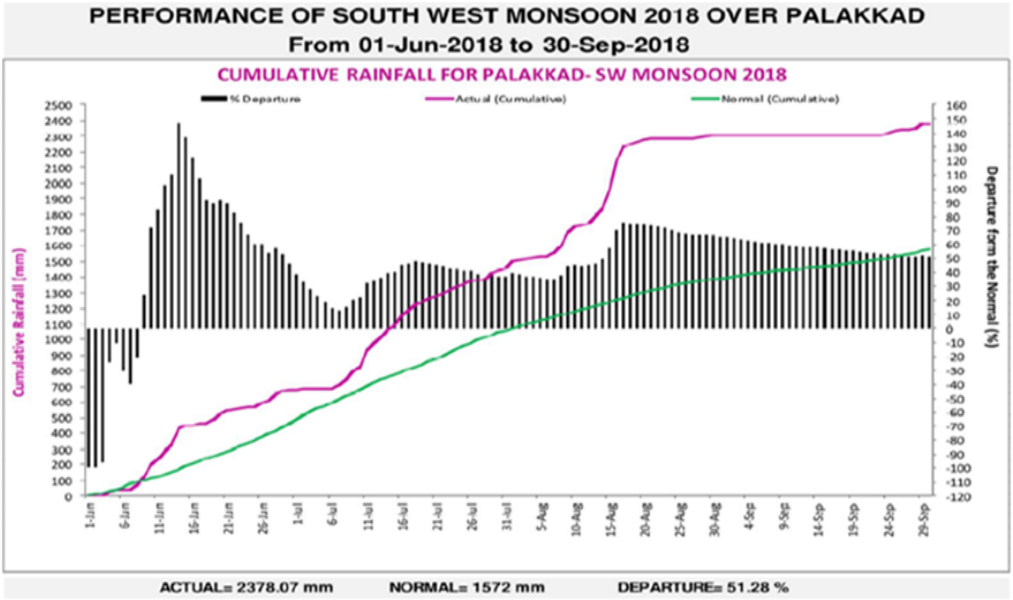


Fig 20.14. Details of the 2018 southwest monsoon for Palakkad District

The peak rainfall data was used for susceptibility mapping to predict the regions that may get the worst hit by flood. Annual average rainfall data for the year 2018 were collected from 6 stations surrounding the Cherpulassery town area and were mapped by Inverse Distance Weightage (IDW) method (Fig 20.15). Annual rainfall for Cherpulassery Municipality ranges from 278-310 mm. The weightage details for rainfall classes are given the Table 20.9.

ii. Slope

Slope controls the velocity of water on the ground surface, which affects infiltration and runoff. Generally, the areas with steep slopes generate more velocity hence conveying the water to nearby basins more rapidly without giving scope to further accumulation. Whereas gentler slope areas dispose the excess water gradually resulting in floods and water-logging. The slope map (Fig 20.16) for Cherpulassery Municipality was generated from ALOS Dem of the same area utilizing the surface tool of ArcMap software**.** From the map, it is evident that the majority of the area falls under 7° (flat-

Gentler) slope category hence more susceptible to flooding. The weightage details for slope classes is specified in Table 20.9.

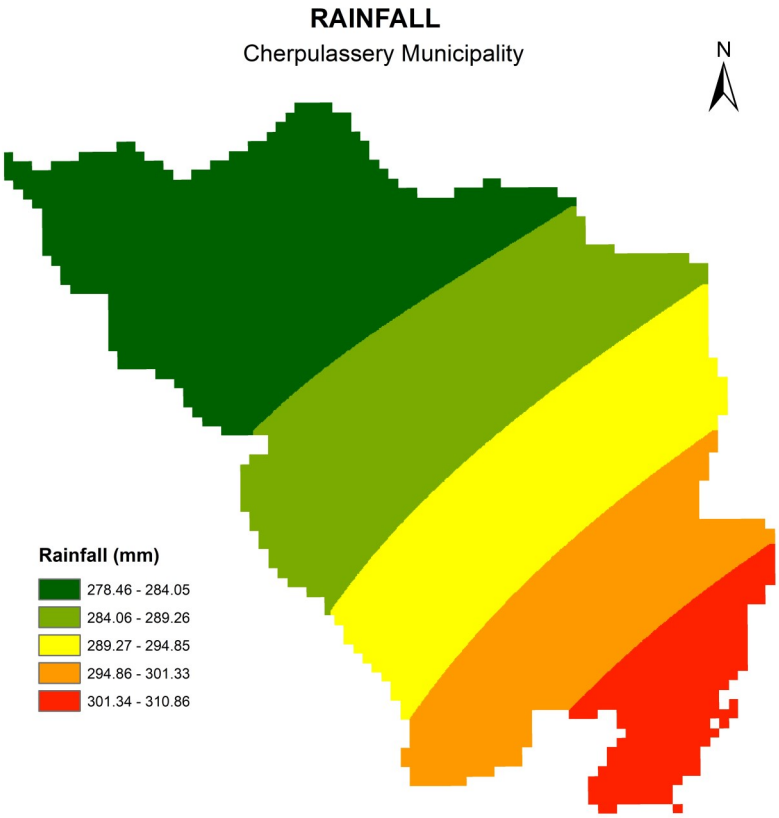


Fig 20.15. Rainfall map of Cherpulassery

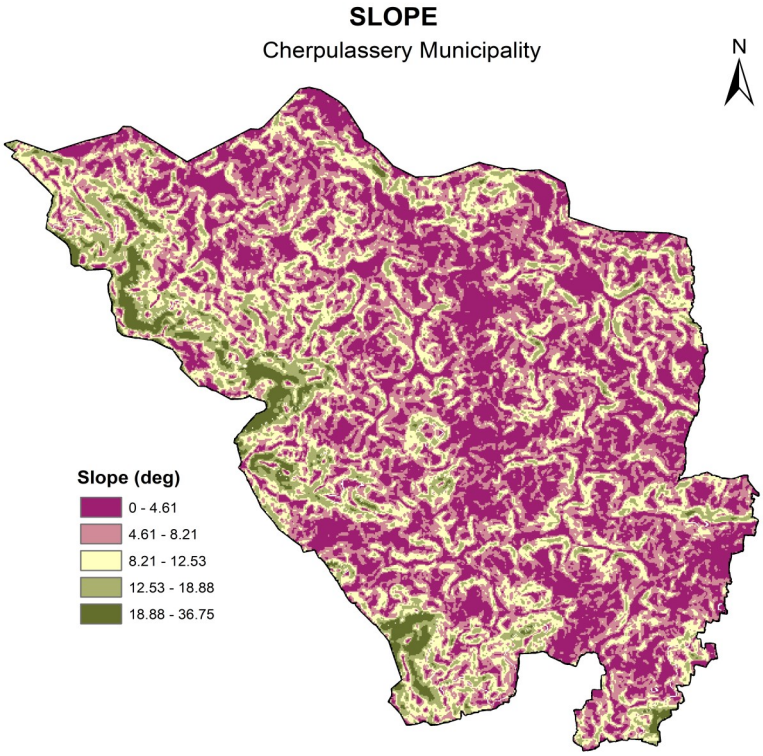


Fig 20.16 Slope map of Cherpulassery

iii. Elevation

Elevation has a reverse correlation with flooding. It is commonly observed that low elevated areas are more susceptible to flooding. The elevation map (Fig 20.17) was prepared using ALOS DEM data. The altitude values were sub-divided into five classes ranging from 17-205 m using the natural breaks method which was later reclassified by assigning weights (Table 20.9) in accordance with their ability to contribute to flooding.

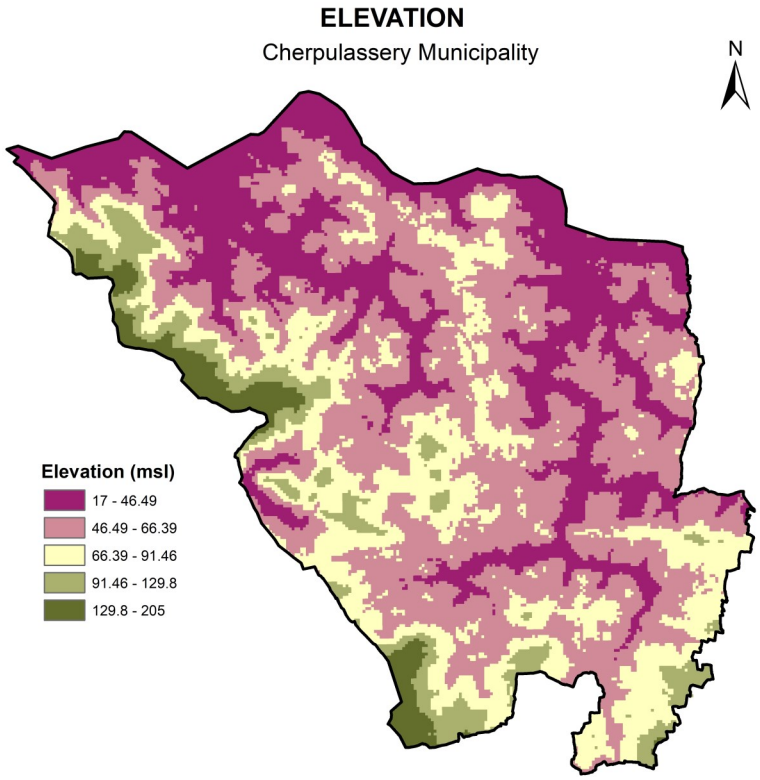


Fig 20.17. Elevation map of Cherpulassery

iv. Flow Accumulation

Flow accumulation is an indirect way of measuring drainage areas. It is a pixelated representation of actual flow accumulation that occurs in the ground. The accumulated flow depends on the number of cells flowing into each cell in the output raster. An increase in flow accumulation should reflect an increase in flood susceptibility. Flow Accumulation map (Fig 20.18) was derived from ALOS DEM data on a watershed basis using the Hydrology tool in Arc Map environment which was later clipped to the areal extent of the town. The blue lines act as source regions for water, which adds up to form the next higher channel (red lines), and finally to a stream network inundating the pathways**.** The weightage details for flow accumulation classes are given in Table 20.9.

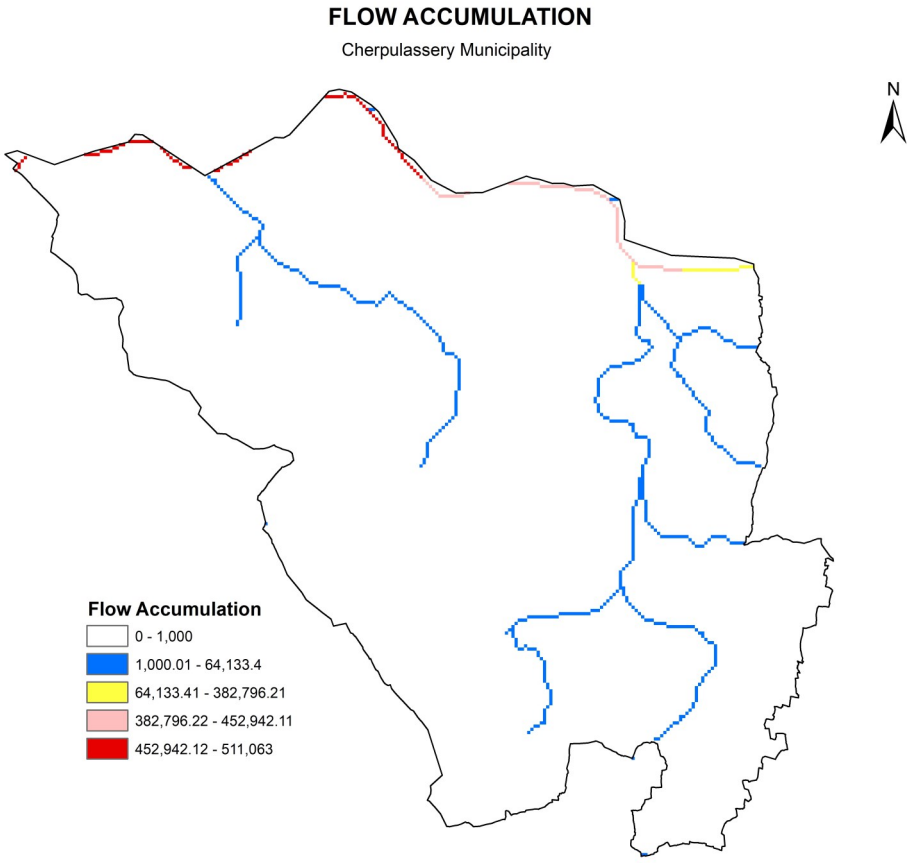


Fig 20.18. Flow Accumulation map of Cherpulassery

v. Geomorphology

As identified from the NRSC geomorphology map, the Cherpulassery municipal area is mainly categorized into 2 geomorphic classes; Water body, Pediment-Pedi plain complex (Fig 20.19). Pediment-pediplain complex covers a major part of the town and represents a gently sloping landform made of weathered sediments. All two features represent areas with low slope and elevation hence are likely to be inundated during flood. The weightage details for geomorphic classes are specified in Table 20.9

vi. Soil

Soil permeability plays a much larger role in flooding. The higher the permeability of a soil layer, the faster water can infiltrate through and avoid flooding. Soil permeability affects not only how quickly and how much an area can flood, but also the recovery time of an area after a flood event. 8 types of soil are identified in Cherpulassery Municipality. The Fig.(20.20) shows the soil map of Cherpulassery Municipality. The weightage details for soil classes are specified in Table 20.9

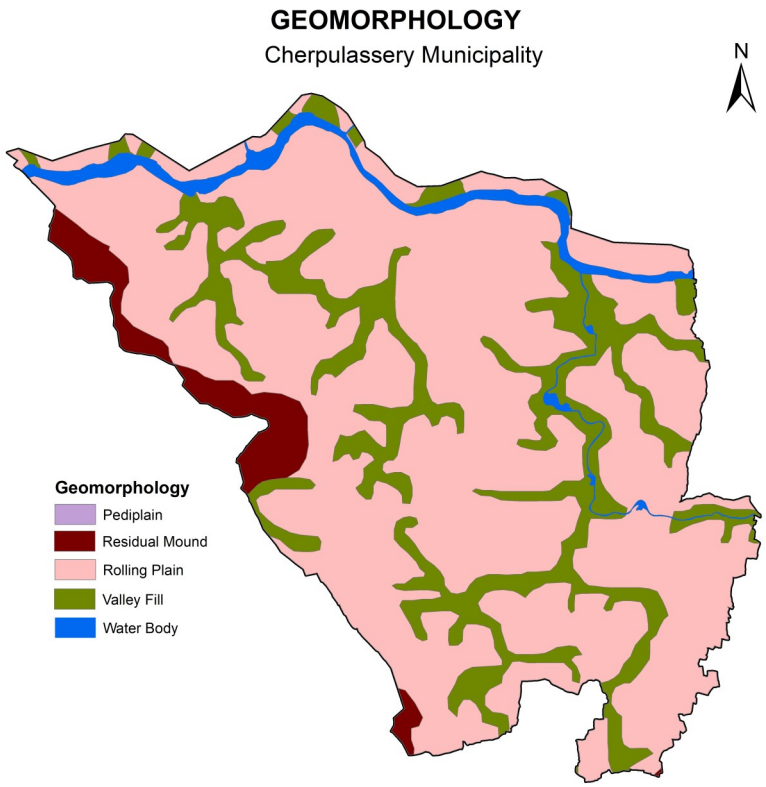


Fig 20.19. Geomorphology map of Cherpulassery

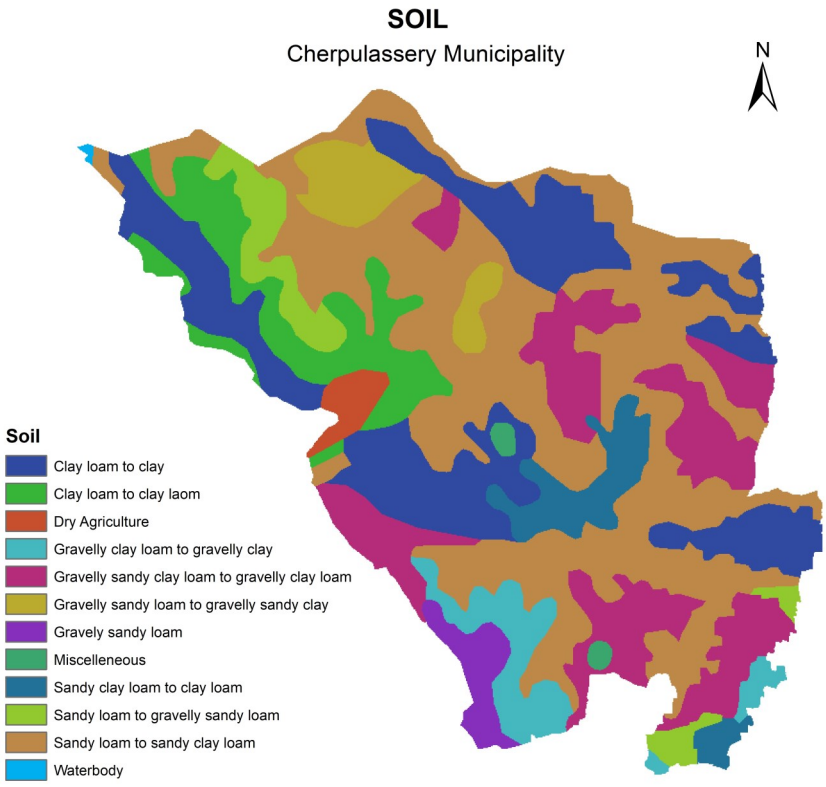


Fig 20.20. Soil map of Cherpulassery

vii. Drainage density

Drainage density shows up to be the most essential, promising and useful variable in morphometric analysis of drainage networks as it is connected to the potent nature of the stream segments and area. Drainage density, defined as channel length per unit watershed area (km km^{-2}), reveals the amount (or density) of channels in a watershed. Drainage density regulates slope weathering and erosion and the drainage pattern regions reflect the direction of discontinuities. Drainage density depends upon both climate and physical characteristics of the drainage basin. The area having high drainage density is more highly susceptible to flood than moderate and low drainage density The Fig. (20.21) shows the drainage density map of Cherpulassery Municipality. The weightage details for drainage density are specified in Table 20.9

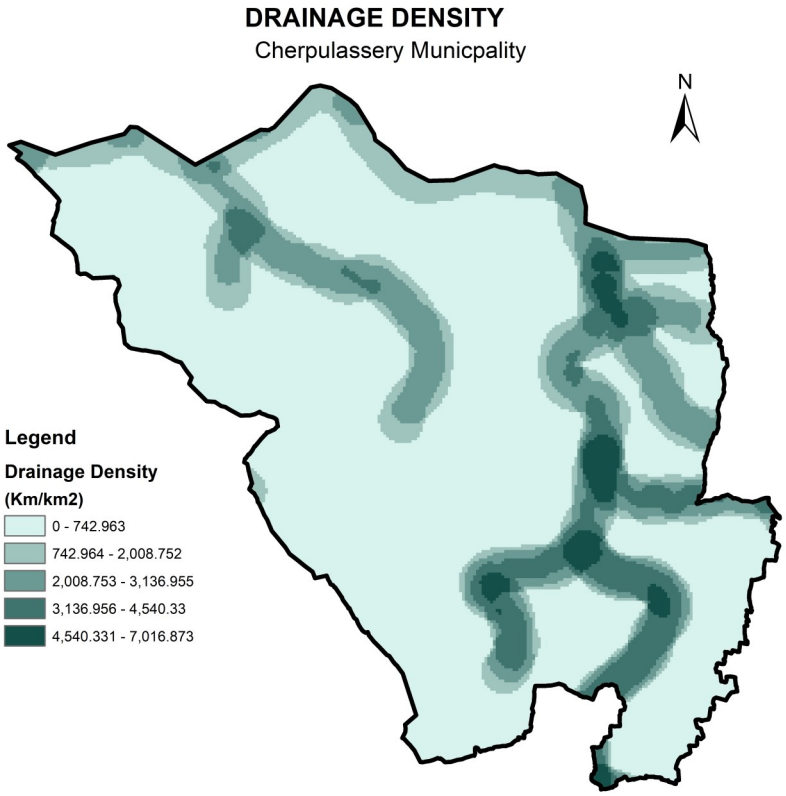


Fig 20.21. Drainage density map of Cherpulassery

viii. Land use

Land use is the only manmade parameter among flood conditioning factors. Anthropogenic interventions, such as urban area growth, disrupt the natural slope of the land and increase the impervious surface area of the city continuously, while the storage facilities such as large paddy fields and fishponds decrease, causing an increased runoff coefficient leading to localized flow accumulations and flooding. The Land use map (Figure (20.22) was rasterized and weightage is shown in (Table 20.9) for each land-use class was given according to their potential in contributing flood.

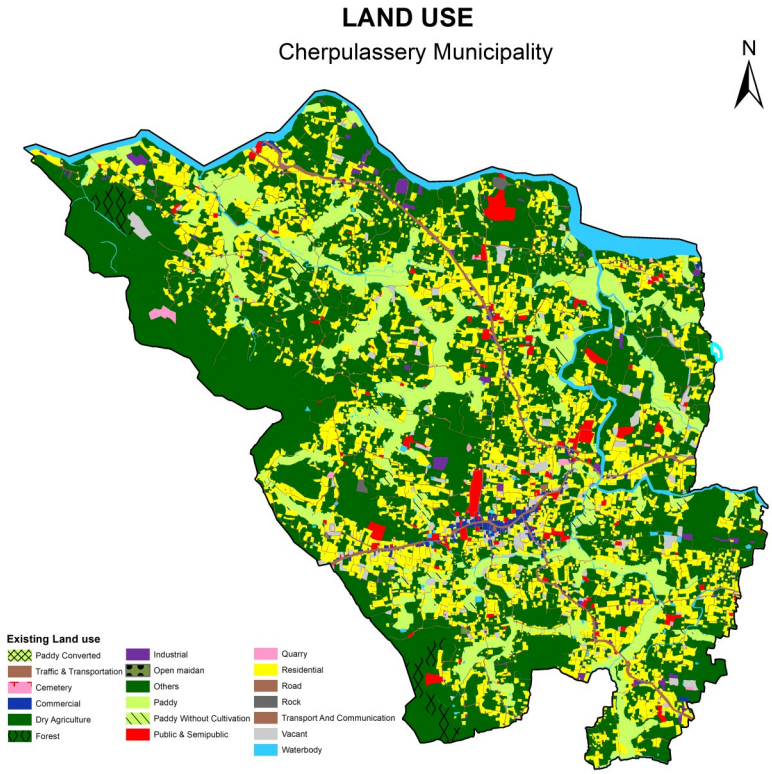


Fig 20.22. Land Use map of Cherpulassery

20.5.1.1.3 Approach for Flood Susceptibility Mapping

Frequency Ratio Method (FRM) is a statistical approach to Identifying the relationship between past flood locations and each influencing factor. From the connection between unaffected flood regions and the causal factor, the relationship between the flood occurred area and the causal factor could be determined. Thus the frequency ratio model is more promising for ranking the causal factors. Statistical relationships can be used to calculate the probability of floods between past flood areas and specified data sets. In general, floods will occur more frequently in factor classes with a frequency ratio value of >1. The causative factors influencing flood must be arranged according to their relative relevance in order to identify probable flood area. A proper rating scheme could be adopted for successful susceptibility mapping. The thematic layers generated were reclassified into 5 classes and the causative factors and their classes were assigned numerical values. All the weight-assigned causative factors were put together to develop a rating scheme for floods based on knowledge and experience. The weightage assigned to each parameter indicates the level of influence in the occurrence of floods, whereas higher weightage and ranks indicate greater influence for flood occurrence. All the causative factors and past occurred floods spatial data sites are resampled on the same cell size for the frequency ratio model. The number of the flood pixel value represented as the count is calculated for each class of every factor

using ArcGIS software. The higher the count value greater will be the probability of flood in a specific factor class. The frequency ratio for the every factors classes are calculated based on following equation.

$$FR = \frac{N_i^p / N}{N_i^{lp} / N^l}$$

Where N_i^p is the number of pixels in each flood conditioning factor class, "N" is the number of pixels in the total area. N_i^{lp} is the number of flood pixels in each flood conditioning factor. N^l is the number of all flood pixels in the total study area.

The Relative Frequency (RF) is determined by calculating the total Frequency Ratio of a factor and dividing it by the Frequency ratio values of each factor class. i.e.,

$$RF = \frac{FRi}{\sum_{i=0}^{n} FR}$$

Where FR_i is the frequency ratio of each class of a factor, $\sum_{i=0}^{n} FR$ is the summation of the Frequency ratio of each class.

The percentage of Relative Frequency (RF) is calculated by multiplying each relative frequency value with 100 to get the relative frequency integer and this RF integer is used as new weightage for reclassifying the causative factors of floods.

The Minimum RF integer and Maximum RF Integer are computed to obtain the Mean Maximum – Minimum RF integer. The probability ratio of a flood is calculated by dividing Maximum–Minimum RF values by a mean maximum-minimum RF integer.

The Probability ratio is calculated as

$$PR = \frac{(MaxRF)-(MinRF)}{((Max)-(Min))MeanRF}$$

Where Max_{RF} is the Maximum relative frequency, Min_{RF} is the minimum relative frequency and $(Max\text{-}Min)_{Mean\ RF}$ is the Mean Relative Frequency of subtraction of Min_{RF} from Max_{RF}

The obtained Probability Ratio (PR) is used as weightage for weighted Overlay analysis in ArcGIS. The resulted weightage and calculations are shown in the Fig. (20.23).

The weighted overlay analysis is a quick, accurate, and competent method for assessing probable flood areas. In this study 8 environmental factor maps were used for assessment of flood hazard susceptibility mapping. In order to combine these in performing the analysis, each cell from each map layer must be reclassified into a common preference scale, such as 1-5. All thematic maps were integrated using Weighted Overlay Model (WOM) (Eq.1). The maps corresponding to each conditional factor were overlaid following the weighted linear combination approach. According to this technique, each factor is multiplied by its percentage weight (numeric overlay) and the summation of all factors yields the final map of hazardous areas:

$S=\Sigma w_i\ x_i$

Where, S is the final map of hazardous areas, w_i is the weight of factor and x_i is the rate of factor. These weighted factor maps were integrated into GIS platform using WOM analysis to prepare a susceptibility flood hazard zonation (FHZ) map. The Table 20.9 shows the ranked weightage assigned for different influencing factors.

Table 20.9 Weightage of flood factors

Sl No.	Factor	Classes	Weight-age
1	Rainfall	274-284	1
		284-289	3
		289-295	5
		295-301	7
		301-311	9
2	Slope	0-4.6123	9
		4.6123- 8.215	7
		8.215 – 12.5397	5
		12.53979- 18.88754	3
		18.88176 – 36.754	1
3	Elevation	17- 46.9	9
		46.49- 66.39	7
		66.39- 91.46	5
		91.46- 129.8	3
		129.8- 205	1
4	Flow Accu-mulation	0-1000	1
		1000- 74133	3
		74133- 284800	5
		284800- 454946	7
		454946- 511063	9
5	Geomor-phology	Pediplain	5
		Residual Mound	1
		Rolling Plain	4
		Valley Fill	7
		Water body – River	9
6	Land Use	Dry Agriculture/Paddy Without Cultivation	1
		Paddy Converted	1
		Paddy/Vacant/Open maidan/Forest	3
		Road/Rock/	5
		Cemetery/Quarry	7
		Residential/Others/Public & Semipublic/Commercial/ Industrial/Traffic & Transportation/Transport And Communication	7
		Waterbody	9

7	Soil	Clay loam to clay	7
		Clay loam to clay laom	7
		Dry Agriculture	2
		Gravelly clay loam to gravelly clay	6
		Gravelly sandy clay loam to gravelly clay loam	5
		Gravelly sandy loam to gravelly sandy clay	4
		Gravely sandy loam	1
		Miscellanous	2
8	Drainage density	0- 742	1
		742-2008	3
		2008-3136	5
		3136-4540	7
		4540-7016	9

The factors (thematic layers) were reclassified and combined according to weightage obtained through frequency ratio model. The general representation of procedure for flood Susceptibility processed in the model builder (GIS) is shown in Fig 20.23. The flood Susceptibility Map for Cherpulassery municipal region obtained after overlay analysis is given in Fig. 20.24.

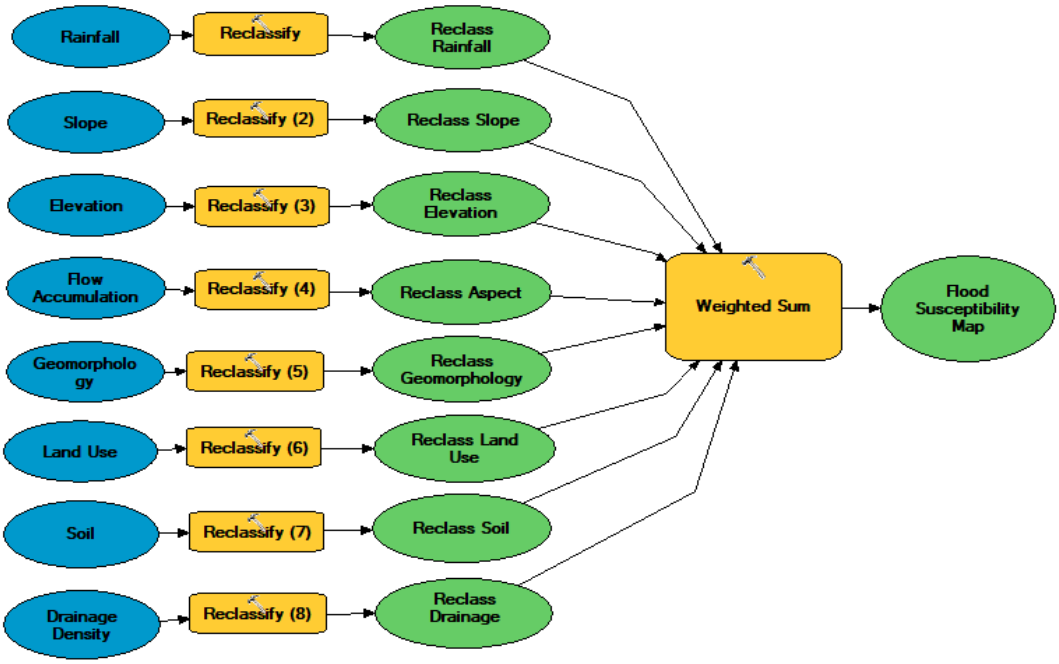


Fig 20.23. General representation of procedure for Flood susceptibility processed in model builder

As a verification procedure, the 2018-flooded regions were overlaid over the flood susceptibility map of Cherpulassery municipality. The corresponding image is shown in Fig 20.25, 20.26 & 20.27. The spatial locations of 2018 flood affected regions exactly match the very high risk and high-risk zones marked in the flood susceptibility map indicating the credibility of mapping results, which can be utilized for planning flood management measures in future.

Table 20.10 Weightage of the factors through Frequency Ratio Model

Soil				Flood pixels in each class			Count	Frequency Rati	Relative Frequency	RF(non%)	RF (INT)	Minimum RF	Maximum RF	Max-Min RF	Mean Max-Min	Probability Ratio
OBJECTID	Class	Count		OBJECTID	VALUE	VALUE_0										
1	2	1960	Gravely sandy loam/San	1	2	143469.2	152	0.07755102	0.423287539	42.32875387	42					
2	3	403	Dry Agriculture	2	4	82117.24	87	0.063923586	0.348906527	34.89065273	34					
3	4	1361	Miscelleneous/Gravelly s	3	5	418137.2	443	0.036101377	0.197047866	19.70478665	19	0.000698692	0.423287539	0.422588847	0.65188011	0.648261605
4	5	12271	Sandy loam to sandy clay	4	6	943.8763	1	0.000128008	0.000698692	0.069869194	0					
5	6	7812	Gravelly sandy clay loam	5	7	47193.82	50	0.005507214	0.030059376	3.00593756	3					
6	7	9079	Clay loam to clay laom/Clay loam to clay													
7	8	23														
	Total	**32909**				**Total**	**733**	**0.183211206**								
Geomorphology																
OBJECTID	Value	Count		OBJECTID	VALUE	VALUE_1	count	FR								
1	1	1452	Residual Mound	1	5	315254.7	334	0.0139045	0.046138311	4.613831062	4	0.046138311	0.899703532	0.853565222	0.65188011	1.309389883
2	5	24021	Rolling Plain	2	7	98163.14	104	0.016321406	0.054158157	5.415815703	5					
3	7	6372	Valley Fill	3	9	278443.5	295	0.271139706	0.899703532	89.97035324	89					
4	8	4	Pediplain													
5	9	1088	WatBod - River			**Total**	**733**	**0.301365612**								
	Total	**32937**														
Land Use				**Flood pixels in each class**												
OBJECTID	Value	Count	Ex_Landuse	OBJECTID	VALUE	VALUE_1	count	FR								
1	1	3899	Paddy	1	1	178392.6	189	0.048473968	0.219768145	21.97681455	21					
2	2	358	Paddy Without Cultivatio	2	2	28316.29	30	0.083798883	0.379321965	37.93219647	37					
3	3	15470	Dry Agriculture/Paddy Cr	3	3	198214	210	0.013574661	0.06154392	6.154392007	6	0.057902113	0.379321965	0.322019852	0.65188011	0.493986312
4	4	783	Rock/Vacant/Open maic	4	4	9438.763	10	0.012771392	0.057902113	5.790211297	5					
5	6	11151	Residential/Others/Road	5	6	228418.1	242	0.021702089	0.098391532	9.8391532	9					
6	8	1292	Waterbody	6	8	49081.57	52	0.040247678	0.182472324	18.24723244	18					
	Total	**32953**				**Total**	**733**	**0.220568671**								
Slope																
OBJECTID	Value	Count		OBJECTID	VALUE	VALUE_1	count	FR								
1	1	1174		1	1	1887.753	2	0.001703578	0.019916539	1.991653941	1					
2	2	3845		2	2	33979.55	36	0.009362809	0.109460679	10.9460679	10					
3	4	7654		3	4	117040.7	124	0.016200679	0.189402283	18.94022826	18	0.019916539	0.479540996	0.459624457	0.65188011	0.705075135
4	6	10956		4	6	178392.6	189	0.017250821	0.201679503	20.16795027	20					
5	7	9313		5	7	360560.8	382	0.041017932	0.479540996	47.95409963	47					
	Total	**32942**				**Total**	**733**	**0.085535819**								
Elevation				**Flood pixels in each class**												
OBJECTID	Value	Count		OBJECTID	VALUE	VALUE_1	count	FR								
1	1	1241		1	4	943.8763	1	0.000113701	0.001298539	0.129853871	0	0.001298539	0.965105674	0.963807135	0.65188011	1.478503669
2	3	2760		2	5	33035.67	35	0.002941671	0.033595787	3.359578729	3					
3	4	8795		3	7	657881.8	697	0.084505335	0.965105674	96.5105674	96					
4	5	11898				**Total**	**733**	**0.087560706**								
5	7	8248														
	Total	**32942**														
Flow Accumulation																
OBJECTID	Value	Count		OBJECTID	VALUE	VALUE_1	counts	FR								
1	1	32197		1	1	653162.4	692	0.021492686	0.067266697	6.726669716	6					
2	2	552		2	2	17933.65	19	0.03442029	0.107726845	10.77268449	10	0.067266697	0.755456495	0.688189798	0.65188011	1.055699346
3	4	45		3	4	943.8763	1	0.022222222	0.069549963	6.954996302	6					
4	5	87		4	5	19821.4	21	0.24137931	0.755456495	75.54564949	75					
5	8	61				**Total**	**733**	**0.319514508**								
	Total	**32942**														
Rainfall																
OID	Value	Count		OBJECTID	VALUE	VALUE_1	count									
1	1	10303		1	1	501198.3	531	0.051538387	0.632588022	63.25880222	63	0.096631932	0.632588023	0.535956091	0.665569375	0.805259543
2	2	8023		2	2	95331.51	101	0.012588807	0.154516451	15.45164511	15					
3	3	6605		3	3	49081.57	52	0.007872824	0.096631932	9.66319325	9					
4	4	5173		4	4	46249.94	49	0.00947226	0.116263594	11.62635942	11					
5	5	2665				**Total**	**733**	**0.081472277**								
	Total	**32769**														
Drainage Density																
OBJECTID	Value	Count		OBJECTID	VALUE	VALUE_1	count	FR								
1	1	22426		1	1	109489.7	116	0.005172568	0.022270572	2.227057172	2	0.022270572	0.339679944	0.317409372	0.65188011	0.486913724
2	2	2383		2	2	98163.14	104	0.043642467	0.187903336	18.79033365	18					
3	3	2966		3	3	220867.1	234	0.078894134	0.339679944	33.96799442	33					
4	5	4170		4	5	**217092**	230	0.055155875	0.237474497	23.74744966	23					
5	7	992		5	7	46249.94	49	0.049395161	0.212671651	21.2671651	21					
	Total	**32937**				**Total**	**733**	**0.232260205**								

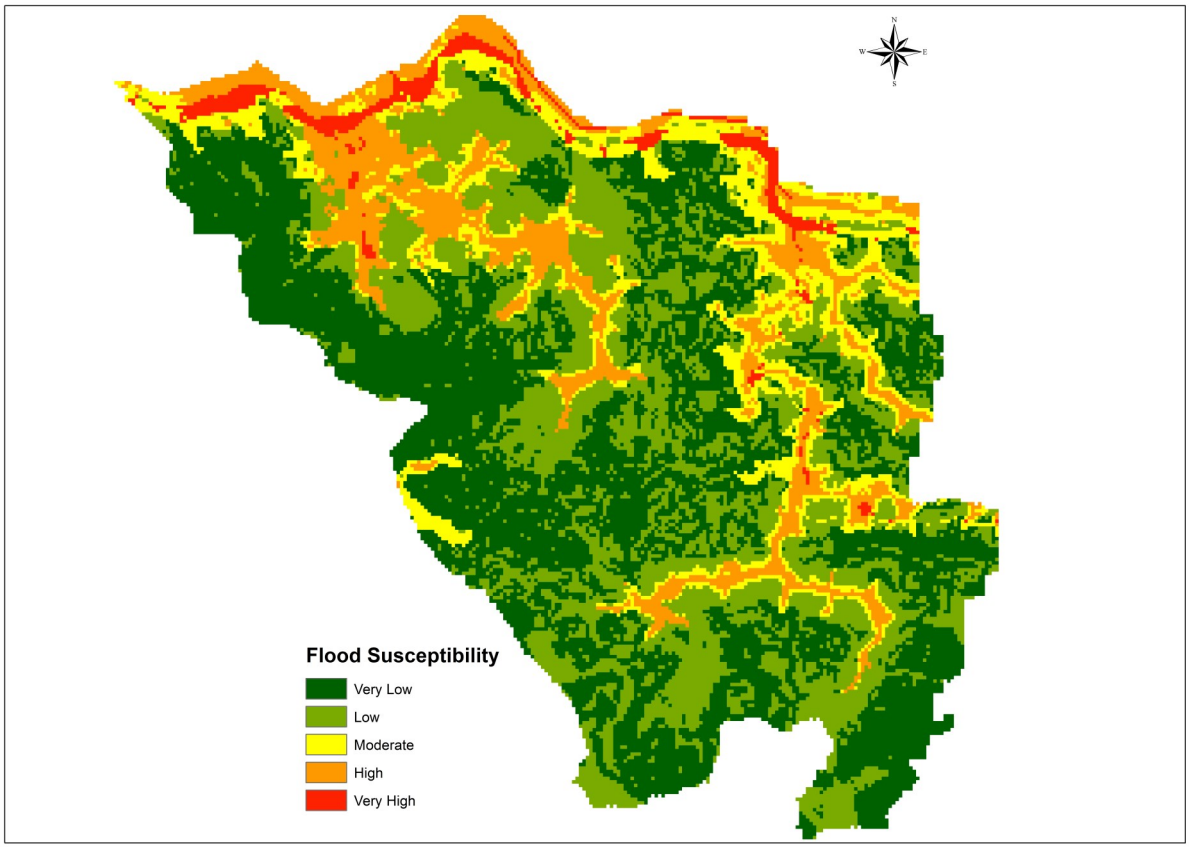


Fig. 20.24 Flood Susceptibility Map of Cherpulassery

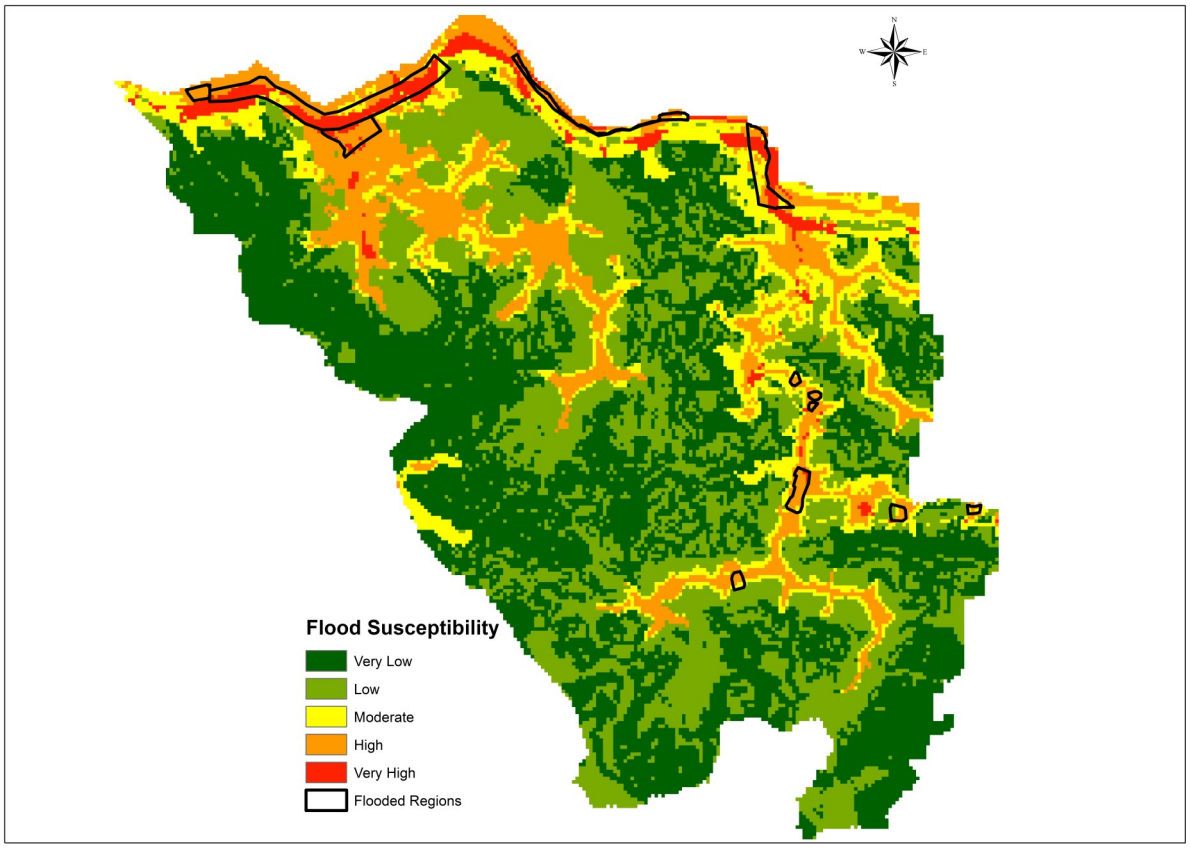


Fig. 20.25 Flooded area overlained flood Susceptibility Map of Cherpulassery

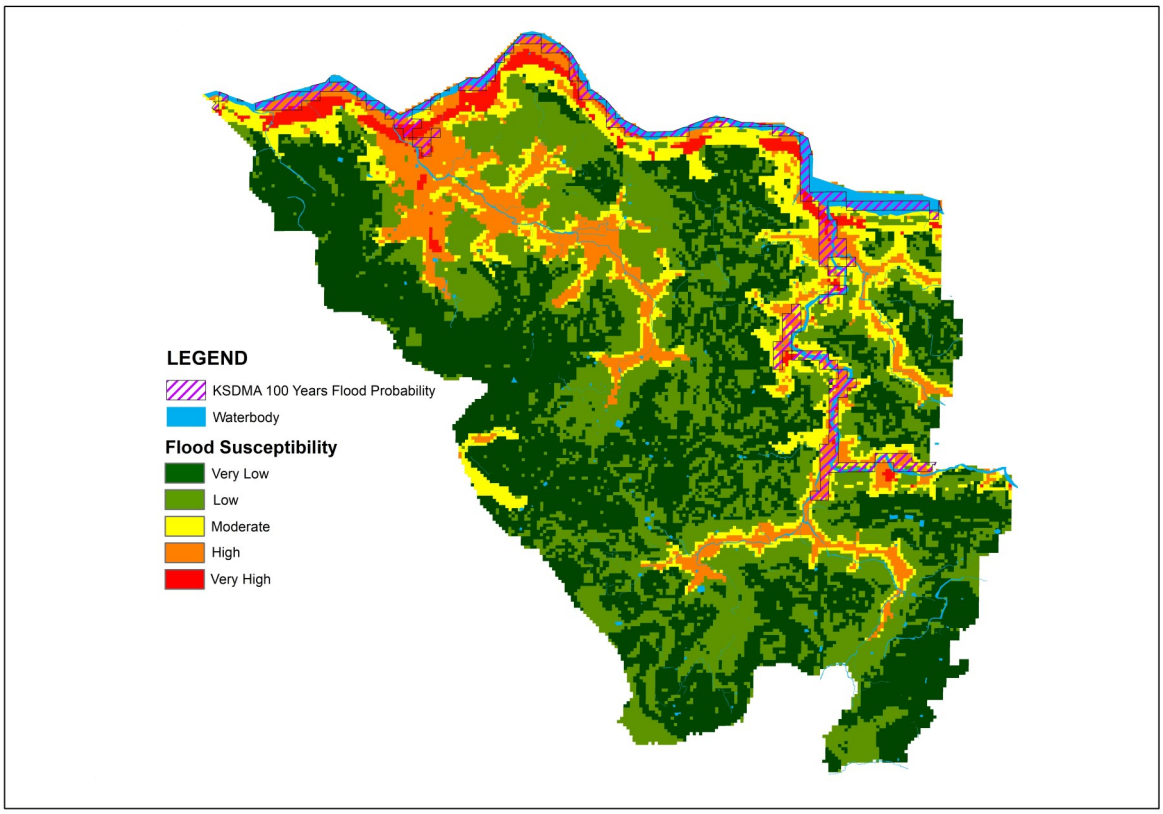


Fig. 20.26 KSDMA 100 Year Flood Probability overlained Flood Susceptibility Map of Cherpulassery

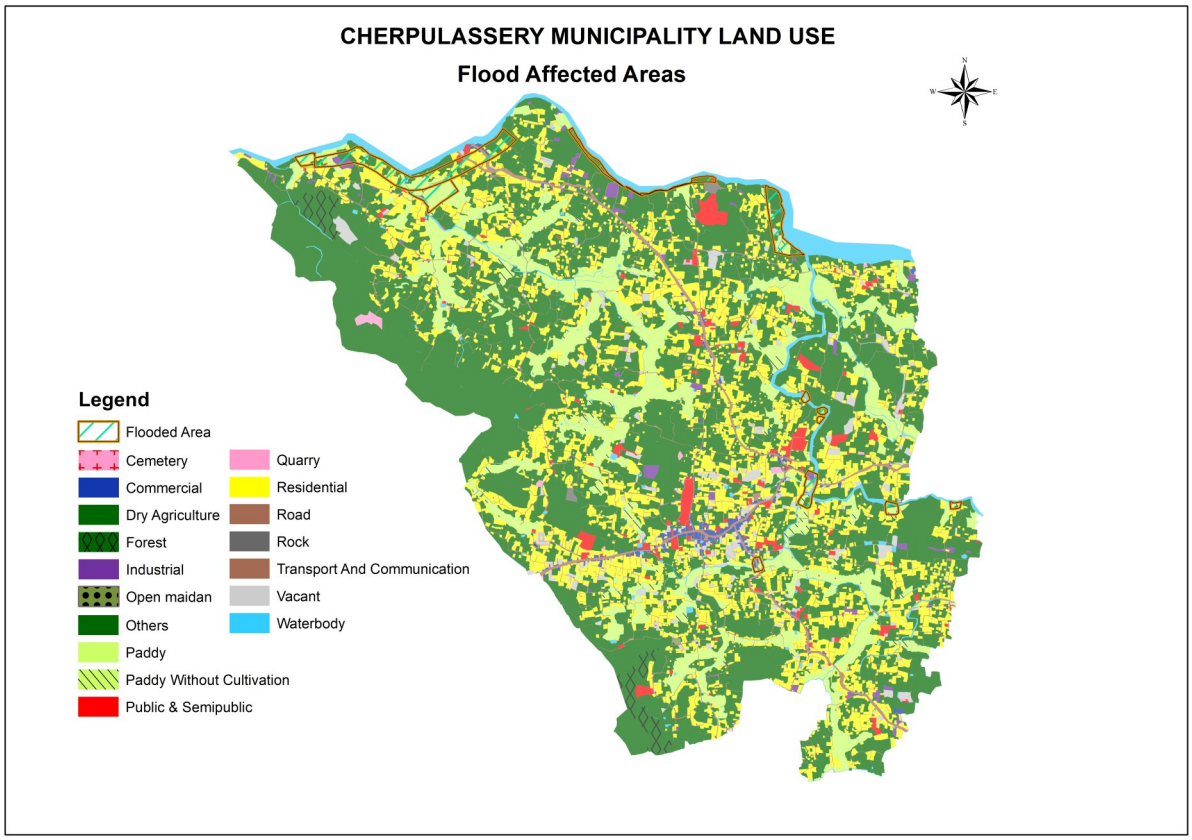


Fig. 20.27 Flooded area overlained Existing Land Use Map of Cherpulassery

Figure (20.28) shows the 2018 Google earth image of flooded regions of Cherpulassery Municipality

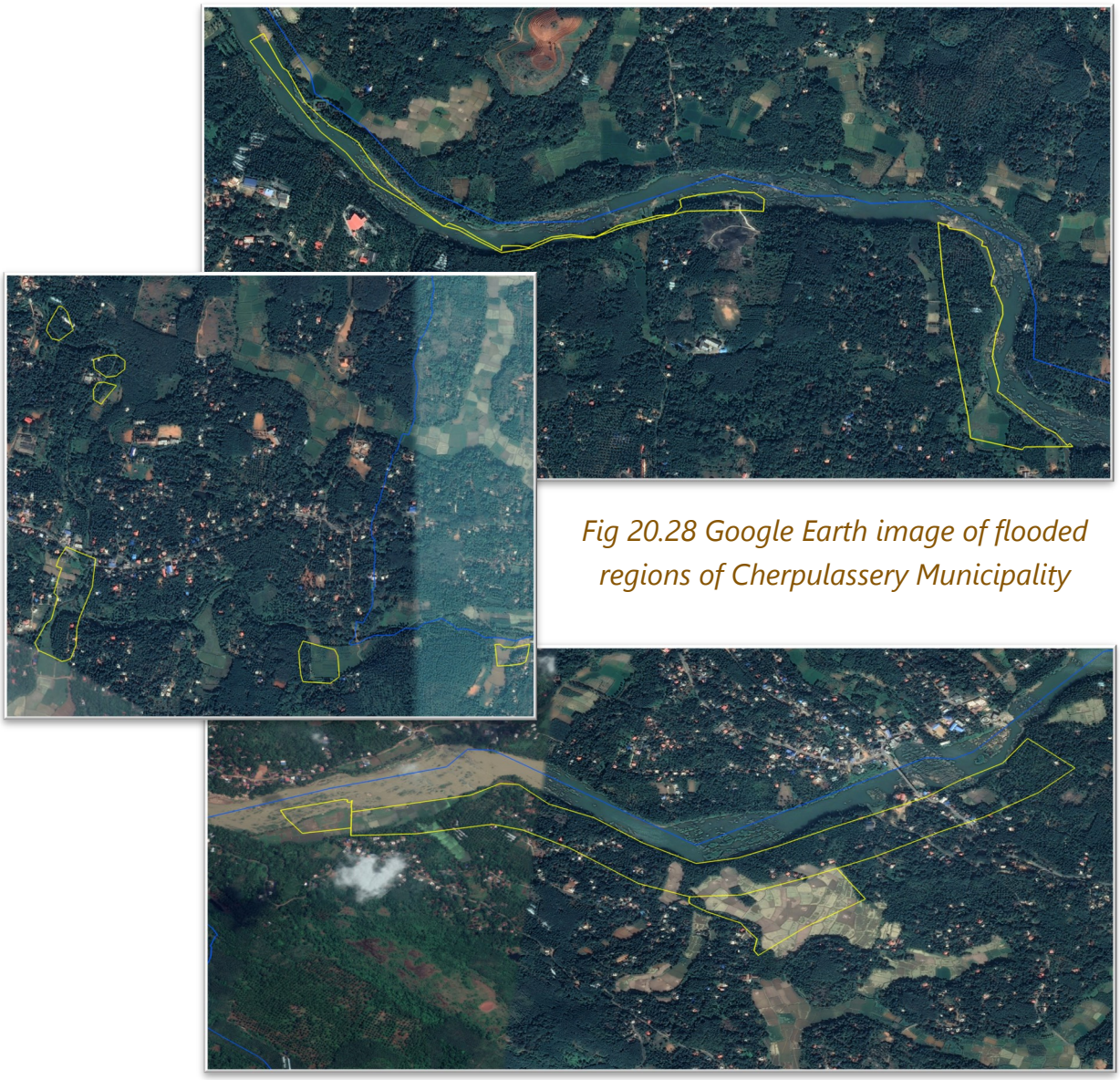


Fig 20.28 Google Earth image of flooded regions of Cherpulassery Municipality

What caused the flooding in Cherpulassery in 2018 & 2019 ?

The Cherpulassery municipality area suffered prominent damage during the destructive flood. The primary causes that likely triggered this disastrous event could be rainfall. Given its nature, long-term rainfall patterns can be unpredictable and challenging to monitor. However, rainfall alone cannot be solely responsible for flooding. The rainwater that causes floods is made possibly by the effect of other causal factors. The outcome of land use change leads to the unsettled terrain slope where any excess water flows to the low-lying water bodies. Floods/Water-logging occur when this natural slope is disrupted. The construction of new structures often involves cutting slopes and deporting soil, leading to modifications in the natural drainage system and the creation of new water pathways results in disrupts the natural flow of water. Consequently, urban flooding can attributed to such alteration in land use and exacerbate the risk of flooding and waterlogging.

20.5.1.2 Landslide

Landslides are natural disasters that can cause severe damage to human lives and physical Infrastructures. The present report focuses to map the susceptible areas of the landslides as a mitigation measure incorporating various landslides conditioning factors and previous landslides experienced in a GIS environment.

Every year, particularly in the rainy season, the state of Kerala endures Landslides preceded by floods. As the landslides have been triggered in the regions of highly unstable. The District Palakkad encountered a few landslides in recent past years. Even in years of normal rainfall, landslide issues could exist in the midland and highland regions. Physiographically, Cherpulassery municipality has been categorized under the low lying undulating midland region. There could be a possibility of landslides. It is a fact that Cherpulassery has no records of previous extremely serious landslides and the resulting damages. It is necessary to show some attention to the Landslides condition of Cherpulassery municipality. The most common causes of Landslides are recognized to be the instability of mid high land regions and intense frequent rainfall.

20.5.1.2.1 Landslide Susceptibility Mapping

Landslides are calamitous events, that's has huge impacts on life and property. Landslide susceptibility is the possibility of spatial occurrence of landslides based on past geo-environmental conditions for a particular area. Landslides are more prone to occur under similar geological conditions and the geomorphologic factors that led to previous slope instability. Finding the probable locations for landslides is very crucial thus, Landslides susceptibility mapping techniques help to identify the susceptible areas where landslides are likely to occur using geographic information systems (GIS) and available topographic data. The use of landslide susceptibility mapping is a prerequisite for sustainable risk management. As natural hazards are multi-dimensional and multi-disciplinary phenomena that have a strong spatial component, GIS can be effectively applied in the context of landslide damage analysis and risk assessment. Detailed knowledge of the frequency, character and magnitude of landslides is essential for carrying out successful quicker and safer mitigation programs along with future strategic planning of the area.

To assess landslide susceptibility, the landslide conditioning factors were determined and their mutual interaction ratios were calculated. For the present study, a total of 10 conditional factors were created for susceptibility mapping including Slope, Aspect, Rainfall, Land use, Elevation, Geology, Ndvi, Distance to road network , Soil , Geomorphology.

Base datasets used :

- Alos Dem data with 12.5m resolution

- Geomorphology map from NRSC
- 2018 Existing Land use
- Rainfall data.(Ottappalam, Mannarkkad, Pattambi, Mannarmala, Perinthalmanna).

20.5.1.2.2 Landslide Conditioning Factors

i . Rainfall

Rainfall is the primary inducing factor for landslides. As persistent rainfall and heavy precipitation storms can cause landslides, especially in the region with loosened soil where rainwater infiltrates the slopes. Landslides are influenced by accompany of rainfall characteristics such as amount, Intensity, duration, and spatial distribution. Therefore the landslides may be triggered by low stable region with high intensity, short-duration storms, or longer duration , low intensity rainfall. Entire Kerala witnessed unprecedented spells of rain in 2018 which was the worst to hit the state in a century.

A graphical representation showing rainfall details of the 2018 southwest monsoon for Palakkad distirct is given in Fig 20.14. This peak rainfall data was used for susceptibility mapping to predict the regions that may get the worst hit by Landslides. Annual average rainfall data were collected from the surrounding 5 stations of Cherpulassery municipality for the year 2018 and were mapped by Inverse Distance Weightage (IDW) method. ranges from 278-310 mm. The Fig. (20.15) shows the rainfall map of Cherpulassery Municipality. The weightage details for rainfall classes are given the Table 20.11.

ii. Elevation

The elevation is another important element that can cause landslides which have a direct correlation. The landslide is more likely to occur as the rises in relative elevation of the area. In a gentle terrain of lower altitude, landslides happen quite often. The areas with higher water levels there might be a great chance for slope collapse. Thus, In higher elevated areas landslides are more probable to occur than in lower ones. The Elevation map for the study is prepared from the Alos DEM data is shown in Fig. (20.17) . The highest elevation areas are mainly seen towards the southwestern part of the study area. The elevation values were sub-divided into five classes ranging from 17-205 m using the natural breaks method which was later reclassified by assigning weights (Table 20.11) in accordance with their ability to contribute to Landslides

iii. Slope

The slope constitutes a relevant parameter in landslide susceptibility studies. Since the magnitude and frequency of the landslides are based on slope stability. In a hilly area, higher slopes have a larger possibility of experiencing landslide threats. Slope regulates the speed of water on the ground, which has an effect on infiltration and runoff. Generally, the gentle slope land area has a higher absorption rate due to the slow surface

runoff. The steeper slope areas facilitate high water surface runoff to nearby basins without giving scope to further accumulation making the land mass vulnerable to landslides. The slope map (fig 20.16) for Cherpulassery Municipality was generated from ALOS Dem of the same area utilizing the surface tool of Arc Map software**.** From the map, it is evident that the majority of the area falls under 7º (flat-Gentler) slope category. The weightage details for slope classes are specified in Table 20.11. The highest slopes are mostly confined to the southwestern, of the Cherpulassery Municipality.

iv. Soil

Soil is an important parameter that influences landslides. The features of the soil are dramatically altered by rainfall and infiltration. The intense rainfall alters some soil properties, including its water content, matrix suction and pore water press. Higher permeability of soil layers allows water to pass quickly and easily infiltrated. The water content of soil increases during rainfall and reduces the shear strength of soil which leads to the instability of natural slopes. In Cherpulassery Municipality, 8 different types of soil have been recognized The soil map of Cherpulassery Municipality is shown in Fig. (20.20). The weightage details for soil classes are specified in Table 20.11.

v. Geology

Geology is the fundamental instability character in landslide analysis. Most often, loose, poorly consolidated soil and debris covering bedrock are where landslides occur. The Cherpulassery municipal area is mainly categorized into 2 geomorphic classes; Charnockite and Migmatite. Charnockite covers the major part of the town followed by Migmatite. As igneous and metamorphic rocks are often hard and large, showing greater resistance to erosion. The charnockite are least susceptible to the landslide. A thematic map of geology is generated as shown in below Fig. (20.29). The weightage details for geology classes are specified in Table 20.11.

vi. Aspect

Aspect is the orientation or direction of slope that is measured clockwise in degrees from 0° to 360° . History of Landslides ascertain that landslides have always occurred in a particular direction , thus the aspect is considered as a causative factor. Though the aspect of the slope does not directly affect the slope stability, it affects the hydrologic processes such as the direction of precipitation and the amount of sunshine thereby determining the weathering process of the landforms., The aspect is encountered for all eight direction with addition of flat areas. The information about the slope aspect was directly taken from the DEM. The slope aspect map of the study area was prepared using the spatial analysis tool (surface) in ArcGIS environment is shown in Fig. 20.30. The weightage details for aspect classes are specified in Table 20.11

vii. Land Use

Land use is the sole manmade parameter that causes landslides. Land Use frequently denotes changes in both natural and social systems. The anthropogenic interventions such as changes in vegetation cover, undercutting of natural slopes, expansion of the impervious surface area, changes of the drainage system and surface sealing lead to promote the propensity for landslide occurrence, and can significantly affect the activity of landslides. The initiation and reactivation of landslides are extensively contributed by human induced land use. Thus it is utmost importance to link the land use during the analysis. The Land use map of 2020 (Fig. 20.22) was rasterized and weightage (Table 20.11) for each land-use class was given according to their potential in contributing landslide.

viii. NDVI

The Normalized Difference Vegetation Index (NDVI) is a standardized index that allows generating an image displaying greenness (relative biomass). NDVI map was prepared from Landsat 9 OLI (operational land imager) satellite data using ArcGIS software tools. The NDVI was calculated using the formula of NDVI = (IR-R) / (IR+R), where, IR is the infrared portion and R is the red portion of the electromagnetic spectrum. The values of NDVI range from -1 to +1. Positive NDVI value shows healthy vegetation which covers slope surface and reduces soil erosion and slope failure. Negative NDVI values depict no vegetation cover where slope is exposed to atmosphere, soil erosion and slope failure.. The NDVI map of Cherpulassery Municipality is shown in Fig.(20.31). The weightage details for NDVI classes are specified in Table 20.11.

ix. Proximity to Road

Urbanization involves the construction of the utilities and enhancement of infrastructure. Constructing roads in hilly regions can vitally reduce the stability of the slope causing damage to the support. The stability of a slope may change from stable to unstable during road constructions and vehicle movements. These slope activities may occur because of cracks that lead to high water absorption of the soil and these negative influences, such as water saturation, can trigger landslides. Proximity map was prepared using 'Euclidean Distance' technique in ArcGIS which gives the distance from each cell in the raster to the closest source. The Proximity to road network of Cherpulassery Municipality is shown in Fig. (20.32). The weightage details for distance to road classes are specified in Table 20.11.

xi. Geomorphology

Geomorphology represents the relationship between the landslides and the geomorphology of the area. The geomorphic features such as denudation hills, escarpments, and interjunctions have higher landslide probabilities. As identified from the NRSC ge-

omorphology map, the Cherpulassery municipal area is mainly categorized into 3 geomorphic classes such as waterbody, and Pediment-Pediplain complex. Pediment-pediplain complex covers a major part of the town and represents a gently sloping landform made of weathered sediments. Knowing the geomorphological characteristics is very important to identify the estimated massive landslide potential in an area. The Geomorphology of Cherpulassery Municipality is shown in Fig. (20.19).

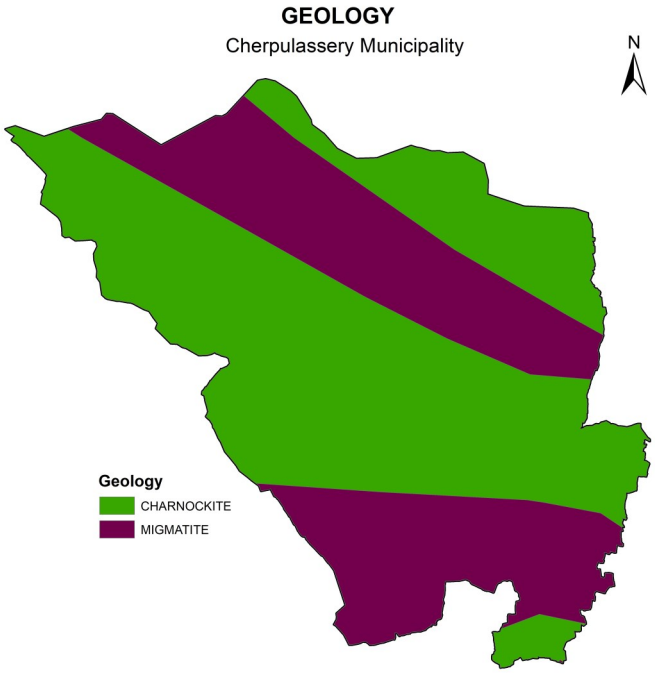


Fig 20.29. Geology map of Cherpulassery

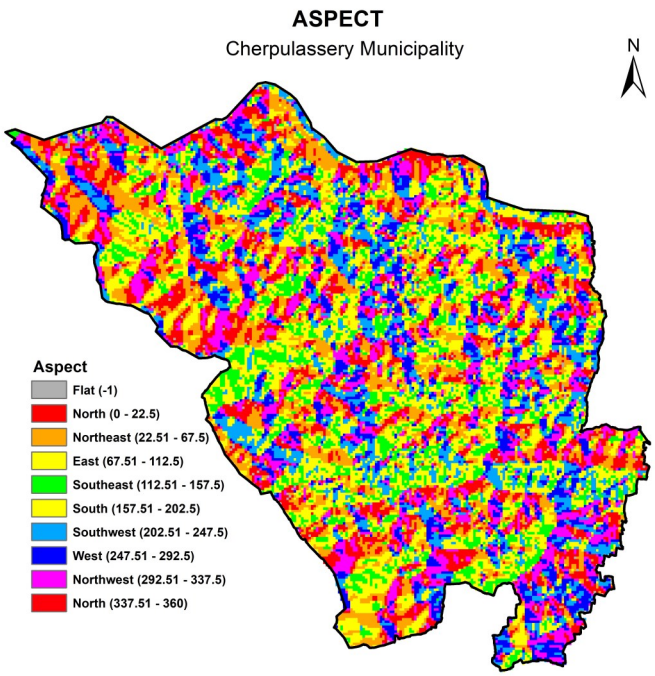


Fig 20.30. Aspect map of Cherpulassery

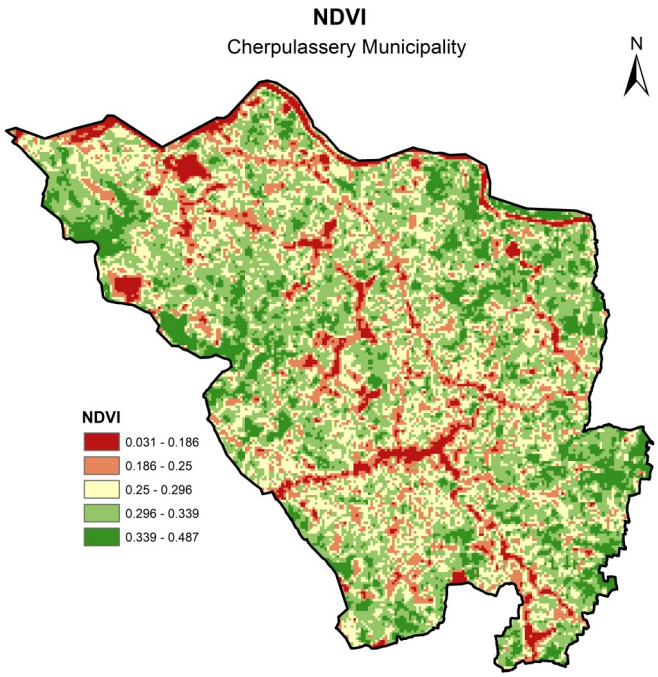


Fig 20.31 NDVI map of Cherpulassery

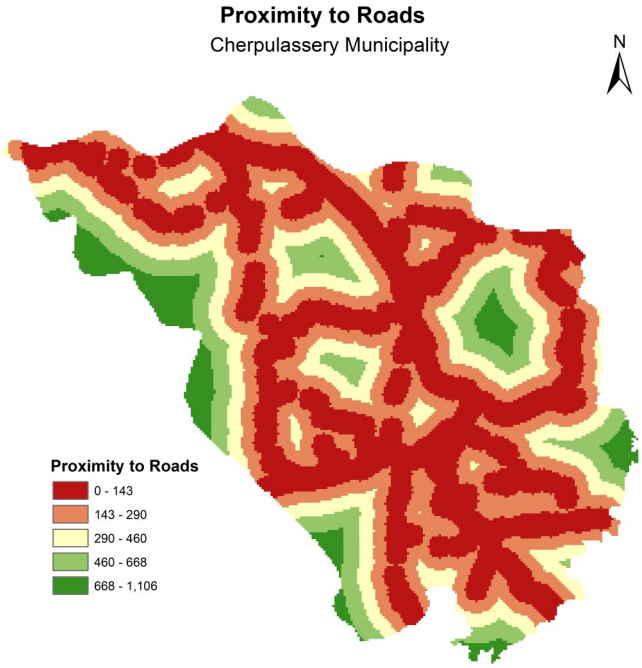


Fig 20.32. Proximity to Road network of Cherpulassery

Approach for Landslide Susceptibility Mapping using Analytical Hierachy Process (AHP)

The Analytical Hierarchical Process (AHP) is a popular GIS technique used to identify areas at risk for landslides. This method allows for the evaluation of the significance of each factor by establishing criterion weights and a hierarchy, which determines the im-

pact of individual criteria on the overall assessment. The Ahp method is a decision-making technique that can handle intricate and multi-dimensional issues, enabling decision-makers to identify the most suitable solution based on their objectives and comprehension of the problem. This approach was employed to establish the comparative importance and precedence of each factor and sub-factor that contributes to the occurrence of landslides.

Earlier research has provided significant insight into the process of weighting and rating parameters. Rating values were derived through the Ahp method. The significance of a parameter can be determined by its weight, where a high weight suggests a greater impact on landslide susceptibility, and a low weight indicates a relatively small impact. The weight assigned to each parameter was based on Saaty's scale of relative importance, which ranges from 1 to 9 . The Saaty's scale of relative importance value reveals that the value of 9 indicates extreme importance, 8 very, very strong, 7 very to extreme importance, 6 strong plus, 5 strong importance, 4 moderate plus, 3 moderate importance, 2 weak and 1 equal importance. Weightage and rank details of each theme and its sub-classes based on Saaty's scale are given in the Table 20.11.

In this study 10 environmental factor maps were used for assessment of landslide hazard susceptibility mapping. These 10 thematic layers are supposed to control factor for the landslide of study area. The association of these influencing factors are weighted according to their reaction for landslide occurrence and expert opinion.

The weights assigned to the thematic maps and their individual classes were normalized by using Saaty's AHP method by constructing a pairwise matrix (Table.20.12). The normalization process reduces the subjectivity associated with the assigned weights of the thematic maps and their features.

The judgment on the pair-wise comparison of the thematic layers and sub-classes within the thematic layers was validated by evaluating the Consistency Index and Consistency Ratio after calculating the principal eigenvalue (λ_{max}) (Table 20.13).

$$\lambda_{max} = 100/10 = 10$$

$$\text{Consistency Index (CI)} = \lambda_{max}\text{-n / n-1}$$

Where λ is the principal eigenvalue and n is the total no. of themes.

$$CI = 10\text{-}10/10\text{-}1 = 0$$

Consistency Ratio is defined as CR = CI/RCI, Where RCI = Random consistency Index value, whose values were obtained from Saaty's standard scale (Table 20.13)

$$CR = 0/1.49 = 0$$

According to Saaty, if the Consistency Ratio (CR) is 0, there is a perfect level of consistency in the pairwise comparison. The threshold value is not exceeding 0.1, which means the judgments matrix is reasonably consistent. Based on the assigned weights, all 10 thematic layers were integrated with weighted overlay analysis in ArcGIS software to generate the Landslide susceptibility map of Cherpulassery Municipality.

Landslide Susceptibility Zone= $\sum_i^N$ (Xa × Yb)

where, *X*- represents the weight of the thematic layers; *Y* – represents rank of the thematic layer subclass. The A term (A = 1, 2, 3, ..., X) represents the thematic map and B term (B = 1, 2, 3, ..., Y) represents the thematic map classes.

Table 20.11. Weightage and rank details of each theme and its sub-classes.

Sl No.	Factor	Classes	Weightage
1	Rainfall	274-284	1
		284-289	3
		289-295	5
		295-301	7
		301-311	9
2	Slope	0-4.6123	1
		4.6123- 8.215	3
		8.215 – 12.5397	5
		12.53979- 18.88754	7
		18.88176 – 36.754	9
3	Elevation	17- 46.9	1
		46.49- 66.39	3
		66.39- 91.46	5
		91.46- 129.8	7
		129.8- 205	9
4	Soil	Clay loam to clay	7
		Clay loam to clay laom	7
		Dry Agriculture	2
		Gravelly clay loam to gravelly clay	6
		Gravelly sandy clay loam to gravelly clay loam	5
		Gravelly sandy loam to gravelly sandy clay	4
		Gravely sandy loam	1
		Miscellaneous	2
5	Aspect	-1- 61	1
		61– 132	3
		132– 208	5
		208-285	7
		285-360	9
6	Land Use	Paddy/ Non Active paddy/Water	1
		Forest	2
		Residential/Others/Public & Semipublic/ Commercial/Industrial/Traffic & Transportation/Transport And Communication	3
		Dry Agriculture	5
		Roack/Vacant	6
		Quarry	8
7	Ndvi	0.03– 0.18	9
		0.18-0.24	7
		0.24-0.29	5
		0.29-0.33	3
		0.33-0.5	1

8	Geology	Charnockite	3
		Migmatite	2
9	Geomorpholo-gy	Residual Mound	9
		Rolling Plain	6
		Pedi Plain	3
		Valley Fill	2
		Water Body - River	1
10	Proximity to Road network	0-143	9
		143-290	7
		290-460	5
		460-668	3
		668-1106	1

Table 20.12. Pair-wise comparison matrix table of ten thematic layers

Theme	Weight	Slope	Aspect	Rain-fall	Land Use	Eleva-tion	Ndvi	Geolo-gy	Geo-morph ology	Soil	Proximity to road network	Geo. Mean	Nor. Weight
Slope	8	8/8	8/7	8/7	8/6	8/5	8/5	8/4	8/4	8/3	8/3	1.6226	0.1538
Aspect	7	7/8	7/7	7/7	7/6	7/5	7/5	7/4	7/4	7/3	7/3	1.4199	0.1346
Rainfall	7	7/8	7/7	7/7	7/6	7/5	7/5	7/4	7/4	7/3	7/3	1.4199	0.1346
Land use	6	6/8	6/7	6/7	6/6	6/5	6/5	6/4	6/4	6/3	6/3	1.2172	0.1153
Elevation	5	5/8	5/7	5/7	5/6	5/5	5/5	5/4	5/4	5/3	5/3	1.0142	0.09615
Geomor-phology	5	5/8	5/7	5/7	5/6	5/5	5/5	5/4	5/4	5/3	5/3	1.0142	0.09615
Ndvi	4	4/8	4/7	4/7	4/6	4/5	4/5	4/4	4/4	4/3	4/3	0.8113	0.07691
Geology	4	3/8	3/7	3/7	3/6	3/5	3/5	3/4	3/4	3/3	3/3	0.8113	0.07691
Soil	3	3/8	3/7	3/7	3/6	3/5	3/5	3/4	3/4	3/3	3/3	0.6086	0.05769
Proximity to Road network	3	3/8	3/7	3/7	3/6	3/5	3/5	3/4	3/4	3/3	3/3	0.6086	0.05769

Table 20.13. Results of Consistency Ratio

Theme	Slope	Aspect	Rainfall	Land use	Elevation	Geomorphology	Ndvi	Geology	Soil	Proximity to road network	Weighted sum	Row average	λ
Slope	0.1537	0.1538	0.1537	0.1538	0.1538	0.1537	0.1538	0.1538	0.1537	0.1538	1.5376	0.154	10
Aspect	0.1347	0.1346	0.1346	0.1347	0.1346	0.1346	0.1347	0.1346	0.1346	0.1346	1.3463	0.135	10
Rainfall	0.1346	0.1345	0.1346	0.1346	0.1345	0.1346	0.1346	0.1345	0.1346	0.1346	1.3457	0.135	10
Land Use	0.1155	0.1154	0.1155	0.1154	0.1154	0.1155	0.1154	0.1155	0.1154	0.1154	1.1544	0.115	10
Elevation	0.0962	0.0963	0.0962	0.0962	0.0963	0.0962	0.0962	0.0963	0.0962	0.0962	0.9623	0.096	10
Geomorphology	0.0963	0.0962	0.0963	0.0962	0.0962	0.0963	0.0962	0.0962	0.0963	0.0962	0.9624	0.096	10
Ndvi	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.769	0.077	10
Geology	0.0769	0.0769	0.0769	0.0768	0.0769	0.0769	0.0769	0.0769	0.0769	0.0769	0.7689	0.077	10
Soil	0.0576	0.0577	0.0577	0.0576	0.0577	0.0577	0.0576	0.0577	0.0577	0.0577	0.5767	0.058	10
Proximity to Road Network	0.0576	0.0577	0.0576	0.0577	0.0577	0.0576	0.0577	0.0576	0.0577	0.0577	0.5766	0.058	10

Table 20.14. Saaty's ratio index for different values of N

The consistency indices of randomly generated reciprocal matrices										
Order of the matrix										
N	1	2	3	4	6	6	7	8	9	10
RCI value	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

The general representation of procedure for Landslide Susceptibility processed in the model builder (GIS) is shown in Fig. 20.33. The Landslide Susceptibility Map for Cherpulassery municipal region obtained after overlay analysis is given in Fig 20.34

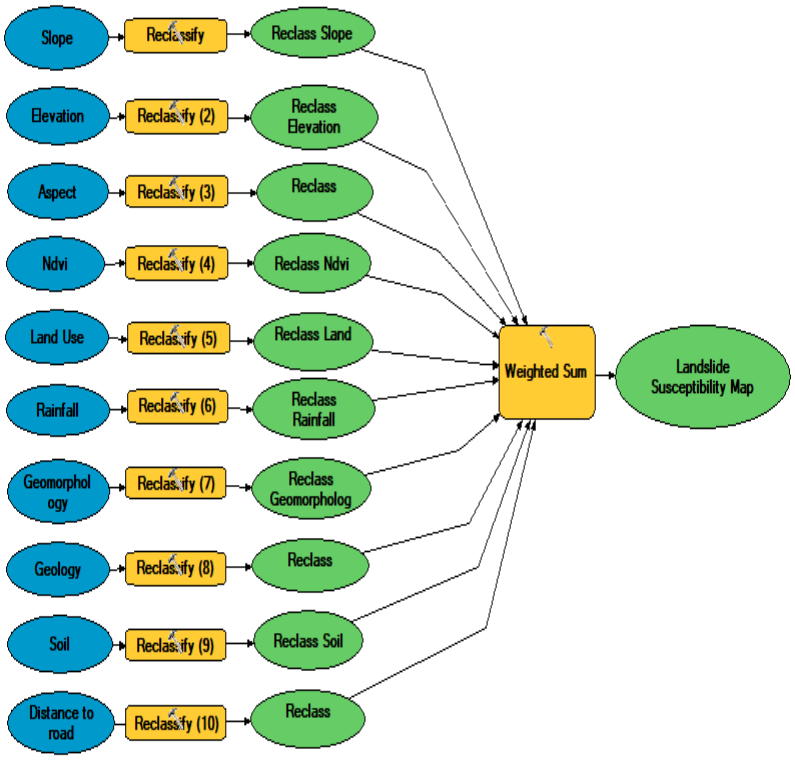


Fig 20.33 Landslide Susceptibility Mapping Procedure as displayed in ArcMap Model Builder

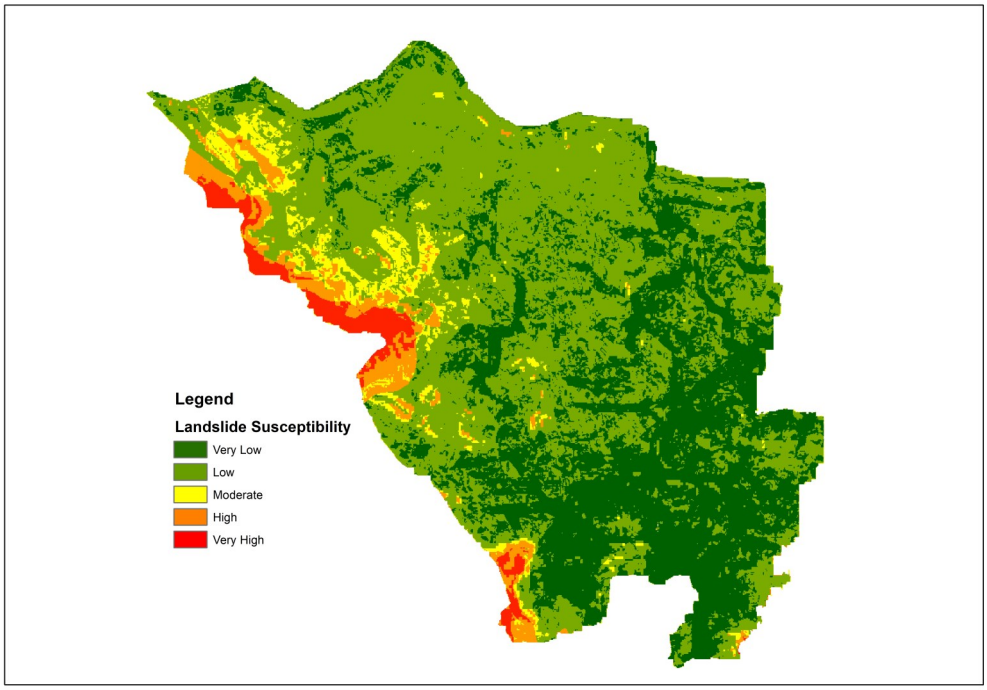


Fig. 20.34 Landslide Susceptibility Map of Cherpulassery

The Fig. 20.35 and Fig 20.36 show the landslide region overlained the landslide susceptibility map and Existing land use respectively.

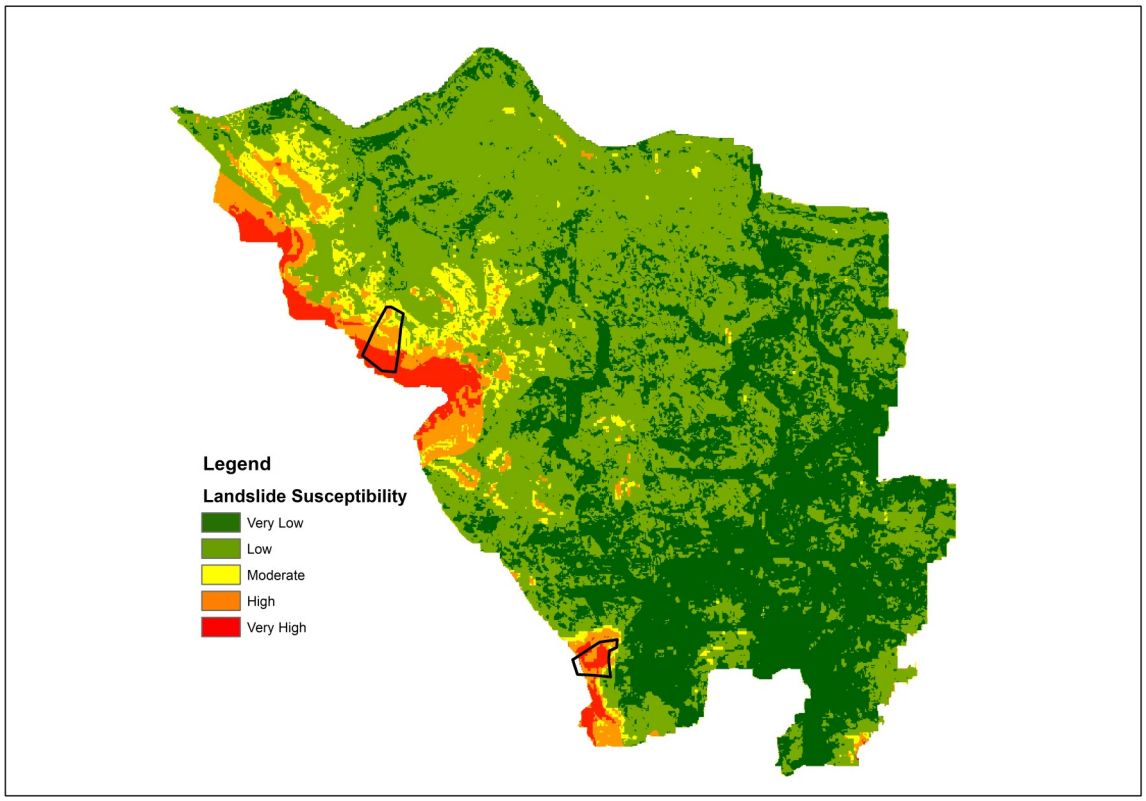


Fig. 20.35 Landslide region overlained Landslide Susceptibility Map of Cherpulassery

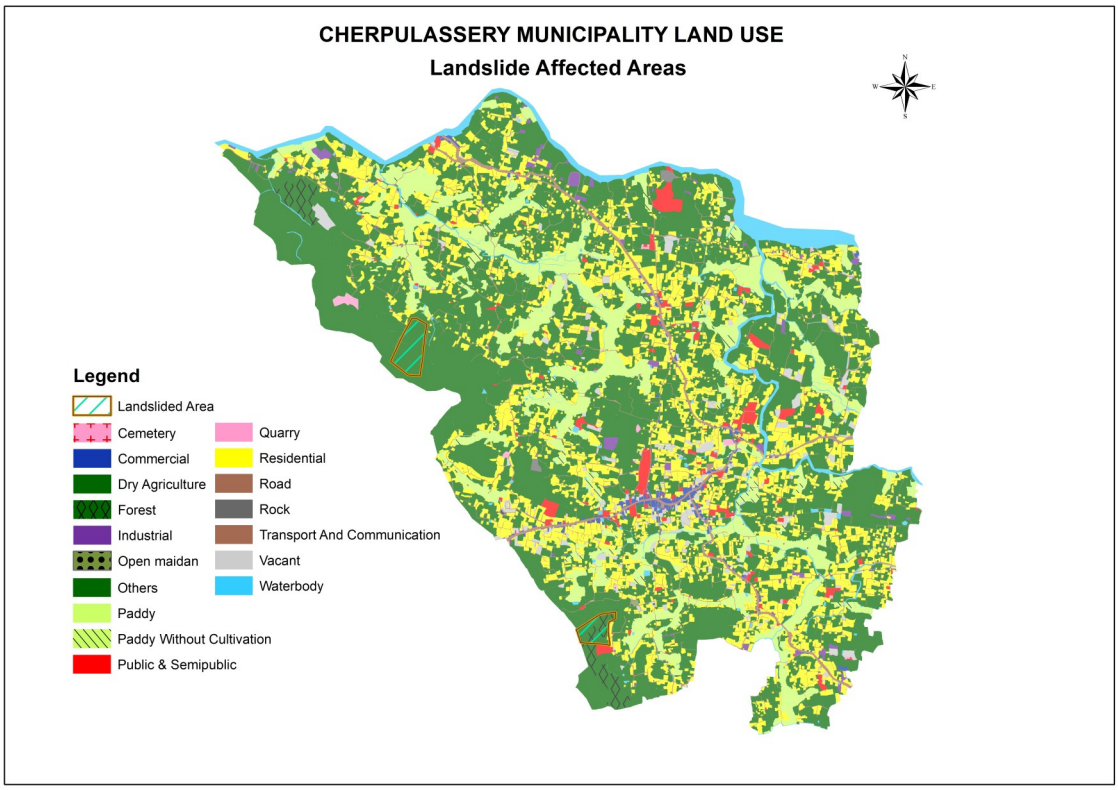


Fig. 20.36 Landslide region overlained Existing Land Use Map of Cherpulassery

Table 20.15 Landslide region overlained Landslide Susceptibility Map of Cherpulassery

Sl No.	Category	Area Hectare	Area %
1	Stable	121.25	4.04
2	Moderately Stable	1206.028	40.34
3	Moderately Unstable	1370.246	45.67
4	High Risk Zone	272.654	9.09
5	Critical zone	29.783	1.00

Disaster Mitigation Measures

The Cherpulassery municipal area's riverside frequently experiences flooding, and it faced inundation during the monsoons of both 2018 and 2019. These significant floods, being highly destructive, drew limited attention to disaster preparedness and management. Consequently, it is crucial to establish disaster preparedness and management at the municipal level to implement measures for reducing the risk of future disasters.

The mitigation measures have been categorized into three distinct phases: the Pre-disaster phase, the Impact phase, and the Post-disaster phase. The Pre-disaster phase encompasses Prevention, Mitigation, and Preparedness. A successful mitigation strategy, however, hinges on obtaining the collective support and commitment of various stakeholders, including the administrative authorities, research institutions, non-official organizations, and the community. Therefore, it is essential to establish institutional arrangements and/or legislative support to ensure the effective implementation of the mitigation strategy over an extended period.

Flood mitigation measures encompass a variety of strategies designed to minimize the destructive consequences of flooding on communities, infrastructure, and the environment. Historically, the primary focus of flood management has involved implementing physical measures to prevent floodwaters from reaching vulnerable areas or infrastructure.

These measures can be broadly categorized into two primary approaches: structural and non-structural. Structural measures involve the construction of physical infrastructure such as dams, levees, and flood control channels to directly control floodwaters, safeguarding communities and critical assets. In contrast, non-structural measures focus on policies, planning, and community engagement to mitigate flood risks, including activities like zoning and land-use planning, early warning systems, and educational initiatives. Both types of measures play a vital role in comprehensive flood risk reduc-

tion, enhancing community preparedness, resilience, and reducing vulnerability to the detrimental impacts of flooding. The main thrust of the flood protection programme undertaken in India so far has been in the nature of structural measures like:

1. Embankments and dykes.
2. Dams and Reservoirs.
3. Natural detention basin.
4. Drainage and Channel improvement.
5. Flood waters diversion.
6. Watershed Management / Catchment area treatment.
7. Anti-erosion works.

Non-structural measures primarily concentrate on policies, urban planning, early warning systems, and educational seminars. These non-structural approaches are known for their cost-effectiveness and rapid implementation. It's important to recognize that there is a growing trend of human encroachments and activities in flood-prone areas within our country. Implementing non-structural measures permits the utilization of floodplains while minimizing the disaster potential and maintaining their positive contributions.

- Flood Plain Zoning - This has been described in zoning regulation chapter. Proper land use planning and zoning regulations restrict development in flood prone areas, minimizing exposure to flood risks. This approach helps protect communities and encourage construction technique and materials that are flood resistant.
- Flood Proofing- It includes structural or non-structural measures like porous pavements, rain gardens, bio wales, raised houses, floating houses etc.
- Mapping and assessing flood prone areas provide valuable data for informed decision making ensuring that new developments, infrastructure projects and proper mitigation strategies considering flood risk.
- Flood Forecasting and Warning- The proper early warning system to observe weather forecasting, monitor the data from rain gauge stations, especially in monsoon season and giving vital warning alert to public and evacuation team.
- Education and outreach programs - Public awareness campaigns and educational initiatives inform residents about flood risks, encouraging them to prepare for emergencies and follow safety guidelines.
- Flood Insurance program - Flood insurance provides financial protection to property owners. Encouraging insurance coverage not only helps individuals recover from flood damage but also promotes overall resilience.

- Elevation and relocation – Encouraging property owners to elevate or relocate structures in flood prone areas reduces vulnerability to flood damages.
- Natural Flood Management: Restoring and preserving natural features like wet-lands, forest and river banks helps absorb and slow down flood waters that can act as a sponges and reduces the risk of flooding downstream.



Constructing Retaining walls to prevent landslides





Conceptual Disaster Flood Resisted Houses

20.5.2 Disaster Preparedness

Coordinated action is essential when preparing for a disaster. This includes the development of plans or arrangements based on risk assessments done by Local governments, districts and the state through a continuous cycle of risk management, planning, coordinating, training, equipping, exercising, evaluating and taking corrective action to ensure the effective coordination and response during disasters. Effective disaster management planning for all hazards is a key element of being prepared. Disaster management planning establishes community networks and arrangements to reduce risks related to disaster preparation, response and recovery. State and district management authorities are the statutory bodies constituted under the Disaster Management Act, 2005 (Central Act 53 of 2005). The institutional structure of the District Disaster Management Authority (DDMA) is given in Fig 20.37.

State Disaster Management Authority

The first KSDMA was constituted vide S.R.O No. 395/2007 dated 4th May 2007. Present Composition of KSDMA is notified vide S.R.O No. 583/2013 dated 17th July 2013. Vide Section 3 of the Kerala State Disaster Management rules (KSDMR), 2007 the authority is composed of ten (10) members, chaired by Chief Minister and convened by Additional Chief Secretary, Revenue and Disaster Management. The Chief Secretary (inter alia Chairperson of the State Executive Committee) is the Chief Executive Officer of KSDMA vide Section 14(4) of the DM Act, 2005.

District Disaster Management authority

The Palakkad disaster management authority is functioning under the chairmanship of the District Collector. District disaster management authority Palakkad prepared district disaster management plan, and Kerala state disaster management policy, 2010 vide G.O(MS) No. 240/2010/DMO dated 19-06-2010 has laid down the guiding principles for the District disaster management plan of Palakkad.

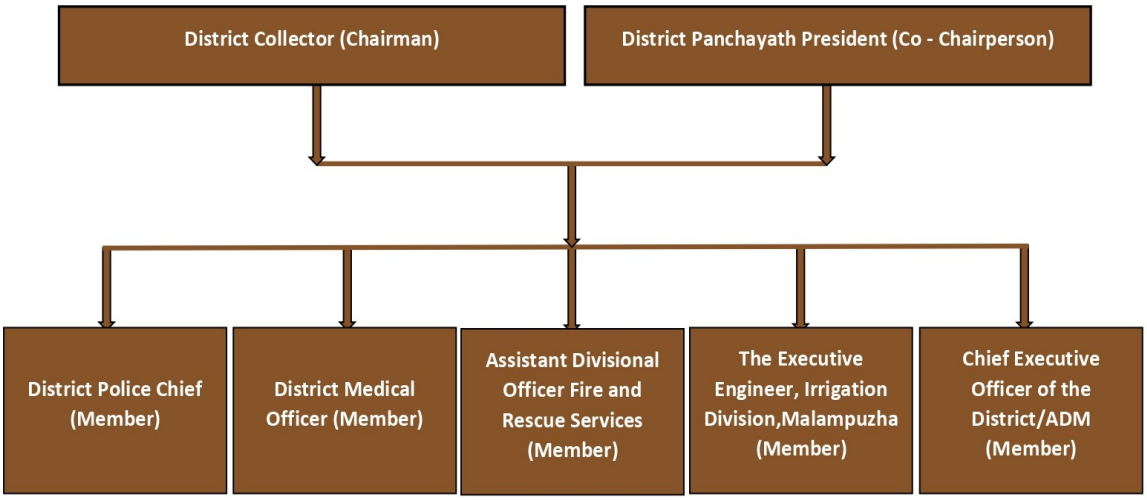


Fig.20.37. Institutional structure of DDMA

20.5.2.1 Strategies

20.5.2.1.1 State Interventions

- Regulations & compliance monitoring mechanisms to check overutilization of natural resources.
- Support and guidance for conducting scientific studies to identify the optional distance between quarry locations to ameliorate the disaster effects.
- Preparation of spatial plans at the district level in the context of disaster.
- Adopt policies to incentivize vertical growth in safe zones.
- Frame and implement policies to regulate developmental activities along risk zones.

20.5.2.1.2 District Interventions

- Revise draft integrated District Development Plan (IDDP), 2013 include the context of disaster and legalize the same by District Planning Committee (DPC).
- Ensure that local bodies prepare projects in the context of present disaster effects and implement them.
- Formulation of evacuation routes connecting to safe zones in the event of disasters and dissemination of the same to the public.
- Consolidate the high-risk zones of the district on a spatial platform. Place regulatory measures.
- Stronger monitoring & corrective actions – on unauthorized development along flood plains, natural drains & landslip hazard zones.
- Action plan for de-siltation of dams, deepening of rivers.

20.5.2.1.3 Local Interventions

- Every local body to have a Local development plan on a spatial platform and submission of projects including the disaster context.
- Compulsory buffer zones in high-risk regions of the floodway.
- Riverfronts in high-density habitations
- Agricultural tracts/wetlands in medium to low-density habitations
- Flood proofing of residential/commercial complexes in flood fringe regions.
- Sensitizing the local populace regarding the importance of buffer zones and flood proofing.

Only the local Interventions strategies above mentioned have been proposed to resolve through Master plan.

20.5.2.2 Activity plan for Landslide

Table 20.16. Activity Plan for Landslide

Activity Plan for Landslide		
1	Structural	Non-Structural
2	Clearance of water ways	Public awareness campaigns
3	Removal of encroachments	Monitoring & updating landslide related parameters, Flood warning system
5	Cleaning of Sewerage	Map the landslide prone areas
6	Check dams,gully benching	Display boards for the public the areas prone for the landslides to avoid accidents
6	Re-grading of slope, Benching of slopes	Update Resource Inventories
7	Plant barren and sloppy areas in hill with suitable trees	0
8	0	Collect details of earth movers, cutters, JCB's and other related machineries in the District , Generators, Storage of Medicine, Mobilize the search and Rescue Equipments

20.5.2.3 Activity Plan for flood

Table 20.17: Activity plan for Flood

Activity Plan for flood	
1	Identification of flood prone areas and marking on maps
2	Documenting previous floods
3	Monitoring of landslides causing blockages in rivers
4	Assessment of area suffering drainage congestion
5	Assessment area prone to river erosion
6	Identify new safe areas and maintain existing shelters, making sure they have sanitary and other basic necessities
7	Implement public awareness activities to create a pro-active and prepared society, which can cope effectively with hazards and their aftermath
8	Educate the public on what to do and what not to do to prevent harmful activities in the floodplain
9	Inspect flood mitigation infrastructure

20.5.3 Disaster Response

The aim of emergency response is to provide immediate assistance to maintain life, improve health and support the morale of the affected population. Such assistance may range from providing specific but limited aid, such as assisting refugees with transport, temporary shelter, and food, to establishing a semi-permanent settlement in camps and other locations. It also may involve initial repairs to damaged infrastructure. The focus in the response phase is on meeting the basic needs of the people until more permanent and sustainable solutions can be found.

The disaster response activities are organized through Incident Response Systems (IRS). The Incident Response System (IRS) is an effective mechanism for reducing ad-hoc measures in response. It envisages a composite team with various Sections to attend to all the possible response requirements. The IRS designates officers to perform various duties and get them trained in their respective roles. It also emphasizes the need for proper documentation of various activities for better planning, accountability and analysis. This will greatly help in reducing chaos and confusion during the response phase. Everyone will know what needs to be done, who will do it and who is in command. The institutional framework of IRS for Palakkad is given in fig Responsible Officers (ROs) have been designated at the State and District level as overall in charge of the incident response management. The Responsible Officer may delegate responsibilities to the Incident Commander (IC). Flow chart showing the institutional structure of IRS is depicted in fig 20.38 The Incident Response Team (IRT) is managed under IRS which will function at State, District, Sub-Division and Tehsil / Block levels. The IRTs will be predesignated at these levels and on receipt of Early Warning, the corresponding Responsible Officer will activate them. In case a disaster occurs without any warning, the local IRT will respond and contact the Responsible Officer for further support, if required.

20.5.3.1 Operation Section

The Operations Section helps to prepare and execute different tactical operations required in response to the disaster. The duties include;

- Monitoring field level rescue and evacuation operations
- Monitoring salvage operations
- Requisition of accommodation, transport and other necessary equipment for relief groups
- Maintain law and order
- Regular updates to the EOC regarding relief operations

20.5.3.2 Planning Section

The Planning Section is responsible for the collection, evaluation, and display of incident information, maintaining the status of resources, and preparing the Incident Action Plan and incident-related documentation.

20.5.3.3 Logistics Section

The Logistics Section is responsible for providing adequate services and support to meet all incident or event needs. The duties include;

- Assess the need in terms of manpower and resources and ensure regular supply
- Ensure proper storage and transport facilities for relief materials
- Maintain adequate supply of necessary transport and equipment Coordinate with private transport associations and boat associations for emergency requirements
- Organize transportation for rescue party, evacuated people medical terms and injured or sick people

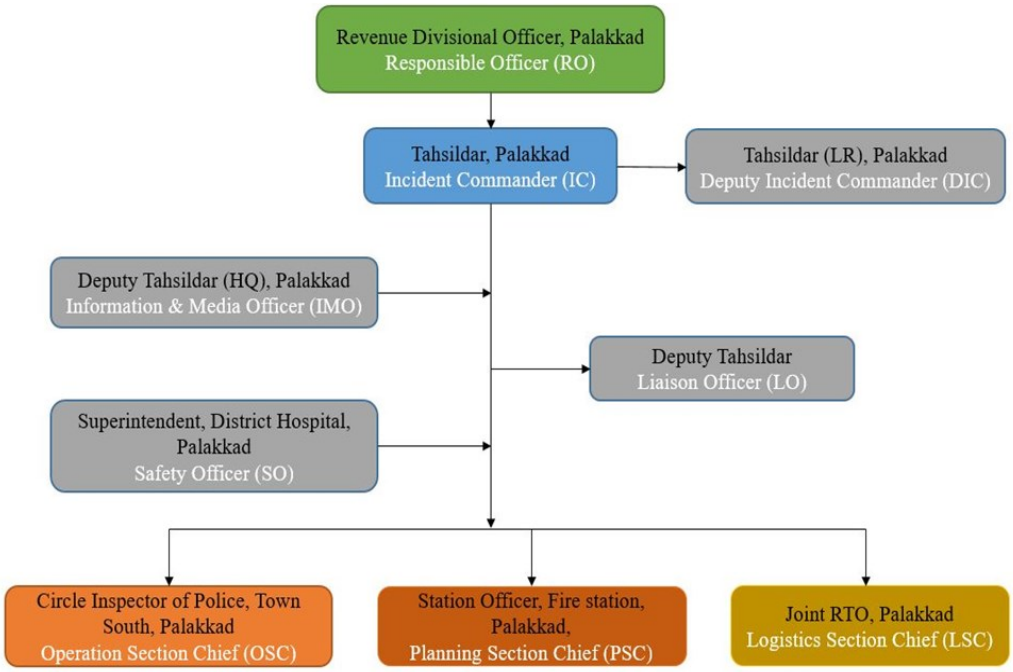


Fig 20.38 Incident Response System of Palakkad (Source: SDMA)

20.5.4 Recovery

This post-disaster phase aims in establishing the 3R's; Recovery, Rehabilitation and Reconstruction thus providing the opportunity to 'Build Back Better' (BBB) integrating disaster risk reduction into development measures, and making communities resilient to disasters.

Recovery measures, both short and long term is a set of orderly actions triggered by the impact of a disaster upon a community taken by the integration of central, state

and local level departments and NGOs. It will consist of several related activities such as the following:

- Damage assessments
- Debris clearance, removal and its environmentally safe disposal
- Restoration and even upgrading utilities including communication networksRe-establishment of major transport linkages
- Temporary housing
- Detailed building inspections
- Redevelopment planning
- Environmental assessments
- Demolition and Reconstruction
- Integrating DRR (Disaster Risk Reduction) into various development initiatives
- Financial management and Economic impact analyses

The major steps/ processes of the recovery process and the processes involved are summarized in Table 20.18

Table 20.18 Major steps of the recovery process and the key processes involved

Sl No	Major Steps	Process
1	Post-Disaster Needs Assessment (PDNA) and Credible Damage Assessment	• Preliminary assessment reports, Compilation and transmittal of damage and loss data • Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment • Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluk) and districts • Results monitoring and evaluation plan for the recovery program, • Select the most appropriate and achievable processes and methodology for conducting early and credible damage and needs assessments
2	Developing a vision for Build-Back Better (BBB)	• High-level meetings as well as broad-based, wider consultations with experts, civil society, and key stakeholder • Build consensus among the range of stakeholders within and outside government
3	Ensure coherence of BBB with the development programs and goals	• Discussions at top level to align the recovery vision with the government's broader, longer-term development goals and growth and poverty reduction strategies

4	Incorporating resilience and BBB in recovery vision	• Consultations and background studies on: • Disaster resistant physical recovery • Options for fast economic recovery • Gender and equity concerns • Vulnerability reduction • Natural resource conservation and environmental protection
5	Balancing recovery across sectors	• Balance public and private sectors BBB programs • Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities • Prioritize infrastructure reconstruction • Address the recovery of the lives and livelihoods of disaster-affected communities • Show sensitivity to the needs of the affected population with regard to public expectations from recovery
6	Prioritizing sectors for recovery	• Determine the relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications, infrastructure, environment, livelihoods, tourism, social protection, health, and education

20.6 INFERENCES

In 2018, Cherpulassery Municipality had unusual spells of rain that resulted in flooding of 0.69289 sq. km. of land. An increase in the water level of the Kunthipuzha River that flows through the northern boundary of Cherpulassery municipality caused the inundation of water. Some of the few wards of the municipality were flooded during the 2018 mega flood namely Padinjattamury ,thootha, Naalumkunnu and health center.

The impactful rain spell resulted in extensive damage to both houses and people within the municipal region. The extremity of the disaster has prompted us to investigate their plausible explanations. Due to severe rainfall , the likelihood of an impending flood cannot be dismissed. Over the past decades , Cherpulassery has encountered occasional landslides, notably in 2018, triggered by a significantly diminishes in the absence of substantial rainfall

Cherpulassery has quite suffered from landslides in the past decades. High floods resulted in landslides in Cherpulassery may be attributed to the midland geographical aspect of the region. More priority should be given to sustainable development plan where the developments as well as nature, would go hand in hand.

21. ADMINISTRATION AND FINANCE

21.1 DEVELOPMENT ADMINISTRATION

Municipalities are local governments formed for the purpose of providing services to local residents and to provide local guidance over the development and enhancement of the community. Administration includes, budgeting and financial reporting, the payment of bills, the maintenance of both an office and the records of the municipality, the organization of Council meetings, the implementation of municipal programs and policies and other related tasks.

The development activities under taken by the municipalities are

1. Construction and Maintenance of municipal roads, gardens, and public well, drains etc.
2. Keeping and equipping of open spaces
3. Water supply
4. Sewage disposal
5. Public health
6. Providing economic help for the Construction and maintenance of houses to economically backward communities.
7. Street light
8. Administration of Institutions owned by the municipality like Schools, Hospitals etc
9. Construction and maintenance of municipal markets and slaughter houses.
10. Implementation of the planning in the municipal area as a part of the district plans and local plans.

Besides municipal level activities function in the various development departments are being controlled by the municipality and state plan schemes of these departments are channelled through the municipality.

21.2 MUNICIPAL FINANCE

The financial sector is the centre of economic activity; its health affects the entire economy. Municipal governments are directly linked with the availability and utilization of financial resources. The financial position of urban local self-governments throughout the nation is very precarious except for a few very large urban centres. Most of the urban local self-governments especially the smaller ones like Cherpulassery are not financially self-sustaining. These towns often depend on grants from Central and State

governments for funding their day to day affairs and fulfilling their constitutional obligations.

This section deals with the present status of income expenditure and utilization of available resources in the town. As the Cherpulassery panchayath is upgraded to Cherpulassery municipality by adding 14, 15 and 16 wards of nearby Panchayath, Thrikkaderi on November 2015 the data available for the financial year 2014-15 is for the Cherpulassery panchayath. Fig. 21.1 shows the hierarchy of Municipal finance in Cherpulassery town.

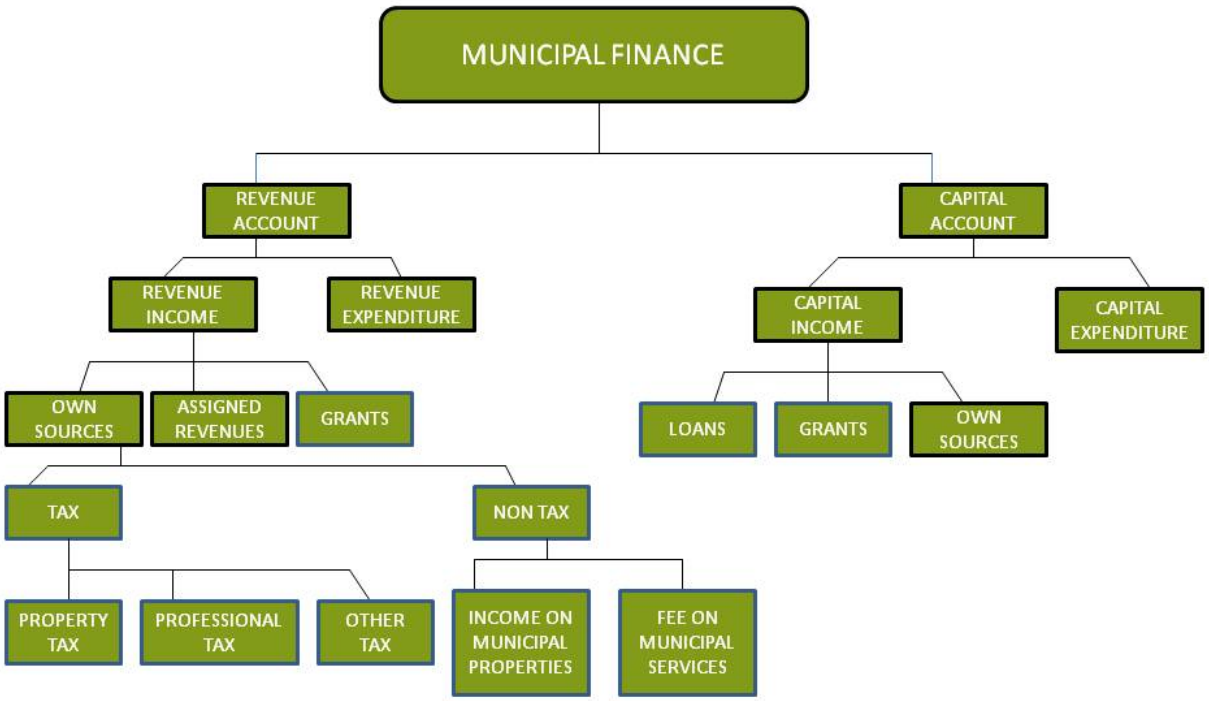


Fig 21.1 Hierarchy of Municipal Finance in Cherpulassery Town

The major source of revenue income for urban local self-governments is the property tax levied on the buildings in the municipality. This source has immense potential, but is not being tapped to the full extent at present.

The problems faced in revenue generation through property tax are

1. Irrational rates

2. Reductions given due to various (non-financial) reasons

3. Tax avoidance and evasion

4. Leakages in collection system

5. Improper record keeping and monitoring.

Almost all these handicaps can be overcome by digitizing the data base and managing this spatial information in a GIS platform with stake holder interface. The timely detec-

Table 21.1 Detailed Annual financial statement of Cherpulassery Town

Head of Account	APRIL2014-MARCH15	NOVEMBER 2015-MARCH16	APRIL 2016-MARCH17
Opening Balance			
Bank/ Treasury	2,07,27,645.00	2,18,29,413.00	6,92,66,874
Cash	0.00	93,874.00	75,472.00
	2,07,27,645.00	**2,19,23,287.00**	**6,93,42,346.00**
Income			
Revenue Account / Operating Receipts			
Tax Revenue	87,98,979.00	34,57,562.00	1,03,33,451.00
Rental Income from Miunicipal Properties	22,38,850.00	12,49,648.00	28,54,836.00
Fees & user Charges	11,49,603.00	8,22,095.00	23,32,991.00
Sale & Hire Charges	1,12,810.00	24,150.00	2,89,943.00
Revenue Grants, Contributions and Subsidies	3,62,41,895.00	51,17,825.00	1,13,01,309.00
Income from Investments			1,854.00
Interest Earned	2,97,693.00	80,960.00	1,84,282.00
Other Income	21,055.00	7,500.00	1,93,428.00
Other Liabilities	31,97,488.00	4,06,80,822.00	
Investment -General Funds		7,82,465.00	
Sundry Debtors (Receivables)	1,02,33,465.00	59,633.00	1,03,06,081.00
Miscellaneous Expenses to be written off			
Total	**6,22,91,838.00**	**5,22,82,660.00**	**3,77,98,175.00**
Capital income Receipts			
Grants Contributions for Specific purposes	5,76,60,327.00	3,46,67,922.00	4,94,29,119.00
Loans, Advances and Deposits	8,21,250.00	3,27,344.00	12,05,029.00
	5,84,81,577.00	**3,49,95,266.00**	**5,06,34,148.00**

Head of Account	APRIL2014-MARCH15	NOVEMBER 2015-MARCH16	APRIL 2016-MARCH17
Debt head			
Earmarked Fund	3,60,100.00		
Deposits Received	3,47,592.00	2,70,259.00	1,95,145.00
Other Liabilities	7,60,810.00	4,77,95,018.00	65,98,276.00
Total	**14,68,502.00**	**4,80,65,277.00**	**67,93,421.00**
Grand Total	**12,22,41,917.00**	**13,53,43,203.00**	**9,52,25,744.00**
Grand total including opening Balance	**14,29,69,562.00**	**15,72,66,490.00**	**16,45,68,090.00**
Expenditure			
Revenue Operating Payments			
Establishment Expenses	26,67,986.00	25,31,756.00	67,99,131.00
Administrative Expenses	15,14,394.00	23,55,043.00	50,09,038.00
Operations & Maintenance	51,33,413.00	15,79,053.00	28,38,528.00
Maintenance Projects	2,04,44,275.00		
Interest & Finance Charges		1,13,105.00	5,13,450.00
Programme Expenses		35,41,056.00	1,01,35,929.00
Expenditures of Transferred Institutions and State Sponsored Schemes	2,66,84,311.00		
Revenue Grants, Contributions and Subsidies	10,42,219.00	22,024.00	41,964.00
Other Liabilities	73,19,492.00	4,58,101.00	34,96,296.00
Investment -other Funds		7,82,514.00	
Stock in hand	26,210.00		
Decentralized Plan Programme - Productive Sector	34,58,951.00		

Head of Account	APRIL2014-MARCH15	NOVEMBER 2015-MARCH16	APRIL 2016-MARCH17
Decentralized Plan Programme - Service Sector	1,75,23,363.00	61,53,475.00	91,59,020.00
Decentralized Plan Programme - Infrastructure Sector	32,67,338.00	1,91,08,033.00	1,61,17,830.00
Decentralized Plan Programme -Projects not included in Sector Division	7,37,000.00	8,57,996.00	31,62,625.00
Prior period item	61,982.00	16,000.00	
Revenue Expenditure Total	**8,98,80,934.00**	**3,75,18,156.00**	**5,72,73,811.00**
Capital expenditure			
Reserves			
Grants Contributions for Specific purposes		1,75,32,633.00	33,71,680.00
Grants, Contributions and Compensations from Own Fund	10,000.00		
Capital Work in Progress	27,72,734.00	1,00,000.00	
Fixed Assets	78,75,181.00	53,25,376.00	79,78,477.00
Loans, Advances and Deposits	4,55,250.00	11,74,313.00	5,50,201.00
Capital Expenditure Total	**1,11,13,165.00**	**2,41,32,322.00**	**1,19,00,358.00**
Debt Head Expenditure			
Earmarked Funds	3,60,850.00	3,860.00	28,425.00
Deposits Received	1,18,017.00	44,361.00	2,66,018.00
Other Liabilities	12,29,253.00	2,62,25,445.00	2,85,24,396.00
Debt Expenditure Total	**17,08,120.00**	**2,62,73,666.00**	**2,88,18,839.00**
Expenditure total	**0,27,02,219.00**	**8,79,24,144.00**	**9,79,93,008.00**
Closing Balance			
Bank/ Treasury	4,02,61,823.00	6,92,66,874.00	6,65,75,082.00
Cash	5,520.00	75,472.00	-
Total	**4,02,67,343.00**	**6,93,42,346.00**	**6,65,75,082.00**
Grand Total including closing balance	**14,29,69,562.00**	**15,72,66,490.00**	**6,45,68,090.00**

Source: Municipal Office Cherpulassery

tion of unauthorized construction, bringing the evaders to the tax net and ensuring compliance of regulations, also can be effectively carried out using remote sensing applications once the GIS data base is in position and regularly updated.

Another source of own revenue for the town is the entertainment tax which is shrinking due to reduced public interest in cinema theatres. Receipts from municipal properties also could be a major source. In fact, the Cherpulassery town has less income under this head than that from taxes. However, the full potential of this source of revenue is not utilized.

Table 21.1 shows the details of revenue and capital accounts of the Cherpulassery town. The major sources of income in the municipality are revenue from the tax and the revenue grants and contributions.

The major portion of the expenditure is for decentralized plan programs for service sector (Education and health related activities), for infrastructure sector (Construction and maintenance of roads, buildings, bridges etc) and expenses for housing development programme.

Table 21.2 Details of Revenue and Capital Accounts of Cherpulassery Town

Item	APRIL2014-MARCH15	NOVEMBER 2015-MARCH16	APRIL 2016-MARCH17
Opening balance	2,07,27,645.00	2,19,23,287.00	6,93,42,346.00
REVENUE ACCOUNT			
Revenue income	6,22,91,838.00	5,22,82,660.00	3,77,98,175.00
Revenue expenditure	8,98,80,934.00	3,75,18,156.00	5,72,73,811.00
Surplus/Deficit	-2,75,89,096.00	1,47,64,504.00	-1,94,75,636.00
CAPITAL ACCOUNT			
Capital income	5,84,81,577.00	3,49,95,266.00	5,06,34,148.00
Capital expenditure	1,11,13,165.00	2,41,32,322.00	1,19,00,358.00
Surplus/Deficit	4,73,68,412.00	1,08,62,944.00	3,87,33,790.00
DEBT HEAD ACCOUNT			
Income	14,68,502.00	4,80,65,277.00	67,93,421.00
Expenditure	17,08,120.00	2,62,73,666.00	2,88,18,839.00
Surplus/Deficit	-2,39,618.00	2,17,91,611.00	-2,20,25,418.00
Closing balance	4,02,67,343.00	6,93,42,346.00	6,65,75,082.00
Total Income	14,29,69,562.00	15,72,66,490.00	16,45,68,090.00
Total Expenditure	10,27,02,219.00	8,79,24,144.00	9,79,93,008.00

Source: Municipal Office Cherpulassery

Table 21.2 shows the summary of Municipal finance in Cherpulassery town. Revenue income shows a decreasing trend from 2015-16 to 2016-2017 and it shows a deficit during the period 2016-17. Capital income shows surplus in the financial year 2015-16 and 2016-17 which indicate the underutilization of available funds.

Considering the revenue account, revenue income decreases and the expenditure increases during the period 2015-16 and 2016-17 which results in revenue deficit. In the case of capital account, capital income increases and capital expenditure decreases

during the period 2015-16 and 2016-17, results in capital surplus, which is an indication of under utilization of capital account.

Financial year 2014-15 cannot be compared with 2015-2016 and 2016-2017 since Cherpulassery was panchayath during the year 2014-15.

21.3 GOVERNANCE

The available technologies are not much utilized to the maximum extent for ensuring efficient and effective governance. The tax administration is still based on manual registers and assessment which causes heavy leakage and non-compliance. Reluctance in use of IT enabled solutions hampers seamless integration of various governance functions and efficient service delivery.

21.4 EXISTING SOURCE OF FUND

The major sources of revenue income for the municipality are municipal rates and taxes, income from the municipal properties and grants from the state government. The municipal rates and taxes contribute 27.33% of the revenue income during 2016-17. The income from properties comes to 7.55% and the share of grant from state government is 29.89%. In the capital account 97.62% of the funds are from grants and contributions for specific purposes which include general capital fund and development fund for special component plan. The total municipal income constitutes 39.69% of revenue income and 53.17% of capital income. This indicates the need to concentrate on efficient collection of rates and taxes and enhancing income from properties for the financial health of the municipality. The Fig 21.2 depicts temporal variation of total income and total expenditure.

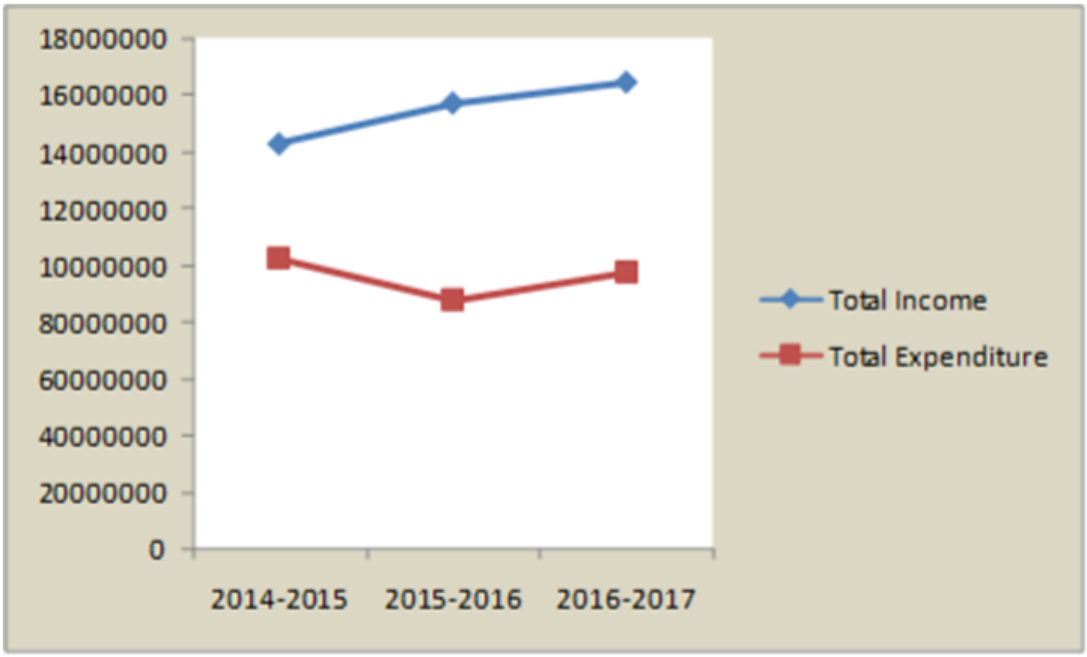


Fig 21.2 Temporal Variation of Total Income and Total Expenditure

21.5 ASSET MANAGEMENT PLAN

Asset management is the systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan.

While the need for Asset Management is clearly felt, it is equally important to have appropriate management information on asset condition, infrastructure costs and performance, and the consolidated requirements for repairs and maintenance, as well as appropriate maintenance standards. This section will deal with the elements that are essential in an asset management program for movable and immovable infrastructure.

21.5.1 Municipal Assets

Water Supply

There are two Water supply schemes operated and maintained by Cherpulassery municipality. They are Oduvangattil drinking water scheme and Vettikkalthodi vellottukurussi drinking water scheme. 22 Public open wells and 35 public borewells are constructed and maintained by Municipality. Also, Municipality is paying the water charges for 496 Nos of public taps.

Sewerage and Sanitation

There is no specific sewerage system for the town and the population is dependent on septic tanks and low cost sanitation units. The role of the municipality in this sector is limited to provision of public comfort station/latrines and giving financial aids through schemes.

Lands and Buildings

Municipality owns 40 numbers of plots having an extent of 757.54 cents within the municipal area. Total built up area of all municipal owned buildings are 5770.58 Sq m. Non remunerative assets of the Municipality are the office buildings, assets which are either acquired or purchased or transferred by state government as per 74th CAA on which the municipality incurs considerable expenditure for operation and maintenance. They are maintained by the municipality under the general, water supply & drainage and elementary education funds separately. The municipality has vehicles which are used for service delivery and for administration purposes. The details of Municipal assets - land and buildings are presented in Tables 21.3 and 21.4 respectively

Table 21.3 Municipal Assets - Lands

Sl.No.	Name of Asset (Land)	Suvey No.	Area	Area in cents
1	Chalavara land	65/1	2are 6sqm	5.09
2	Bus stand	BL-43 90/7	24are 21sqm	59.82
3	Thootha panniyamkurussi road	BL-42,405/4	36are	88.95
4	Karuvanamkurussi	BL-42,89/5	20are23sqm	49.99
5	Eliyakkadan well place	42, 9/4	40.500sqm	1.00
6	Karalmanna Anganwadi	BL-42,379/11	1are 20sqm	2.97
7	Kacherikunnu Manakari Anganwadi	BL-42,251/2	2are 80sqm	6.92
8	Athanikkal Kakkathodu Anganwadi	BL-42,284/75	1are 60sqm	3.95
9	Karumanamkurussi Health centre	BL-42,76/6	4are	9.88
10	Mundiyamparambu Anganwadi	BL-42/440	1are 61sqm	3.98
11	Aaluparambu Anganwadi	BL-42,65/6	1are 20sqm	2.97
12	Malmathodi Anganwadi	BL-43,34/4	1are 20sqm	2.97
13	Pandamangalam Anganwadi	BL-42,30/9	1are 20sqm	2.97
14	Dharmashastha Anganwadi	BL-42,405/13	1are 20sqm	2.97
15	Chettikunnu Anganwadi	BL-42,382/2	1are 20sqm	2.97
16	Thekkumuri Anganwadi	BL-43,58/2	1are 20sqm	2.97
17	Vadakkumari Health Centre	BL-41,309/8	1are 20sqm	2.97
18	Near Ayyappankavu (Cherpulasseri Pattambi Road)	BL-42,74/2	3are 13sqm	7.73
19	GLPS Karumanamkurussi	BL-42,84/14	12are 54sqm	30.99
20	Homeo Hospital	BL-41,251/11	1are 40sqm	3.46
21	Community Hall Compound	BL-42,405/6	17are 19sqm	42.48
22	Veterinary Hospital	BL-42,399/6	20are 23sqm	49.99
23	Samskarika Nilayam	BL-41,325/5	3are 64sqm	8.99
24	Panchayathu Shishu Mandiram	BL-42,477/12	2are 2sqm	4.99
25	Health care centre	BL-42,477/12	81sqm	2.00
26	Primary Health Sub Centre	BL-43,247/4	46are 53sqm	114.97
27	Primary Health centre	BL-42,363/5	80are92sqm	199.95
28	Govt.UP School Compound	BL-43,37/2	1are 25sqm	3.09
29	Ayurveda Dispensary Compound	BL-42,290/1	1are 20sqm	2.97
30	Laksham veedu colony Anganwadi	BL-43,58/2	1are 20sqm	2.97

31	Anganwadi compound (EMS Chalavara road)	BL-42,175/6	1are 20sqm	2.97
32	Anganwadi	BL-41,327/6	1are 20sqm	2.97
33	Anganwadi	BL-43,232/3	1are 20sqm	2.97
34	Aalumkunnu Anganwadi	BL-42,477/12	1are 20sqm	2.97
35	10th mile Anganwadi	BL-42,213/10	1are 20sqm	2.97
36	Majakkal Anganwadi	BL-43,34/5	1are 20sqm	2.97
37	Naduvattom Anganwadi	BL-41,180/56	1are 20sqm	2.97
38	Pottakulam Anganwadi		1are 20sqm	2.97
39	Narippattakunnu Anganwadi	BL-42,30/9	1are 20sqm	2.97
40	Karumanamkurussi Anganwadi	BL-42,88/12	1are 20sqm	2.97
			Total	**757.54**

Source: Municipal Asset Register, Cherpulassery

Table 21.4 Municipal Assets - Buildings

Sl.No.	Building Name	Suvey No.	Area	Plinth Area (Sqm)
1	Cherpulasseri Panchayath Office	90/7	24are 21sqm	780.00
2	Police Aid post Building	BL-43	24are21sqm	20.00
3	PHC Health Centre	BL-42/6	3are 64sqm	90.00
4	Mundiyamparambu Anganwadi	BL-42/6,440	1are61sqm	23.00
5	Aalumparambu Anganwadi	BL-42,65/6	1are20sqm	30.00
6	Malmathodi Anganwadi	BL-43,34/4	1are20sqm	40.00
7	Pandamangalam Anganwadi	BL-42,17/2	1are20sqm	25.00
8	Dharmashastha Anganwadi	BL-42,405/13	1are20sqm	25.00
9	Chettikkunnu Anganwadi	BL-42,382/6	1are20sqm	44.00
10	Thekkumari Changampuzha Anganwadi	BL-41,122/3	1are20sqm	25.00
11	Vadakkumuri Primary Health Sub Centre	BL-42,309/8	1are20sqm	23.21
12	Veterinary Hospital	BL-42,399/6	36are0sqm	184.98
13	EMS Memorial Town Hall	BL-42,405/6	17are19sqm	612.10
14	Samskarika Nilayam	BL-41,325/5	3are 64sqm	159.25
15	Pachayathu Sishumandiram	BL-42,477/12	3are 64sqm	124.95
16	Aalumkunnu Health Centre	BL-42,477/12	3are 64sqm	101.66
17	Primary Health Sub Centre	BL-43,247/4	2are2sqm	57.38
18	Panniyamkurussi PrimaryHealth Centre	BL-42, 363/5	81sqm	405.00
19	Govt.UP School	BL-43/2,37/2	46are53sqm	800.00
20	Govt. Ayurveda Hospital	BL-42/1,290/1	80are92sqm	109.20
21	Laksham veedu colony Anganwadi	BL-43/2,58/2	1are25sqm	46.32
22	Aaramkunnathukavu Anganwadi	BL-42,175/46	1are20sqm	44.00

23	Karalmanna Town Anganwadi	BL-41,325/6	1are20sqm	46.00
24	10 th mile Anganwadi	BL-43/3,213/10	1are20sqm	61.98
25	Aalumkunnu Anganwadi	BL-41,477/12	1are20sqm	56.00
26	Manjakkal Anganwadi	BL-43,34/5	1are20sqm	44.00
27	Naduvattom Anganawadi	BL-41/5,180/56	1are20sqm	46.00
28	Pottakulam Anganawadi		1are20sqm	36.00
29	Narippattukunnu Anganwadi	BL-42,30/9	1are20sqm	56.00
30	Karumanamkurussi Anganwadi	BL-42,88/12	1are20sqm	41.90
31	KaralmannaAnganwadi	BL-42,379/4	1are20sqm	40.00
32	Mandakkari Anganwadi	BL-42/2	2are80sqm	52.70
33	AthanikkalAnganwadi	BL-42,284/75	1are60sqm	56.95
34	Vettikadu Govt. Homeo Dispensary	42,251/11	1are40sqm	90.00
35	Panchayath Office New Building	42/40	17are19sqm	42.00
36	Karumanamkurussi GLP School New Building	42,84/14	12are54sqm	260.00
37	Panchayath Daily Market Building	42/74	32are13sqm	85.00
38	Panchayath Open Stage	N/A	50sqm	50.00
39	Thachamparambathu Anganawadi	N/A	3are	50.00
40	Thoothavadakummuri Anganawadi	N/A	1are	44.00
41	Thootha Bus waiting Shed	N/A		8.00
42	Moochithottam Anganwadi	N/A	2are	50.00
43	26th mile Muttiyamkunnu Anganwadi	N/A	N/A	50.00
44	Karinkara Anganwadi	N/A	N/A	40.00
45	Karalmanna Library	N/A	N/A	84.00
46	29th mile waiting shed	N/A	N/A	20.00
47	Panniyamkurussi Anganwadi	N/A	N/A	42.00
48	Naduvattom Bus Waiting Shed	N/A	N/A	20.00
49	Eliyappatta Anganwadi	N/A	N/A	40.00
50	Niraparambu Sishumandiram	N/A	N/A	40.00
51	A D L P Anganwadi	N/A	N/A	40.00
52	Pandamangalam Anganwadi	N/A	N/A	40.00
53	Vellottukurusi Anganwadi	N/A	N/A	40.00
54	Vadakkekkara Anganwadi	N/A	N/A	40.00
55	29 th mile Anganwadi	N/A	N/A	40.00
56	Shappukunnu Kalathumkundu Anganwadi	N/A	N/A	40.00
57	Karinkara Anganwadi	N/A	N/A	40.00
58	Kattukandam Anganwadi	N/A	N/A	40.00
59	Oaliyam Anganwadi	N/A	N/A	40.00

60	Changampuzha Library	N/A	N/A	40.00
61	26th mile Attanikkal Bus Stop	N/A	N/A	12.00
62	Naduvattom Bus stand	N/A	N/A	12.00
63	Karalmanna Bus stop	N/A	N/A	12.00
64	Cherpulasseri old bus stand	N/A	N/A	12.00
			Total	**5770.58**

Source: Assets Register, Cherpulassery Municipality

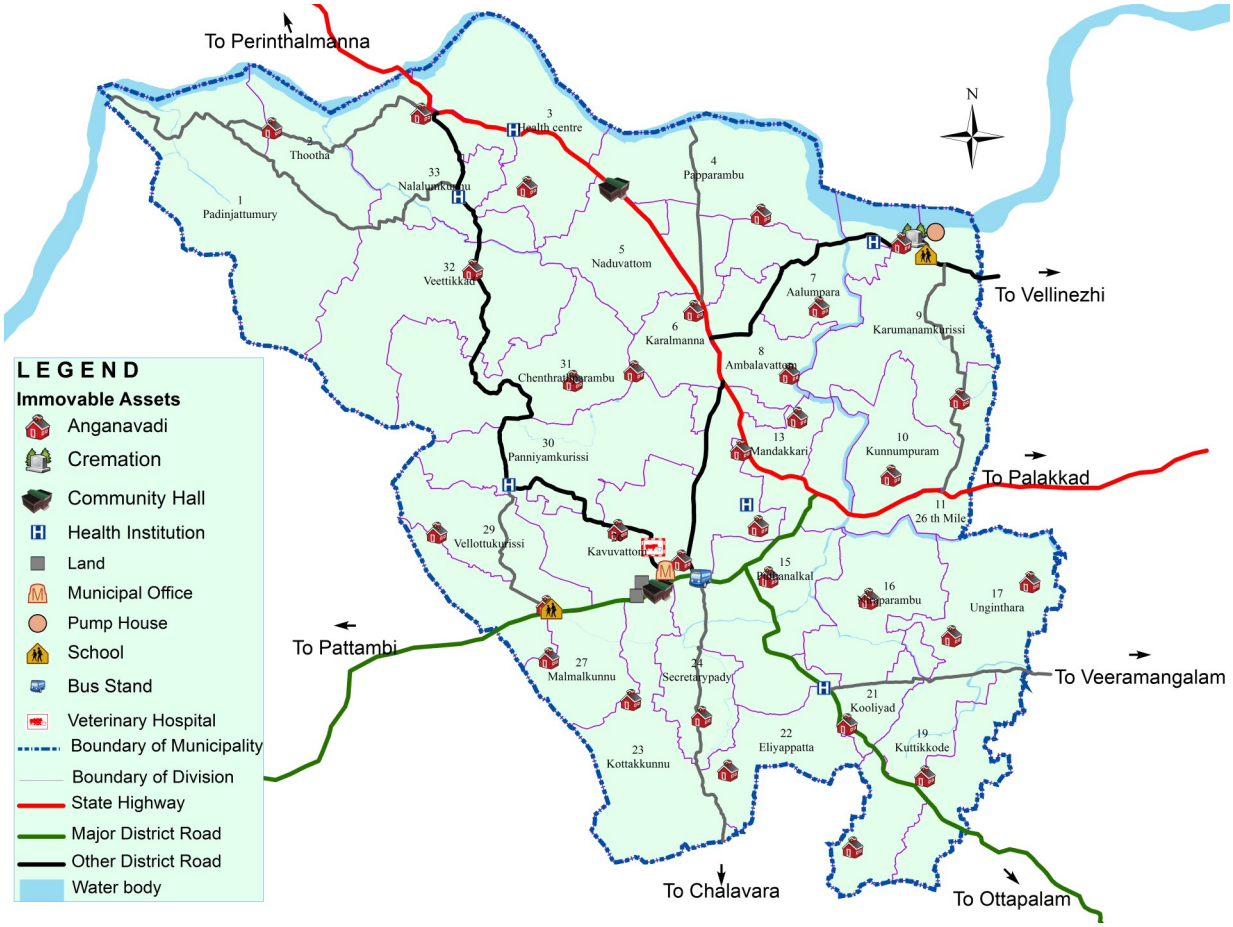


Fig 21.3 Asset Map of Cheprulassery Municipality

21.6 INFERENCE

Resource mobilization: The revenue income receipts in 2016-17 was Rs.6,93,42,346 whereas the figure stood at Rs.5,22,82,660 in 2015-16, which is a 33% increase from the previous year, while the revenue expenditure registered a 53% increase during the same period.

However, the ratio of Revenue expenditure to revenue income in 2014-15 was 1.44, it decreased to 0.72 in 2015-16 and was increased to 1.51 in 2016-17. More efforts should be directed to improve the revenue income receipts.

Whereas the ratio of capital expenditure to capital income receipts increased from 0.19 to 0.69 during the FY 2014-15 to 2015-16, the it was decreased to 0.23 in FY

2016-17 which is not very encouraging as it implies that rate of investment in fixed assets and capital works in progress are decelerating.

This drop in fixed investments can weaken the Administration from gaining financial independence on a long-term perspective. It also implies that there is a huge scope in augmenting the revenues by focusing on capital receipts. Value capture finance framework may be envisaged to boost the revenues in this regard.

Revenue deficit in the town indicate the poor tax collection system and leakages in tax collection. Capital surplus indicate the lack of fund utilization for major development project, since there is no major development exists. But the town has tremendous potential for development of financially remunerative projects for sourcing funds for urban development. Leakage in taxes and paucity of funds for developmental activities are the major problems faced by the town in the finance sector.

22. SECTORAL LINKAGES

This chapter provides a clear idea about the factors of relationship between various sectors for the overall development of municipality. The study of inter-sectoral linkages helps us to formulate a better development perspective and will give a possible feedback mechanism that will exist among sectors.

22.1 PRIMARY SECTORS - EFFECT ON INDUSTRIES, TRADE AND COMMERCE

The total agriculture area of the municipality comes 62.36% of the total area including the wet and dry cultivation, i.e. about 2/3 portion of municipal area comes under agriculture activity. It revealed that agriculture have a key role in the overall development of the town. The influence of primary sectors with the other development sectors is very crucial to the economical base of the town.

The paddy field itself comes to 12.86% of total land within the municipality, and may support the economic development through the animal husbandry, industrial trade commercial sectors of the town.

Dry cultivation is spread over the municipal area with 49.50 % of total land area of the town with rubber, coconut, areca nut, banana, and tapioca are as main crops. Presently the dry cultivation mainly influences the economic pattern of trade and commerce, micro level industrial and animal husbandry activities of the municipality.

The cultivation of Vegetables, Ginger, Turmeric, and Tapioca etc are having direct involvement in the daily livelihood demands of the town dwellers.

22.2 PRIMARY SECTORS - EFFECT ON TOURISM, TRADE AND COMMERCE

Hinter lands have hillock and thick vegetation having variety of flora and fauna contribute the possibilities of tourism activities within the town. Agriculture and all its wonderful trappings when properly and uniquely packaged gave possibilities of farm tourism activities thereby creates strengthen the economy. Livestock produces also create the commercial demands of the tourism.

The possibilities of natural scenic beauties and land use pattern including the water frontages of the municipal area are to be taken for the promotion of tourism sector, which will indirectly influence the commercial activities of the town.

22.3 TRANSPORTATION EFFECT ON TRADE & COMMERCE AND INDUSTRIES

Cherpulassery has good connectivity primarily through road transport. The state high way and major and other district roads are well connected to nearby regions as well as adjacent neighbourhoods, which is a promising sign for the trade and commercial activities. It can also influence the possible industrial activities of the town. The improvement of marketing facilities within the town, so as to lend benefits to the adjacent local bodies can also spruce up the employment opportunities in the transportation sector also.

22.4 TRANSPORTATION EFFECT ON ENVIRONMENT

The predominant land use of the municipal area is agriculture registering 62.36%, which are sensitive to environmental changes. The developmental activities mainly depend on transportation networks and construction of a well defined network of transport has to be set up in such a way that it will not damage environmental balance beyond its tolerance limit. Hence care should be taken in selecting the routes of newly proposed road network, future traffic demand can be achieved by widening of existing road network, and new proposals may be avoided.

The factors for creation of pollution also has to be considered while framing the proposed transportation network plan.

22.5 TOURISM EFFECT ON CULTURE AND ENVIRONMENT

Cherpulassery town and its premises enriched with various cultural and classical art forms such as Thiyyattu, Kaalavela, Pulluvan pattu, Kathakali etc. Cherpulassery hosts several seminars and workshops on Kathakali and allied classical arts. Numerous workshops, seminars, speeches are conducted as a part of art and culture promotion, by the trusts namely "Vazhkkada Kunch Nair Smaraka Trust" and "Nanu Nair Smaraka Kala kendram". Such potential for tradition & culture has to be provisioned for attracting tourists to this area and will also contribute in tourism based economical development of the town.

Thoothapuzha is a major spatial element with peculiar landscape constituting a significant scope for eco-friendly river front tourism for Cherpulassery. Strengthening of tourism sector will provide employment opportunities for locals and neighbourhood LSGs.

There are many folk communities practising traditional arts and artisans living within the municipality. Traditional products like "Adakkaputhur Kannadi", Kathakali headgears and wooden ornaments are also specialties of the area. These potential

areas can contribute in promoting tourism sector.

22.6 EFFECT OF VARIOUS SECTORS ON EMPLOYMENT

The planned development activities within an area will normally create new employment opportunities in various sectors. The supporting sectors have can also play a role in doling out job opportunities, same as joint efforts of various sectors provide multi functionary employment opportunities in an urban area.

Since agriculture activities are one of the predominant sector within the municipality, agro based industries can be flourished value added by- products and it causes to change the employment pattern of the town. Linkages with traditional industries based handloom, Pottery and Bamboo/reed with marketing facilities will create more jobs in both sectors.

The resources of abundant ponds and surface water resources may be utilised for inland fish cultivation and flora culturing. It not only provides job opportunities for those who need it, but also enriches fish and flora for locals also.

Tourism sector provide indirect job opportunities in addition to the creation of sector itself with association of lodging, hotels, restaurants, transportation.

22.7 ENVIRONMENTAL SECTOR WITH VARIOUS SECTORS

The municipality have 62.36% of agricultural land use, 1.16% of forest land use, 3.92% of water resources and 2.26% as vacant and parks within the municipality and these totally constitute 69.70 % of total land area of the municipality. Analysis reveals that only 1/3rd land is coming under developed land and remaining are considered as sensitive areas of the municipality. While framing development activities the environment factor should be actively provisioned in the town. The development activities in every sector have to be taken carefully otherwise the environmental degradation will adversely affect the developments of the municipality

22.8 INFERENCE

The study of linkages between various sectors gives that the economic level can be enhanced by empowering the sectors of Agriculture, animal husbandry, industry, tourism and trade and commerce. The culture & tradition based activities do carry equal weightage in realising the potential of the municipality.

23. SPATIAL STRUCTURE

The existing spatial structure of the municipality is derived on the basis of activity pattern, based on land use concentration, Functional character, existing connectivity pattern and existing hierarchy of nodes. The existing spatial structure of an area shows overall existing spatial pattern of that area and this spatial structure has a major key role for framing future development concept for that area.

23.1 FUNCTIONAL CHARACTER OF TOWN

Census applies three - fold criteria based on demography, to identify the character, be urban or not, of a settlement. If this criterion is applied for the study of settlement in Kerala, majority of the settlement will show urban character. Studies reveal that there are only a few areas in the State which are pucca urban or pucca rural. In between the pucca urban or pucca rural area, large area of land with mixed land use character, where in a combination of residential and agricultural land use, exists. So, we make use of the fourfold classification model comprising - rural, semi rural, semi urban & urban character. We make use of the four fold classification model comprising - rural, semi rural, semi urban & urban character.

The settlements study of Cherpulassery town based on the land use, population distribution, and land holding size of individuals, also determined above four categories associated with the town.

Table 23.1 Ward wise Functional Character

Ward No	Ward_Name	Functional character	Ward No	Ward_Name	Functional Character
1	Padinjattumury	Rural	18	Unginthara South	Semi urban
2	Thootha	Semi rural	19	Kuttikkode	Semi urban
3	Health centre	Rural	20	Kuttikkode South	Rural
4	Papparambu	Semi rural	21	Kooliyad	Urban
5	Naduvattom	Semi rural	22	Eliyappatta	Rural
6	Karalmanna	Semi urban	23	Kottakkunnu	Rural
7	Aalumpara	Rural	24	Secretarypady	Semi urban
8	Ambalavattom	Semi rural	25	Cherpulassery Town	Urban
9	Karumanamkurissi	Rural	26	Kavuvattom	Semi urban
10	Kunnumpuram	Semi rural	27	Malmalkunnu	Semi urban
11	26 th Mile	Semi urban	28	Manjakkal	Semi urban
12	Kacherikkunnu	Urban	29	Vellottukurissi	Rural
13	Mandakkari	Semi urban	30	Panniyamkurissi	Rural
14	Illlikkottukurissi	Urban	31	Chenthrathparambu	Rural
15	Puthanalkal	Urban	32	Veettikkad	Rural
16	Niraparambu	Semi urban	33	Nalalumkunnu	Rural
17	Unginthara	Rural			

Fig 23.1 shows the ward wise functional character distribution for Cherpulassery town. It is seen that urban activities are concentrated in the wards near the town centre and around the main roads. The table 23.1 shows the ward wise functional character of the town.

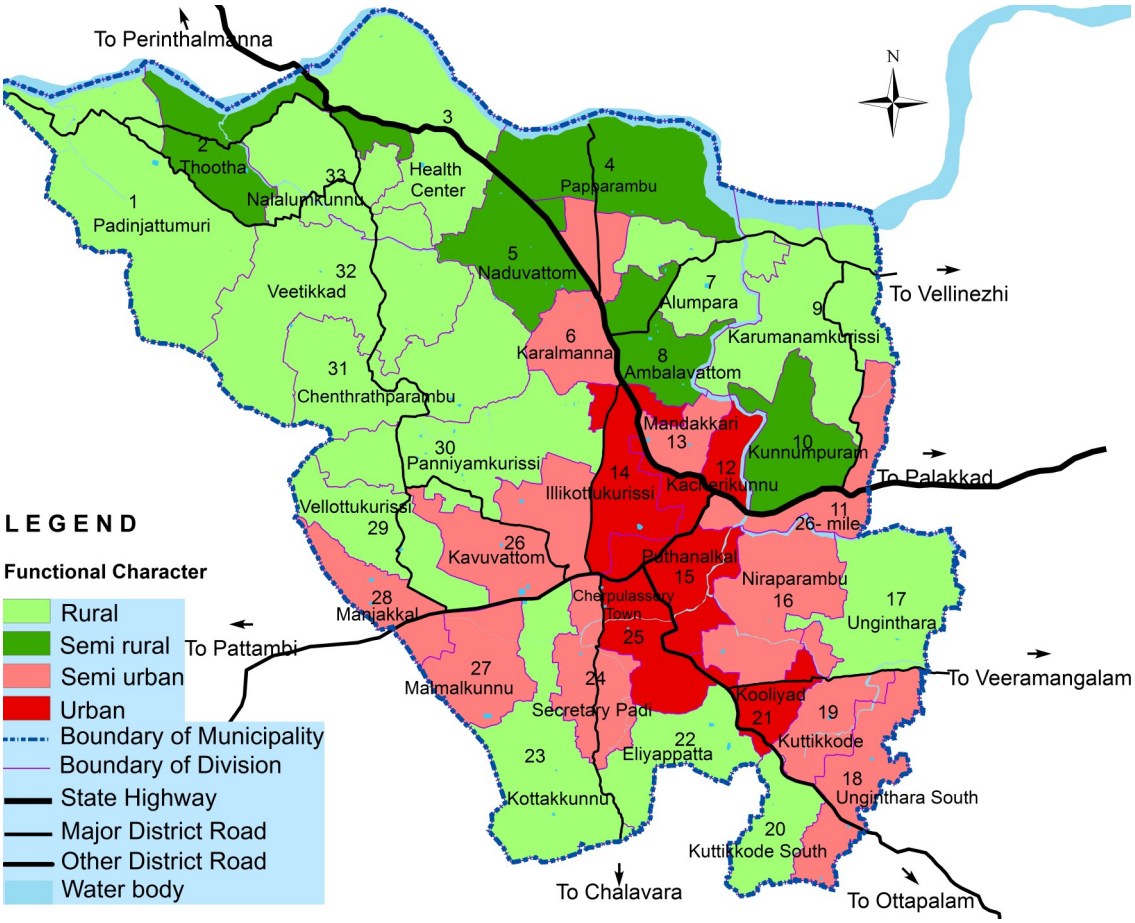


Fig 23.1 Functional Character of the Town

23.2 ACTIVITY PATTERN

The term activity pattern is used to indicate the major economic activity of an area or that can be brought there in future. The activity pattern is derived by the integration of the land use concentration pattern, functional character of the Town. Table 23.2 and shows the ward wise land use concentration within the municipality and Figure 23.2 shows the ward wise land use concentration pattern of the Municipality. From the study of the land use concentration pattern of the town, it is seen that non agricultural land use concentrations are mainly seen at the core area of the municipality.

The activities of the municipal area can be derived by intersecting the land use concentration pattern with functional character of the town. The study of activity pattern revealed that agriculture, residential, commercial and built up (built-up land is comprised of areas having intensive urban use with much of the land covered by structures. Activities in built up land use here includes industrial, public and semi public, Park and open space, Cemetery, transport and Communication.) are the predominant

Table 23.2 Ward wise Land Use Concentration

Ward No	Ward_Name	Land Use Concentration	Ward No	Ward_Name	Land Use Concentration
1	Padinjattumury	Agriculture	18	Unginthara South	Commercial
2	Thootha	Residential	19	Kuttikkode	Residential
3	Health centre	Builtup	20	Kuttikkode South	Residential
4	Papparambu	Builtup	21	Kooliyad	Residential
5	Naduvattom	Residential	22	Eliyappatta	Agriculture
6	Karalmanna	Residential	23	Kottakkunnu	Agriculture
7	Aalumpara	Residential	24	Secretarypady	Commercial
8	Ambalavattom	Builtup	25	Cherpulassery Town	Commercial
9	Karumanamkurissi	Agriculture	26	Kavuvattom	Commercial
10	Kunnumpuram	Residential	27	Malmalkunnu	Commercial
11	26 th Mile	Commercial	28	Manjakkal	Residential
12	Kacherikkunnu	Commercial	29	Vellottukurissi	Builtup
13	Mandakkari	Residential	30	Panniyamkurissi	Agriculture
14	Illlikkottukurissi	Commercial	31	Chenthrathparambu	Agriculture
15	Puthanalkal	Commercial	32	Veettikkad	Agriculture
16	Niraparambu	Residential	33	Nalalumkunnu	Residential
17	Unginthara	Residential			

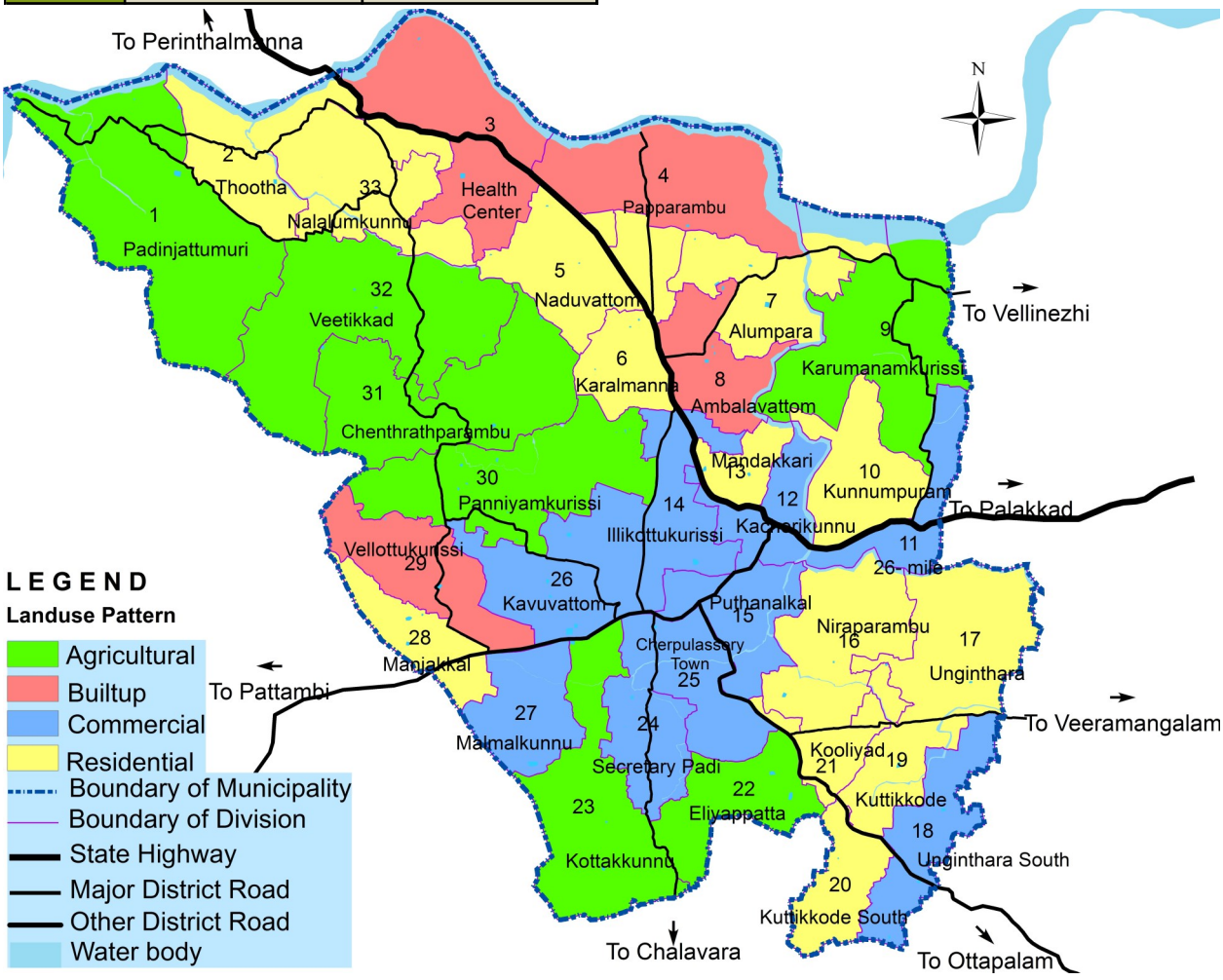


Fig 23.2 Ward wise Land Use Concentration

Table 23.3 Ward wise Activity Pattern of Cherpulassery Town

Ward No.	Ward_Name	Activity Pattern	Ward No.	Ward_Name	Activity Pattern
1	Padinjattumury	Primary Activity	18	Unginthara South	Urban
2	Thootha	Secondary Activity	19	Kuttikkode	Secondary Activity
3	Health centre	Urban	20	Kuttikkode South	Secondary Activity
4	Papparambu	Urban	21	Kooliyad	Secondary Activity
5	Naduvattom	Secondary Activity	22	Eliyappatta	Primary Activity
6	Karalmanna	Secondary Activity	23	Kottakkunnu	Primary Activity
7	Aalumpara	Agro allied	24	Secretarypady	Urban
8	Ambalavattom	Urban	25	Cherpulassery Town	Urban
9	Karumanamkurissi	Primary Activity	26	Kavuvattom	Urban
10	Kunnumpuram	Secondary Activity	27	Malmalkunnu	Secondary Activity
11	26 th Mile	Secondary Activity	28	Manjakkal	Secondary Activity
12	Kacherikkunnu	Urban	29	Vellottukurissi	Urban
13	Mandakkari	Secondary Activity	30	Panniyamkurissi	Primary Activity
14	Illlikkottukurissi	Urban	31	Chenthrathparambu	Primary Activity
15	Puthanalkal	urban	32	Veettikkad	Primary Activity
16	Niraparambu	Secondary Activity	33	Nalalumkunnu	Agro allied
17	Unginthara	Agro allied			

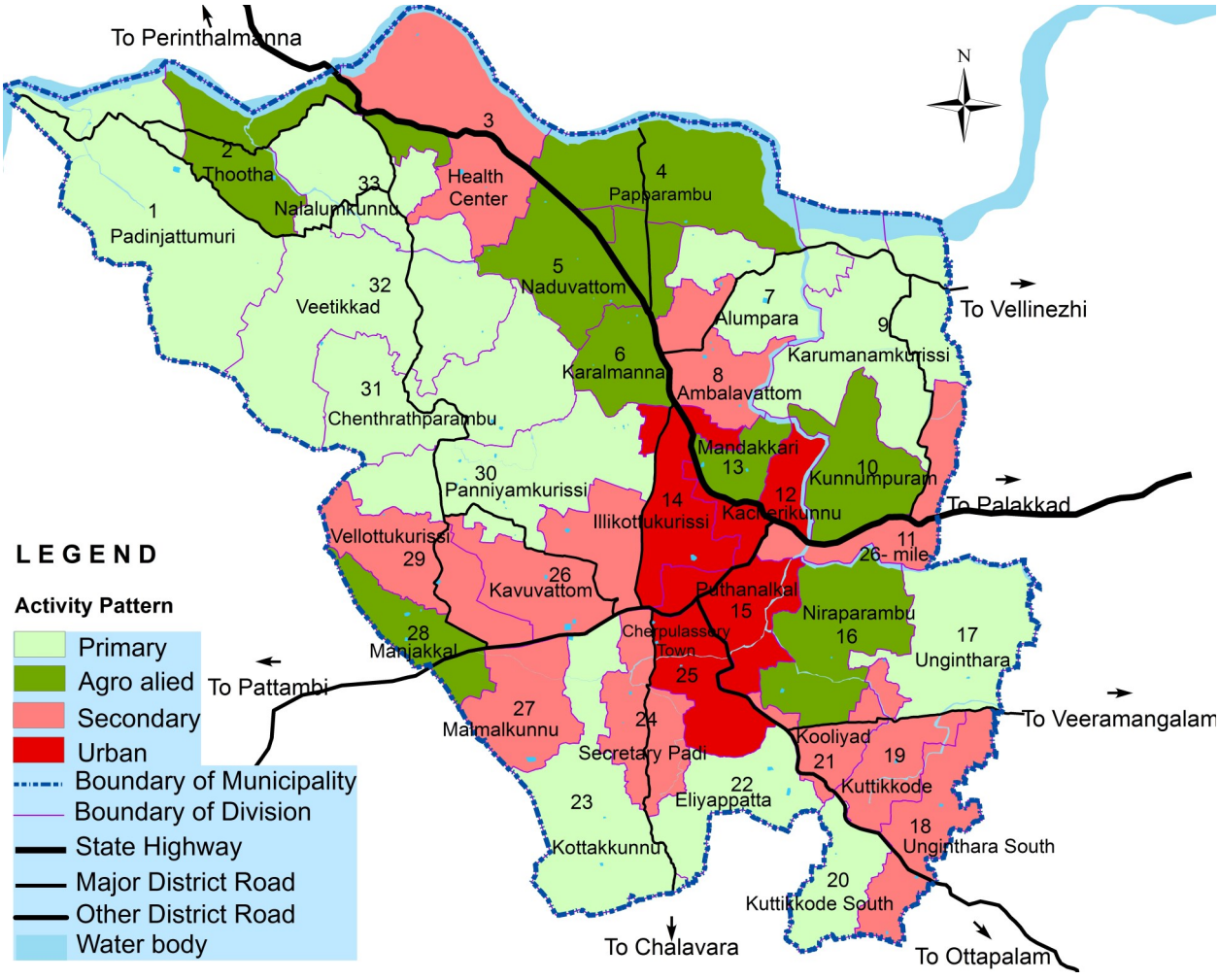


Fig 23.3 Activity Pattern of the Town

activities of town. The derived activities of each ward are shown in table 23.3 and the activity pattern of the municipality is derived in figure 23.3.

23.3 CONNECTIVITY PATTERN

Cherpulassery municipal area is well connected by roads with nearby regions and adjacent destinations. The existing road net work is similar to radial as well as block pattern. A state highway, major district roads, other district roads and local roads are formed an existing connectivity pattern to the municipality as shown in figure 23.4.

23.4 EXISTING HIERARCHY OF NODES

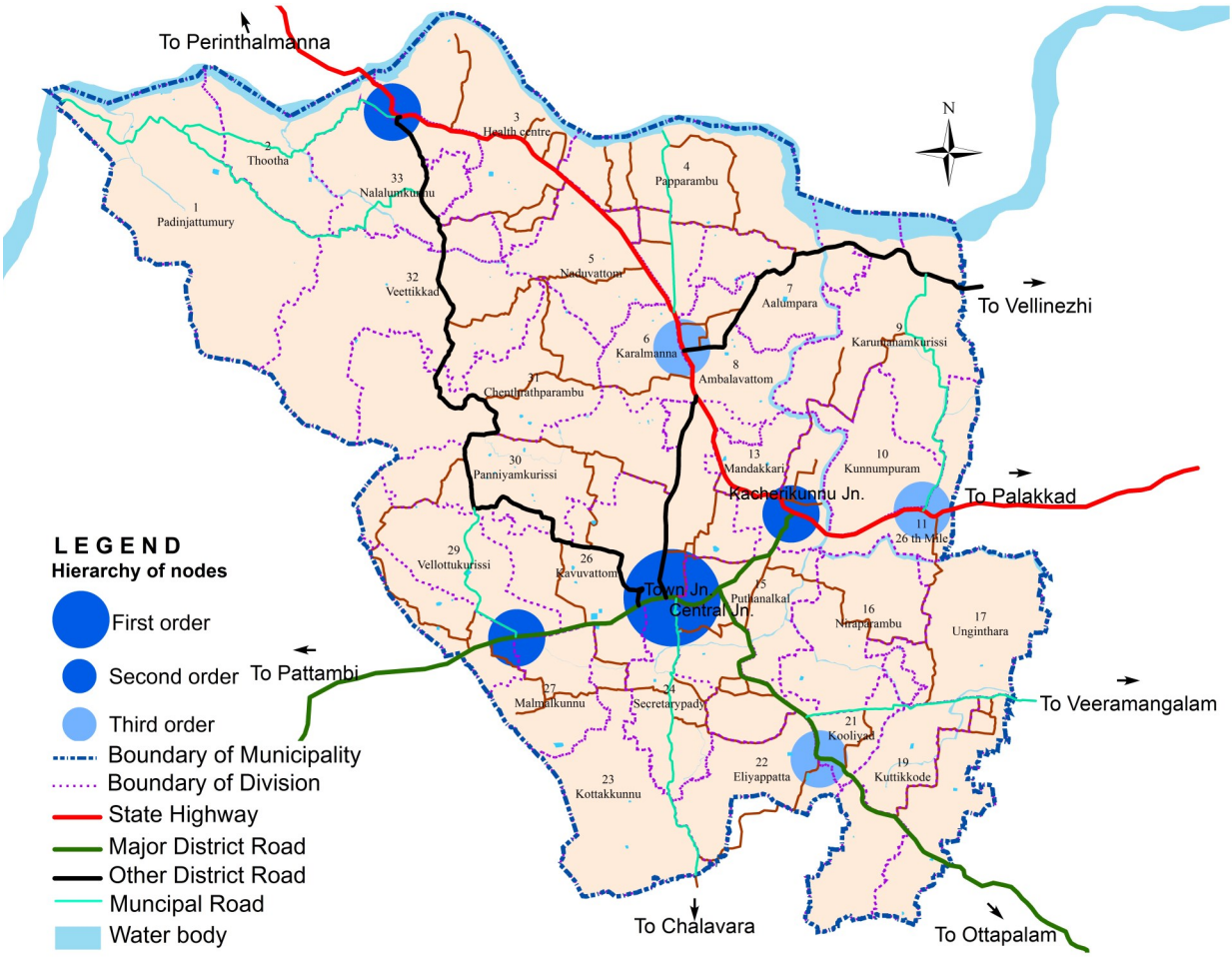


Fig 23.4 Hierarchy of Existing Nodes and Road Network

Following are the hierarchical nodes within the Cherpulassery town area.

1st order Junctions

1. Town Centre

2nd order Junctions

1. Thootha Junction
2. Kacherikunnu Junction

3. Madathiparambu Jnction

3rd order Junctions

1. Karalmanna Junction
2. Eliyapetta Junction
3. 26th mile Junction

23.5 EXISTING SPATIAL STRUCTURE

The existing spatial structure derived by intersecting the activity pattern, existing transportation network and with hierarchy of nodes. The derived spatial structure of Cherpulassery town is shown in figure 23.5.

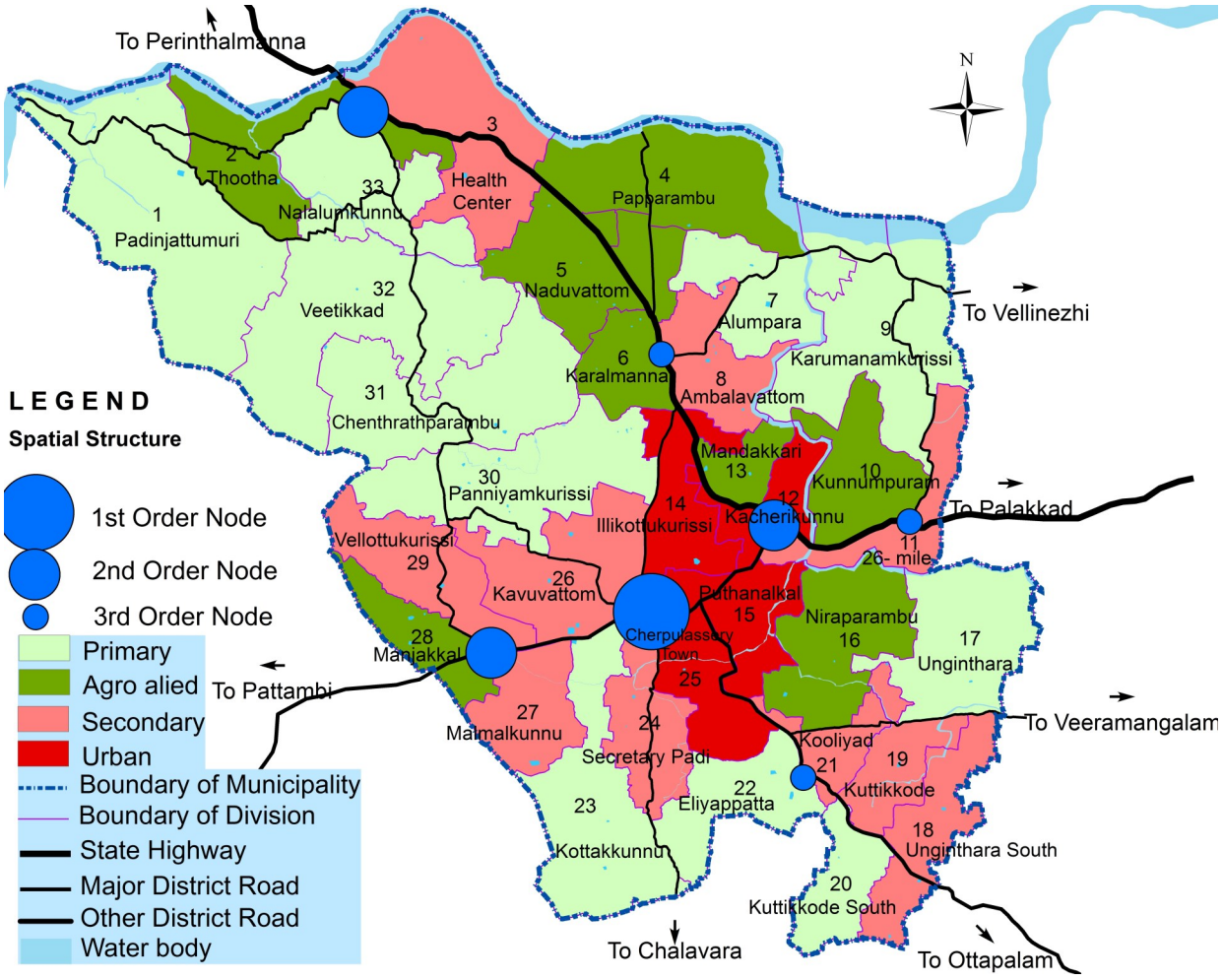


Fig 23.5 Existing Spatial Structure

23.6 INFERENCE

The existing spatial structure contribute a specific direction for framing best future development concept for the Cherpulassery town.

24. SUMMARY OF FINDINGS

The results of the analysis of social, physical, and economical sectors, demographical and employment pattern are consolidated here as summary of findings and which guide to formulate development goals and objectives of the planning area.

24.1 FINDINGS AS PER INTEGRATED DISTRICT DEVELOPMENT PLAN FOR PALAKKAD

- As per Integrated District development Plan for Palakkad 2013, Cherpulasserywas identified as rural character, but in the District Plan 2018 ,Cherpulassery is considered as an urban settlement.
- The suggested hierarchical settlement of Cherpulassery was third order settlement (Service centre) so as to facilitate to the nearby LSGIs as Vellinezhi, Thachannattukara, Thrikadeeri, Nellaya and Kulukallur etc.
- As per development concept of District Plan, Cherpulassery comes under IIIrd order multifunctional zone which act as a service centre for the neighbourhood.
- According to the suggested road network for the overall development of the district, Palakkad –Koppam road passing through the municipal area is proposed to widened so as to ensure efficient traffic pattern for the district .

24.2 REGIONAL SETTINGS

- Cherpulassery Town lies about 55 Km North west of district head-quarters.
- The nearest corporation Thrissur is located at 50Km south of town.
- The nearer Ports Kozhikode and Kochi are located at a distance of 79Km and 136 Km respectively away from the Cherpulassery town.
- Coimbatore the second largest city after Chennai in Tamil Nadu is located at 100 Km east of Cherpulassery.
- The Nearer airports are Kozhikode- 60 Km, Kochi- 102 Km and Coimbatore- 112 Km away from the town.
- The State Highway 53, Palakkad-Perinthalmanna passing through the Municipal town and NH 966, SH23 and SH39 are passing through at a distance of 11, 15, and 11 Km. respectively from the Municipal town.
- No Railway network through the Municipality, but Shoranur Jn. and Palakkad Jn. Railway stations are at a distance 20 and 42 Km respectively from Municipal town. The nearest railway stations are Vallapuzha and Kulukkalur along Nilamboor road

which facilitate only local trains.

24.3 POPULATION

- As per the census 2011 the total population of the municipality is 39,241 consisting 18,656 males and 20,585 females.
- Municipality accounts 0.71 % of the total area of district and 1.39 % of the total population of the district.
- The municipality consist 8439 households with an average household size of 4.65. Size of households is steadily decreasing due to the preference from joint families to nuclear families.
- Population growth rate of the last decade was 13.44 %. Growth rate was declining from 2001 to 2011.
- Population growth rate and house hold size is highest compared to other urban LSGIs within the District.
- As per the Population from NRHM (44,339)in 2019 , gross population density is 1,390 persons /Sq. Km. and net population density is 1,740 persons/Sq.Km.
- The sex ratio of the municipality is 1,103 and which high compared to other urban LSGIs within the District.
- Child sex ratio is only 956 which is lowest compared to the district and other urban LSGIs in the district.
- Literacy rate is 94.71% is highest compared to nearby LSGIs and lowest compared to similar towns.

24.4 EMPLOYMENT

- The work force of municipality is 31.39 % and in which 26.54 % are main workers and 4.85% are marginal workers.
- Total number of workers are showing an increasing trend from 27.23% (1981) to 31.39% (2011) and the number of non-workers are decreasing.
- Cherpulassery has least WPR compared to Kerala ,district and other similar towns within the district.
- The WPR is same as of the adjacent local bodies.
- Major share of main workers are coming under service sector as about 89%.
- The percentage share of workers in primary sector shows in decreasing trend.
- Dependency ratio as 2.18 which is higher compared to other municipalities and

district average and state average.

- The employment pattern revealed the backwardness of the economy of the municipality.

24.5 LAND USE

- As per existing land use pattern 62.36% of land coming under agriculture activities including dry and wet agriculture and which is the predominant land use of the town.
- The environmentaly sensitive area comprising Paddy, dry agriculture, forest & water bodies constitute 67.44 % of total land area of the Municipality.
- The dry agriculture itself constitute 49.50% of municipal area with rubber coconut, tapioca, banana, arecanut etc are main crops.
- The wet agriculture as paddy comes 12.86 % of the municipal area.
- Agriculture land is distributed all over the Municipality. Veettikkad, Chenthrathuparambu, Panniyamkurissi, Padinattumury, Eliyappetta, Karumanamkurissi, Vellottukurissi, Nalalumkunnu are the wards which are have high concentration.
- The land area with built up comes only 29.92 % of the total land area of the municipality . In which built up land use, 21.68 % comes for residential activities.
- The Commercial activities comes only 0.72% of municipal area, mainly concentrated at the core area. This is very low for a municipality and the commercial areas to be decentralised.
- The total land area for industrial is also very meagre as 0.72% of total area of the town.
- The public and semi public land area is only 1.85% of total area of the municipality.
- Two Vested forest are located as Veettikadan Mala (North west part of the Municipality) and Kottakunnu (South west part of the Municipality) constituting with 1.16 % of total land area of the municipality.
- An area as 3.92 % of Municipal area is under water bodies which includes Thoothapuzha, ponds, and thodu etc.
- The study of lands use pattern shows the development activities are not in the manner of urban status.

24.6 ECONOMIC ASPECTS

24.6.1 Agriculture

- Cost of seed, fertilizer, pesticide, and labour had gone up considerably resulting in higher cost of production. The area of paddy cultivation had shrunk considerably because paddy farming had become a losing vocation.
- Non-adoption of scientific management practices such as scientific spacing, manuring, based on soil data, irrigation and Integrated Pest Management (IPM) measures.
- Lack of facilities for post harvest processing, storage and value addition. In the absence of an organized marketing structure, private traders and middlemen dominate the marketing and trading of agricultural produces.
- Agricultural sector in this municipality is mainly depends on the rain. Most of the farmers are doing 1st crop and 2nd crop. The second crops totally supported by irrigation schemes. Hot arid climate and lack of efficient irrigation facilities causes less production.
- Crop damage by wild animals were reported from many places. To resolve the human-wildlife conflict more attention is needed on the social angle of the problem.
- The lush green of paddy fields is one of the most captivating features of Cherpulassery town accounts for 12.86% of the total area, which covers 410 Ha of land.
- The Padashekhara samithies and Kudumbasree groups are also has to taking initiatives in paddy cultivation.
- Coconut integrated farming method has to be adopted in the Municipality.
- There is tremendous scope for organic farming. Organic vegetables will fetch premium price, as people are health conscious and vegetable is an indispensable dietary component.
- There is scope for value addition / product diversification, scope for terrace cultivation for achieving food security and self-sufficiency in homesteads.
- Adoption of scientific management practices (scientific spacing, manuring, based on soil data, irrigation etc.) in agriculture can increase the production and productivity of different variety of crops.
- There have been a decrease in the paddy land due to conversion for other crops .
- Agriculture land has many issues relating to irrigation, most of the cultivators are depending natural source like river, thodu and ponds.

24.6.2 Animal Husbandry

- Cattle population is decreasing for the past few years but Poultry population is in increasing trend.
- The cow / Buffalo population has decreased by about 17.08 % over the previous census.
- There are two milk co-operative societies in the municipality and they are collecting 1900liters of milk per day.
- There are no authorized slaughter houses within the municipality but many Unauthorized slaughter houses are existing within the town.
- There is a veterinary dispensary in Cherpulassery town.
- The animal husbandry sector has no much potential for influencing the economic pattern of the municipality at present.
- The potentials of allied sector of agriculture has not properly taped to improvement of this sector .
- An integrated projects has to be prepared with the primary allied sectors so as to obtain sustainable economic development for the town.

24.6.3 Industries

- The land area under industrial use is only 0.23 sq.km which constitutes only 0.72% of the total Municipal area.
- There is no major and medium scale industries and industrial estates within the town.
- Presently small and micro industrial units are seen scattered throughout the town, and no an organised pattern for promoting industrial activities within the town.
- The backwardness of industrial sector directly effects the economic level of the municipality.

24.6.4 Trade and Commerce

- The land area under commercial use is only 0.23sq.km which constitutes only 0.72 % of the total municipal area.
- Commercial activities are mainly concentrated at core area of the town and along the main roads.
- There are 106 licensed Street vendors and they are mainly concentrated along road sides near bus stand.

- Commercial facilities are seen mainly as ribbon development along the major transport corridors, in between two temples namely Puthanalkal and Ayyappankavu.
- There is no organised market within the town for the town dwellers as well as for neighbourhoods.
- There is no facilities for selling the agro products of the farmers within the town and surrounded local bodies directly to the consumers.
- Insufficient space for Parking, loading and unloading are the main problems. Most of the commercial activities within the town laying close to the existing bus stand which aggravates the congestion problems.
- There is no scientific slaughter house within the Municipality and surrounding LSGs, but some unauthorized meat stall is functioning in the Municipality.

24.6.5 Tourism, Heritage and Culture

- There are no major tourism centres present in Cherpulassery.
- The existing few tourism spots within the municipal area are not yet utilized in an viable manner.
- The religious institutions as Ayyappankavu, Puthanalkal temple, Thootha temple. Thirumullappulli Mahadeva temple, Sree Mangode Bhagavathy temple etc are the potential for the pilgrim tourism activities.
- The traditional festivals as Puthanalkal Kaala vela and Thootha Pooram, and associated cultural art forms as Thiyyattu, Tholpavakoothu, Naga kalam are also the specialities of Cherpulassery, which are to be promoted in the scale of tourism.
- The potentials of "kalagramam:"at Vellinezhi has to be utilised in a tourism manner as getting the benefits to cherpulassery also.
- A hillock namely Cheenikapara one of the hillock on the bank of Thoothapuzha at Kaalikadavu has a potential for eco-tourism activities .
- The traditional architectural and historical places and monuments as Olappamannamana, Naranathu-mangalathumana etc. are located within 15 KM from Cherpulassery and these may be included in the tourism plan .
- The potential of Tootha River bank has to be developed as river front tourism activities.
- VazhakkadaKunchu Nair Smaraka Trust at Karalmanna played a pivotal role in classical art form Kathakali.
- Cherpulassery has been the birth place as well as home of many artists in dance,

music and drama. Cherpulassery Sivan, Kottakkal Sivaraman, Prof. Rajalakshmi are few examples for prominent personalities.

24.7 WATER SUPPLY

- The existing water supply system cannot service to the municipal inhabitants in a safe and sufficient manner. The inhabitants of the municipality are facing issues related to water scarcity, frequency of availability, accessibility of water supply, non availability of water in the area where high altitudes etc.
- The physical condition and service delivery performance of the existing scheme is very poor due to non-availability of the scheme components and dilapidated conditions of gravity transmission mains. Due to this the water distribution to the farthest areas is very much limited.
- The proposed project on implementation is capable to meet the demands of water supply in a limited extent. Since urban standards were not taken while designing that projects , a new comprehensive projects has to be framed to solve the analysed problems in future and so as to improve the social and economic status of the community .
- Existing water sources should be protected and water conservation techniques should be implemented to meet the water demands of people in the Municipality. Appropriate strategies and mechanism needs to be explored including recycling of waste water. Mechanism of rain water harvesting should also be encouraged so as to minimise the fast depletion of ground water table.

24.8 DRAINAGE, SEWERAGE, SANITATION & SOLID WASTE MANAGEMENT

- Rapid unplanned urbanization, shallow groundwater level, low to medium elevation have resulted in frequent water logging problems in this region. In order to alleviate flooding and to support sustainable growth of Cherpulassery Municipality, a time bound action program for augmentation and capacity revision of existing and new drains (due to increase in runoff from urban extensions) is vital. Check dams and depression/ lakes may be designed for increasing ground water table and as storm water holding points wherever needed. The design shall preserve the natural drainage pattern after the development of the area.
- Majority of the houses in the municipal area use leach pit tank/septic tank for sanitation. Moreover, there is no public sewerage system within Cherpulassery Municipal area. There has been wide spread bacteriological contamination of faecal origin in ground and surface water which relate to close proximity of increasing numbers of leach pit latrines, leakages from septic tanks, washing, bathing and other domestic activities. An elaborate liquid waste management plan need

to be prepared and according to it sewerage network must be laid and sewage treatment plant and faecal sludge treatment plant must be constructed. The promotion of adequate number of public and community toilets is required to be focused to cater to the needs of floating population of tourists and migrants.

- In the absence of efficient water treatment systems and solid waste management systems, untreated domestic and industrial wastes natural environment is getting polluted and which leads to unhygienic conditions. Municipality need to take adequate measures and options of composting for organic waste; co-processing of dry fractions of municipal waste in cement/power sectors and waste incineration for energy production would also be explored.

24.9 ENERGY

- Presently Cherpulassery Municipality does not have major energy problems. Utilisation of non-conventional energy is very much limited. However in order to meet the future demands and achieve energy sustainability, low energy consuming gadgets and Non-conventional energy sources like recovering energy from sewerage, solar energy should be promoted in house hold as well as institutional levels.

24.10 EDUCATION

- The dependence on professional government colleges in neighbouring local bodies indicate the need for increased presence in Cherpulassery municipality.
- Ramp provisions for accessibility in schools and colleges merits attention. This would be a positive drive in the wake of *Accessible India campaign*.
- Government colleges can increase the *affordability* criterion of populace in Cherpulassery municipality.
- Renovations in school infrastructure can garner more enrolment in government run schools.
- Career guidance/counselling centres could be set up to direct the students in a better direction.
- Even though Cherpulassery has a mix of educational institutions with large numbers offering space for primary, secondary and higher secondary educational institutions, the service coverage area of these institutions appears to be least in the northern and north eastern divisions of the Urban local body. In some cases, this is being mitigated by the service coverage of neighbouring local bodies. Given the passage of SH bisecting the northern regions of Cherpulassery, a protracted spread of settlements could be safely assumed on either sides.

- It becomes imperative to consider this growth aspect and plan the spatial distribution of entire spectrum of educational institutions evenly. Undivided attention needs to be given for skill development to capitalise on the demographic dividend that Cherpulassery is undergoing, particularly with respect to Agriculture and MSME. This could potentially retain the youth from migration.
- Measures in KMBR with respect to ramps and other accessible infrastructure needs to be implemented effectively to make the accessibility of educational institutions *universal*.

24.11 HEALTH

- For higher order medical facilities, people of this municipality are depending on Palakkad, Thrissur and Perinthalmanna in Malappuram district
- In Govt. institutions the infrastructure condition is not satisfactory; many of them lack sufficient space, clinical laboratory with advanced modern facilities, medicines, furniture, sanitation and proper waste disposal system.
- Existing health services in the government sector requires considerable upgradation for improving their capacity to provide desired level of service to the people. Proper infrastructural developments should be applied in allopathic, ayurvedic and homeopathic sectors. For better treatment people are depending on the super speciality hospital in the neighbouring district.
- An integrated programmes have to be framed with various sectors so as to get provide best services to the neighbour local bodies as well as the regions.

24.12 HOUSING

- Total area of the Municipality is 31.88 sq.km . Residential land use constitutes 21.68 % of the total area i.e. 6.91 sq. kms.
- As per 2011 census the total population is 39,421, number of households is 8,440 and thus average HH size is 4.65 which higher than the district average of 4.41.
- The trend in household size has been steadily decreasing from 6.00 in 1971 to 4.65 in 2011 indicating the shifting of preference from joint families to nuclear families.
- As per socio-economic survey 50.01% of houses belongs to Pucca and 30.02% belongs to semi-pucca category. This indicates the better living conditions experienced by households of Cherpulassery. Kutcha houses constitutes 19.88% , which require immediate repairs or required to be demolished and rebuilt without which it might be unsafe for habitation.
- Majority of the dwelling units have plinth area in the range of 50-75 sq. m which

constitutes 38.3% of the total houses. In Cherpulassery ordinary tiles / cement flooring are the common materials used for floor construction which constitutes 92.97% of the houses. 55.31% of the HHs have concrete roofing. Ordinary tiles is the next most common used roofing material.

- About 99% of the HHS had own dwelling units which shows that the HHs in Cherpulassery had the most secured tenure status. There are 49 SC colonies within the municipality, in majority of them housing conditions is not satisfactory.
- According to the LIFE Mission survey, the total numbers of landless houseless households are 218. There is no slum in the town.

24.13 RECREATION AND OTHER CIVIC AMENITIES

- The major deficiency associated with the recreation and cultural facilities are the lack of open play grounds and an organised park and open spaces for leisure activities The programmes has to be framed with the possibilities and potentials within the town to meet the essential requirements of the town as well as to the sub region of the municipality

24.14 TRAFFIC AND TRANSPORTATION

- The land area constitutes for transportation is only 4.83 % of municipal area (1.542 Sq. Km).
- State Highway No 53 (Length 7 Km within the town) from Palakkad to Perinthalmanna passes through the town
- Cherpulassery town faces traffic congestion in Central areas of the town. Insufficient width in most of the road stretches, especially between Hospital Jn. And Puthanalkkal Jn. Absence of adequate turning radii at the major intersections in the town namely Hospital Jn., Bypass Jn., EMS road Jn., and Central Jn.
- Due to poor surface condition and lack of signals systems in the junctions, the vehicles cross the junctions without any order which creating accidents and traffic blocks.
- Increasing number of personalized vehicle creating parking problems. Lack of parking spaces and encroachment of road space for parking in the central area of town between Bypass Jn. And Central Jn. There are huge pedestrian and street vending activities experienced on the problematic road stretch which act as the major external interferences in the smooth operations of traffic flow in the town.
- Movement of inter city bus traffic on congested urban road due to the location of bus stand within the central area of the town. In the absence of adequate link roads and bypasses, all the traffic have to pass through the congested CBD area

of the town.

- The Cherpulassery town has good interactions with neighbouring towns like Ottapalam, Shoranur, Pattambi, Perinthalmanna and Mannarkkad. The State highway (SH-53) from Palakkad to Perinthalmanna passes through the peripheral of the CBD area with a length of about 7 Km.
- The MDR Pattambi-Cherpulassery road and State Highway no. 53 Palakkad to Perinthalmanna is found over utilized with V/C ratio more than 1.
- From traffic volume survey, It was observed that Pattambi-Cherpulassery Road (Pattambi Border to Kacherikunnu) has the highest peak hour traffic volume – ranging from 1,164 PCU to 2,069 PCU.
- From speed and delay studies, minimum speed was observed between Bus Station Jn. to Central jn. stretch with a total delay of 15.23 seconds (Average speed is 25.285 km/hr) and maximum speed was observed in the Thootha Jn. to Karalmanna Jn. road stretch and no delays were observed there (Average speed is 44.65 km/hr).
- Public transport services are met by both KSRTC and private buses in Cherpulassery Town. These services are operated from Municipal bus stand located on Pattambi-Cherpulassery road (MDR).
- Data compiled from KSRTC Depot and Private bus operators Association at Cherpulassery reveal that 327 buses are operated from/through the bus station in Cherpulassery town with about 887 trips per day. The highest number of bus trips is operated to Pattambi, followed by Palakkad, Ottapalam and Perinthalmanna.
- A count of buses entering/existing the Pattambi bus station were made during normal working day and it was observed that 847 entries and 887 exits were made during the period between 06.00 Hrs and 21.00 Hrs.
- Pattambi-Cherpulassery road passing through the CBD area of the town has the highest peak hour bus passengers with 4100 between Central Jn. And EMS road Jn.
- The existing bus terminal is located at the heart of the town. The buses to and from the bus station has to make multiple trips creating a bottleneck situation in the Town center.
- The O-D pattern of inter-city passenger traffic revealed that out of 1.36 lakh inter-city passenger trips.
- 21000 external – external trips were performed through the study region and they constituted 16 % per cent of the total trips. It could be inferred that Cherpulassery

town had higher level of interaction with the neighboring settlements with low level of through traffic.

- Study of the goods traffic pattern observed within the study region with regard to the outside study region revealed that 5462 MT of traffic originated from the study region. The major part (700 MT) from Town Center. Thootha area generated of 240 MT and followed by Karalmanna area (150 MT).
- Major delay to free flow of traffic was due to conflicting movements at intersections on most of the road stretches, inadequate width of road and location of bus station at the CBD areas.
- IPT modes consist of auto-rikshaws and taxis. There are 11 auto stands and three taxi stands located within the municipal limit.
- The share of IPT modes especially auto-rikshaws in the city road network comes around 21% and varies from 13% to 42% during peak hours. One state highway connecting two districts – SH 53- Palakkad-Perinthalmanna road passes through Cherpulassery. Two MDR Cherpulassery-Pattambi road and Cherpulassery-Ottapalam road also passes through the town.

24.15 SOCIAL BACKWARDNESS

- The SC population are mainly concentrated in wards having greater concentration of agricultural labourers and cultivators. Socially backward communities are mostly engaged in primary activities like agriculture. Government's financial assistance for education at all levels and reservations in educational institutions was found effective as their education status has also improved over the years. In spite of several initiatives taken towards poverty alleviation, there are several critical issues and challenges remaining unsolved.
- 53 % of families of Cherpulassery Municipality is below poverty line. There are certain areas of concern in the development of BPL population including Animal husbandry, Agriculture has a good potential in Cherpulassery Municipality. Therefore the development programmes in these sectors should be given priority to include the BPL population especially the SC/ST and other socially weaker sections of the society. Also, infrastructure facilities including safe drinking water, electricity, solid waste disposal system etc. should be provided in the BPL concentration areas.
- A special program has to be framed by integrating the various programs of central and state governments so as to get maximum benefits to weaker sections of the Municipality.

24.16 ENVIRONMENT

- The paddy land essentially acts as green open space and also functions as ground water recharges during rains preventing floods and fast run off. Likewise, the dry cultivation area and vested forest area also provides the necessary green cover in the Municipality. The sacred groves are unique eco-systems with wide variety of trees, plants and also they are homes for various reptiles, birds and animals. Changes in this land use shall reduce the green cover and hence shall adversely affect the environmental quality.
- Effective conservation measures need to be taken for preserving the ecologically sensitive areas in the Municipality. Existing paddy fields, water bodies, and sacred groves need to be conserved.
- Existing water bodies has to be protected by preventing discharge of sewage and dumping of solid waste into it. Effective conservation measures are need to be taken for preserving the ecologically sensitive areas in the Municipality.

24.17 DISASTER MANAGEMENT

- Consecutive floods exposed the vulnerability of Cherpulassery municipal area to natural disasters resulting from numerous factors such as settlements of habitations in disaster prone areas, lack of proper urban/spatial planning frameworks that; and poor quality of municipal infrastructure being built by the local governments; inadequate drainage infrastructure and a very limited and provision of solid and liquid waste services and infrastructure.
- In 2018, a total of 69 families were affected by flood and heavy rainfall in which about 13 families including 48 members were rehabilitated to relief camp. And as many as 56 families were shifted to relatives' homes as their houses were flooded. In 2019 , 80 families were affected by inundation.
- Agriculture took the major hit. Massive flooding and inundation of fields, resulted in rotting of crops and wilting of trees, causing significant losses to farmers. Total crop losses are estimated at Rs.36,00,100 with the maximum losses in Banana, coconut and elephant foot yam. The total cultivated area affected by floods during 2019 is estimated as 116 ha.
- Given that flood losses are likely to increase in future years, increased attention to flood prevention and mitigation strategies is necessary. Improved land use planning and regulation of development can mitigate flood impacts.

24.18 MUNICIPAL FINANCE

- Resource mobilization: The revenue income receipts in 2016-17 was Rs.6,93,42,346 whereas the figure stood at Rs.5,22,82,660 in 2015-16, which is a 33% increase from the previous year, while the revenue expenditure registered a

53% increase during the same period.

- However, the ratio of Revenue expenditure to revenue income in 2014-15 was 1.44, it decreased to 0.72 in 2015-16 and was increased to 1.51 in 2016-17. More efforts should be directed to improve the revenue income receipts.
- Whereas the ratio of capital expenditure to capital income receipts increased from 0.19 to 0.69 during the FY 2014-15 to 2015-16, the it was decreased to 0.23 in FY 2016-17 which is not very encouraging as it implies that rate of investment in fixed assets and capital works in progress are decelerating.
- This drop in fixed investments can weaken the Administration from gaining financial independence on a long-term perspective. It also implies that there is a huge scope in augmenting the revenues by focusing on capital receipts. Value capture finance framework may be envisaged to boost the revenues in this regard.
- Revenue deficit in the town indicate the poor tax collection system and leakages in tax collection. Capital surplus indicate the lack of fund utilization for major development project, since there is no major development exists. But the town has tremendous potential for development of financially remunerative projects for sourcing funds for urban development. Leakage in taxes and paucity of funds for developmental activities are the major problems faced by the town in the finance sector.

24.19 SWOT ANALYSIS

The findings summarized in the previous session which is evolved from settlement analysis local & spatial analysis of various development sectors are now attempted to SWOT analysis and given in the table. The analysis clearly reveals the importance of Cherpulassery as it acts as a 3rd order settlement in the district.

The town has to sustain agro-allied activity so as to ensure optimum resource utilization and the environmental and ecological sustainability.

A) Strength

- Area rich in history and plenty of heritage and religious places that can attract pilgrims and tourists.
- Blessed with natural environment: Availability of wide hinder land, wide range of flora & fauna and spices.
- Agro-based economy i.e. strong resource base of Agriculture and allied activity
- Diversifying non farm livelihood and income generation primary, secondary & tertiary sector.
- Availability of developable land
- Presence of vibrant and effective local self-government

- Institutions of education and health services are there in the municipality
- The area is blessed with different categories of road systems such as SH, MDR etc. and is well connected to major towns of Malappuram and Palakkad Districts.

B) Weakness

- Lack of infrastructural developments
- Very limited industrial base, absence of agro-based industries when compared to agricultural production.
- Lack of knowledge about business management and marketing intelligence.
- Absence of organised marketing structure.
- Insufficient width in most of the road stretches; between hospital jn. And Puthanalkal jn. Also absence of adequate turning radii at major inter sections.
- Poor road geometry, absence of adequate link roads and by passes, and location of the bus stand in CBD area creating congestion.
- Lack of Parking facilities
- Inadequate Drainage System, irrigation facilities, waste treatment facilities.
- lack of efforts, continuity and coordination in waste management activities.
- Lack of recreational facilities

C) Opportunity

- Scope for entrepreneurship and industrial development
- Scope for agro-processing units for value addition.
- Maximise the use of urban land
- Incentives for establishment of processing units
- State government' thrust to sub urban development and Central governments support.
- Scope for development in heritage, pilgrim, religious, Agricultural and eco-friendly tourism

D) Threat

- Depletion of paddy fields
- Unscientific agricultural practices
- Rapidly growing population and urban sprawl

- Climate change and natural calamities
- Improper disposal of waste from town area pollutes the water bodies and which in turn leads to various environmental problems.
- Weak financial position of the municipality
- Trade of between environment and development

25. VISION, GOALS AND OBJECTIVES

In the previous chapters, outcomes of various sectoral and settlement studies conducted in connection with preparation of Master Plan for Cherpulassery Town were discussed. The development issues specific to the town, be it a problem or potential pertaining to various aspects were identified. Now it is time to set the vision, goals and objectives for the Planning area. A development vision for Cherpulassery Municipality have framed as

"Making Cherpulassery as a vibrant service centre of sub region through the improvement in the quality of urban life by facilitating creation of quality urban infrastructure, with assured service levels and efficient governance, also protecting and enhancing the natural environment & traditional character of the town."

25.1 DEVELOPMENT GOALS

Based on the detailed study and analysis carried out, it is observed that Cherpulassery being an important town in the district because of its spatial location at the boundary of District and at the banks of Thoothapuzha, can act as an important service centre in the district.

Cherpulassery municipality has urban character in general. As seen in the Existing Land use map, agriculture occupies a predominant economic position in the town. Agriculture areas will be retained for as long as possible beyond the planning period 2038. In the above backdrop development goals for the Master Plan can be listed out as follows.

Goal - I

To develop the town as a sub regional service centre with second order facilities to cater the demand of the surrounding Local bodies.

Objectives:

- Providing and developing higher order facilities to cater the demands of the surrounding regions.
- Strengthening trade and commercial activities of the town.
- Ensure better connectivity of the region by strengthening the traffic network.
- Relocate the bus stand, bus terminal and other establishment

Goal - II

To develop the town as an eco-friendly and economically vibrant market

centre, as a collection, distribution and processing of agriculture products of the town and surrounding rural areas.

Objectives:

- To promote value addition of agricultural products.
- To promote agro based industries.
- Strengthening the agriculture and allied sector.
- To increase the economic growth by enhancing job opportunities and better socio-economic environment.

Goal - III

Ensure safe and easy access and circulation to, from and within the town.

Objectives:

- Ensure safe pedestrian and vehicular movements.
- Relocate the bus stand, bus terminal and other establishment
- Providing sufficient parking facilities.
- Develop a side walk plan prioritizing needed links between public facilities, school and other centres of activity and neighbourhoods.
- To minimize travel distance within the town by creating self contained and self sufficient communities.

Goal- IV

Protect natural features and agricultural land that retains its prominence within the town.

Objectives:

- Conserve the environmentally sensitive area and minimize the conversion of agricultural land use for other development purposes.
- Enforcement of the existing rules to protect the environment.

Goal - V

Enhancement and protection of natural and cultural resources within the community to reinforce its past and history.

Objectives:

- Framing policies to protect the heritage sites and festivals.

- Preserving and promoting the rich cultural traditional art forms of the region.
- Framing an effective development control regulations.
- Providing green infrastructure (network providing the "ingredients" for solving urban and climatic challenges by building with nature) that is important to the health, welfare and the quality of life of residents and tourists.

Goal -VI

Conserve existing open space and increase recreational facilities and opportunities.

Objectives:

- Protecting formal and informal open spaces from inappropriate development.
- Ensure the distribution of open spaces and recreational facilities matching the current and future population characteristics.
- Developing and improving existing gardens, parks and open spaces, besides creating new open spaces to make Cherpulassery, a green city.

Goal -VII

Ensure a quality life for the people, especially economically and socially weaker section in the town by providing social and Physical infrastructure in an equitable manner.

Objectives:

- Provide adequate physical infra structure facilities to meet the current and future demands of all areas.
- Provide access and support for health services to all citizens with an emphasis on weaker sections of community.
- Develop a system of permanent open spaces that provide recreational uses with residential neighbourhoods.
- Make educational facilities and services a priority.
- Encourage provision of recreational activities.
- Increase public awareness about the protection of environment.

Goal -VIII

Optimum utilization of resources for diversification and strengthening of the economy of the town.

Objectives:

- To promote value addition of agricultural products.
- To promote small scale industries based on the agro-allied resources of the region.
- To develop tourism activities utilizing existing potentials and develop the town as a tourist transit centre.
- Ensure employment opportunity by strengthening the various service sectors.

26. DEVELOPMENT CONCEPT

The development concept will act as a guide for development of Cherpulassery Town over the next 20 year. The concept has been structured to be conducive to the realization of goals and objectives. The suggested form and structure of the town is influenced by its regional setting, geographical features and evolved through an extensive process of social, physical and economic sectoral analysis. Development objectives when spatially located, taking into account the existing spatial structure, provides the development concept of town. The development concept will clearly indicate how the plan area will develop in future and also will give an overall idea of the location of determinant development proposals.

26.1 FORMULATION OF DEVELOPMENT CONCEPT

Based on detailed study and analysis of the existing and historical growth and development mechanism, it has been observed that, Cherpulassery as an agrarian town, has enormous potential for rapid economic and physical growth. Town has more potential to emerge as an industrial and cultural based tourist town, apart from having agriculture and allied sector potentials in and around it, quality infrastructure, user friendly policy options, state of art developmental and institutional mechanisms are put in place. More over the town and region is bestowed with natural resources, tourism and socio–cultural resources. At the same time there are areas of environmental concern.

The resource base of the town and integration of core sectors plays a crucial role in the planned development of the town. The existing transportation network read together. With envisaged traffic and transportation concept and proposed transportation plan has profound impact in the formulation of development concept. Obviously the impulses of ongoing / committed/ proposed projects within the Municipality and surrounding region has to be given due consideration while formulating the development concept. The factors to be synthesized to formulate the development concept are described in Fig 26.1.

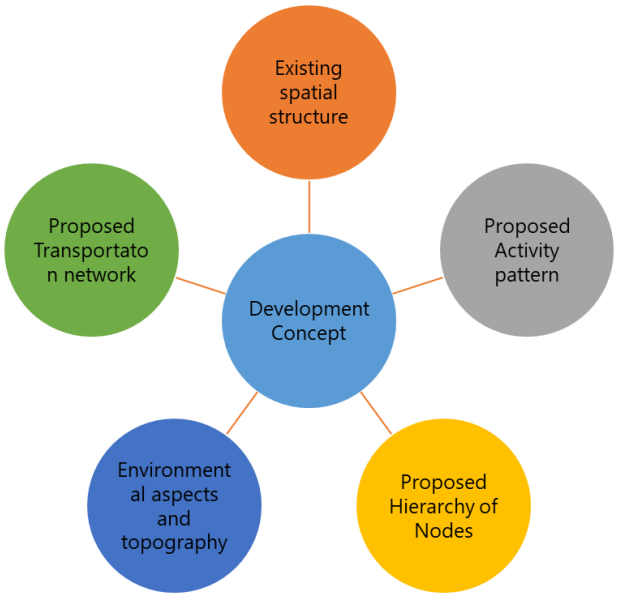


Fig 26.1 Guiding Factors to Formulate Development Concept

26.2 ENVIRONMENT AND TOPOGRAPHY

There is a total of 572 Hectare of land to be conserved due to environment sensitiveness and which is shown in Fig 26.2. The land under paddy is 12.86% of total land area of Municipality, Forest at 1.16 % and water bodies at 3.92%. A total of 17.94 % of land has to be conserved. New infrastructure, especially roads, increases development pressures on agricultural land. For example, the construction of roads through paddy field will cause hike in land price and this can make farming relatively uneconomical compared to selling lands to real estate developers. Hence, planning and management of acceptable sites coupled with control, where necessary, is required to avoid damaging pressure on environmentally sensitive sites.

As per the slope analysis, Cherpulassery Town comes under gently to moderate sloping and elevation of 18 to 205m. The figure 26.3 shows the slopping pattern of the Municipality. Thoothapuzha and its nearby areas are having the lowest elevation which is less than 27m from MSL. North west part and south-west part of the municipal town are under High land having elevation of 85 to 205m from MSL. Wet agriculture area having elevation 20 to 65m from MSL.

Presently, there are already large tracts of paddy lands covering a total land area of 410 ha within town that can assume the role of important green lungs to serve the town and helps to mitigate pollution. To preserve the natural characteristics of the town, it is also proposed to conserve land for the use of green buffers and open space. The *thodu* are proposed to be developed as the channels carrying clean water in order to improve the quality of ground water in the town.

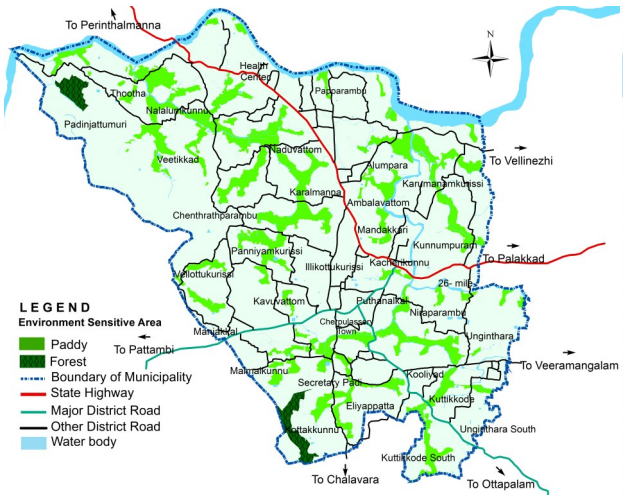


Fig 26.2 Environmentally Sensitive Areas

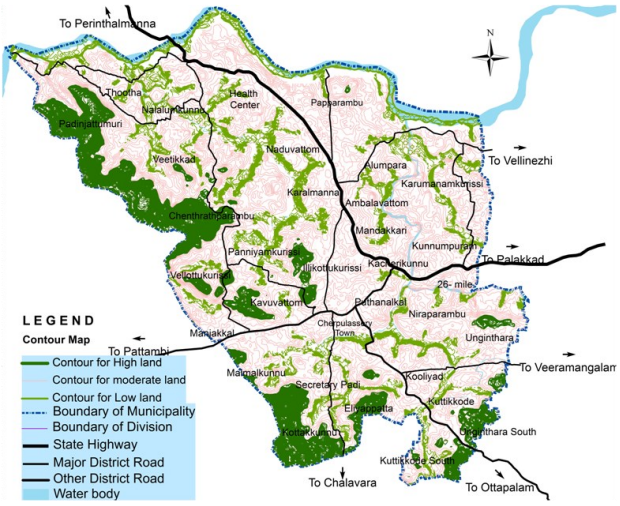


Fig 26.3 Contour Pattern of Town

26.3 EXISTING SPATIAL STRUCTURE AND DEMOGRAPHY

The existing spatial structure of the town defines the pattern of land use, activities, transportation and functional character of the town, which makes an important factor while designing the future spatial structure. The areas with major activity concentration and the areas that ought to be reserved for the planned distribution of these activities as well as future development are all derived after analysing this. So as to accommodate future increase in population, spatial structure has to be designed keeping the environmental hindrances also in mind. Nearly half of the total geographical area of town covered by high yielding paddy fields and high land which covers forest and plantations like rubber, mixed trees and coconut. The existing nodes as well as transportation pattern also needs to be taken care of while developing a concept for accommodating its future needs. Fig 26.4 shows the existing spatial structure of the town.

From the demography study of the town considering population distribution, gross population density, net population density and population concentration, it is clear that the population distributed mainly in the Puthanalkkal, Illikottukurrissi, Cherpulassery town, Kacherikunnu, Mandakarei, Niraparambu, Kuttikode, Kuttikode south and Kooliyad wards. The major population of the Municipality is concentrated on the wards within 2.0 km. from the Town Centre. Population distribution of the town is shown in figure 26.5

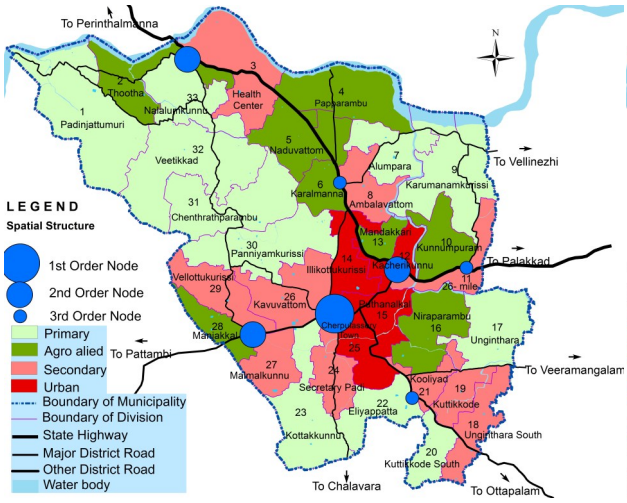


Fig 26.4 Existing spatial structure

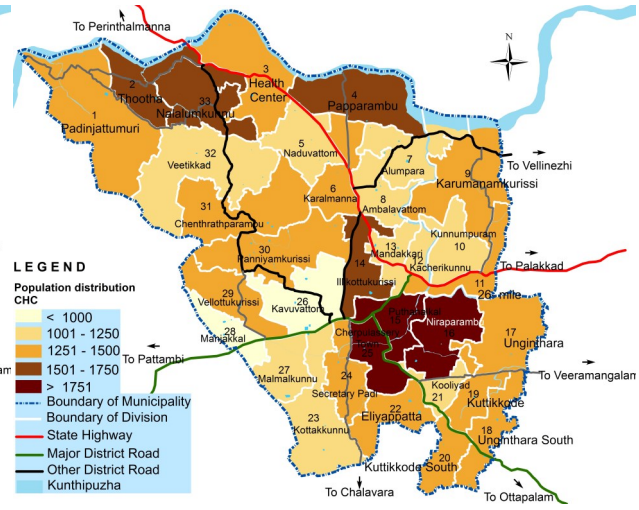


Fig 26.5 Existing population distribution

26.4 FUTURE TRANSPORTATION PATTERN

On the basis of the projected volume of traffic and alternative development schemes considered, a road development plan has been formulated for the town. As per the future road development plan for the town, the town will have a high capacity road network of well defined hierarchical pattern with widened roads, host of radi-

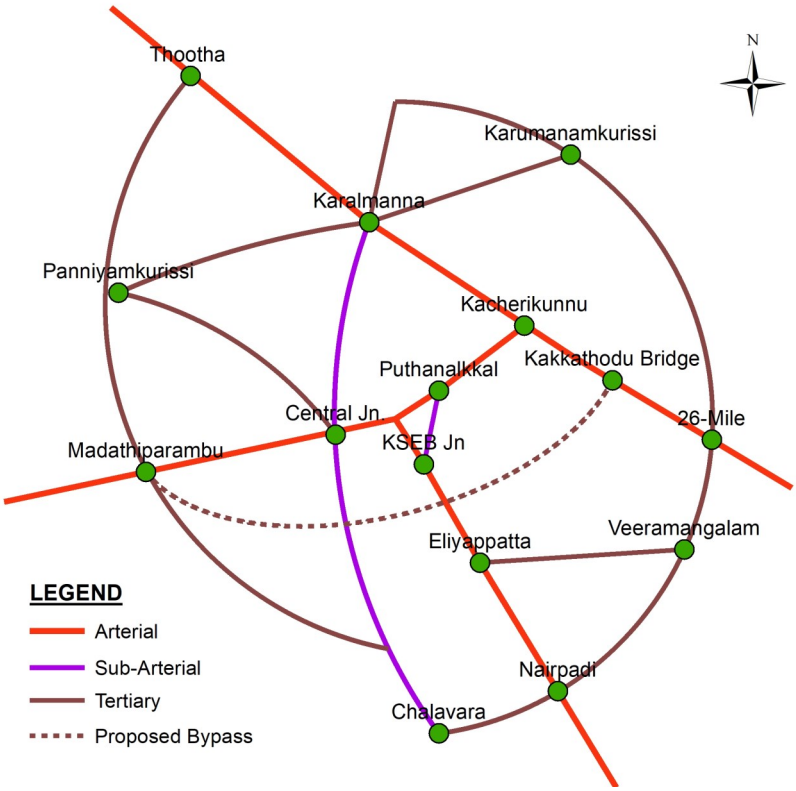


Fig 26.6 Conceptual Road Development Plan

al roads and quarter circular bypass. Conceptual road development plan for Cherpulassery town is shown in Fig 26.6.

Radial roads are designed in such a way that the centre point as Cherpulassery town centre Junction. The existing roads in northern part have been adopted as a quarter circular bypass with widening proposal in the CBD area around the town junction, which serves in reducing the congestion due to heavy vehicle traffic and act as a bypass. Goods traffic from Perinthalmanna to Pattambi can be diverted without hindrance to the town roads where most of the commercial activities and Government offices are situated.

For completing ideal ring road concept, a road proposal is required through the south portion of Cherpulassery town to ease out the heavy traffic traversing through the CBD, without entering there as well as without disturbing the existing settlements. The proposed by pass between Madathiparambu and 26th mail is designed to deviate the additional traffic travelling in Palakkad—Pattambi route serving the above purpose. The Ottapalam road connecting this by pass a little away from the present town centre will help in diverting the traffic towards that side also. While studying the existing road network of Cherpulassery Town and some proposed linkages, it is found that certain very important road junctions are coming up, which may prove to be potential nodal centres of development within town. Besides the poten-

tiality due to future road intersections, all these nodal centres are having their own justification and reasons to grow. Hence, in addition to the CBD area, commercial nodes are proposed at different part of the town considering the future distribution of population and proposed road network.

26.5 PROPOSED HIERARCHY OF NODES

As most of the commercial activities of town are based on ribbon development along the prime movement corridors, future concept on commercial development is to decentralize commercial activities with a well-defined hierarchy of commercial nodes. The existing town centre in Cherpulassery are highly-accessible and already serves as the natural town centre which comprises of an existing built-up area of commercial or mixed uses. Further intensification of existing commercial activities within the town centre must be so as not to worsen the crowded pedestrian and vehicular traffic conditions there. However, it is recognised that commercial activities are needed to serve the needs of the community and residents living in the area. This is addressed through retaining the commercial core area surrounded. Hence, for existing commercial activities within the town centre, the planning intention is not to relocate or phase them out, rather, a set of criteria will be imposed to guide and control commercial developments located there, as well as areas intended for residential use.

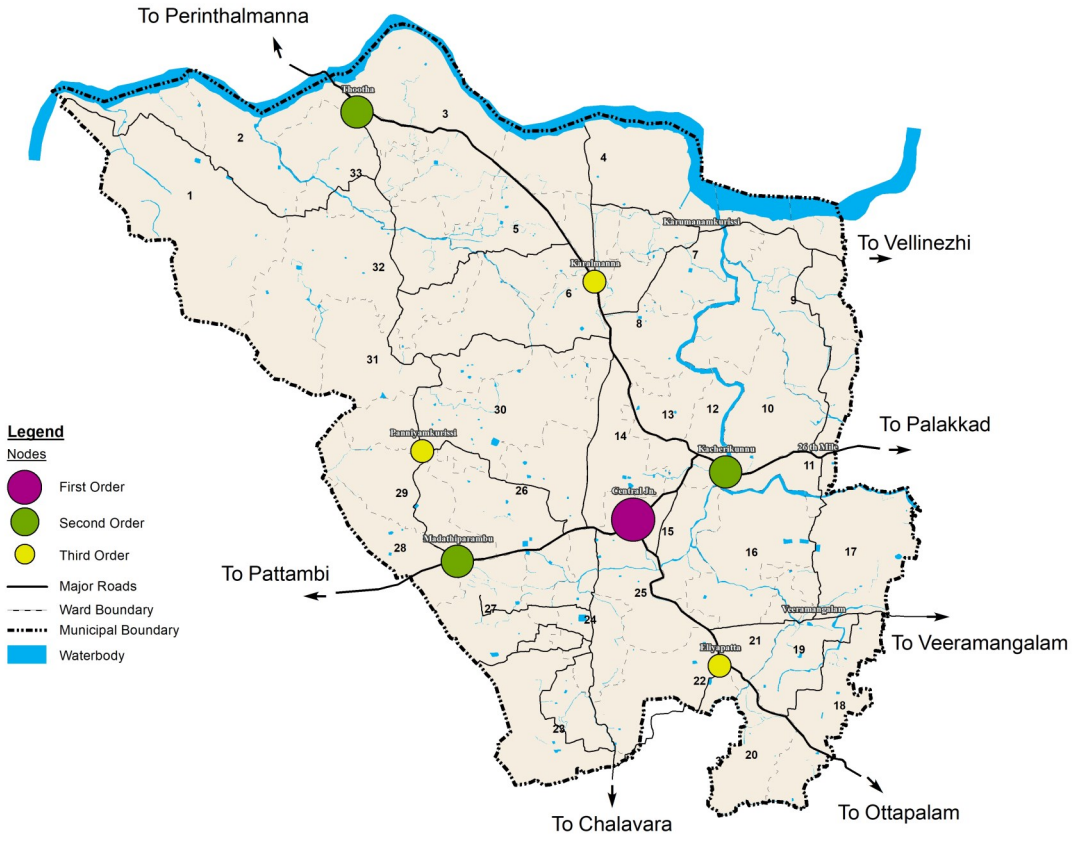


Fig 26.7 Proposed hierarchy of Nodes

In the residential areas, there will be provisions for small scale commercial facilities at the local level. These are intended to serve the needs of local residents only and all of them may not be shown separately in the master plan as they will be subsumed under the predominant land use. Even though, strengthening of existing major commercial nodes is planned incorporating all infrastructure facilities to serve a population of 20,000 of its service areas. Based on this, the nodes are proposed to be prioritised as below.

Town centre will remain function as a first order node and it will be holding a stretch between Ottapalam road up to Municipal junction. The new proposed by pass will probably create much impact for development at Kacherikkunnu and Madathiparambu junctions which are thus proposed to act as second order nodes. Thootha being the northern most part of the town also has the capability to develop to such standards. Karalmanna junction with its wider probabilities of connectivity to tourism and heritage proposals makes it a third order node, along with the Eliyappetta junction at Ottapalam road, which is growing itself to act as a satellite town to the main town. Another proposed third order node is Panniyamkurussi which could cater the interior settlements along the northern portion. The proposed hierarchy of nodes is depicted in fig 26.7

26.6 FUTURE ACTIVITY PATTERN

The CBD areas are main work areas of the town that hosts major commercial and public activities. The other work areas are mainly institutional areas like High school and Higher Secondary school along existing bypass. On the basis of studies, it is observed that most of the development activities are concentrated in the town core and in areas falling in the vicinity of existing developed areas of the city. Development is also happening along the main roads passing through the town. But the advantage of Cherpulassery is that the State Highway (SH-53) passing through the town are properly free from these kind of traffic congestion. Hence, keeping in view the present growth trend and factors like existing residential pockets, topography, land suitability, proposed road network etc, a new spatial structure is envisaged for the future of Cherpulassery Town. Therefore different activities which are currently in operation in Cherpulassery town, needs to be regulated and decentralized elsewhere within the planning area.

Compact core in a ring pattern save the fertile and scarce land resource of the town, it has been conceived to shape the future town in a compact manner. More intensive urban activity is thus proposed concentrating in the core area and adjoining the major nodes also. Cherpulassery town area have developed along the radiating routes all merging in the centre of the town. So, there is need to think upon the concept of ring road development to deviate the traffic which is mainly concentrated in

the core. This would also create a sift in the commercial activities along these roads as well as it could also arrest an un controlled spread out of such activities and self de densification. More densification of this transition area around immediate surroundings of CBD area by means of land use zoning and its regulations to create a mixed use pattern is thus envisaged.

The remaining area, now occupied by a low density residential activity is intended to be continued by conserving environmentally sensitive areas like paddy fields, forest, water bodies and heritage protection areas. The northern portion of the town, between Thootha river and SH has a great potential for small scale industrial development by which would confirm with the existing residential settlements. The beautiful banks of Thootha river, along the northern portion also holds the scope of sustainable tourism development activities. Along with this, sectorial proposals also need to be provided wherever necessary.

26.6.1 RESIDENTIAL ACTIVITY

The proposed residential area of large town as per URDPFI guidelines is 35-40 % of the developed area. The existing residential area is 28 % of the developable area, which verifies that there is demand for more residential area. Suggested developed area density as per URDPFI guidelines is 100-150 persons / hectare, whereas maximum existing density is 45 persons per hectare and the maximum existing developed area density is 40 persons per hectare. This suggests the ample scope for densification of the developable area, especially residential area of the planning area.

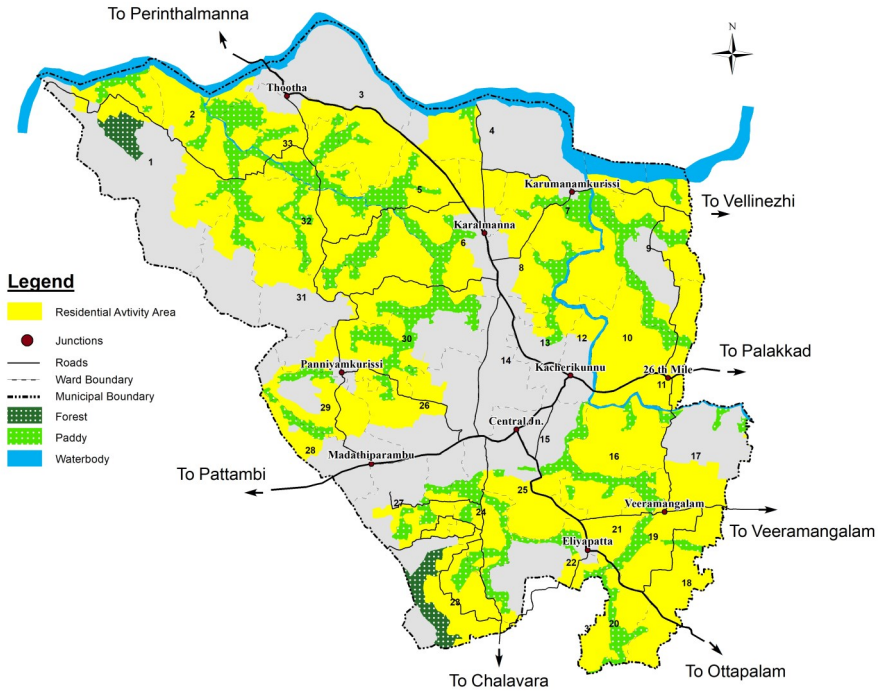


Fig 26.8 Residential Activity area

As Central area of the Municipality and nodes developed along major road intersections are highly concentrated with commercial activities, and the immediate vicinity to it turns out be of mixed nature, the remaining major land use is set aside for residen-

tial purpose considering more densification of the town in future. Even though, paddy and dry agriculture patches along with environmentally sensitive land uses such as water bodies are conserved as such within this residential zone.

More open spaces and paddy lands will promote calm and comfortable life in these areas. The residential activity zones are depicted in fig. 26.8.

26.6.2 Commercial Activity and its growth

The economic development of the Cherpulassery town mainly depends upon the commercial activity. The main commercial centre of town is very congested where lack of parking facilities and inadequate approaches etc. are the major problems, therefore to serve the additional population of the town, more new commercial areas are proposed to be developed in the new expansions. It has also been kept in mind that this town will continue to function as a regional centre and will serve the larger area than its planning area.

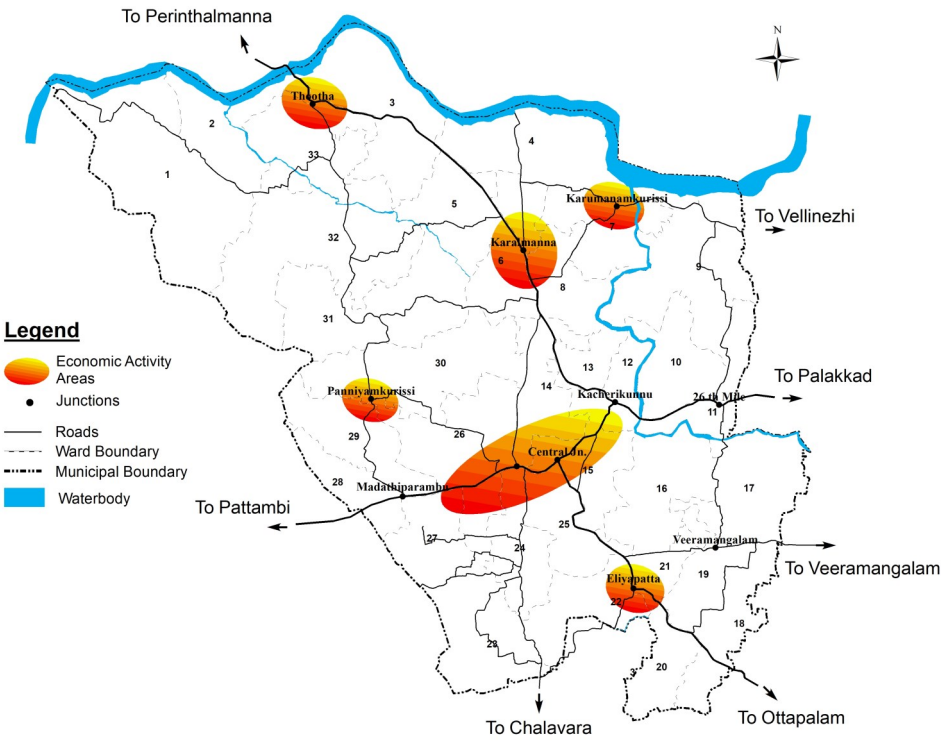


Fig 26.9 Commercial activity areas

In order to satisfy the probable increase in the residential activity, more commercial centres will be required. Junctions are categorised based on the nodal hierarchy of commercial usage. So to provide self sustainable residential settlements and reduce the over dependence on the core area, area around such nodes are also provided with commercial activity. The existing commercial area shall remain as part of proposed commercial land use zone. The probable commercial activity areas are shown in figure 26.9.

However it is recognised that the expansion of commercial activities around the present core area is also needed to serve the needs of the community and residents in

the planning area. This is addressed through the mixed use zone proposed around this area .

26.6.3 URBAN DEVELOPMENT AREA

The adjacent areas to the existing town core is showing a character of mixed use. Lot of commercial establishments are being emerged within the earlier residential settlements marking the growth of the urban centre towards its periphery. This happens due to land availability constraints to match up the natural growth of the town and it is visible mainly along the transportation corridors. Public and semi public activities are also aiming this periphery for setting up of their institutions due to the proximity to the required infrastructure facilities.

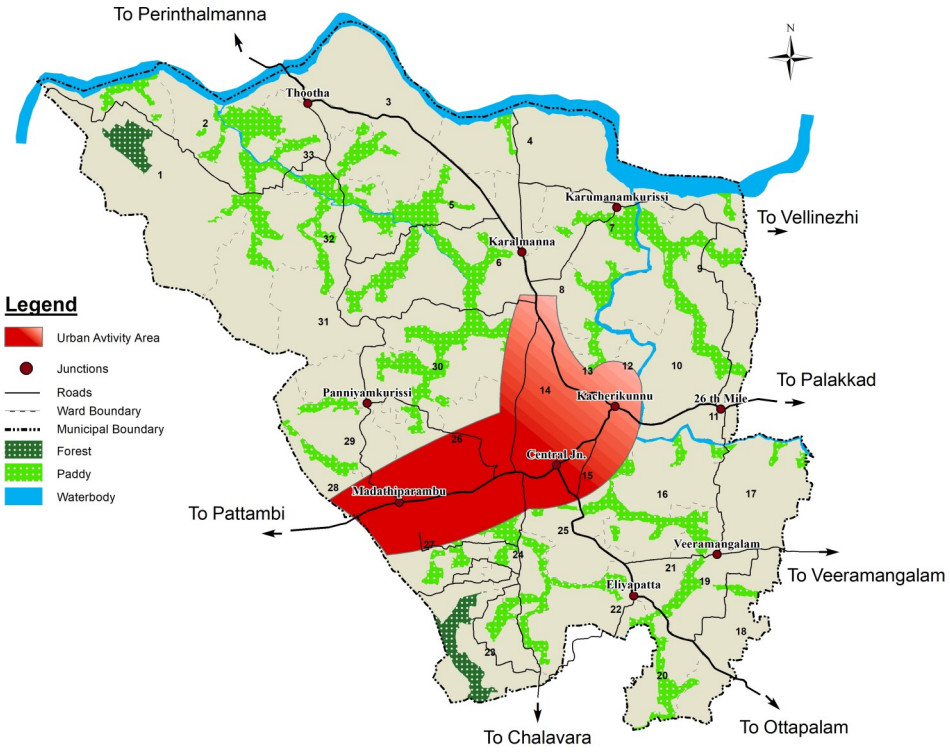


Fig 26.10 Urban development area

The up-gradation of existing roads over the northern portion and new by pass proposal along the south of the existing town core would enhance this situation as this could open up more hinder lands with better connectivity. So such new corridors must also be prepared to take up such developments at the same time restrict the scattered un planned development through out the planning area which would largely disturb the peaceful living environment. Hence, an Urban development zone is proposed as a buffer to the central core area of the town to contain its development without disturbing the existing environment. This would be largely a commercial development area which also promotes high density residential settlements as well as permitted public and semi public uses.

26.6.4 INDUSTRIAL USES

In addition to commercial, another supplementary activity of economic growth and creation of employment opportunities will come from industrial sectors. But the Cherpulassery town is unfortunately backward in this sector. There is slight concentration of industries at some wards like Kooliyad and Health Centre.

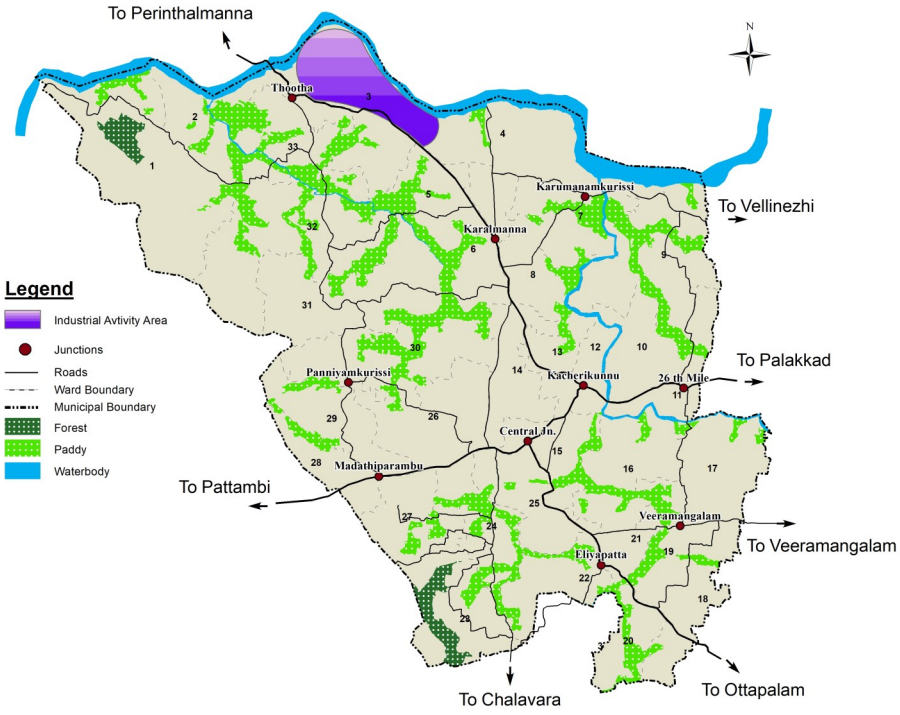


Fig 26.11 Areas suitable for industrial activity

The Cherpulassery town is largely agrarian in nature, but there are no such industrial units to exploit this opportunities. Hence, there is large scope for development of agro-based industries in this town. Also other MSMEs and non polluting industries that could work within the existing residential settlements is proposed at Thootha along Palakkad-Perinthalmanna road. Standard Design Factories which could conceive the establishment of such agro related industrial units, food industries , handicrafts manufacturing units, musical and other related instruments making, small scale industries manufacturing surgical equipment etc. which are already a part and parcel of industrial establishments functioning in and around the town can be assembled here for their working, which in turn would enhance their marketing strategies as well as scope for better business opportunities. This area is also depicted in fig 26.11.

26.6.5 PUBLIC-SEMI PUBLIC ACTIVITY

Within residential areas in general, social facilities have to be provided to meet the residents' needs for public services. These include schools, libraries, health facilities, police and fire posts, government offices/ departments etc. These facilities serve complementary roles and can be clustered or co-located to optimise land use and create synergy. The provision for social facilities at regional level has to be reasonably

planned and sited for the needs of the town and its growing residential population in the new housing areas and its surrounding hinterland.

Pockets of land are kept aside for incorporating proposals in public and semi-public sector. Majority of these lands are presently possessed by government or local body itself with buildings and as vacant lands.

26.6.6 RECREATION, HERITAGE & TOURISM CONCEPT

Recreational facilities are unavoidable in a town's growth as it influences mental health of inhabitants to a greater extent. The municipality is blessed with large areas of green paddy fields forming a blanket upon the land. There is a possibility of converting potential cropped areas as tourist attractions with minimum intervention to transfer the benefits of tourism directly to the farmers. The various schemes underway are intended to prepare the farms to receive tourists by presenting a positive image of the farm and of agriculture as a whole, in view of revitalising the agriculture sector through tourism. By the implementation of Responsible Tourism, the public participation could be encouraged duly conserving the nature. This aims at attracting tourists towards agriculture/ farming activities and thereby develop it to be an income generation method for the farmers. This could also create a change in the occupational structure and boost the local economy.

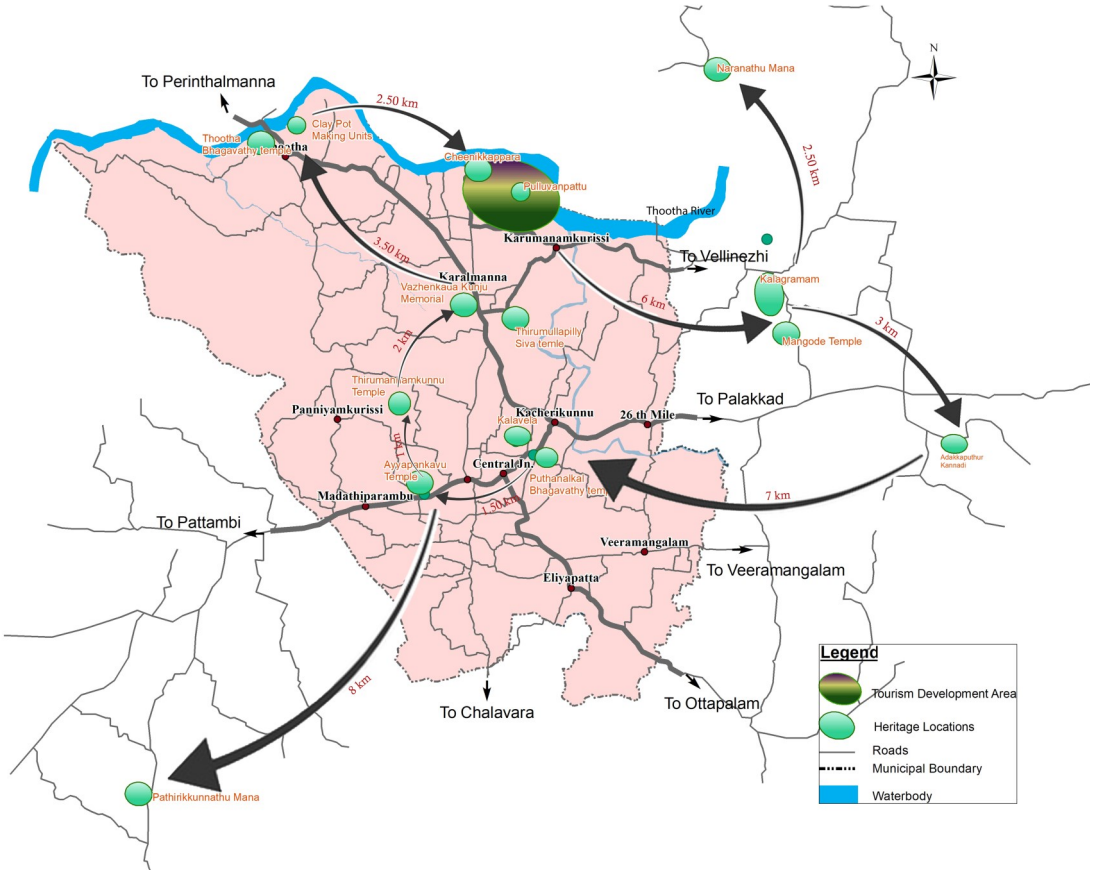


Fig 26.12 Tourism activity and concept of heritage circuit

Walkways are proposed to be planned along Thoothapuzha besides undertaking the landscaping. It is proposed to earmark a green belt on the side of the river, which shall be developed as the leisure valleys providing for landscaping and walkways as explained above. Bank of Thoothapuzha and adjacent hillock namely Cheenikkapara is proposed to be developed for recreation place by creating parks, waterside promenades, and open theatre for conducting cultural and recreational programs. Cheenikkapara is also suitable for installations which could attract people around the globe to visit the place and enjoy the pastoral beauty of the region. The dry agriculture activities along the banks of Thootha river has a great scope for responsible tourism activities including farm houses, home stays etc. A sector level park is also proposed here at the bank of Thoothapuzha.

Cheruppulassery and its peripheral villages are rich with a lot of art, cultural and heritage resources that could attract tourists from in and out of the country. .Vellinezhi, a village famous for its contribution towards Kathakali and presence of "Vellinezhi Kalagramam", an art village under Kerala tourism department are some of these places in the vicinity that are often visited by the tourists. These places alsong with Handicraft manufacturing units, Kathakali props manufacturers, Adakkaputhur mirror, Pulluvanpattu performers etc as discussed in the earlier chapters are available in the locality itself creating a greater scope for Cultural Tourism circuit which could attract a lot of heritage enthusiasts. A cultural promotion centre is also proposed at the available land at Karalmanna which could display such activities where visiter can experience it live. The town can also provide adequate facilities for stay and travel thereby developing allied hospitality sector also. The planning area can act as "The Cultural Capital " of the district and mark itself in national and international tourism calendars.

In addition to this, top create better recreational facilities within the town, the land owned by KPIP can be transformed into an ideal place where some one can be spend their time peacefully. This has to be provided with adequate walkways, open gym, kids playing area, open air auditorium etc. These parks will also enhance liveability in the area and strengthen the Town's green network.

26.6.7 AGRICULTURAL ACTIVITY

The agriculture activities are broadly in use for cash crops as well as food crops in the planning area. Certain such activities are being done in much environmentally sensitive "Nilam" whereas some are being done by transforming the existing "Parambu" class of land temporarily for economic growth. Hence, the paddy fields and water bodies are taken into account considering their environment sensitiveness. Paddy lands and ponds will be conserved following the provisions of The Kerala Pad-

dy and Wetland Conservation Act. Separate land use categories are provided for Wet Agriculture as well as water bodies to preserve each of them individually considering their environmental impact. Land use changes or developments not confirming to the said act will be permissible here

With the intention of preserving the basic character of agriculture, the existing dry agricultural area other than those proposed for specific projects will be retained as dry agricultural itself. While promoting the prevailing activities, other uses are also possible in such landscapes, even if its not related to agriculture.

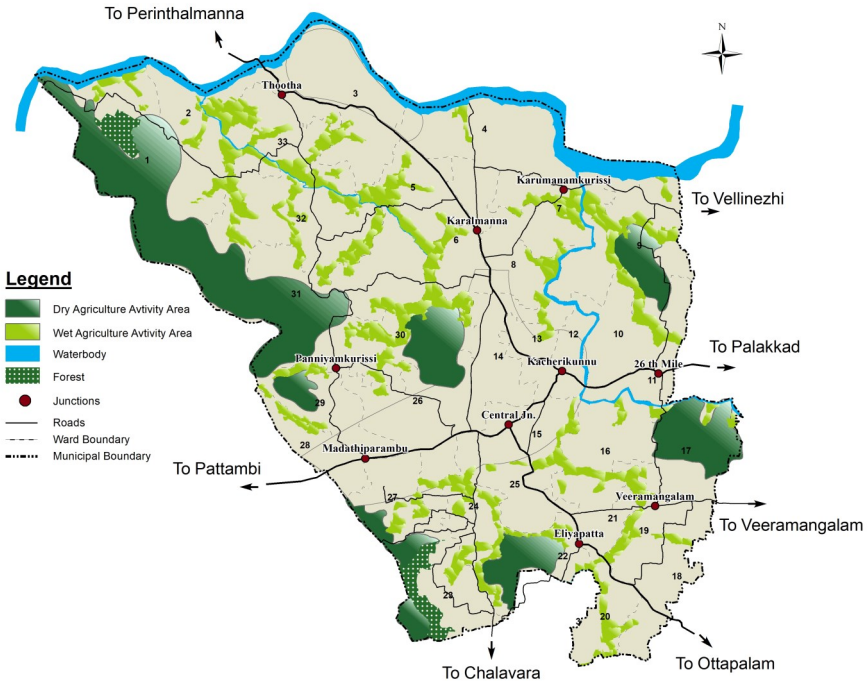


Fig 26.13 Agriculture activity Zoning

26.6.8 PROVIDING INFORMATION ON RISK AND DISASTER MANAGEMENT

A Development, if needed to be sustainable, must be disaster resilient also. In the modern context of long term development plans and ideologies, informing the risk is very important. Hence, a detailed study on disaster management has been conducted at the planning area to analyse the forms of disasters that are affected by and are prone to by the planning area.

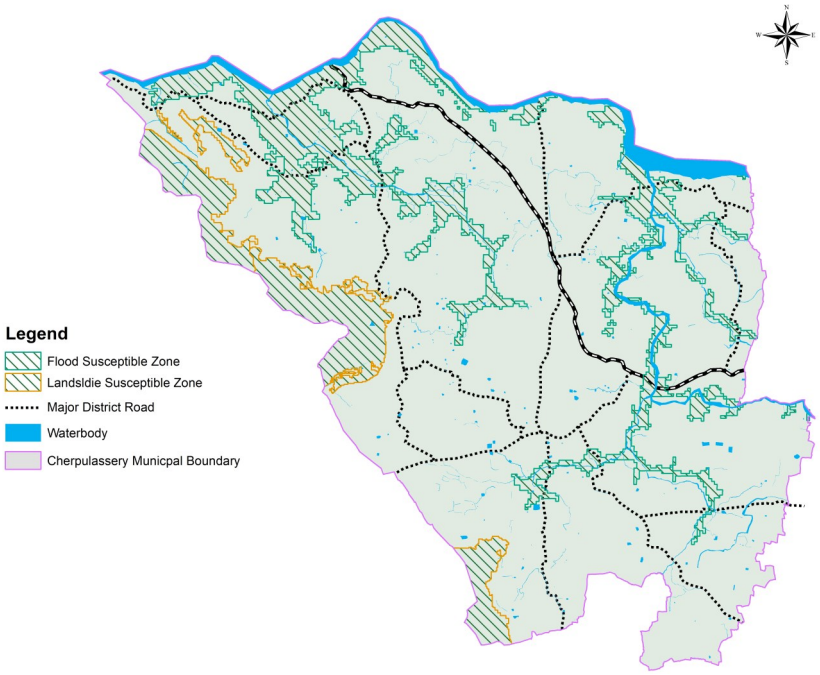


Fig 26.14 Concept of risk information zoning

The study analysed in detail, the various ca-

lamities ad disasters that are prone to be by this town. It also took relevant information from KSDMA also. Hence, arrived to a conclusion that flood and landslide are the major disasters that are usually struck in the planning area. A detailed analysis for these disasters were conducted using various GIS methods as detailed in Disaster Management Chapter and flood susceptibility as well as land slide susceptibility maps were generated. Meantime, actual flood prone areas and land slide locations were also identified through field survey. Flood proneness maps were obtained from KSDMA also. All these factors were overlaid and checked with each other to bring a conformity regarding the risk information to be provided. Such areas which were found out to be risk prone is to be planned meticulously with certain controls over built up and land development along with informing the people about the risk.

The areas that are prone to risks are to be zoned separately as overlays provided over the proposed land use zones. In these areas, additional regulations and restrictions to restrain the land use activities will have to be enforced over and above the permitted land uses through this plan. This would include methods for occupying the flood water, plinth level restrictions, restrictions in slope deformation, construction of retaining walls, regulating land filling and excavations etc. In addition to this, various activities are also meant to be enforced here as mitigation and preparedness measures which shall be detailed through sectoral proposals.

26.6.9 SPECIAL PROPOSALS FOR SPECIFIC INFRASTRUCTURE DEVELOPEMNT

On studying the existing situation and analysing the needs for future, a lot of sector specific requirements are felt for the town. It is very much needed to achieve the goals and objectives set for future development. The town is lacking a good transport terminal which could cater both the inter as well as intra district public transportation facilities are a major requirements of the town. A

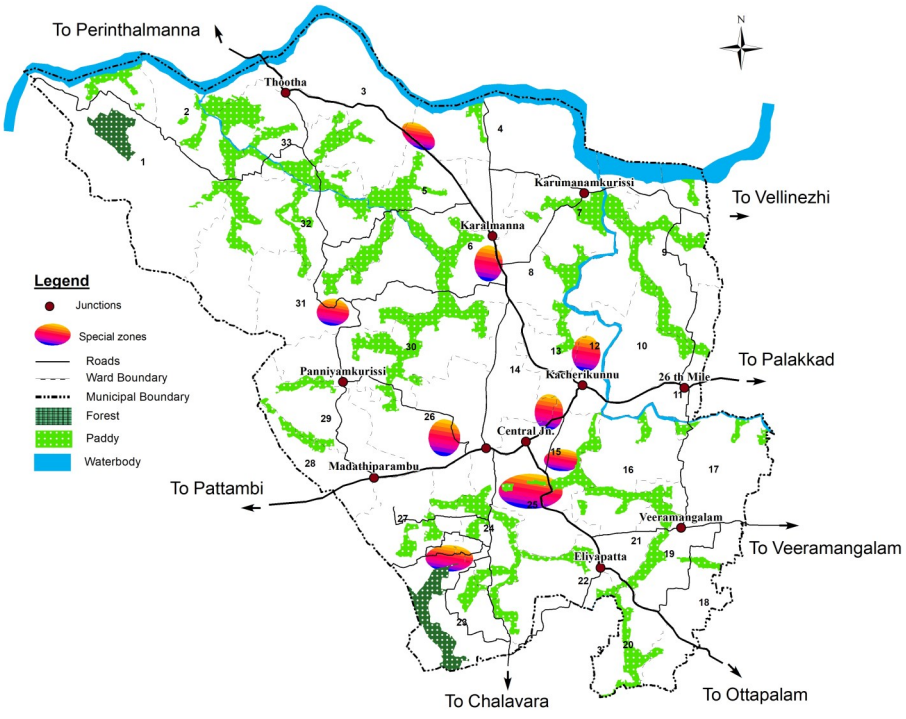


Fig 26.15 Spaces for special zones

better recreational facility within the town, an assembly area for public processions, a municipal town hall for functions and gatherings and all is a need of the hour. A cultural centre for the comprehensive development of art and culture is also very much demanding. Along with this, facilities such as Sewage treatment plants, better office spaces, slaughter houses, higher education facilities etc are also required by the planning area while considering the future development perspectives. Hence suitable areas for such proposals are also to be earmarked while considering the future spatial planning for the town. Such lands, be it private or public shall be suitably reserved for future use restricting the land use from being changed and used for any other purpose.

26.7 FINAL DEVELOPMENT CONCEPT

Fig. 26.1 portrays formation of development concept of Cherpulassery Municipality. Cities grow through a path avoiding natural and manmade barriers. As per the study, analysis and result, keeping the present growth trend and future population of city in mind, following city structure is obtained. The structure thus obtained depicts clear combination of uses such as commercial, industrial, tourism, recreation, transportation, public and semi-public and mixed land use. Fig 26.16 gives the final development concept for Cheruppulassery Municipality.

This development concept guides an actual pathway of development activities of the town. An effective set of policies and strategies have to be framed for complementing the development so as to make a vibrant town in future.

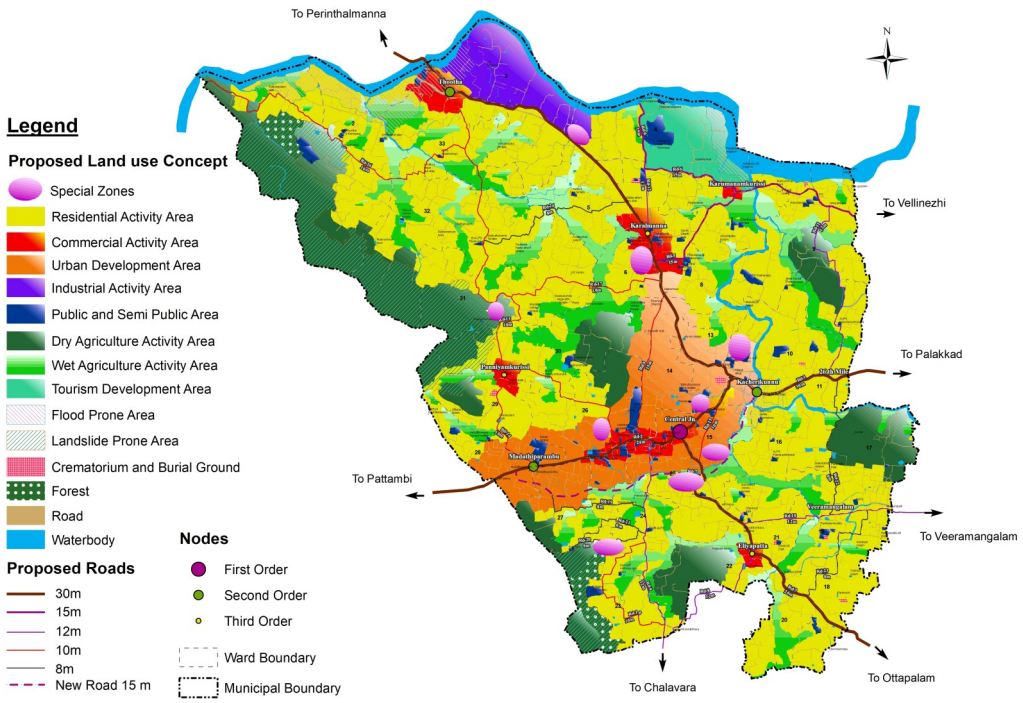
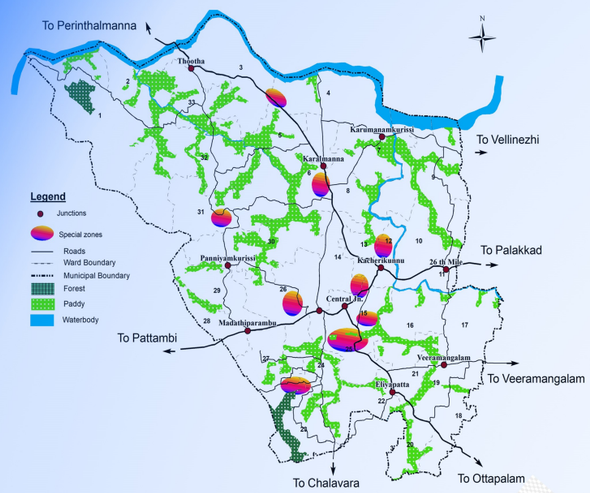
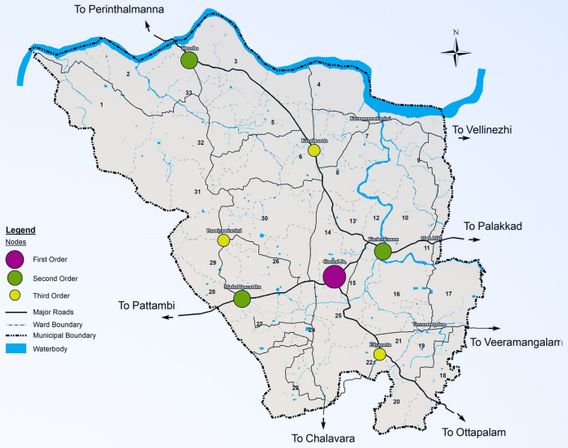
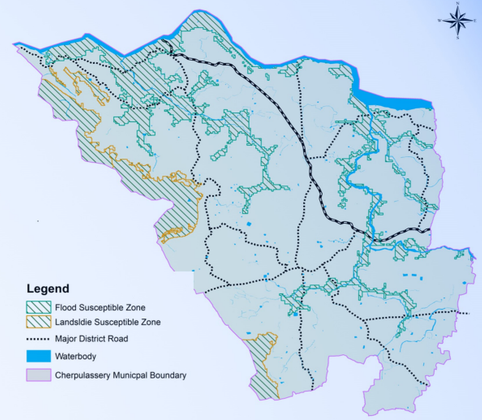


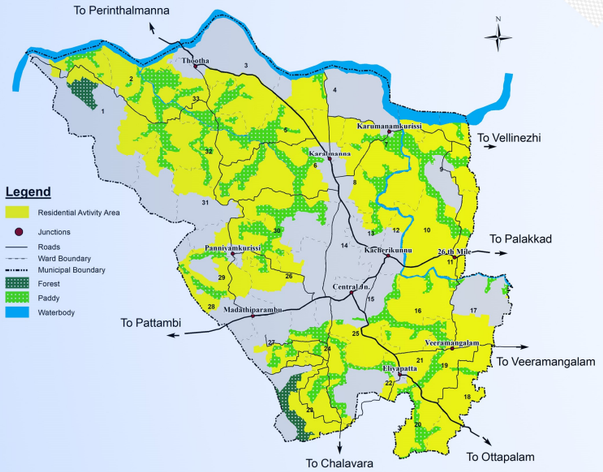
Fig 26.16 Final Development Concept

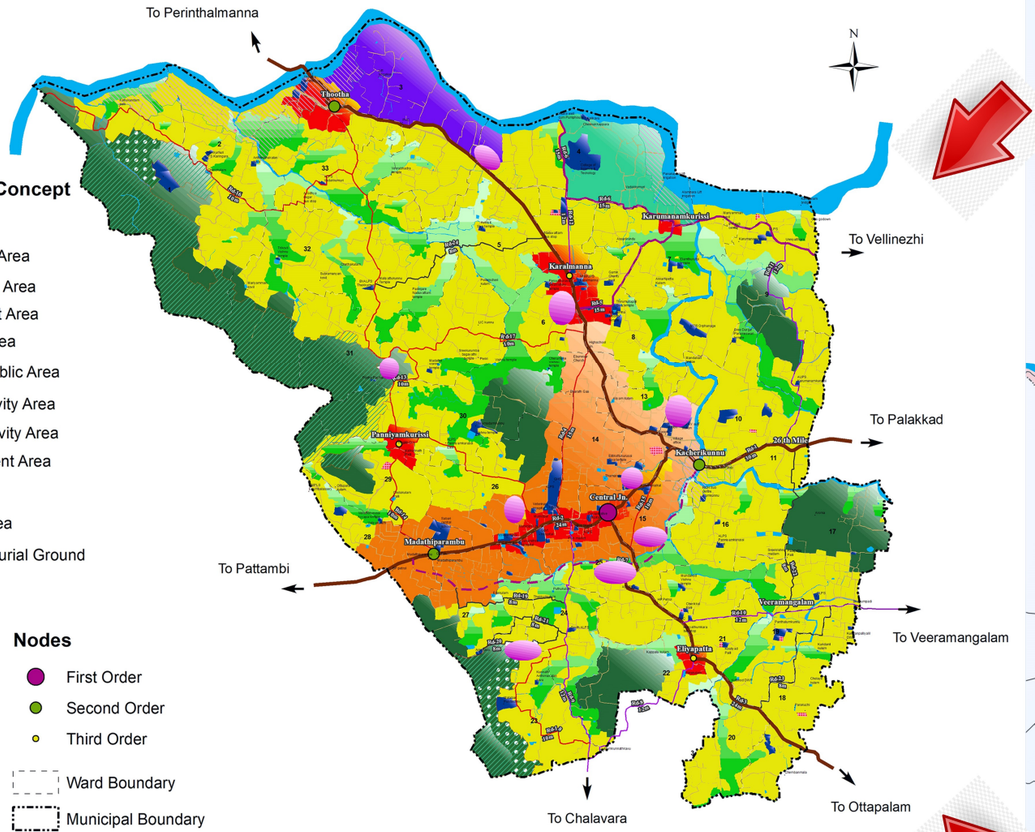


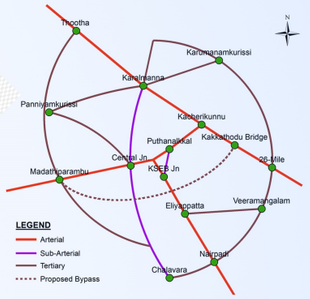


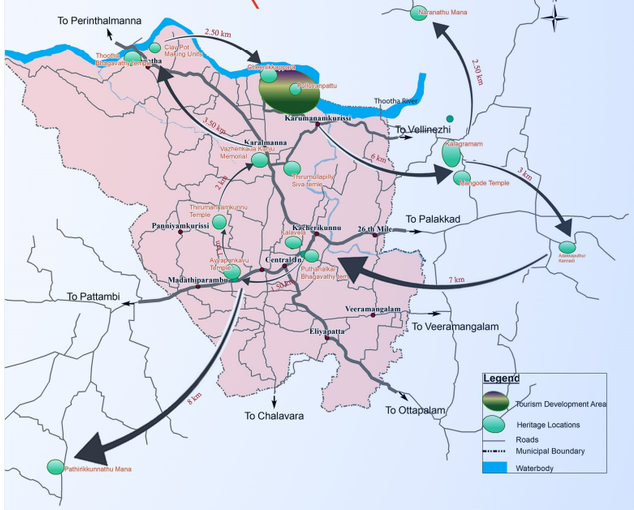


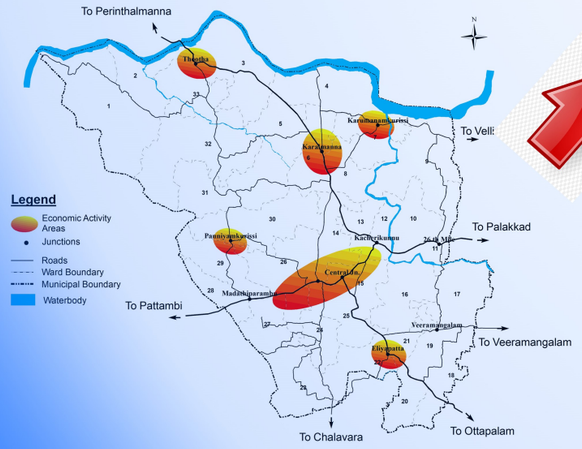


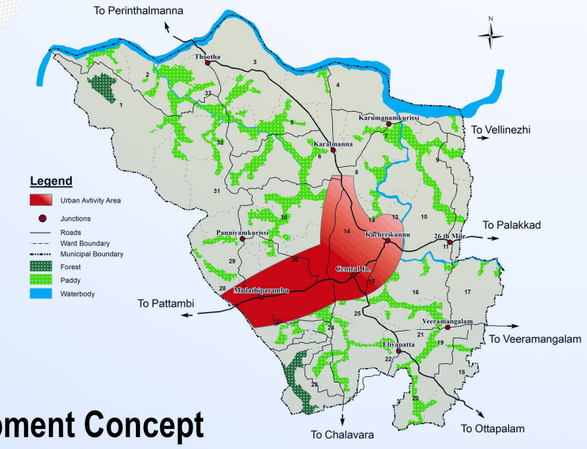












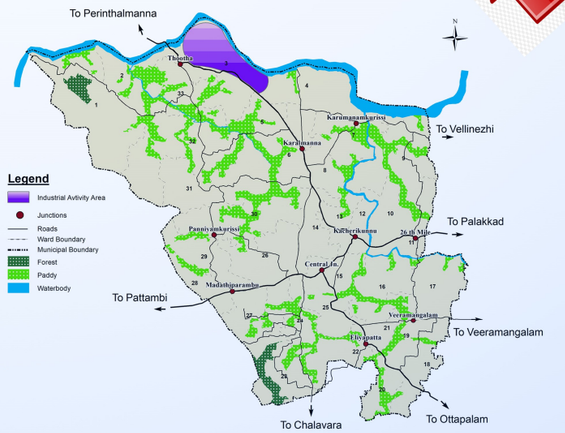




Fig. No. 26.17 Derivation of Development Concept

27. DEVELOPMENT POLICIES AND STRATEGIES

The development policies have to be framed based on the development concept. On the basis of the issues, problems and potentials evolved from the study of settlements, sectors and within the frame work of the goals and objectives, the key sectors, where planning interventions required are identified. The environmental aspects of the local body are also studied. Based on the above and incorporating the spirit of the development goals, development policies & strategies has been formulated.

SECTORAL DEVELOPMENT POLICIES AND STRATEGIES

The development strategies for an urban local bodies have been formulated based on findings of analysis, development concept and the general development policy. Like that the sectoral policies and strategies are as follows:

27.1 TRADE AND COMMERCE

Policy

- To develop town as vibrant commercial centre in the order of hierarchy nodes as well as the throughout the planning area.

Strategies

- Provide adequate infrastructure facilities and strengthening in the existing commercial areas.
- Provide modern wholesale markets, cold storage facilities, etc. especially for perishable items.
- Ensure the market facilities for agro-allied produces from the town as well as for neighbouring local bodies.
- Provide sufficient parking facilities, waste management system etc.

27.2 INDUSTRY

Policy

- Mobilize the establishment of Micro and Small Enterprises to achieve employment generation and utilization of local resources.

Strategies

- To develop a mutually beneficial link between industry, agriculture and allied activity and tourism to enhance the local economic development and penetration of the economy to the weaker sections of the community.

- Enhance the value addition of agricultural products to support small scale and house hold industrial activities.
- To strengthen and modernize traditional industries by diversification of product and implementing new technologies.
- To ensure proper storage and marketing facilities for the industrial produces.

27.3 AGRICULTURE

Policy

- Sustain and develop agricultural sector as the major economic base of this local body. Developing sustainable agriculture through economically viable agricultural production system.

Strategies

- To adopt suitable activity pattern and land use for ensuring sustainability of the existing agro base.
- To effectively link the agriculture and allied sector with environment, tourism and industry.
- To ensure the effective marketing network for agriculture products.
- Development of agricultural sector by mechanization and use of innovative technologies.
- Restricting diversion of prime agricultural land for other purposes
- Adopting modernization techniques to improve production of crops.
- Adopting enabling measures to protect and promote coconut cultivation.

27.4 ANIMAL HUSBANDRY

Policy

- Achieving self sufficiency in live stock produces in qualitative and quantitative manner by enhancing the live stock population with improved and native breeds.

Strategies

- Establish dairy farms and increase productivity of milk through scientific methods.
- Promote fodder cultivation in the garden lands.
- Promote establishing of poultry farms and goat farms

- Ensure necessary support from the side of the Municipality and Government departments concerned.
- Augmenting the production potentialities of livestock and poultry and thus increasing the production of milk, egg, meat.
- Providing necessary and timely modern veterinary assistance and health cover to the livestock and poultry.
- Improve infrastructure facilities; implement schemes for the development of livestock and poultry products for self sufficiency.

27.5 TOURISM & HERITAGE

Policy

- Developing tourism projects which can cater to the needs of low and middle income group and concentrate on development which enriches our cultural heritage.

Strategies

- To encourage the resource base tourism activities like, Pilgrim tourism, heritage tourism, farm tourism, eco- tourism etc.
- Improve tourism for employment generation, economic development and providing impetus to rural tourism.
- Protect ecological tourist area from natural threats.

27.6 INFRASTRUCTURE

Policy

- The development policy in this sector is to enhance the maximum utilization of infrastructural resources by providing hassle free atmosphere, better traffic movement to all habitants. The development strategies are as follows:

Strategies

- To plan an efficient, effective, road transportation network so as to cater the present and future need of the Municipality.
- To provide adequate drinking water supply with priority to improve the existing schemes.
- To plan and implement efficient waste management system with due regards to topography, waste reuse, waste recycle and waste reduction.
- Improving the natural water drainage channel by desilting and stopping the

sewage water from entering the drainage

- The canals and rivulets to be made free from encroachments, to be deepened, widened and side protected.

27.7 HEALTH

Policy

- Enhance the health status of the people of the Municipality through preventive measures and by providing quality treatment through the three systems of medicine.

Strategies

- To provide higher order health and education facilities not only to cater the demand of the Municipality but also the adjoining areas so as to ensure the public health and quality education to all.
- To provide authentic treatment through the highly qualified personal of Indian System of Medicine (ISM) department to economically and socially weaker section as well as to middle and upper class of the society.
- To thereby enhance the reach and acceptability of ISM among all the section of the society through genuine ayurveda, Siddha and naturopathy intervention.

27.8 EDUCATION

Policy

- Increase the Coverage and Quality of education and infrastructural facilities and preclude spatial disparity in the distribution of higher educational institutes and establish technical institutes to support the economic activities by 2038.

Strategies

- Improving the existing facilities and make provision for new facilities.
- Provide training and awareness programs for teachers and students for skill development.
- Coaching classes for higher secondary students. Opportunities for higher education and converging the educational process with the vocational needs of the society.

27.9 IRRIGATION

- The policy of the sector is reliable, timely and efficient supply of irrigation water, protect the existing Water Resources. The development strategies are as

follows:

Strategies

- Rain water harvesting will help to reduce the shortage of water.
- The use of drip/sprinkler system of irrigation will help an economical use of precious irrigation water.
- Modernization of existing natural ponds has to improve for the efficiency of distribution system.

27.10 DISASTER MANAGEMENT

Policy

- To have an integrated system of disaster management with emphasis on the concerted and coordinated actions.

Strategies

- Enhance public awareness of the risk and risk reduction measures
- Emphasis on mitigation and preparedness rather than relief
- Strengthen institutional capacity on a multi– thematic and multi-sectoral manners
- Ensure community level capacity for disaster risk reduction
- Streamline sufficient and efficient funding

27.11 ENVIRONMENT

The policies and strategies pertaining to the protection, conservation and maintenance of the natural resources that shall be adopted in Cherpulassery, including those related to ponds, streams, sacred groves, groundwater recharge, etc. have been discussed below:

Ponds: Regular cleaning and maintenance of ponds is necessary. Maintenance through efforts from beneficiaries (Private owners) and Municipality is the possible mode of operation.

Streams: MGNREGA works to be rescheduled such that the whole network suffers no connectivity issues. For this, the existing water channel connectivity need to be studied and mapped for carrying on further works.

Sacred Groves: Manage a data bank of existing well managed sacred groves in the Municipality by laying them out into categories of size, density of vegetation and expanse. Spell out protection and conservation projects in the Municipality

by providing funding from the local Municipality funding. There ought to be protection using buffers (Natural/artificial) according to the data gathered. General awareness about the social and environmental need for conservation (apart from the religious concepts) and existing assistance schemes. Promote afforestation of medicinal plants and trees inside the groves for better environmental stability.

Medicinal Plants: Identify suitable areas of potential for a botanical medicinal plant garden. This shall be managed by the women folk of Kudumbasree.

28. FUTURE PROJECTIONS

Projections are conditional statements about the future. They refer mostly to the exercises of extrapolation of the past trends into the future; and they do not take into account changes in the policy parameters.

28.1 POPULATION PROJECTION

Knowledge about past populations and assumptions about future populations are fundamental to planning decisions in every aspect of community life. A population projection estimates the needs and amount of resources that has to be distributed to satisfy such needs. To arrive at a conclusive projection figure, five methods of population projections have been used. The methods used for projecting population are

1. Arithmetical Increase Method
2. Incremental Increase Method
3. Geometric Increase Method
4. Decreasing Rate of Growth Method
5. Exponential Method

Average of the five methods is considered as the projected population. Table 28.1 shows projected population calculated for years 2021, 2026, 2031 and 2036 of Cherpulassery Town to implement the proposals in short term, medium and long term basis.

Table 28.1 Projected Population of Cherpulassery Town

Sl No	Method	Population (2011)	Projected Population			
			2021	2026	2031	2036
1	Arithmetic mean method	39241	43706	45939	48172	50404
2	Incremental increase method	39241	45690	49302	53200	57405
3	Geometric increase method	39241	49407	54833	60407	66053
4	Decreasing rate of growth method	39241	46251	50212	54513	59181
5	Exponential method	39241	43948	46393	48898	51463
	Average Population		45801	49336	53038	56901

28.2 WORK FORCE PROJECTION

Cherpulassery town is expected to have projected workers of 21,628 in the horizon year 2036. As per the projection of workforce shown in Table 28.2, the average WPR targeted for the Municipality by 2036 is 38.01%. With the introduction of new development projects, economic base will be increased, which will further result in the increase of job opportunities in the Town.

Table 28.2 Total Projected Work force of Cherpulassery Town and WPR

Item	1971	1981	1991	2001	2011	2021	2031	2036
Total no of workers	5610	6953	9083	10069	12251	15884	19545	21628
WPR	26.24	27.48	29.79	29.11	31.22	34.68	36.85	38.01

The projection of four fold classification of workers has been done based on category wise employment data available from the census. It can be seen that the percentage of cultivators, agricultural labourers and Household industrial workers are decreasing over decades. Adopting the policy of conserving existing agricultural land and by enforcing zoning regulations, expected number of workers in agricultural field (i.e. both Cultivators and agricultural labourers) are assumed to continue the same manner. Identifying one of the future potential sectors of development as industrial sector this sector has to be strengthened by induced intervention. Therefore, based on the proposed, development estimated occupational structure by 2031 is given in Table 28.3.

Table 28.3 Category wise Projected Work Force of Town

Year	2011		2021		2031		2036	
Workers classification	Person	%	Person	%	Person	%	Person	%
Cultivators	583	5.65	583	5.35	583	4.89	583	4.69
Agri labourers	1548	15.00	1548	14.21	1548	12.98	1548	12.44
HHI	177	1.72	327	3.00	716	6.00	1120	9.00
Other workers	8011	77.63	8435	77.44	9079	76.13	9188	73.87
Total Main workers	10319	100.00	10893	100.00	11925	100.00	12439	100.00

28.3 INFRASTRUCTURE PROJECTION

Infrastructure facilitates the provision of basic social services such as sanitation, water supplies, education, health care and recreation. Infrastructure projects may be funded publicly, privately or through public private participation. Infrastructure systems tend to be high cost investments however they are vital to a country's economic development and prosperity.

28.3.1 Physical Infrastructure

The physical infrastructure is a set of interconnected structural elements that provide a framework for the development of urban centre. It is an important parameter for judging a region's development. The infrastructure backlogs and demand has been calculated on the basis of projected population and standards given in URDPFI guidelines.

Water Supply

The estimated water demand for a city is broadly classified as domestic and non domestic. The domestic water demand includes per capita consumption and system losses, while non domestic water demand includes industrial and commercial consumption, institutional consumption and fire fighting demand. Table 28.4 showing estimated water demand for the horizon years.

As per URDPFI guidelines, the desirable standard of water for domestic use for a medium size town is 135-450 lpcd. As per CPHEEO guidelines, the domestic water requirement is 135 lpcd. For assessing the future water requirement 135 lpcd is taken.

Considering non domestic demand such as industrial, commercial and institutional uses, the quantity is same as 20.8 % of domestic supply. An additional 1 % is given for fire demand. As per Central Public Health and Environmental Engineering Organisation (CPHEEO) manual, a maximum provision of 15% towards unaccounted water losses shall be made. An allowance of 33% has to be given for elevated storage capacity. 100% of supplied water is to be properly treated. Table 28.4 shows estimated water demand of town.

As per projection the total water demand required for the town by 2036 would be about 10.44 MLD and storage capacity required for the year 2036 is 13.89 MLD.

Table 28.4 Estimated Water Demand

Year		2021	2026	2031	2036
Population	**Unit**	**45801**	**49336**	**53038**	**56901**
1. Domestic water demand @ 135 l/h/d	MLD	6.18	6.66	7.16	7.68
2. Non-domestic water demand @ 20.8% of (1)	MLD	1.29	1.39	1.49	1.60
3. Fire demand 1% of (1)+(2)	MLD	0.06	0.06	0.07	0.07
4. UFW @ 15% of (1) + (2) + (3)	MLD	0.85	0.93	1.01	1.09
5. Total water demand @ (1)+(2)+(3)+(4)	MLD	8.37	9.03	9.72	10.44
6. Storage capacity required @ 33% of supply	MLD	2.76	2.98	3.21	3.45
7. Total storage capacity required @ (6) + (5)	MLD	11.13	12.01	12.93	13.89

Sewerage

In Cherpulassery municipal area there is no public sewerage system. As per CPHEEO norms, sewage generated will be considered as 80% of the water reaching the consumer end. 135 litres/capita water supply has been considered for the waste water generation. Now peak factor should be considered for the total discharge to be generated for the STP. Peak factor depends upon the density of population, topography of the area and hours of water supply for the design based on contributory population recommended by CPHEEO manual. As per CPHEEO Manual peak factor for population in the range of 20000 and 50000; is 2.5 and that in the range of 50001 and 75000 is 2.25. The sewage is eliminated at the rate of 80% of the water supply in any area. Installation of Sewerage Treatment Plant is essential to treat sewerage generated daily in the town. By 2036, 13.83 MLD capacity treatment plant will be required. Table 28.5 shows the Projection and Requirements of Sewerage System.

Table 28.5 Projection and Requirements of Sewerage System

Year	Unit	2021	2026	2031	2036
Population		45801	49336	53038	56901
Total water demand	MLD	6.18	6.66	7.16	7.68
1. Waste water @ 80% of total water demand	litres/day	4946465	5328274	5728085	6145326
2. Peak factor		2.5	2.5	2.25	2.25
3. Total waste water	MLD	12.37	13.32	12.89	13.83

Storm Water Drainage Network

Drainage of storm water is not a major issue in Cherpulassery Municipality. The drainage system consists of natural drains and now a day due to the encroachment and dumping of the waste to the natural drain, drain system is blocked. The artificial drains along the roads are not proper and should be properly designed for the horizon year to avoid the flooding of the streets.

Solid Waste Management

As per URDPFI guidelines, the waste generation varies from about a quarter of kilogram per capita in small towns to about half a kilogram per capita in large and metro cities. Cherpulassery Town is a small town & the waste generation will be 320 g/c/d. During treatment both biodegradable and non biodegradable wastes are to be separated. About 30% is taken for extra waste generation considering other institutions. In 2036 waste generation will be around 18.21 tonnes per day. Table 28.6 shows projection of solid waste generated for town.

Housing requirement

Table 28.6 Projection of Solid Waste

Year	Unit	2021	2026	2031	2036
Population		45801	49336	53038	56901
1. Solid waste generation @ 320 g/h/d	tonnes/day	14.66	15.79	16.97	18.21
2. Including 30% extra for other institutions	tonnes/day	19.05	20.52	22.06	23.67
3. Area required for Composting plant @400 sq.m/t	Acres	1.88	2.03	2.18	2.34

Housing

Housing is the most basic requirement of human being after food and clothing hence due consideration need to be given to this sector while planning. As per the socioeconomic survey, 2016 among the total number of 10482 existing houses 5242 are pucca houses, 3156 are moderate and 2084 are kutcha houses. To estimate the housing requirements for the municipality following assumptions are made and the housing requirement analysis is given in table 28.7

- Population projections is taken as finalized in section 28.1 population projection
- Household size is assumed as 4
- With adequate government intervention and policies all the kutcha houses in the town shall be demolished and reconstructed and 50% of the Moderate houses shall be made pucca by the end of planning period.

From the table it can be seen that absolute housing demand for the year 2016 is 127. Considering Kutcha houses, which are not safe, the total housing demand is 2211. Number of new additional houses that needs to be constructed by the end of planning period to cater the demands of future population is 3743. Assuming a ninimum 5 cents of land is required for each house the land requirement by the end of planning period is 18715 cents say 76 Hectare.

Table 28.7 Projected housing requirements

Si.No.	Year	2016	2021	2026	2031	2036
1	Population	42435	45801	49336	53038	56901
2	Household size	4	4	4	4	4
3	Household	10609	11450	12334	13259	14225
4	Pucca	5242	6158	7073	7988	8904
5	Moderate	3156	2762	2367	1973	1578
6	Kutcha	2084	1563	1042	521	0
4	Housing demand	127	968	1852	2777	3743

Traffic & Transportation and Street Lights

Growth of urban transport along a sustainable path in cities is the foremost need of the country and is an important part of the nation's economy. The total road length comes out to be 42.8 kms, with per capita availability of 1 m against the URDPFI standard of 0.96m. The available road length is sufficient for the existing situation. The projections are made taking the view point that only two type of roads should be built with major share to bituminous roads (85% of total roads), and the rest 15% to concrete roads. Accordingly, while earthen road and WBM roads are proposed to be converted to bituminous or to concrete road. Improvement of major roads and construction of new roads are necessary for a growing town. Among various categories of street lights priority is given to power lamps (70%), followed by tube lights and high mast lamps (30). Street lights are seen sufficient as per the standards. The table 28.8 depicts the projection of traffic and transportation and street light.

Table 28.8 Projections of Traffic and Transportation Requirements, Street lights

Year			2017	2026	2031	2036
Population		Unit	45801	49336	53038	56901
1. Road length @ 0.96 m per capita		km	44	47	51	55
Road Surface	Concrete (km) @ 15% of total road length	km	7	7	8	8
	Bituminous (km) @ 85% of total road length	km	37	40	43	47
2. Lamp poles @ 30 m c/c			1467	1567	1700	1833
Street Lights	Tube Light/CFL /Ordinary bulb @ 30% of lamp poles	Nos	440	470	510	550
	High power lamps @ 70% of lamp poles	Nos	1027	1097	1190	1283
	High Mast Lamps @ 0.1% of lamp poles	Nos	1	2	2	2
3. Parking facilities @ 0.4 Ha of land per 10000 population		Ha	1.83	1.97	2.12	2.28

Traffic Projection

Traffic flow is an important macroscopic traffic characteristic in transportation systems. The measurement and forecasting of traffic flow are crucial in formulating a long term transportation plan serving the community in the future. Traffic forecasts are used for several key purposes in transportation policy, planning, and engineering: to calculate the capacity of infrastructure.

Method of Traffic Projection

For projecting the future demand, various methods of traffic projection including statistical, economical and mathematical models are available. These could be judiciously utilized depending upon level of accuracy warranted and the extent of database available.

Projected link volume of existing network

Volume-capacity ratio for the horizon years is also given in the table. It can be seen that almost all the major road corridors in town would be severely congested in the horizon year with anticipated traffic more than the capacity of the roads. The capacity utilisation of major corridors will carry heavy traffic. But most of the minor roads are not so severely loaded. Table 28.9 shows the Projected Daily Volume-Capacity ratios for different horizon years in Cherpulassery study area.

Table 28.9 Projected Daily Volume-Capacity ratios for Different Horizon years in Cherupulassery Study Area

SI NO	Name of section		Carriage way width (m)	Capacity (PCU)	2017		2027		2037	
					vehicle (PCU)	V/C	vehicle (PCU)	V/C	vehicle (PCU)	V/C
I	**Pattambi - Cherpulasserry road**									
1	Pattambi Border	Madathiparambu	7	1500	1555	1.04	1555	1.04	1555	1.04
2	Madathiparambu	Hospital Jn	7	1500	1654	1.10	1654	1.10	1654	1.10
3	Hospital Jn	Karalmanna Bypass Jn	8	1500	1669	1.11	1669	1.11	1669	1.11
4	Karalmanna Bypass Jn	EMS Road Jn	8	1500	2069	1.38	2069	1.38	2069	1.38
5	EMS Road Jn	Bus Station	8	1500	1841	1.23	1841	1.23	1841	1.23
6	Bus Station	Central Jn	7	1500	1412	0.94	1412	0.94	1412	0.94
7	Central Jn	Puthanalkkal Jn	9	1500	1164	0.78	1164	0.78	1164	0.78
8	Puthanalkkal Jn	Kacherykkunnu	6	1500	1254	0.84	1254	0.84	1254	0.84
II	**Cherpulasserry to Ottappalam road**									
9	Central Jn	KSEB JN	5	1500	972	0.65	972	0.65	972	0.65
10	KSEB JN	Eliyappatta Jn	5	1500	1270	0.85	1270	0.85	1270	0.85

11	Eliyappatta Jn	Ottappa-lam Bor-der	5	1500	1206	0.80	1206	0.80	1206	0.80
III	**Palakkad - Cherpulasserry - Perinthalmanna road**									
12	Perinthal-manna Bor-der	Thootha Jn	7	1500	752	0.50	752	0.50	752	0.50
13	Thootha Jn	Karal-manna Jn	7	1500	866	0.58	866	0.58	866	0.58
14	Karalmanna Jn	Kuzha-lumpadi Jn	7	1500	937	0.62	937	0.62	937	0.62
15	Kuzhalumpa-di Jn	Kacherik-kunnu	7	1500	1204	0.80	1204	0.80	1204	0.80
16	Kacherikkun-nu	26th Mile Jn	8	1500	1535	1.02	1535	1.02	1535	1.02
17	26th Mile Jn	Palakkad Border	8	1500	1207	0.80	1207	0.80	1207	0.80
IV	**Panniyamkurissi road**									
18	Hospital Jn	Panni-yamkurissi	3	900	147	0.16	147	0.16	147	0.16
19	Panniyamku-rissi	Thootha Jn	3	900	0	0.00	0	0.00	0	0.00
V	**Bypass road**									
20	Karalmanna Bypass Jn	Kuzha-lumpadi Jn	4	1200	543	0.45	543	0.45	543	0.45
VI	**EMS Road**									
21	EMS road Jn	Chalvara Border	5	900	269	0.30	269	0.30	269	0.30
VII	**Chalavara road**									
22	Eliyapatta Jn	Chalvara Border	5	1200	164	0.14	164	0.14	164	0.14
VII	**Market road**									
23	Eliyappatta Jn	Veeraman galam (Market Road)	3	900	139	0.00	0	0.00	0	0.00
VIII	**Vellinezhi road**									
24	Karalmanna	Vellinezhi Border	3	900	139	0.15	139	0.15	139	0.15
IX	**Thootha - Thachangad road**									
25	Post Office Jn	Kulappida border	3	900	138	0.15	138	0.15	138	0.15

X	Other roads									
26	Madathipa-rambu	Panni-yamkurissi	3	900	289	0.32	289	0.32	289	0.32
27	Puthonalikkal Jn	KSEB Jn	3	900	164	0.18	164	0.18	164	0.18
28	26h Mile Jn	Karuma-namkuriss i	3	900	0	0	0	0	0	0
29	Karalmanna	Panni-yamkurissi	3	900	0	0	0	0	0	0

Power

As per the standards given in URDPFI guidelines, the power consumption works out to be 2kw per household. Average household size is taken as 4. Based on above, the power consumption for Cherpulassery municipality has been calculated for different phase in Table 28.10 below.

As per standards one electric substation of 11 kv is required for every 15000 population. There is one substation having capacity of 110kv in the Cherpulassery town. it serves 60% of Cherpulassery town and near by areas, Thutha, Nellaya, Kothakurussy and Adakkaputhur.18 nos 160 kv Transformer and 66 Nos 110 kv Transformer is presently available in Cherpulassery Municipality.

Table 28.10 Power Requirement for Horizon Years

Years	2017 (Existing)	2021	2026	2031	2036
Population	42877	45801	49336	53038	56901
Household	10719	11450	12334	13260	14225
Power consumption (MW)	21	23	25	27	28
Sub-stations: One 11 kV sub-station for every 15000 population	3	3	3	4	4

28.3.2 Social Infrastructure

Education

Education plays an important role in shaping an individual's career. Hence it is the prime duty of mankind to try to make education available in every part of the world. Presently Cherpulassery municipality has improved educational background. Projection of education is made based on the norms and standards given in UDPFI guidelines and other standards of different aspects of social infrastructure. Number of Primary schools, High schools, Higher Secondary Schools and Colleges are seen satisfactory for Cherpulassery Municipality. Currently there is no ITI/ITC and special school for handicapped students. For the horizon year 2036, 2no ITI/ITC and 1 no Special school for handicapped students is required. Number of nursery schools is not sufficient now. By the

year 2036, 13 more nurseries will be required. The projection of education facilities are depicted in table 28.11.

Table 28.11 Projection of Educational Facilities

	Existing	Required	Gap	Required			
	2017	2017		2021	2026	2031	2036
Population	42877	42877		45801	49336	53038	56901
1. Nursery: 1 for every 2500	10	17	7	18	20	21	23
2. Primary: 1 for every 5000	22	9	0	9	10	11	11
3. High School: 1 for every 13000	8	3	0	4	4	4	4
4. Higher Secondary School: 1 for every 13000	4	3	0	4	4	4	4
5. Arts & Science College: 1 for every 80000	5	1	0	1	1	1	1
6. Professional College: 1 for every 250000	1	1	0	1	1	1	2
7. Polytechnic College: 1 for every 36000	2	0	0	0	0	0	0
8. ITC/ITI: 1 for every 35000	0	1	1	1	1	2	2
9. TTC: 1 for every 120000 population	0	0	0	0	0	0	0
10. Technical institution: 1 for every 100000	1	0	0	0	0	1	1
11. School for handicapped: 1 for every 45000	0	1	1	1	1	1	1

Health Care

The provision of high-quality, affordable, health care services is an increasingly difficult challenge. Cherpulassery municipality has a number of hospitals to serve the inhabitants. There are 8 Allopathic Private Clinics, 1 Co-operative Hospital, 1 Cherpulassery Health Center, 6 Primary Health Centers , 1 Govt. Ayurvedic Hospital and 4 private Ayurvedic Hospitals in Cherpulassery Municipality. The details of the hospitals required for the year 2036 are given in the Table 28.12

Table 28.12 Projection of Health Infrastructure

	Existing 2017	Required 2017	Required			
			2021	2026	2031	2036
Population	42877	42877	45801	49336	53038	56901
1.PHC Sub centre 1 for every 20000	6	2	2	2	3	3
2. Taluk hospital: 1 for every Taluk (PHC Cherpulassery can be upgraded to Taluk Hospital)	1	1	1	1	1	1
3. Taluk hospital (number of beds): 1 bed for 2000 (50 beds for 100000 population)	45	21	23	25	27	28
4. Super speciality hospital : 1 for every 100000	0	0	0	0	1	1
5. Multi speciality hospital :1 for every 150000	0	0	0	0	0	0

Socio-Cultural Facilities

According to URDPFI standards one community room is required for every 5000 population and community centre per 15000 population. 11 community rooms would be required by the planning year 2036. Presently there are 8 small recreational club managed by the private persons and there is no facility of public recreational club, meditation and spiritual centre and music, drama centre in the town. Each of these facilities are required as per URDPFI standards and the numbers required for the planning year are shown in the below table 28.13. There is no museum in the District.

Table 28.13 Projection of Community Facilities

Year	2021	2026	2031	2036
Population	45801	49336	53038	56901
1. Community room: 1 for every 5000	9	10	11	11
2. Community hall & Library: 1 for every 15000,2000sqm	3	3	4	4
3. Recreation club: 1 for 15000 population ,2000 sqm	3	3	4	4
4. Music, dance & drama centre: 1 for every 50000	3	3	4	4
5.Meditation and Spiritual centre one for 50,000 population	3	3	4	4

28.3.3 Utility Services

Petrol Pump

As per URDPFI guidelines Petrol pumps is to be provided for every 15,000 population. Existing there are four number Petrol Pump in the municipality and is enough to meet the requirement for the horizon year 2036.

Milk Distribution Outlets

As per the URDPFI guidelines, one milk Distribution outlet is required for every 5000 population. According to the present population there should be 10 milk booths which should be increased to 13 at the end of the horizon year. At present Cherpulassery municipality has only one milk distribution outlet located at Vadakkathara, having average collection of 12,000 ltrs per month.

LPG Godown

There is only one LPG godown located at Karumanamkurussi. As per URDPFI guidelines one LPG godown is to be provided for every 40,000 population. The one number LPG godowns in the municipality is enough for the horizon year 2036.

Police

As per URDPFI guidelines one police station is required for every 90,000 population. Cherpulassery municipality has one police station. Police station is located at Kacherikunnu (Ward 12) having an extent of 1037 cents.

Fire station

As per URDPFI guidelines one fire station is required for two lakh population. There is no fire station in the municipality. Since the population is less than 2,00,000 from the planning year also there is no requirement for fire station. In the case of fire, municipality can depend on the fire station located in Pattambi or Shornur.

Postal and Telephone facilities

As per URDPFI guidelines one post office is required per 15,000 population and one head post office is required per 2,50,000 population. Presently there are five post offices in the municipal area which is less than the requirement of 6 numbers for the planning year 2036. Considering the standards one telephone exchange per 40,000 populations is required and one telephone exchange is available in the municipality and is enough for the horizon year 2036. The table 28.14 shows the projection of utility services.

Table 28.14 Projection for Utility Services

Year	Existing 2017	2021	2026	2031	2036
Population		45801	49336	53038	56901
1. Petrol pump: 1 for every 15000	4	3	3	4	4
2. Milk booth: 1 for every 5000		9	10	11	11
3. LPG Godown: 1 for every 40000	1	1	1	1	1
4. Police station: 1 for every 90000	1	1	1	1	1
5. Fire station: 1 for every 200000	0	0	0	0	0
6. Post Office: 1 for every 10000 - 15000	5	5	5	5	6
7. Telephone exchange: 1 for every 40000	1	1	1	1	1

29. PROPOSED LAND USE

29.1 PROPOSED LAND USE

The proposed land use plan for the Cherpulassery town has been prepared for the horizon year as 2036. The proposed land use plan was derived on the basis of studies and analysis of work force pattern and population structure, existing land use forms; various sectors belong to economic, social, and physical, of the planning area.

On taking the gross developed density as 65.P.P.H, based on the projected population density of the town to 2036, the future urbanisable area calculated is 827 Ha. Taking the future requirements into account, the requirement of proposed land use area for each category is calculated and spatially framed as proposed land use plan. Accordingly the table 29.1 depicts proposed land use split-up of the town.

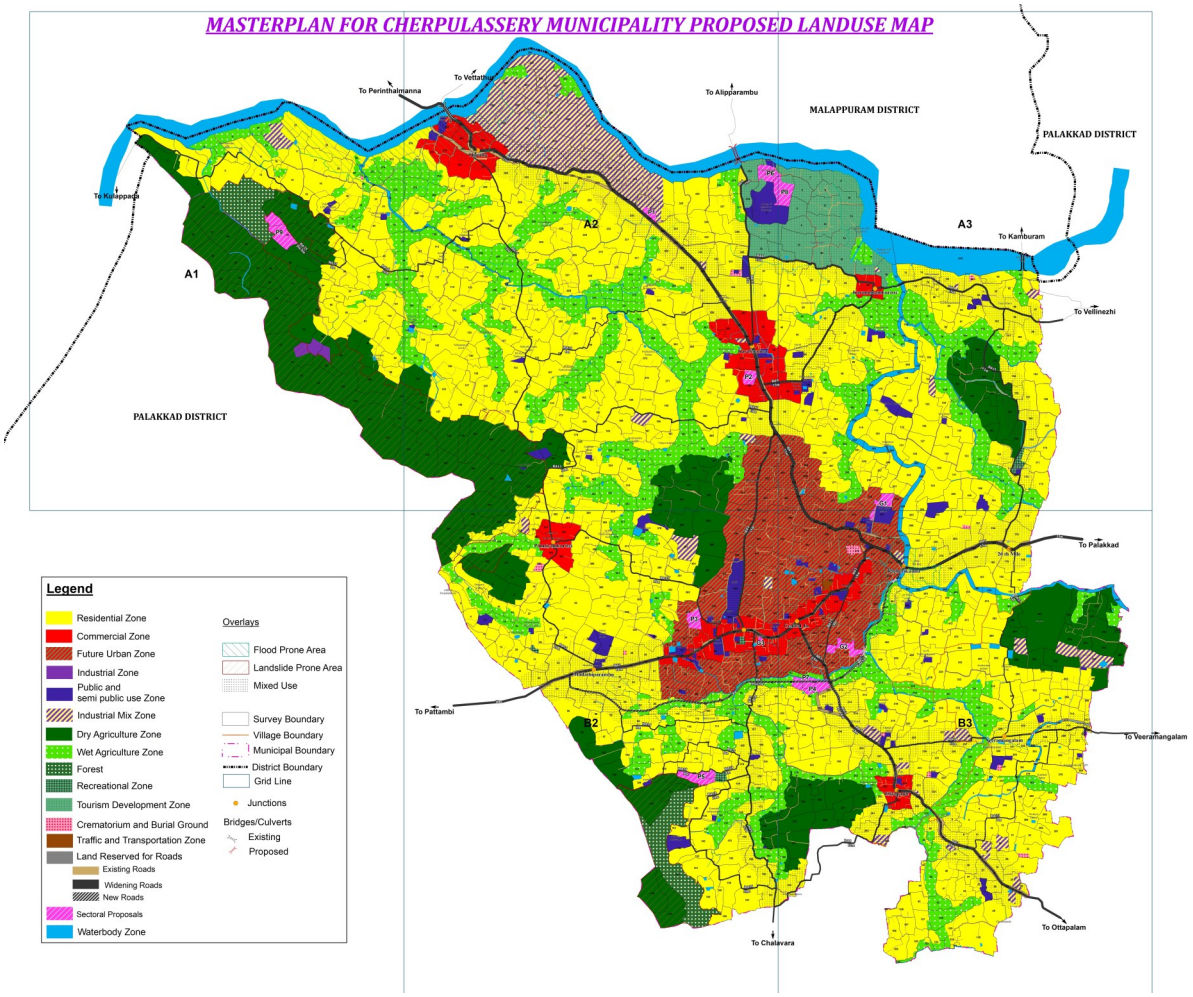


Fig. 29.1 Proposed Land Use 2036

Table 29.1 Proposed Land Use Split-up

Sl.No	Proposed Land Use	Area (Km^2)	% to Total Area
1	Residential Zone	14.78	46.35
3	Commercial Zone	0.91	2.86
2	Future Urban Zone	1.80	5.64
4	Industrial Zone	0.03	0.09
5	Industrial Mix Zone	1.05	3.31
6	Public and Semi Public Zone	0.51	1.58
7	Tourism Development Zone	0.59	1.85
8	Recreational Zone	0.02	0.07
9	Traffic and Transportation Zone	0.01	0.02
10	Land Reserved for Roads	1.76	5.52
11	Dry Agriculture Zone	4.44	13.93
12	Wet Agriculture Zone	4.15	13.02
13	Forest	0.37	1.16
14	Crematorium and Burial Ground	0.03	0.09
15	Water body zone	1.24	3.88
16	Flood Prone area (Overlay)	1.00	-
17	Landslide prone area (Overlay)	2.44	-
16	Special Zones	0.20	0.64
	Total Area	**31.88**	**100.00**

In the above table, Flood prone area and landslide prone area are provided as overlays over the proposed land use to provide risk information and hence, doesn't contribute to the total land area. The proposed land use map for 2036 is shown in figure 29.1. The peculiarities of each category of land uses are explained hereunder.

29.1.1 Residential Zone

As per the proposed land use forms, Cherpulassery municipality is designed to have a residential land area of 1391.00 hectares which makes part of 43.63% of total municipal area. At present the most populous wards in the planning area are those lying in between the CBD area and peripheral area of Town due to the proximity of facilities and good connectivity. Hence developments in this area are to be in such a way so as to keep good living environment. Fig 29.2 shows the residential zone in Cherpulassery Municipality.

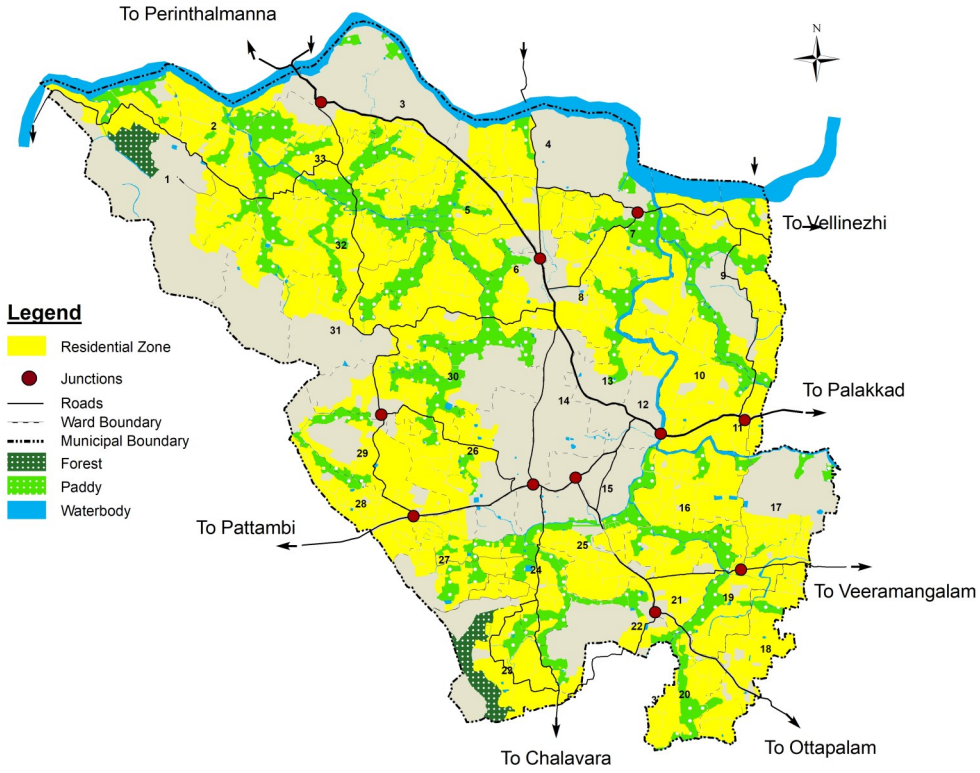


Fig. 29.2 Residential Zone

29.1.2 Commercial Zone

Most of the commercial activities are concentrated in the core area of the town and along the major road network passing through the town. Accordingly, in the proposed land use plan, existing pattern of commercial development in CBD area is retained. The new commercial areas are proposed to be developed so as to cater entire municipal area and neighbourhoods through a well-defined system of hierarchy of nodes in order to make all residential areas self-contained and self-sufficient in terms of basic day to day needs as well as retail and wholesale of commercial activities. In order to meet the demand and fill the gap of major commercial centres, higher order commercial activities are also proposed to be developed within the municipal area.

The most important commercial node in the municipality is Cherpulassery Junc-

tion (1st order). The existing land use in this CBD reveals that majority of commercial developments are along the State highways. Three second order commercial nodes are proposed, one at Thootha Jn, one at Kacherikkunnu and another at Madathiparambu Jn to provide higher order facilities to other parts of town respectively. Further Karalamanna, Eliyapetta and Panniyamkurissi will be the proposed third order nodes considering the future development pottentials. Total Land area under this commercial use comes to 91 hectare as 2.86% of total municipal area. Fig. 29.3 shows the commercial zone in Cherpulassery municipality.

29.1.3 Future Urban Zone

The core commercial area of the town is confined mainly to the existing area where there is predominant commercial activity. But, the future urban development potential is not limited to that area. Proposal of new by pass and future infrastructure development proposals including bus stand and fast growing urbanisation trend of the town which uplifts it to be a sub district headquarters guarantying sufficient facilities not only to inmates but to the immediate rural areas also, creates a greater demand for future urbanisation. Considering these facts, sufficient area around the existing core commercial space is marked as a future Urban Development area called Future Urban Zone, which accounts for 1.80 Ha of land contributing 5.64% of the total planning area.

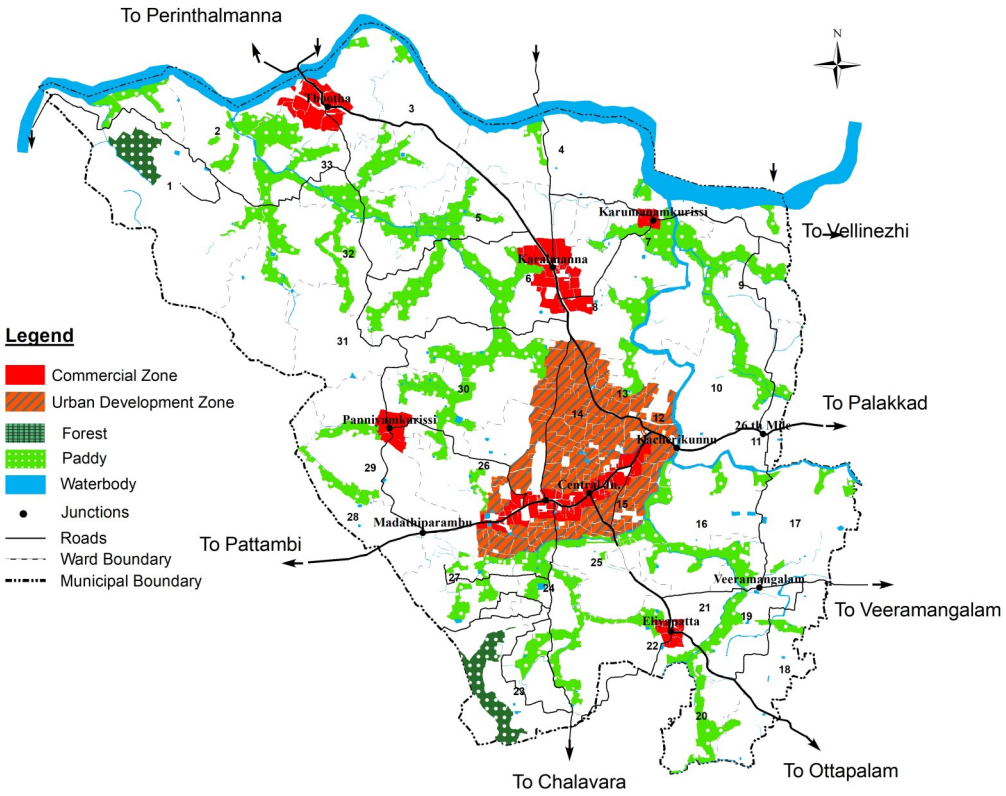


Fig. 29.3 Commercial Zone and Future Urban zone

29.1.4 Industrial Zone

In Cherpulassery town, at present there is no medium and major scale industries and the existing industries are of small scale and micro types. As per the spatial distribution the industrial land use is seen scattered throughout the Town. As per the development concept, existing industries are proposed to be retained. It also includes quarries and crushers currently functioning within the area. Accordingly the proposed industrial land use comes to 3 hectare as 0.09% of the total area. Fig. 29.4 shows the industrial zone in Cherpulassery municipality.

29.1.5 Industrial Mix Zone

The industrial promotion is essential for an urban area for its economic development and at the same time, it should not affect the present living environment of the town also. In Cherpulassery, some area at north eastern portion within the municipality is shown developing industrial activities along with residential developments. This type of development will adversely affect the overall development of the town, considering the above factor, this area has to be regulated with specific criteria. So an area with 105 hectares as 3.31% of total municipality is earmarked as industrial mix zone as shown in figure 29.4.

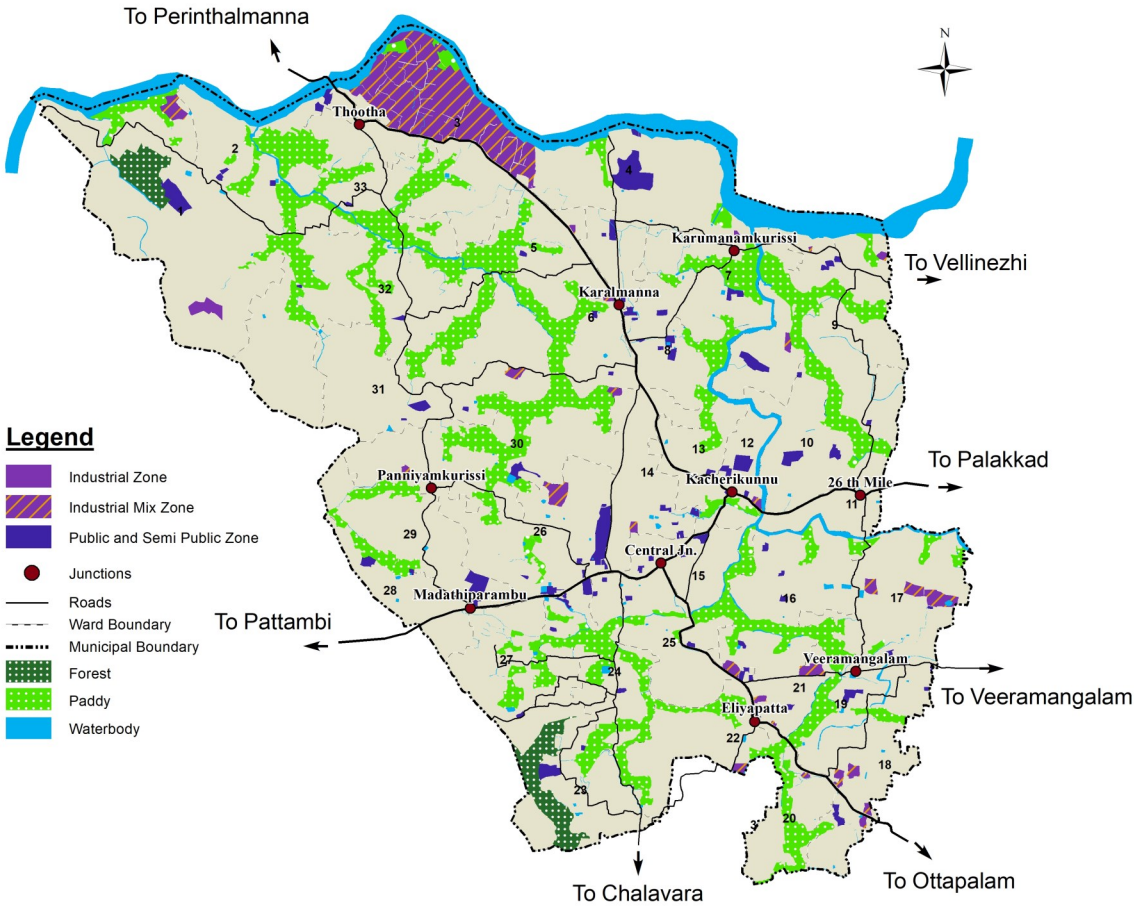


Fig. 29.4 Industrial Zone, Industrial Mix zone and Public and Semi-public zone

29.1.6 Public & Semi-public Zone

Public and semi public land use accommodate Government offices, education institutions and health and religious institutions. The spatial distribution of Public and semi public activities is mainly distributed along major transport corridors and at CBD area of the municipal area at present. According to future needs within the municipal area some additional land area are also earmarked as proposals for public and semi public use. In the above context ,the public & Semi public land use comes to 51.00 hectare as 1.658% of the total area of municipality. The figure.29.5 shows the Public and Semi public zone in Cherpulassery municipality

29.1.7 Tourism Development Zone

The Thootha river and its banks provide huge potential for tourism development. There are untouched pockets of lands with rich fauna, being used now for agriculture purposes, mainly cash crops. These lands could easily be transformed into farm tourism activities. Responsible tourism activities has to be promoted here to make use of this potential for economic development of the town through tourism activities. Beauty of the semi perennial Thootha river and its greenish banks would definitely provide a peaceful environment for the tourists arriving here in search of the cultural and artistic serenity of the region. An area of 59Ha amounting for 1.85% of the total land area is earmarked for this use in the town.

29.1.8 Recreational Zone

At present there is no park and open spaces within the municipal area for leisure activities. Since the park and open spaces are an unavoidable facility within an urban area, an area with extent of 2.00 hectares as 0.07 % of municipal area is proposed for park and open space as shown in figure 29.11 The total area of existing playgrounds and open spaces is 1.16 hectare. There is no park in Cherpulassery town. Also there is a demand for recreational facilities. Hence one open air auditorium with park and open gym is proposed in the Town but is included in special zone.

29.1.9 Traffic and Transportation Zone

The land under this zone only covers existing bus stands, bus bay etc. an extend of 1 hectare is coming under the traffic and transportation zone which is only 0.02 % of the entire municipal area. The zone is planned to be used for transportation uses along with commercially viable value capture mechanisms.

29.1.10 Land reserved for Roads

This zone covers the area included under all existing roads, proposed road widening and new roads (by pass). An area of 176 hectare extends under this zone which holds 5.52% share of the total municipal area.

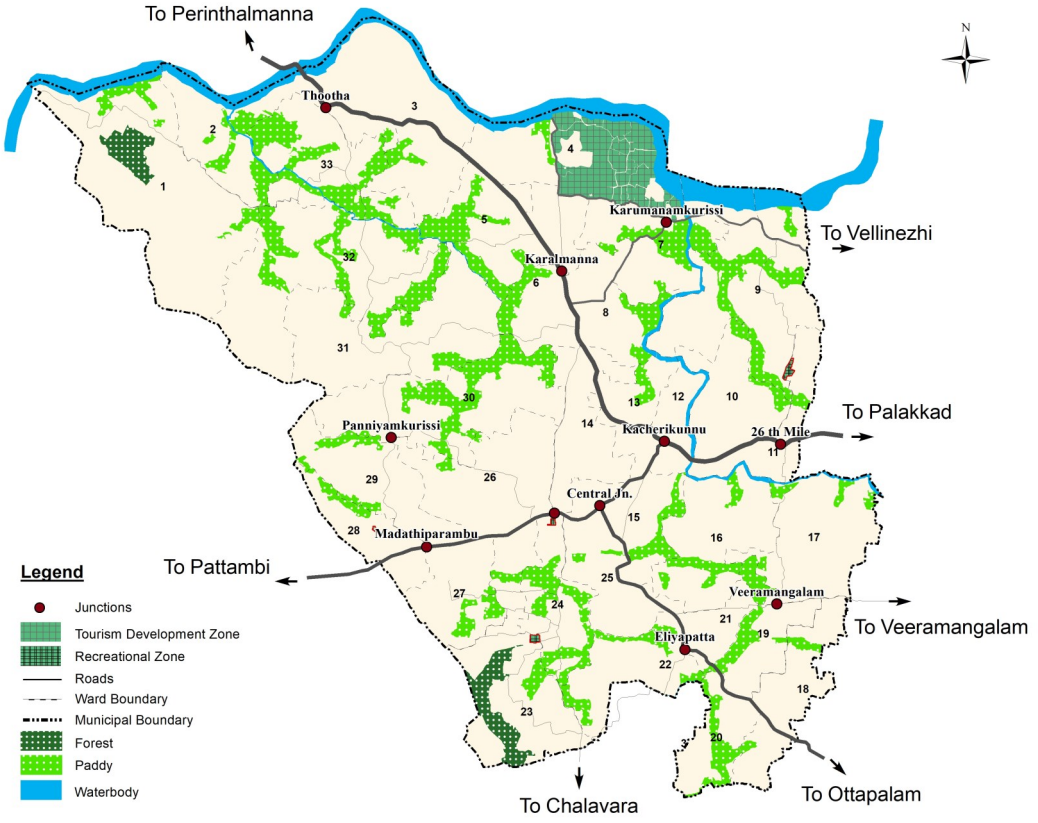


Fig. 29.5 Tourism Development Zone and Recreational Zone

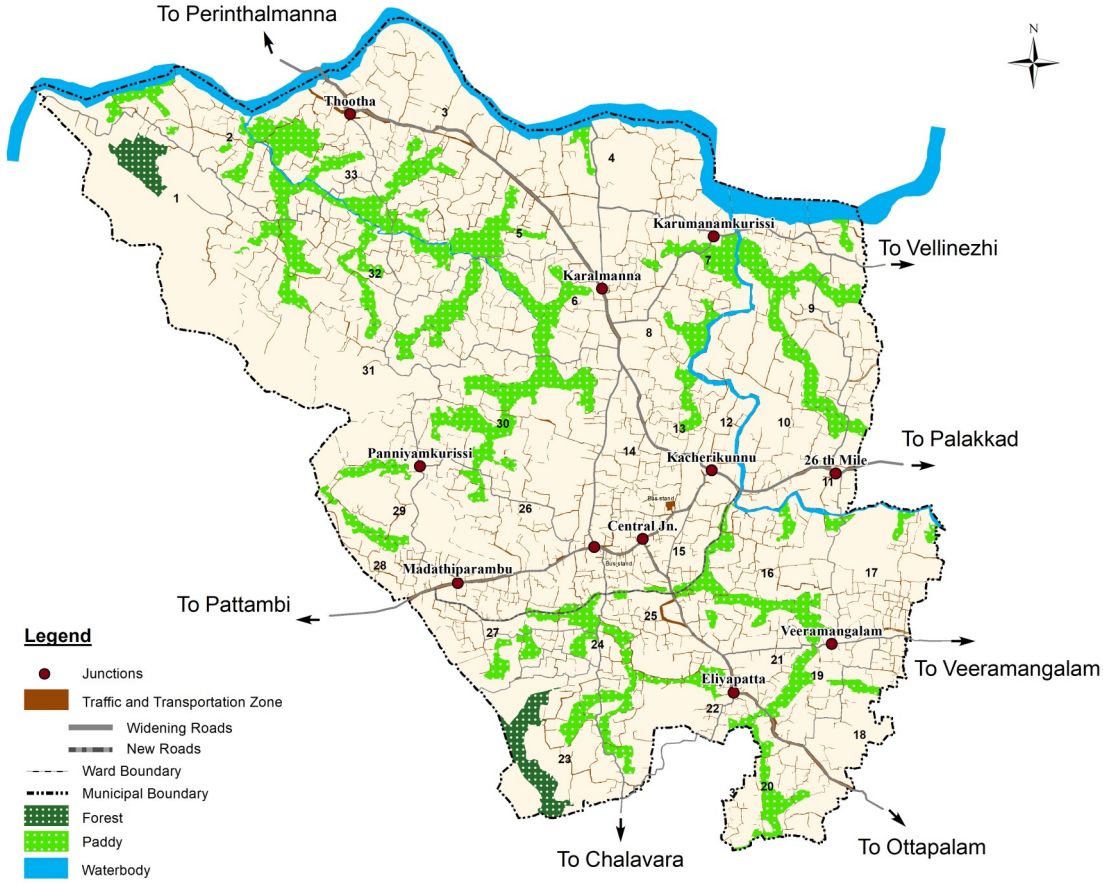


Fig. 29.6 Traffic and Transportation zone and Land Reserved for Roads

29.1.11 Dry Agriculture Zone

Large extent of land in the town is being used for plantations cultivating rubber, coconut and other cash crops. These agricultural activities also have a major role in the economic pattern of the municipality and hence the said area is specially marked as Dry agriculture in the proposed land use plan. This land could also be redeveloped or transformed for large scale development projects also. So the proposed zoning will be aiming for aiding such proposals also. The extent of this zone comes to 444 Hectares as 13.93% of the total area. Fig. 29.7 shows Dry agriculture zone in Cherpulassery municipality.

29.1.12 Wet Agriculture zone

Since the paddy fields are ecologically sensitive area, conservation of paddy fields has to be a prime objective on any planning method. The conversion of paddy fields also adversely affects the food security of the nation. A strict regulatory criteria also have to be framed for conservation of the paddy lands and wet lands, which is already in force in the state in the form of The Kerala Paddy and Wet land conservation act. Accordingly the existing paddy fields with an extent 415 hectares as 13.02% of total land area of municipality are proposed to retained as wet agriculture zone. This zone would certainly help in the enactment of that act through easy identification. The figure 29.7 also shows the paddy land area to be retained as wet agriculture zone within the municipality.

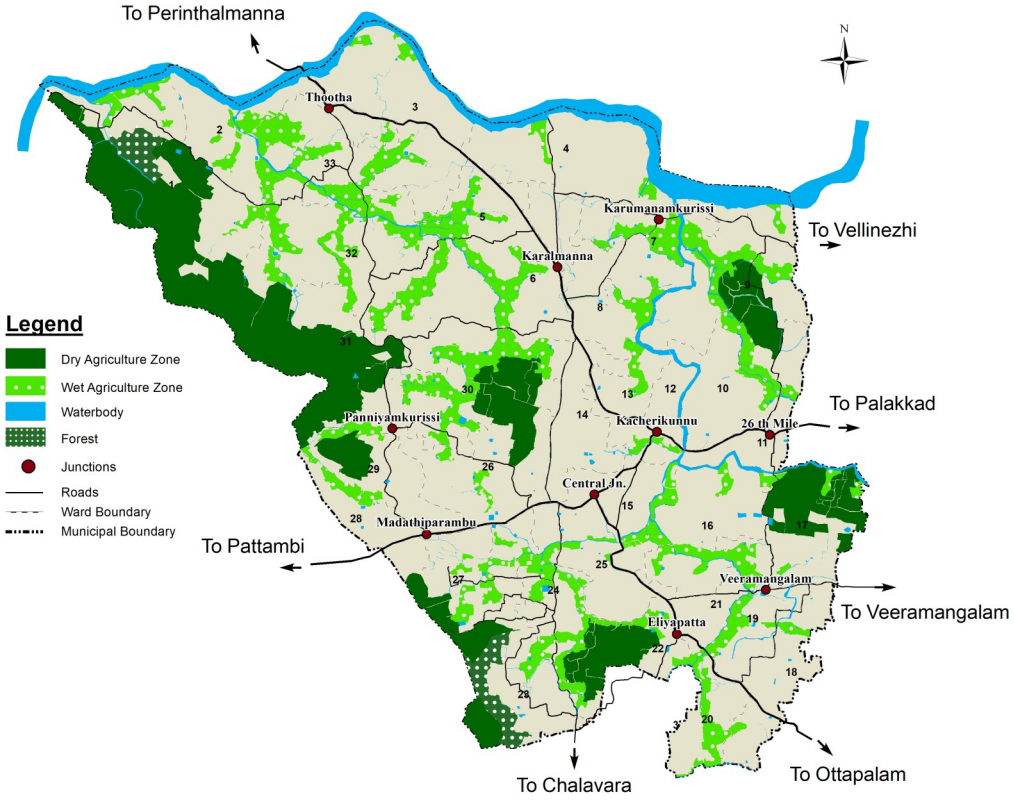


Fig. 29.7 Dry agriculture zone and Wet agriculture zone.

29.1.13 Forest

The Cherpulassery municipality consist an area of 37 hectares of land as 1.16% of the municipal area coming under vested forest area. As the forest area has to be conserved according to the policies of governments, the total land area under forest are proposed to retain in the existing manner. The figure 29.8 shows the forest area of the municipality.

29.1.14 Crematorium and Burial Ground

Most of the burial grounds existing within the Municipality are owned by the different communities and one burial ground is under the ownership of the Municipality at Karumanamkurissi near to the Thoothapuzha. This land is proposed for a modern crematorium for the Cherpulassery municipality. Altogether an extent of 3 hectares as 0.09 % of land is proposed as crematorium as shown in figure 29.8.

29.1.15 Water body zone

The water bodies are not disturbed and to be conserved for maintaining the ecological balance of the earth. The governments also have framed policies to protect water courses within our nation. Considering above facts the water bodies with an extent of 124.60 hectares as 3.88 % are proposed as retained in the proposed land use plan of the municipality. The areas under this land use is shown in the figure 29.8.

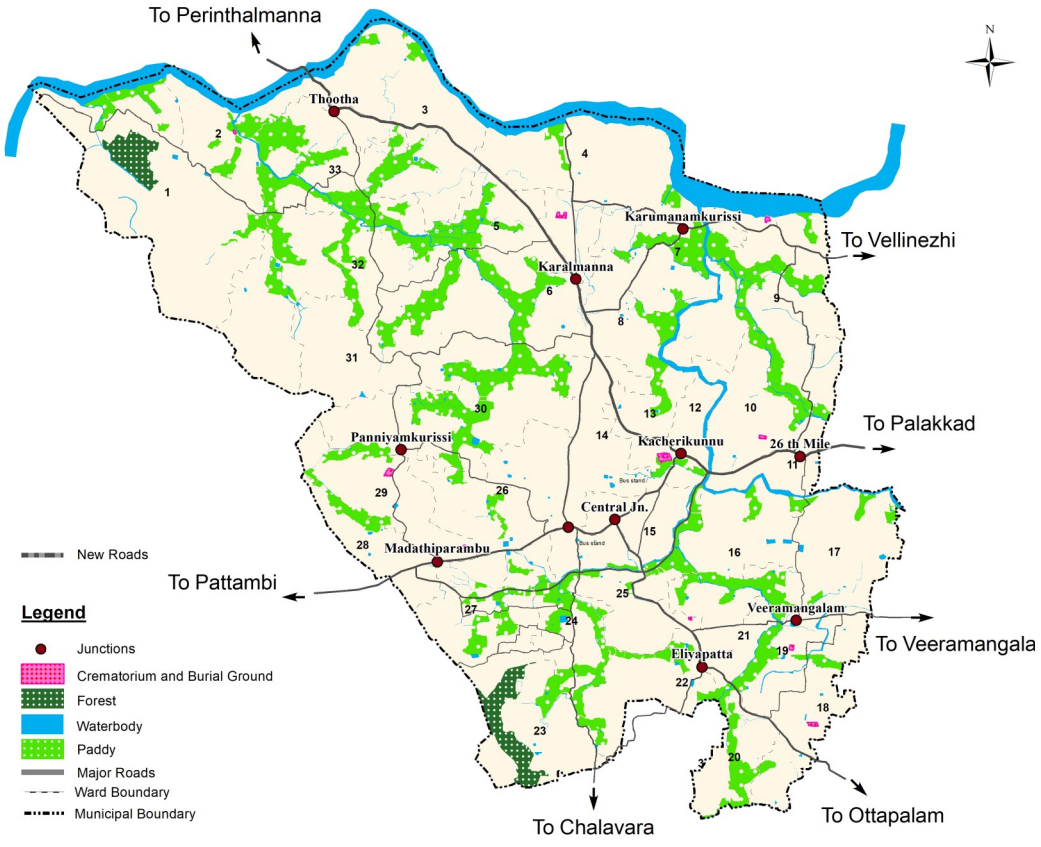


Fig. 29.8 Forest, Crematorium and Burial ground and Water Body

29.1.16 Flood Prone Area (Overlay)

Thoothapuzha river is flowing through the northern boundary of Cherpulassery Town with 9.00 km of river frontage. The shore line is environmentally sensitive, and may directly pollute the river by the storm water flowing to river from the various parts of municipal area. The steep slopes pose threat to stability and may cause flood on the banks of river. During the 2018 and 2019 floods the banks of thoothapuzha were flooded and caused damages to many houses and other properties. Fig 20.9 shows the flood prone areas of Cherpulassery municipality area as derived by KSDMA. To mitigate the effect of flood, to protect the shoreline, and to provide the risk information ,a flood prone area overlay is proposed in the planning area over and above the proposed land uses, where some construction methodologies and easy evacuation measures will be enforced and additional construction guidelines will have to be followed. An extent of 1 hectares is proposed as flood prone area in the proposed land use plan.

29.1.17 Landslide Prone Area (Overlay)

The terrain of Cherpulassery is very much undulating with varying slopes created out of hills and valleys throughout the area. This also cause risk of landslide which is is analysed in detail in chapter 20. Hence, landslide prone areas of the planning areas are specially demarcated and is shown in figure 29.9. In such areas also certain additional restriction shall be provided for construction and a special care will have to be taken before disturbing the existing slope and terrain. Land development activities also must be restricted in such areas and additional guidelines as stipulated in the zoning regulations will also have to be adhered to. This is marked as an overlay above the proposed land use and will be beneficial in identifying such areas easily so that necessary risk information will be available to the residents at the best possible way. An extend 2.44 Ha of land comes under landslide prone zone in the proposed land use map of the municipality.

29.1.18 Special Zones

Special zones include the areas specifically demarcated for certain projects. No other activity other than the specific project and its incidental uses shall be permitted in such zones. Projects proposed for Cherpulassery municipality in special zones are detailed below. This include bus terminal, sewage treatment plan, community hall, town park etc. The government or public lands proposed to be reserved as special zones for certain projects are marked as G1, G2 etc and proposed land acquisition for these projects in private lands are marked as P1, P2 etc. A total area of 20 Ha of land is included in special zones which amounts for almost 0.64% of the total land area under consideration. The list of special zones including its details are shown in table 29.2 and the location are marked in figure 29.10.

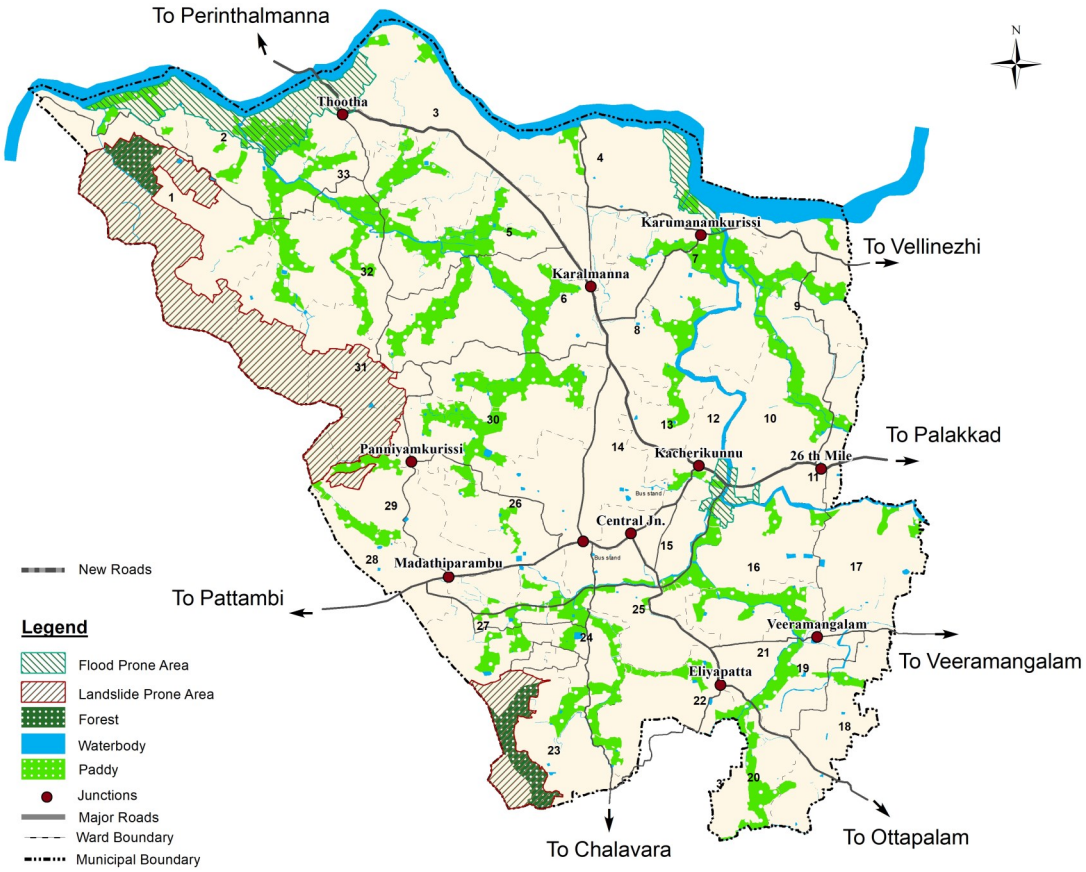


Fig. 29.9 Flood prone area and Landslide prone area

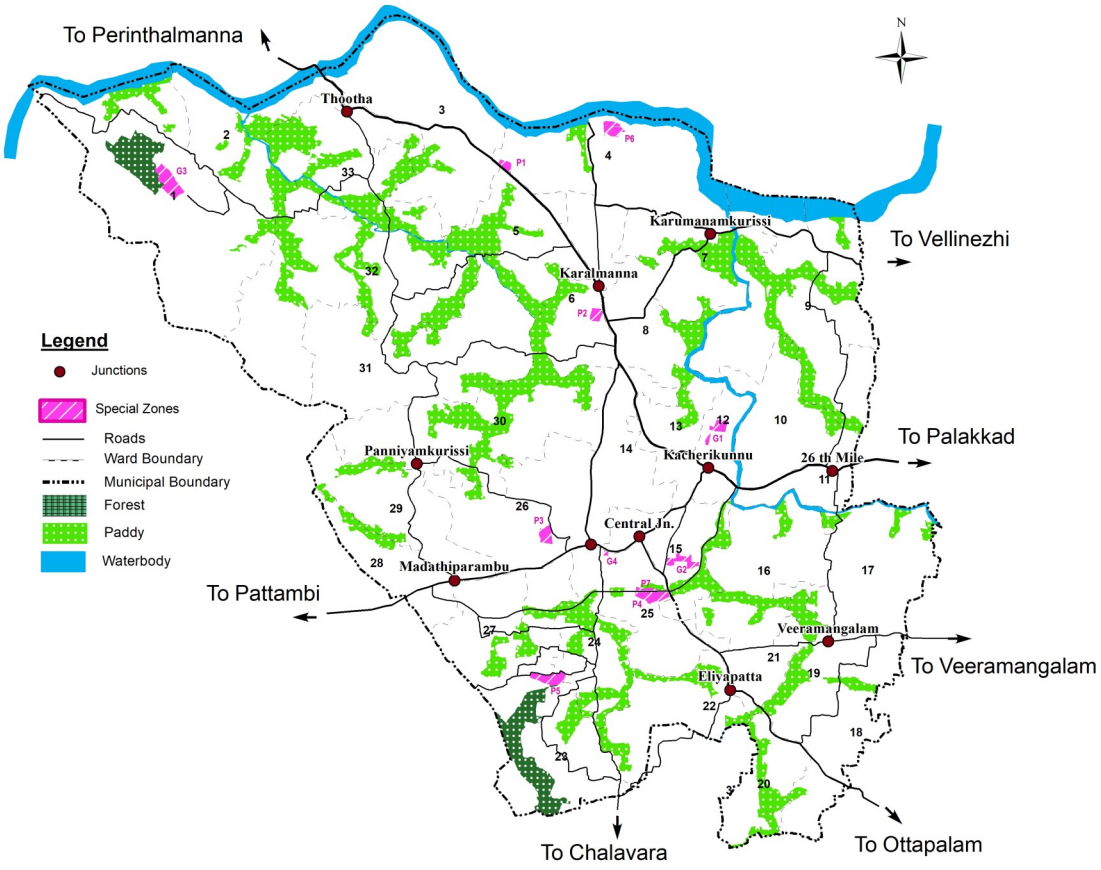


Fig. 29.10 Special Zones

Table 29.2 Details of Special Zones

Sl.no	Zone Name	Project Details	Area (Ha)	Revenue Details
1	G1	Community Hall, Mini civil station and Sports complex	1.44	Cherpulasseryppulassery village, Block number 42, survey number 237/1,2
2	G2	Town Park and congregation centre	1.80	Cherpulasseryppulassery village, Block number 42, survey number 444/1
3	G3	Bus bay and parking plaza	0.15	Cherpulasseryppulassery village, Block number 43, survey number 90/7
5	P1	Truck lay by and amenity centre	0.70	Cherpulasseryppulassery village, Block number 41, survey number 327/2
6	P2	Valluvanad Cultural Centre	1.06	Cherpulasseryppulassery village, Block number 41, survey number 382/8, 382/9
7	P3	Municipal complex	1.48	Cherpulasseryppulassery village, Block number 42, survey number 383/5, Block number 43, survey number 73/1
8	P4	Bus terminal cum Shopping centre	2.10	Cherpulasseryppulassery village, Block number 43, survey number 191/3,5,6, 193/5-14, 194/1,2,4
9	P5	Proposed educational complex	2.40	Cherpulasseryppulassery village, Block number 43, survey number 132/2-4, 133/1
10	P6	Cheenikkapara Tourism centre	3.55	Cherpulasseryppulassery village, Block number 42, survey number 1/2, survey number 2/2
11	P7	Sewage Treatment Plant	0.41	Cherpulasseryppulassery village, Block number 43, survey number 193/2,3, 193/4,5
12	P8	Integrated waste management unit	1.05	Cherpulasseryppulassery village, Block number 42, survey number 2/2
13	P9	Centre for Peacefulness and mind reclamation	3.63	Cherpulasseryppulassery village, Block number 41, survey number 50/3, 51/2

30. TRAFFIC & TRANSPORTATION PLAN

Traffic and Transportation plan for Cherpulassery town is prepared taking into account the existing traffic scenario and based on the evaluation of the future transportation facilities. Transportation plan cover all the available modes of travel and are formulated so as to reduce the severe strain put on the existing road network. All committed development schemes were taken into account while formulating the transportation plan. Proposed traffic and transportation map is shown in fig.30.1. Details of proposed roads and details of cross-sections of roads are shown in table 30.1 and 30.2 respectively.

30.1 Traffic problems faced by Cherpulassery town

Like any urban centre in the State, Cherpulassery town also faces traffic congestion in central areas of the town due to the following causative factors.

- Inadequate width of roads in the central part of the town especially between Hospital Jn and Puthanalkkal Jn;
- Absence of adequate turning radii at the major intersections in the town namely Hospital Jn, Bypass Jn, EMS road Jn and Central Jn
- Lack of parking spaces and encroachment of road space for parking in the central areas of the town between Bypass Jn and Central Jn
- Pedestrians walking on the road space due to lack of footpath
- Inter-mixing of intra-city and inter-city traffic in the absence of adequate link roads and bypasses – all the traffic have to pass through the congested CBD area of the town
- Increasing number of personalized vehicles
- Movement of inter-city bus traffic on congested urban roads due to the location of inter city-bus stands within the central area of the city;
- Encroachment of right-of-way;
- Poor surface conditions
- Absence of proper traffic signs and markings

30.2 Development strategy for Cherpulassery town

While formulating the long term transport development plan for the Town, development proposals made by various agencies are taken into account. The most important problem of Cherpulassery town is the traffic congestion at the central part of

the town especially between Hospital Jn and Puthanalkkal Jn. It is caused by the inadequacy of road width which is not able to cater to the traffic generated by the large number of commercial establishments, bus station and numerous public offices located in the close vicinity of the road stretch. The traffic problems get accentuated by conflicting movements of traffic at the major intersections as they are not having sufficient junction area to handle the conflicting movements. There are a huge parking and pedestrian activities experienced on the problematic road stretch which act as the major external interferences in the smooth operation of traffic flow in the town causing frequent traffic holdups.

Cherpulassery town has good interactions with neighboring towns like Ottappalam, Shoranur, Pattambi, Perinthalmanna and Mannarkkad necessitating a inter-regional transport connectivity. Hence, the development strategy should address the issues of traffic congestion comprehensively and adopt adequate capacity augmentation schemes so that frequent and regular traffic hold-ups are minimized. While deciding the capacity augmentation measures, the limitation of the widening the traffic bottleneck stretch due to the location of large commercial establishments should be kept in mind.

As the level of service of urban roads are dictated to a great extent by the capacity of intersections, the development proposals should give importance to increase the capacity of major intersections by proper planning and design. Special emphasis should also be given to develop off-street parking lots and also to provide adequate pedestrian facilities in the central business area of the town. Considerable traffic movements are observed among the neighboring towns/ settlements which are passing through the traffic bottleneck stretch in the absence of other link roads/ bypass roads. Hence the development strategy should address the issue of providing adequate link roads/ bypasses taking to consideration the present traffic as well as the horizon year traffic.

The planning approaches have Short term, medium and long term proposals. The Short term approach consists of improving intersections, provision of traffic signals, provision of traffic signs and lane markings, footpaths, drainage facilities, road upgradation and integrated traffic management system.

For smaller urban areas, the Medium and Long term approaches involve widening of roads, removal of missing links, construction of flyovers, terminals and integrated land use planning to deactivate congested areas and to decentralize activities to remove transportation bottlenecks. This also aims at integrating all modes of transportation to arrive at an optimum modal split. Integration of different modes of transport will fetch immediate returns in efficient utilization of public transport services and will bring increased patronage, thus reducing the incidence of personal vehicles.

In an era of advanced information technology, use of Intelligent Transport system has a dominant role in traffic management and reducing traffic offences and accidents. The development strategy should aim to utilize the same in enhancing the traffic flow management and in related fields.

30.3 Proposed road development plan for Cherpulassery town

On the basis of the projected volume of traffic and alternative network development schemes considered, a road development plan has been formulated for the town. As per the future road development plan for the town, the town will have a high capacity road network of well defined hierarchical pattern with widened roads, development of a semi circular bypass, host of radial roads and a ring road connecting the neighboring settlements**.** Taking into consideration, the development strategy discussed earlier, the road development for Cherpulassery town is proposed and presented below;

30.3.1 Proposed Hierarchy of road network

The road development plan for Cherpulassery town envisages hierarchical pattern of road network conforming to the following categories of road system.

- Primary distributor road
- Secondary distributor road
- Tertiary road
- Local road

30.3.2 Primary Distributor Road

The road basically provides connectivity to State and district headquarters with a 'right of way' width ranging between 23 and 30 m.

i) Proposed to be developed as 4 lane roads which may further be developed into six lane in future.

ii) More emphasis is to be given for by passing vehicles. Road must be designed to ensure the smooth traffic of heavy vehicles also.

iii) Adequately wide footpaths which are protected with barricades on both sides to be provided.

iv) Pedestrian crossings to be restricted and proper zebra crossings must be provided wherever needed.

v) To be developed with flyovers in junctions to minimize the traffic signals as far as possible. Dividers must be continues in nature as far as possible to minimalize "U" turns and crossings.

vi) The design standards stipulated by IRC must have to be followed, and can be implemented under BOT if required. Speed of Vehicles may be allowed as per NH standards

vii) Continuous footpath cum drain have to be ensured and provision for service roads can be provided wherever required.

viii) Restriction or preferably prohibition of parking on the carriageway/shoulders. Parking must be shifted to off street parking locations or cross roads.

ix) Proper Bus bays and street lighting to be provided wherever required.

Widening of Palakkad-Cherpulassery-Perinthalmanna Road (SH-53)

The existing State Highway-53, Palakkad-Cherpulassery-Perinthalmanna road can be classified under this category. The existing average width of this road is 17m. The projected traffic along this road is demanding a much wider ROW with 4 lane car-riage way. Being a primary distributer road, this road is to be widened to a primary distributor standard. As a shorter route connecting Palakkad and Perinthalmanna and nearly 10km shorter than the existing NH966, the road is of much importance. It also connects the population of Ottapalam and Pattambi Taluk with Kozhikode and airport and will be of much larger demand for use in near future.

30.3.3 Secondary Distributor Road

This provides connectivity to nearby towns and Taluk headquarters. 'Right of way' width varies from 12 to 23 m.

i) These roads acts as an intermediate roads connecting primary distributors with the roads interconnecting the outskirts with the core area.

ii) Equal emphasis for vehicles and pedestrians have to be provided.

iii) Proper foot paths and pedestrian crossing locations with assembly area and signals.

iv) Providing foot over bridges at required locations.

v) Proposed to be developed into four line with divider or two line without grade separators. Speed of Vehicles may be allowed as per SH standards

vi) Cable ducts along with drainages and foot paths to be provided on both sides.

vii) Restricted road side parking and provision of parking lots wherever required are to be provided.

Widening of Pattambi-Cherpulassery Road and Cherpulassery-Ottapalam Road

Pattambi Road and Ottapalam road are the other major roads which is over utilised in the town, as per the study conducted by NATPAC. Even though they have to be categorised under Primary distributor roads, the existing built up density and commercial development already happened on its sides, makes it difficult to provide for a much wider Row width. Hence, it is proposed to provide a by pass for the town connecting Palakkad road, Pattambi Road, and Ottpalam road. This would definitely ease out the demand for wider ROW width since a majority of the future traffic expected in the above roads shall be carried by the by pass. Hence, these roads are suggested with a ROW width of secondary distributor standards as below.

The existing MDR, Pattambi-Cherpulassery road is of average width 13m. This road passes through the core commercial area, and hence it will have to be developed with provisions for parking spaces wherever possible.

The existing MDR, Cherpulassery– Ottapalam road is also having an average width of 17m. The proposed alignment of new bypass also crosses this road. The road is currently having an alignment with numerous turns and curves, which is to be smoothened for safe and comfortable transit of passengers. Hence a new road proposal is also provided in this stretch at 10th mile to negotiate the existing C curve.

By Pass Roads

Widening of an existing road and a completely new proposed alignment are considered as below for bypass roads in Cherpulassery.

Widening of Existing Bypass (High school road)

The existing bypass connecting Cherpulassery Town and Karalamanna via government high school is being used by a number of vehicles coming from Pattambi road and Ottapalam road as an easy access towards Perinthalmanna road. Being a very congested road stretch with more vehicular passage, this road is very much over utilized and its widening is inevitable. But the land constraints and built up makes it difficult for a higher order widening. Hence, also considering the existing width, this road is proposed to be widened to a secondary distributor standards.

New ByPass between Kaakkathodu bridge and Manjakkal

A new bypass road is proposed in this plan to de-congest the existing core commercial area. This proposed alignment would connect Palakkad road, Otapalam road and Pattambi road and would also ease out the traffic congestion of the town core by deviating the bypassing vehicles and restricting the entry of heavy vehicles into the town. Starting from Kakkathodu bridge near Kacherikunnu at Palakkad—Perinthalmanna road, this would keep its alignment along the alignment of the thode

to cross Ottapalam road and progress towards Kavuvattam area crossing EMS road en route and will pass nearby Anapparambu to reach Manjakkal at Pattambi road. The proposed bypass will have underpasses at Ottapalam road and EMS road to facilitate easy traffic. Service roads with ramp in access provision to the bypass will also be provided near the proposed bus stand between Ottapalam road and EMS road so that the traffic arising due to bus entry and exit would not affect the smooth vehicular flow along the bypass. Sufficient number of culverts will also have to be provided along this bypass to ensure the smooth flow of drainage crossing the road towards the canal nearby. The excess water flowing out of the paddy area needs to be flown into this canal without hindrances so as to ensure that the construction doesn't creates any scope of water stagnation and flooding later on. Considering the future growth potential and scope for widening, the road is proposed to be developed in secondary distributor standards with properly designed junctions at each road it crosses.

Other major roads proposed to be developed to secondary distributor standard at Cherpulassery town are **Karalmanna—Karumanamkurissi road** and **Vellinezhi—Karumanamkurissi– Kalikadavu road,** both having an average existing width of 11m.

30.3.4 Tertiary Distributor Road

These roads provide connectivity to Cherpulassery town with hinterland. The 'right of way' width will vary from 8 to 12 m.

i) Aims in providing connectivity to urban core with growth centers residential areas.

ii) These include core area roads with limited scope for expansion.

iii) Pedestrian friendly roads with wider footpaths and specially designed crossings.

iv) Proper bus bays and auto taxi stands.

v) Two way two lane traffic with provision for public transport.

Roads which are proposed to be developed to tertiary distributor standards in the town are **Eliyapatta-Chalavara Road, EMS Road, Mayyathumkara Veeramangalam Road, 26 th mile– Karumanamkurissi road, Karalmanna– Kalikadavu road, Governmnet hospital– Panniyamkurissi– Thootha road, Madathiprambu– Vellottukurissi– Panniyamkurissi road, Puthanalkkal– KPIP Road, Nalalumkunnu-Kulappada road, LIC kunnu– Karalmanna Road and Malabar polytechnic road.**

30.3.5 Local roads

Some of the roads, that are important for providing a comprehensive transportation network for the town, but the scope of widening is limited, are considered under this category. Those roads in Cherpulasserry town which are proposed with the status of local roads with a minimum ROW of 8m are **Shalemkunnu road, Arekkavu road, Lenin Nagar road, Unginthara road, Kuttikode road and LP school– Naduvattom road**. Some new roads proposed as an access to some of the sectoral proposals are also considered under this category. Efforts shall be made to develop any new roads in the municipality to a minimum standard of local road so that hassle free two way traffic will be possible at any case.

30.4 Road Hierarchy

The road hierarchy as discussed above has been classified into different standard cross sections having particular carriage way width ancillary amenities such as provision for grade separators, dividers, pathways, shoulders, drainages etc. The existing width is considered for each roads under different hierarchy while determining a road geometry along with considering various other factors such as proposed road traffic and potential development thrust of the area. Hence the road geometry has been classified as follows:

Primary Roads: R1– 23m wide

Secondary Road: R2– 18m wide, R3– 15m wide

Tertiary road: R4– 12m wide, R5– 10m wide

Local roads: 8m wide

Typical cross section of various road sections are shown in table 30.1. Based on the requirements for each road, the cross sections may be assigned and the specified standards shall be maintained as far as possible.

30.5 Junction improvement

Intersections are the vehicle conflict points and are prone to accident risk. Therefore there is a need to properly design the intersections for streamlining traffic flow and minimizing conflict points. Based on traffic studies and inventory survey, most complicated intersections in Cherpulassery town are Central Jn and Kacherikunnu Jn.

- **At Central Junction**

Considering the acute traffic problems observed at the junction for want of adequate space, all the arms of the junctions are proposed for four lane divided car-

riage way in the junction area and tapered to two lane to merge with the existing/ proposed two lane road. Design of proposed junction elements like bell mouth of the junctions, channelized island are as shown in fig 30.1

- **Kacherikkunnu Junction**

As the intersection is located at an elevation and also lack adequate turning radii, it is proposed to widen all the arms of the junctions to four lane in the immediate influence area of the junction. Design of proposed junction elements like bell mouth of the junctions, channelized island and medians are as shown in fig 30.2

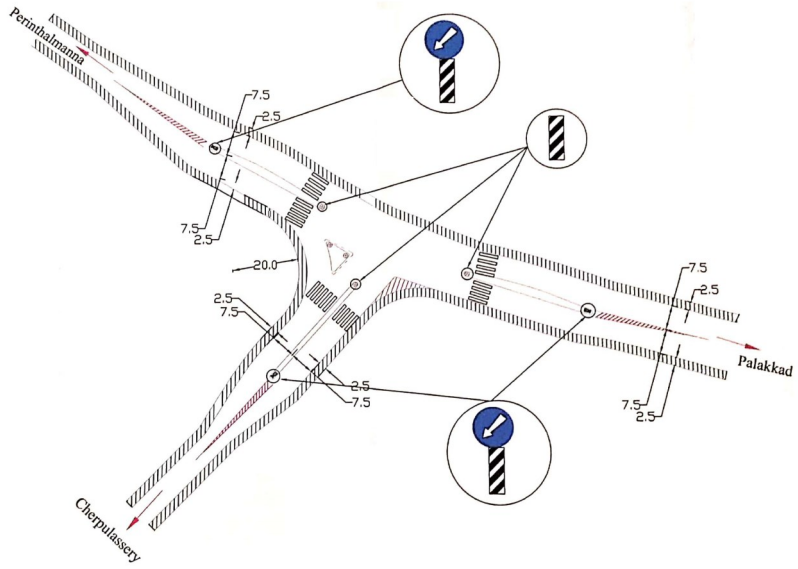


Fig. 30.1 Junction Improvement plan for Kacherikunnu Junction

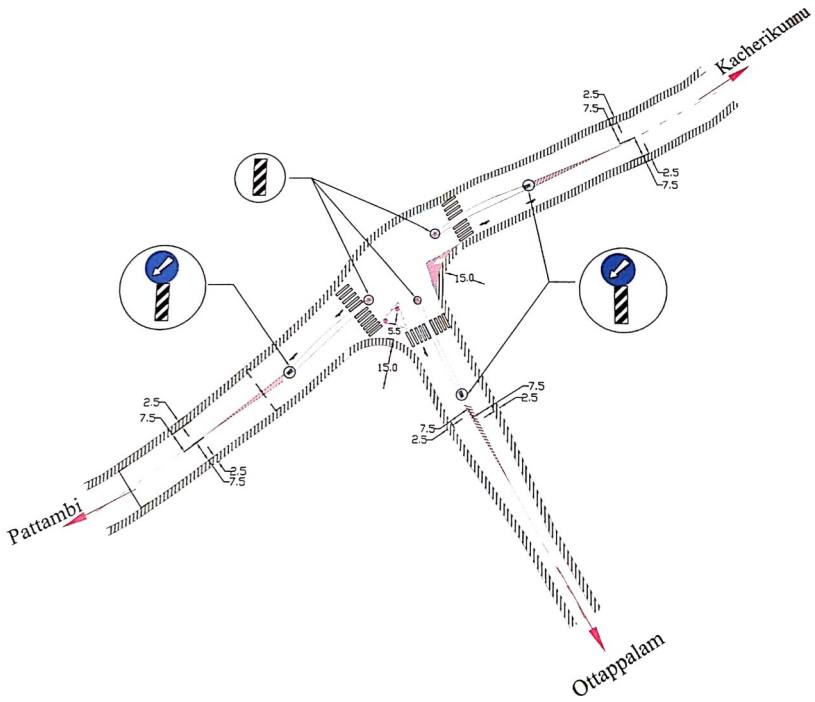
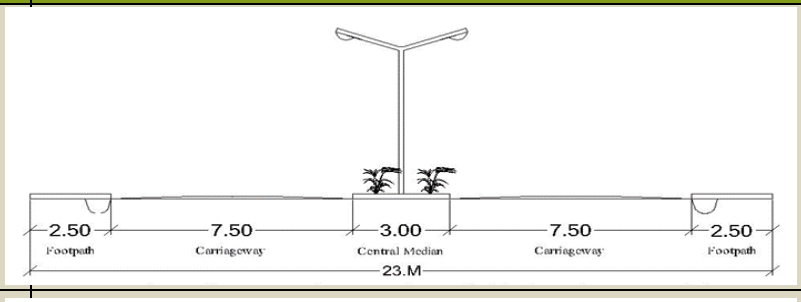
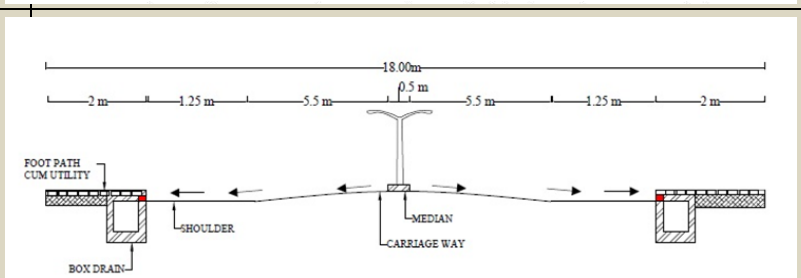
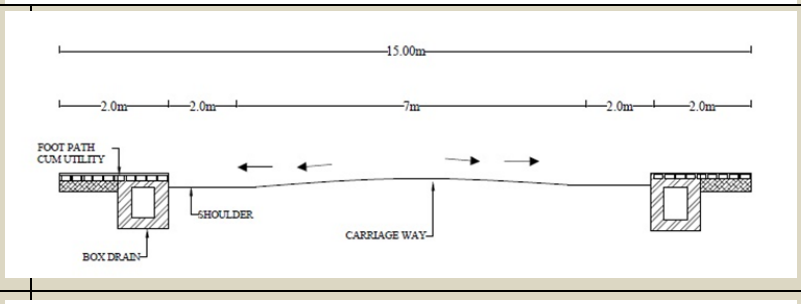
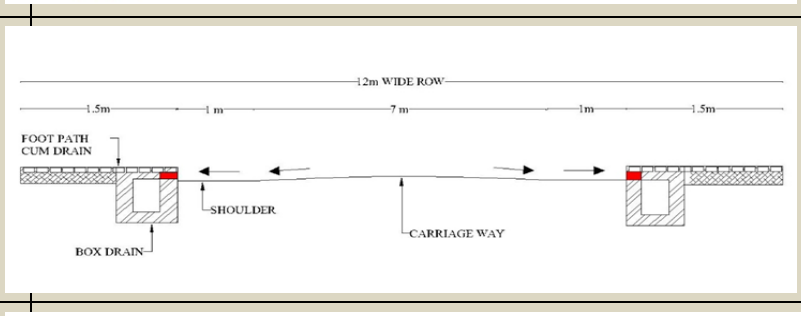
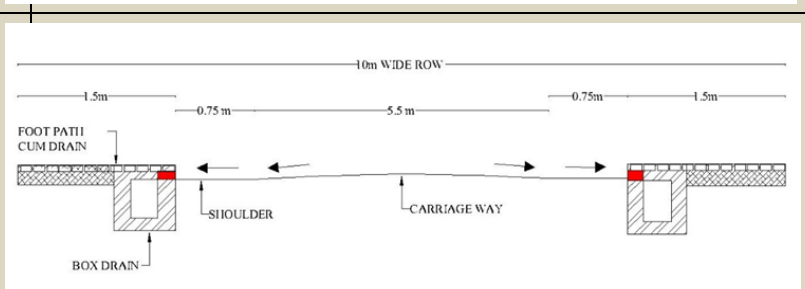
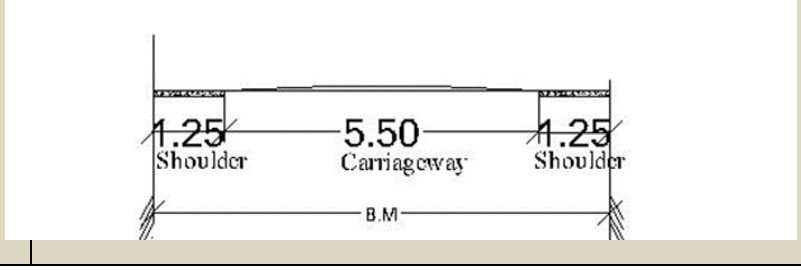


Fig. 30.2 Junction Improvement plan for Central Junction

Table 30.1 Cross-sectional Details of Proposed Roads

Sl.no	Road Hier-archy	ROW in metres	Cross Section
1	R1	23	
2	R2	18	
3	R3	15	
4	R4	12	
5	R5	10	
6	R6	8	

30.6 Bus Terminal

The existing bus stand is located at the heart of the town and the buses to and from the bus station have to pass through the core area adding on to the gridlock. Hence, a new bus stand is proposed outside the core area, besides the proposed bypass to facilitate easy access to the outer cordon points of the town without disturbing the core area.

The new bus stand would easily facilitate all the basic needs required for the passengers. This proposed bus terminal is located vey near to the new bypass, and will be accessible easily through service roads. This facility will be able to capacitate more than 30 buses at a time which would include the existing as well as future development potential in this sector.

Passenger Information centre, E-Ticketing area, PRO (Public Relation Officer) Office, Ladies Waiting Area, Well designed foyer, Well designed general waiting Area, Retail outlets, Hygienic and clean toilet Area, Digital Display of Bus timings, Clock room, Signboards directing approach route to different areas within Bus terminal, Sufficient Auto rickshaws parking within bus terminal, Spacious parking areas for two wheelers & four wheelers, Deluxe A.C. Waiting room, Facility for physically disabled person, Bus navigation system, Bank ATM, Baggage trolleys, Kiosk (For Information of Buses), 24hours Cafeteria are some of the facilities proposed to be provided in the new bus terminal. Being a green field development, the construction of bus terminal would also be considering the idea of sustainable and environment friendly development with all possible measures to ensure free flow of drainage as earlier and sufficient methods for ensuring water percolation and protect the environmental sensitiveness of the area. This project will have to be detailed considering all such aspects before materialising it.

An area of 2.10 Ha of land is demarked for this project ,and is marked as **Special Zone P4**, which is envisaged for this facility along with a proposed shopping area and market. Location details of the project are shown in figure 31.4(b) and revenue details are provided in table 31.1.

30.7 Bus bay and Parking plaza

The existing bus stand is proposed to be converted into a bus bay to engage the town buses only, for facilitating the users within the core area to board and deboard. Proper bus bays have to be provided in all bus stops within the town to enable safe and secure boarding and de-boarding of passengers and for uninterrupted traffic for other road users.

A multi level parking facility is also proposed at the existing bus stand as a measure to curtail the unauthorised parking and to facilitate enough parking for the users. An

area of 0.15Ha in the existing bus stand is marked as **Special Zone G3** for this purpose and its details are provided in in figure 31.4(a) and table 31.1.

An appropriate parking policy can address a number of objectives thereby benefiting the transport network of a city in a number of ways. Such objectives are:

- To discourage the use of private vehicles thereby encouraging public transport.
- To remove obstacles from carriageways thereby improving the steady flow of traffic and increasing carriageway capacity.
- To contribute to a city's economic activities by ensuring a 'turnover' of different vehicles rather than long stay vehicles in commercial areas.
- To satisfy social objectives of supplying adequate parking space at certain locations for certain social groups e.g. residents, mobility disadvantaged.
- The following list provides a summary of components of a parking strategy that are typically utilized by cities worldwide. The design of parking measures should conform to the adopted strategy of the city.
- Minimize the impact of on-street parking and encourage off-street parking (particularly for long-term parkers, such as commuters)
- Utilize parking controls to regulate car usage and optimize existing parking capacity, before creating new parking facilities.
- Prioritize parking in the following order: physically disadvantaged, residents, short-term visitors or commercial activities, long-term parkers such as work commuters.
- Improve safety for pedestrians by reducing illegal parking and opening additional public space for pedestrians and cyclists.
- Introduce paid parking and utilize fees and fines from parking to invest in the building of car parks and to improve public transport.
- Develop public-private partnerships (PPP) for the operation of either on-street or (more often) off-street parking facilities.

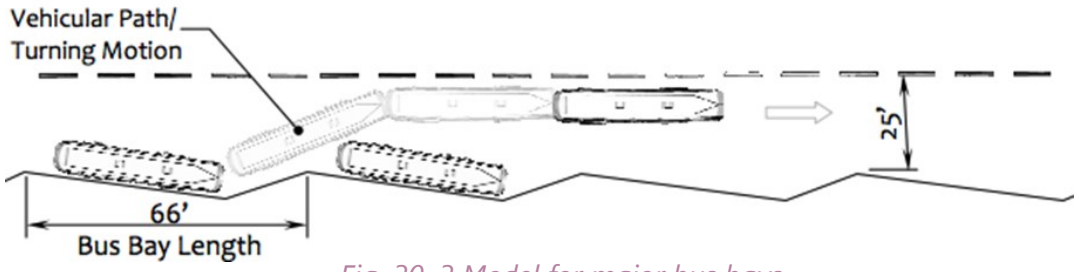


Fig. 30. 3 Model for major bus bays



Fig. 30.4 Model for other bus bays



Fig. 30.5 Model of MLCP

30.8 Truck lay by and amenity centre

The state highway connecting Palakkad and Perinthalmananna is passing through the periphery of the town and a lot of goods movement is happening in this route. As a major facilitator of this route, the municipality is also responsible for providing adequate facilities for the goods movement and its carriers. A truck lay by is thus proposed in this route near Thootha where enough space is earmarked for lay by of trucks. Proper loading and unloading facilities will also be provided here for transferring the goods to smaller vehicles for easy transportation.

An amenity centre providing rest area and washrooms for truck drivers as well as for road users with all modern facilities including cafeterias, rest rooms, dormitories, internet facilities etc will also be provided along this. **Special Zone P1** is earmarked for these facilities over an area of 0.70Ha which is further detailed in in figure 31.4(b) and table 31.1.





Fig. 30.6 Typical truck terminal layout and loading/unloading bays

30.9 Non Motorised transport facilities

Major non motorised transport in the town is walk trips. Pedestrian facilities to aid walk trips like walk ways, pedestrian crossing facilities, pedestrian refuges etc are grossly inadequate or not available in most parts of the town.

Pedestrian walkways separated from roadway provide people with space to walk safely within the public right-of-way. Pedestrian sidewalks and raised footpaths significantly reduce pedestrian conflicts with motor vehicles. From the pedestrian

survey (Fig. 17.20) major pedestrian vehicle conflicts are observed in Pattambi– cherpulassery road. Hence, it is proposed to provide 3m wide foot path on both sides of the median on these roads while widening and sidewalks of 0.5 to 2m is proposed for other roads.

Marked crosswalks which indicate preferred locations for pedestrians to cross the road needs to be provided at all major intersections and pedestrian activity locations like bus stops, educational institutions, hospitals and major commercial centres. Efforts should be made to convert the entire transportation network of the town into a barrier free environment which would facilitate specially abled persons, children and seniors. A special emphasis must be provided to bring this change in the core area extending from Puthanalkkal up to hospital junction in the beginning.

30.10 INTELLIGENT TRANSPORTATION SYSTEM (ITS) APPLICATIONS



Fig. 30.7 Model of grade separated pedestrian path and braille blocks

ITS is a wide area and has many applications which focuses on specific fields like Enforcement, Emergency care, Road Safety, Road user information etc. Some of the useful ITS applications which can be adopted in the study area are:

- Traveller Information System on board the buses and at bus stops for knowing the expected time of arrival of buses.
- GPS equipment on public transport buses for fleet management.
- Vehicle actuated signals or synchronized traffic signals to decrease overall delay.
- Red Light Violation Detection System (RLVDS)
- Speed violation detection system (SVDS)
- Helmet/ Seatbelt compliance checking system
- Wrong side/ triple ride detection system
- Emergency Vehicle Prioritisation System

30.11 Proposed Bridge

A major bridge proposed in the municipal area is Kalikadavu bridge across Thootha river, which could connect the municipality with Aliparambu panchayath of Malappuram district which could create an easy traverse of the inhabitants between these places and this could also create an economic growth in the town as the dependant population of the adjacent Panchayaths would also come here for meeting their needs.

The new bypass proposed between Kakkathodu bridge near Kacherikunnu and Manjakkal at Pattambi road would also requires a bridge at the Kakkathodu itself and several culverts and minor bridges for ensuring undisturbed flow of natural streams to the thodu adjacent to which the new road is aligned. The road shall not be at any cost act as a hindrance to the tributaries of the Thodu, obstructing the natural water flow of water.

The category of each road proposal including new roads and roads to be widened with its proposed width is shown in the table 30.2, below and the proposed road development plan is shown in figure 30.8 . The same should be enforced and must be considered for any future constructions along its alignment.

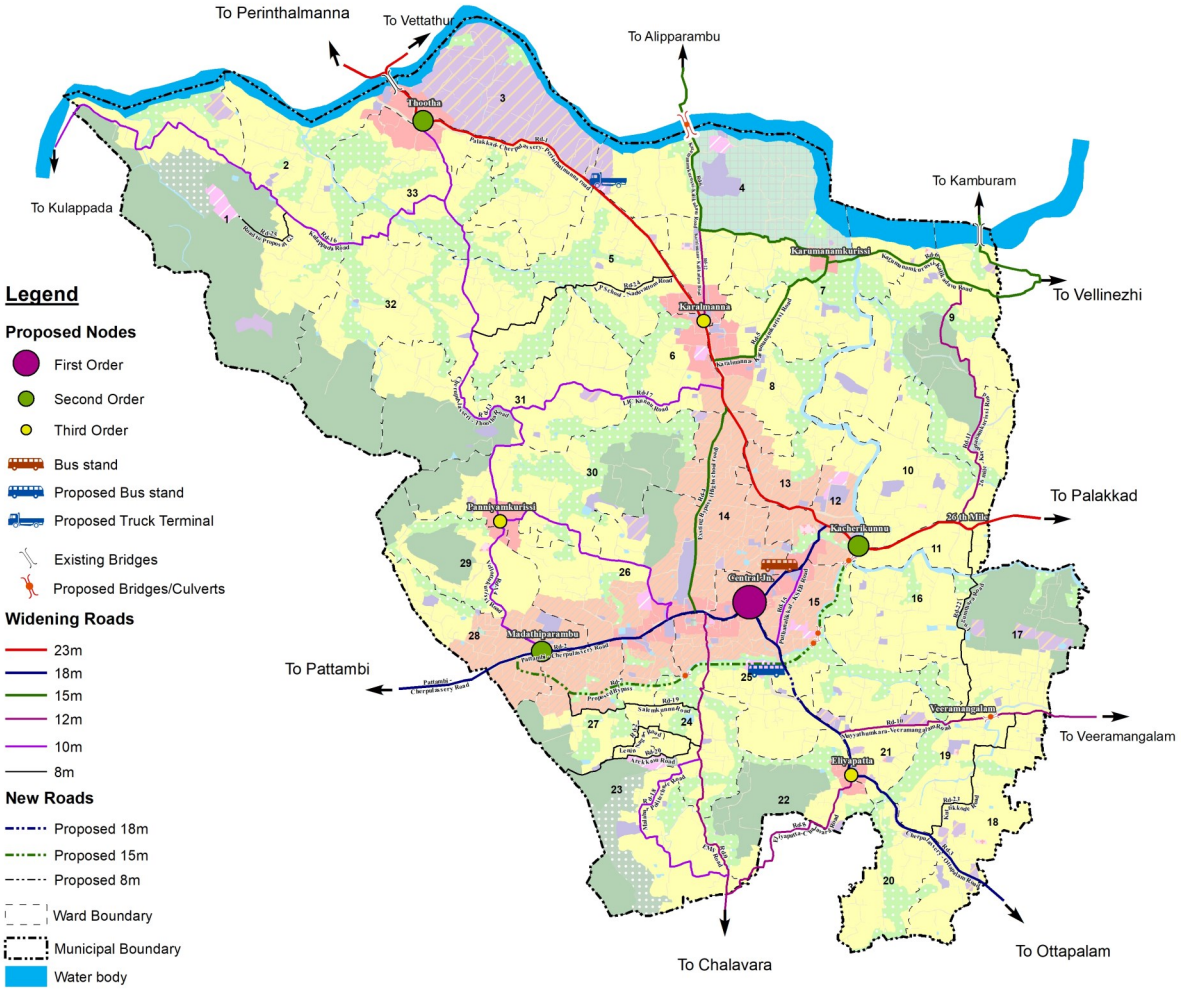


Figure .30.8 Proposed Road development plan

Table .30.2 Details of Proposed Roads

Sl. No.	Road No	Length in Km.	Exist-ing width (m)	Proposed Width of Road (m)	Nature of Proposal	Name of Road
R1 - 23 m Roads						
1	RD-1	6.8	17-24	23	Widening	Palakkad- Cherpulassery- Perinthal-manna road
R2 - 18 m Roads						
3	RD-2	3.1	14-20	18	Widening	Pattambi- Cherpulassery road
4	RD-3	3.3	10-23	18	Widening	Cherpulassery- Ottappalam road
R3 - 15 m Roads						
2	RD-4	1.7	14	15	Widening	Exsting Bypass (Highschool road)
5	RD-5	1.4	10-12	15	Widening	Karalmanna- Karumanamkurissi Road
6	RD-6	6.5	10-12	15	Widening	Vellinezhi- Karumanamkurissi-Kalikadavu Road
7	RD-7	3.5	-	15	Proposed	Kakkathodu– Manjakkal Proposed By-pass
R4 - 12 m Roads						
8	RD-8	1.7	8.5	12	Widening	Eliyapatta-Chalavara Road
9	RD-9	4.3	8.5	12	Widening	EMS Road
10	RD-10	1.7	8.3	12	Widening	Mayyathumkara-Veeramangalam Road
11	RD-11	2.4	9	12	Widening	26 mile - Karumanamkurissi Road (Upto Rd 6)
12	RD-12	0.7	8	12	Widening	Karalmanna- Kalikadavu Road (Upto Rd 6)
R5 - 10 m Roads						
13	RD-13	9.3	7.2	10	Widening	Government Hospital-Panniyamkurissi - Thootha Road
14	RD-14	1.4	5-8	10	Widening	Madathiparambu-Vellottukurissi—Panniyamkurissi Road
15	RD-15	0.7	6	10	Widening	Puthanalkkal - KPIP Road
16	RD-16	4.1	6-8	10	Widening	Nalalumkunnu- Kulappada Road
17	RD-17	2	6-7.5	10	Widening	LIC Kunnu—Karalmanna road
18	RD-18	2	8	10	Widening	Malabar Polytechnic Road
R6 - 8 m Proposed Roads						
19	RD-19	1.3	5-7	8	Widening	Shalemkunnu Road
20	RD-20	1.3	5.5	8	Widening	Arekkavu Road
21	RD-21	0.9	5.8	8	Widening	Lenin Nagar Road
22	RD-22	1.8	4-6	8	Widening	Unginthara Road
23	RD-23	1.6	6	8	Widening	Kuttikkode Road
24	RD-24	2.1	5-6	8	Widening	LP School - Naduvattom Road
24	RD-25	2.1	5-6	8	Widening	Road to proposed special zone G3

31. SECTORAL PROPOSALS

31.1. SECTORAL PROPOSALS

There are some specific projects and schemes in various development sectors which are proposed and demarcated as special zones in the proposed land use plan for the Cherpulassery municipality. The sectoral proposals and special zones are detailed hereafter.

31.1.1 Trade and Commerce

Cherpulassery has an agrarian economy and the trade and commerce is another main activity of the town and act as one of the economic base of the town. For promoting the trade and commerce following projects and schemes are proposed. A commercial activity zone has been designed at town centre in the proposed land use. In this zone, an exclusive commercial growth centre with all modern facilities like super market, whole sale trade, vegetable, fish and meat market etc.

Another commercial activity zone has been designed at around Thootha Jn which is also proposed as a second order commercial facilities like retail trade centres for vegetable, fish and meat. A municipal shopping complex and market are also suggested at the proposed second order nodes.

Many of the commercial places in the planning area are often unsuitable and unsafe for the public, because of congestion for walking and parking problems. Hence it is proposed that one or two roads along with the proposed commercial activity zone which are exclusively for pedestrians and may allot space to street vendors in these stretches. Parking area of the existing individual buildings are reduced by providing pedestrian corridors and so Parking plaza and shared parking spaces are to be provided at various spaces of the commercial area to facilitate parking.

Shopping Centre

A shopping center is a multifaceted asset to any town, driving economic vitality and community engagement. It stimulates local economic growth by creating jobs and encouraging new businesses to set up shop. For residents, it offers unparalleled convenience, reducing the need to travel far for shopping and services. This central hub becomes a focal point for social interaction and community events, fostering a sense of belonging among residents. The introduction of a shopping center often leads to improvements in local infrastructure, such as better roads and public transport, thereby enhancing the overall quality of life. Moreover, the presence of a shopping center can boost property values, making the area more attractive to potential homebuyers and investors. Offering a wide range of products and services, it ensures variety and com-

petitive pricing, benefiting consumers. In essence, a shopping center not only meets the immediate needs of the town's residents but also lays the groundwork for long-term sustainable development and community well-being. The existence of shopping centres creates local income tax contributions, cost savings to the government, inward investment, and additional growth. Put simply, a strong economy means a better standard of living, which is why it's in every community's best interest to ensure their own is as sturdy as possible.

Most centres now have offerings beyond stores and events. Most likely we can find an exciting hub of bars and restaurants among all the shops, or at least a few fast -food options. This underpins a shopping centre's place in society as it offers something online retailers can't. An opportunity to catch up with family or friends over a bite to eat, or a way to refuel in the middle of a busy shopping spree. In terms of leisure, the bigger the shopping centre, the more varied the offerings. Predominantly a cinema hall is also found to be attached to one of these complexes, but in some cases, consumers can even be offered bowling lanes, arcades,

Hence, an exclusive wholesale market for perishable items is proposed along the existing bye-pass and near to the proposed bus stand which facilitates weekly market for agricultural and traditional products, a place of leisure and shopping, an opportunity to gather and spend some quality time. A large scale shopping centre can be constructed near the proposed bus stand. An area of land 2.09 hectares is proposed as **special zone P4** for this purpose as whole.

Proposal for informal sectors

Street vendors are an integral component of urban economies around the world. The national policy on urban street vendors 2009 observes that street vending is not only a source of self-employment to the poor in cities but also a means to provide affordable as well as convenient services to the majority of the urban population.

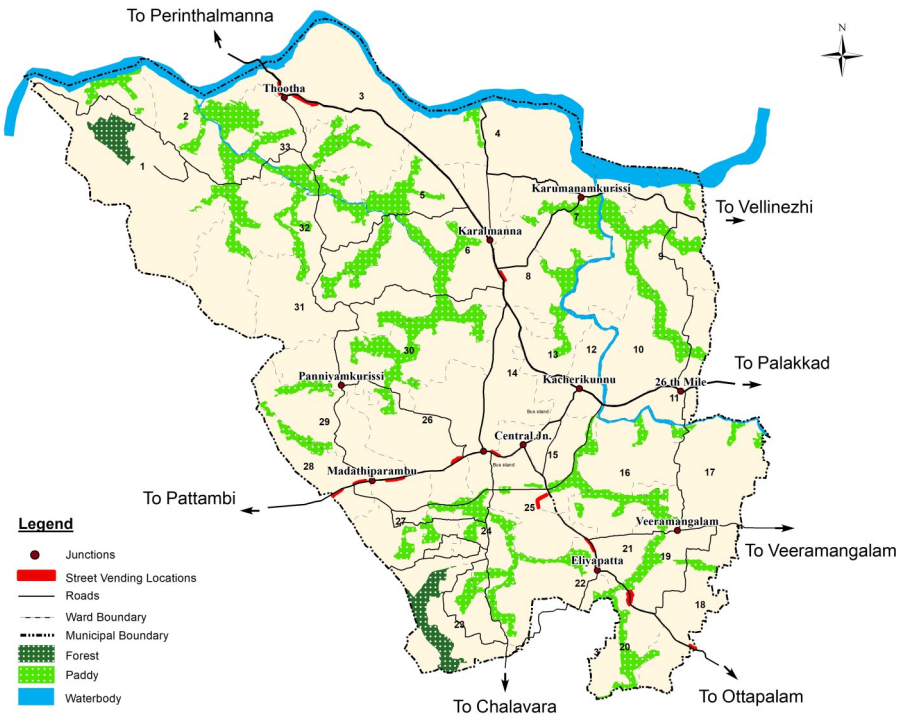


Fig.31.1. Location of Proposed street vending zones

Street vendors act, 2014 recognises the importance of providing designated street vending zones in towns. Such designated street vending zones can be proposed along one or two roads passing through the proposed commercial activity zone which are made exclusive for pedestrians. For street vendors selling perishable goods, space can be allotted in the proposed market. Facilities to be provided for street vendors include drinking water, sanitation, provisions for solid waste disposal, public toilets to maintain cleanliness, aesthetic design of mobile stalls and push carts, provisions for electricity and providing protective covers for protecting themselves as well as their properties from heat, rain, dust etc. Some suitable areas for street vending in the town, without disturbing the existing commercial activity as well as vehicular movement is depicted in the figure 31.1.

31.1.2 Industry

The industrial sector has no major role in the present economic level of the municipality. There are only small and micro industrial units scattered within the municipal area and no major and medium industrial establishments in the municipality. The town being a trade centre ,agricultural products like rubber, coconut, arecanut, tapioca, yam, jack fruit, mango etc. are brought in large quantities to the markets from rural hinder lands and from within the municipality. These potentials of the municipality can be utilised as processing and value addition products. This causes to the employment generation, and improvisation of income of local community.

Considering the industrial development within the municipality, an industrial mix zone is proposed where standard design factories can be established. They are conceived generally as eco friendly industries where buildings are established following the government norms where different units can work independently.

Another potential for this sector is private industrial parks. Such Industrial parks are already being aided by the government for providing basic infrastructure facilities with the help of KINFRA and KSIDC, if there is specified area under the project.

There is a Handloom promoting society at Karumanamkurissi under the leadership of District Industries Centre (DIC) of Department of Industries, and is proposed to uplift the firm so as to get a profitable income basis.

Large number of pottery units are working near Karalmanna as cottage industries. Some traditional bamboo units are also working as cottage industry within the municipality. For promoting these small scale units and other cottage industries a consortium can be formed at to act as a Craft Centre. All the possible measures to sustain these units like mobilization of fund, purchase of machineries, marketing facilities are to be adopted through this consortium. This, along with a **start up incubator** can be easily accommodated at the existing available space of municipal office. As a new community

hall is proposed at PWD compound, the land occupied by the existing hall can be intellectually planned for the expansion of office complex by accommodating the above facilities also. The special zone ascertained nearby the municipal office will also have enough land for the expansion of these facilities.

Marketing is the major problem faced by industrialists working in small scale and cottage industrial sector. A **permanent outlet** for their products is necessary for strengthening these units. The market place proposed near the proposed bus stand is a permanent solution for marketing of such products.

31.1.3 Tourism and Recreation

The tourism and recreation facilities are very meagre in Cherpulassery municipality and more consideration has to be given in this matters. The cultural and heritage activities presently active in the town and its surroundings are having all the possibilities for developing itself into a tourism attraction but only if brought under one roof. Similarly, despite of being an urban settlement, the peripheral areas of the town is having abundant agricultural activities and naturally rich landscapes which if opened up, shall always turned up to be an attractive tourism destination. The Thootha river and its banks could easily be transferred into spaces of recreational activity. Accordingly the following proposals are suggested for improving Agriculture and all its wonderful trappings when properly and uniquely packaged gave possibilities of Farm tourism activities.

Agriculture and Tourism

Agro-tourism, also known as agritourism, combines agriculture and tourism to offer visitors a unique experience on working farms or agricultural operations. It allows tourists to connect with nature, learn about farming practices, and experience rural life firsthand. Activities can include farm tours, fruit picking, wine tasting, livestock feeding, and participating in farm chores. Agro-tourism supports local economies by creating additional revenue streams for farmers and promoting sustainable agricultural practices. It also helps preserve rural heritage and traditions while providing educational opportunities for visitors to understand the importance of agriculture in daily life. Overall, agro-tourism enriches the tourism experience by fostering a deeper appreciation for the agricultural sector and rural communities

There are a lot of farms in private sectors which can be utilized for farm tourism. Farm tourism can include farm visits, farm stay, guided walks, and farm activities. The use of indigenous methods and organic farming is widely accepted and popular among tourists. Identification of the right one is the preliminary step. Government can provide a scheme for farm tourism so that the farm owners may get some subsidy for this activity. The farms so registered may be selected and probable farm tourism destinations in the municipality may be identified. The Agriculture department along with Tourism de-

partment may execute this project.

The lush green paddy fields can also be utilised for tourism development by conducting walks through paddy fields in proper season. The tourists can participate in the harvesting of agriculture in the traditional way and do and other activities related to agriculture. Conducting harvesting festivals, educational activities etc related to this field can also attract tourists.

Culture and Heritage Tourism

Culture and heritage tourism involves travelling to experience the unique cultural aspects and historical heritage of a destination. This type of tourism allows visitors to immerse themselves in the traditions, art, architecture, and history of a place, often through guided tours, museum visits, festivals, and interactions with local communities. It supports the preservation of cultural landmarks and practices, providing economic benefits to local populations and promoting cultural exchange and understanding

The potentials of Tourism has a major role in the economy of a planning area and culture, heritage etc are the supporting factors of the tourism activities within a planning area. The utilisation of existing potentials of this sector may cause the employment generation and uplift of income of local communities. The presence of religious institutions as Ayyappankavu, Puthanalkkal Bhagavathi temple, Thootha temple, Thirumullapulli Mahadeva etc encourages the pilgrims of the Municipality.

For enhancing the potential for heritage tourism the existing tourism structures may be renovated without affecting its basic character. Proper information boards and signal boards may be installed at all the major roads and junctions. Provision of Information centers, tablets displaying the significance and history of the location, cloak room facilities etc will make the locations more appealing to tourists and pilgrims. Sufficient parking, restroom and refreshment facilities may be provided for the visitors. A sabaramala pilgrim halt points with accommodation facilities may also be constructed in the devaswam land near ayyappankavu to facilitate pilgrims.

Valluvanad Cultural centre

Presently the classical art performs and trainings are conducted in the existing auditorium associated with Kunju Nair Memorial Trust at Karalmanna. This trust and associated facilities are proposed to be uplifted into a cultural centre which serves the state as a whole. Also considering its expansion, a **special zone P2** is earmarked here on an area of 1.06Ha. It would serve as a place where people around the globe would come and visit to experience the art forms, cultures and traditions of Valluvanad. These centre will have performing arts auditoriums, Music halls, theatre stages, art gal-

lery, book shops, seminar halls, crafts and craftsmen shop, music and arts study halls, related facilities for cultural activities, rehearsal spaces, work places for sculptures and craftsmen and short term residential facilities for artists, writers etc. In future the centre could also be elevated to an off campus study centre of Kalamandalam. The details of this special zone are *shown in figure 31.4(b) and table 31.1*

Cheenikkapara Tourism centre

The Cheenikkapara, Kalikadavu and the view of Thootha river form here create a serene atmosphere. There is a huge potential for this area to convert it to a tourist attraction with vibrant activities. Any artistic installation as in Jadayupara at Chadayamnagalam, that could attract people can be done here as a centre of attraction and the neighboring areas would definitely boost up due to this. The proposed tourism development zone along the river bank would also create a chance for development of this area and vice versa.

A comprehensive landscaping with adventure activities such as ziplining, rock climbing etc can be easily done to attract tourists. The proposed installation of any kind such as a sculpture, a statue or a building that represents the culture of Valluvanad can be provided at the top of the rock and necessary facilities to reach there shall be provided for tourists. The ancillary facilities such as rest rooms and refreshment facilities shall also be provided for the people visiting here. **A special zone P6** is earmarked here at an area of 1.78Ha and its details are provided in *in figure 31.4(b) and table 31.1*

Town Park and congregation centre

A town park offers a multifaceted array of benefits that profoundly impact the community. It acts as a natural oasis where residents can unwind, engage in recreational activities, and connect with nature, which is essential for maintaining physical and mental health. Parks serve as vital communal spaces that encourage social interactions and foster a sense of belonging, becoming the heart of community life where events, festivals, and casual gatherings take place.

Environmentally, town parks play a crucial role in promoting sustainability. They preserve green spaces, support biodiversity, and improve air quality by providing a natural habitat for various flora and fauna. The presence of a well-maintained park can also enhance the town's aesthetic appeal, making it more attractive to residents and visitors alike.

From an economic perspective, parks can increase property values in the surrounding areas, making the town a more desirable place to live. They also attract tourists, which can boost local businesses and contribute to the town's economy.

Moreover, parks often become educational resources, offering a hands-on learning environment where children and adults can learn about nature, conservation, and the importance of environmental stewardship.

In essence, a town park is not just a recreational space; it's a crucial component of urban planning that enriches the community, supports environmental health, and drives economic benefits. The multifaceted advantages of having a well-designed and maintained town park underscore its importance as a cornerstone for sustainable and vibrant community living.

An organised space for cultural activities, exhibitions, seminars, film festivals, public congregations etc. can promote the socio cultural activities of the residential communities of the municipal area. A well landscaped park with facilities for jogging, kids playing area, open gym, seating spaces, fountains etc would also provide a space for the residents to relax and spend some time with their family. A person coming to the town could also enjoy such places utilising their extra time. Considering the above, a town park and congregation centre is proposed as a **Special Zone G2** in an area of land measuring 1.80 hectares in the compound of Kanjirapuzha irrigation project, details of which are provided *in figure 31.4(a) and table 31.1.*

Papparambu Promenade

This project is planned to construct along the banks of Kunthi river at Papparambu of Cherpulassery Municipality. This location is very near to Karalmanna Junction in Cherpulassery. The proposed location is merely 340m away towards north from the SH-53, the Palakkad – Perinthalmanna State Highway. There is a proposed check dam construction near this site which would ensure availability of enough water in this area and reduces the intensity of water flow. This is an advantageous factor for developing a water front tourism including boating etc in this location. This project is proposed to create an attractive promenade along the banks of Kunthi river, which can use as a tourist spot, jogging/cycle track or an outdoor park. For this purpose, it is proposed to retain the river bank by RCC Retaining walls, additional retaining wall



Fig.31.2. Proposed promenade at Papparambu

shall be constructed at the bed level of the river by using DR Masonry, the space between these two walls can be used as a pathway for the people to access the river in summer season. The promenade proposed consists of beautiful pavements, kerb stones, handrails, cantilever slabs resembling balcony, attractive seating arrangements, tensile canopy roofing, promenade light poles, bollard lights, snack kiosks, wash room facilities, sign boards, landscaping, staircase to get down to the river for accessing boating, irrigation facilities for the plants and landscapes, electrical facilities for the park in order to facilitate lighting in the park etc.

31.1.4 Other civic amenities

Community Hall and Mini civil station

A community hall serves as a vital asset for any town, providing a dedicated space for residents to gather, engage, and participate in a variety of activities. It acts as a hub for social interaction, fostering a sense of belonging and strengthening community ties. Community halls host events such as meetings, cultural performances, workshops, and celebrations, offering a versatile venue that can be adapted to different needs. They also support local organizations and groups by providing a space for activities, promoting social cohesion and collaborative efforts.

Moreover, a community hall can play a crucial role in disaster preparedness and response, acting as a shelter or coordination center in emergencies. It can enhance the town's cultural life by hosting arts and educational programs, encouraging lifelong learning and creativity. Overall, a community hall is essential for nurturing a vibrant, connected, and resilient community, making it an invaluable part of town infrastructure

The municipal town hall is presently located at the heart of the town near the municipal office with inadequate facilities such as insufficient parking, inadequate toilet facilities and inaccessible for physically challenged persons. A well facilitated community hall for conducting various meetings and seminars etc as well as for make availing economical facilities for the people, a new community hall with all modern facilities including dining area and kitchen also with sufficient parking area is proposed in the land available with PWD near the existing guest house. Also, many government offices are situated scattered at different places within and outside the town. To bring all those offices under a single roof, a mini civil station is also a necessity. Therefore land with an extent 1.44 hectares is proposed for community hall and Mini civil station in the above mentioned land and is marked as **Special zone G1.** The constructions must be done with all the required facilities for physically challenged persons and shall be provided with a concept of self sustainable green buildings generating its own solar powered electricity and also by treating any sort of garbage

and waste generated out of these institutions. Location and other details of this special zone are provided in figure 31.4(a) and table 31.1.

Centre for Peacefulness and mind reclamation



In today's tense and stressful world, a local government initiative aimed at reclaiming peace of mind is truly a ground breaking idea. This centre ought to provide wellness to the people who need a special attention for their mind-set, for those who are not in a position to control their thoughts, feelings and manage their stresses and for people who are by birth or for some reason are unable to control their mind and activities on their own. Along with this, the people who are old aged and are to be cared by the society for the lack of their closer ones are also proposed to be admitted here for their rest of their life where they will be provided with all the care and facilities required for them. Area with extent as 3.63 hectares of land is earmarked for Centre for Peacefulness and mind reclamation in **Special Zone P9.** The centre can be managed with the help of concerned government departments or can be made run by any interested NGOs. A buds school, seniors living etc can also be planned along this. Location and other details of this special zone are provided in figure 31.4(a) and table 31.1.

Public Crematorium

Due to land constrain the residents are struggling to conduct religious funeral functions. High hire charges for safe and better cremation process are also unaffordable to the common people and the smoke raised from the fire may cause respiratory problems and air pollution. Public crematorium facilities will help to sort out such issues. An area with extent of 0.03 hectares of land is earmarked under the crematorium zone for the development of a public crematorium on the banks of Thootha river. A quality cremation facility with modern technology and fuel used shall be constructed here for the public so as to dissolve the issue.

Municipal Complex

A municipal complex is an essential component of a well-organized town, serving as the central hub for local government and public services. It typically houses various

municipal departments, including administrative offices, public works, and community services, all under one roof. This centralization enhances efficiency and accessibility, allowing residents to conveniently access multiple services in one location.

The need for a municipal complex stems from the benefits it provides to the community. It fosters better coordination among different departments, leading to improved service delivery and quicker response times. By having a dedicated space for municipal operations, the complex ensures that the local government can function smoothly and effectively.

Moreover, a municipal complex often includes meeting rooms and auditoriums, providing spaces for public meetings, town hall gatherings, and other civic events. This promotes civic engagement and transparency, allowing residents to participate actively in the decision-making process

For the expansion of existing facilities of municipal office and to upgrade the services incorporating the updated requirements and standards, an area is earmarked as **Special zone P3** near the existing municipal office for municipal complex and other allied activities. The sloping terrain of the marked land also helps to provide the office complex and storage and enforcement facilities together but without being disturbance to each other. Location and other details of this special zone are provided in figure 31.4(b) and table 31.1

Mozhikkunnam memorial Secular Corner

Mozhikkunnam Brahmadathan Namboodiripad was a prominent figure in the freedom struggle who was arrested on charges of conspiring against the government and destroying the Kakkathode bridge at Cherpulassery. After his arrest in 1921, Mozhikkunnam was tied behind a horse and dragged 14 km along the road from his ancestral house (illam) near Cherpulassery in Palakkad district. His mother Savithri Pathanady, who saw the sight through the window of the Mozhikkunnam 'illam,' could only weep helplessly. In memory of this remarkable episode of our freedom struggle, a secular corner is proposed in the town.

A secular corner within a community space can serve as an inclusive area for people of all backgrounds to gather, interact, and engage in various activities without any religious connotations. It promotes social cohesion and mutual respect by providing a neutral environment where everyone feels welcome, regardless of their beliefs. This space can host cultural events, educational workshops, and community meetings, fostering a sense of unity and understanding among diverse groups. By creating a secular corner, the community encourages dialogue and cooperation, contributing to a more harmonious and integrated society. It plays a pivotal role in fostering inclusivity and respect within a community. Such a space is dedicated to en-

couraging people from all walks of life to come together, share experiences, and engage in constructive dialogue without the influence of religious affiliations. This neutral ground supports the development of mutual understanding and tolerance among diverse groups.

In addition to cultural events and community meetings, a secular corner can host educational programs, art exhibitions, and social activities that celebrate diversity and promote a sense of shared identity. It can serve as a safe haven for discussions on social issues, human rights, and other topics that impact the community, fostering an environment where every voice is heard and valued.

Furthermore, the presence of a secular corner can enhance civic engagement by providing a venue for grassroots initiatives and volunteer efforts aimed at improving the community. It can also serve as a platform for local talent, offering opportunities for individuals to showcase their skills and contributions. Hence, a suitable land shall be identified from the available vacant spaces (available in Block 34 / 37 of Cherpulassery village) along Kalikadavu– Karumanamkurissi road for this purpose and can be transformed into a secular corner with a prominent architectural character that could display the act of courageous freedom fighter also.

31.1.5 Agriculture

Strengthening of agriculture sector is very important because this sector is main stay of Cherpulassery town. It is proposed to retain the existing paddy and to adopt measure to promote dry farm cultivation such as coconut, areca nut etc. The rubber plantation will be retained and poly crops cultivation will be promoted in the garden lands. The major development proposals under agriculture sector are given here under.

Comprehensive paddy development scheme

There are 19 paddy fields existing in Cherpulassery municipality. It is suggested to promote group farming in each micro-water shed (as mentioned earlier in fig 6.5) so as to make paddy cultivation profitable and an integrated approach is essential in paddy cultivation. This proposal is for the assistance of land preparation, mechanisation, water management, infrastructure development, harvesting operations, processing and value addition.

The activities suggested for intensive paddy cultivation are conducting awareness, workshop for cultivators and soil testing. Other progress envisaged for increasing productivity are mechanization, ensure the availability of employees who are sufficiently trained in the use of such machinery, high quality varieties seed and organic fertilizers.

Improve the vegetable, flowers and fruit cultivation

The farmers cultivate vegetables and fruits like banana in the paddy field as an intercrop. Organization such as vegetable and Fruit Promotion Council and Horticulture Development Society are promoting vegetable and fruit cultivation by giving various incentives. Other programs envisaged for increasing productivity and quality of vegetables and fruits are as follows.

Organic vegetable gardening

As a component of organic agriculture, organic vegetable gardening promotes and enhances natural diversity and biological cycle on the farm. Rather than relying on synthetic fertilizers and pesticides.

Organic banana cultivation

Organic banana farming is a profitable venture. The farmers using chemical fertilizers over the years must be encouraged to do organic farming result better soil condition and chemical free natural products.

Hydroponic Gardening

The soil-less gardening is called hydroponics. Sand, gravel, vermiculite, rock wool, peat, coir, saw dust are used instead of soil. It basically involves growing healthy plants without the use of a traditional soil medium by using a nutrient like a mineral rich water solution instead. A plant just needs select nutrients, some water, and sunlight to grow.

Roof top cultivation

The cultivation practices on the roof of a building are commonly termed as roof top cultivation. Besides the decorative benefit roof planting may provide food, temperature control, hydrological benefits, architectural enhancement, habitats or corridor for wild life, recreation opportunities and in large scale it may even have ecological benefits.

Floriculture

Floriculture is a discipline of horticulture concerned with the cultivation of flowering and ornamental plants for garden and floristry. It also includes production of planting, materials through seeds, budding, grafting and marketing of flowers and flower products.

Fodder cultivation

Scientific nutritive fodder for animals during summer months must be cultivated to counter the problem of malnutrition and decreased production levels. In

order to reduce the cost of production of milk and make dairying profitable, the area under fodder cultivation has to be increased.

Hydroponic fodder production is an innovative and efficient method of growing nutrient-rich sprouts without soil, using water-based solutions. This technique involves selecting high-quality seeds like barley or wheat, soaking them to initiate germination, and spreading them on trays in a controlled environment. By keeping the seeds moist through regular rinsing and maintaining optimal conditions, the seeds sprout and grow into nutritious fodder within 5-7 days. This method not only saves water compared to traditional farming but also provides a consistent and high-quality feed for livestock year-round. It's a sustainable solution that enhances agricultural productivity and supports the health and growth of animals .

Vegetable Market

The town is not having an organised market complex which enables the trade of vegetables, fruits etc. The products cultivated in and around the planning area should have an ideal place for trade in the town also. The proposed **Special zone P4** is having a shopping centre along with the bus terminal for which a total area of 2.09Ha of land is vested for. This shopping centre can be well developed by incorporating such a comprehensive trading centre with a market complex which enable both the cultivators and traders of the planning area to carry out their trading activities and thereby contribute towards the local economy duly boosting up the agrarian sector.

31.1.6 Animal Husbandry

Analysis reveals that the animal husbandry sector has to be taken as major supporting sector of Cherpulassery municipality. The major development proposals under animal husbandry sector are given under.

Feed and fodder scheme

This project aims to provide concentrate feed to cows purchased under Mini dairy unit scheme for a period of one year. The primary objective is to popularise scientific feeding practices among livestock farmers. The unit cost of the project is Rs. 18,240.

Calf feed subsidy scheme

500 male crossed calves of age 4-6 months were enrolled under this scheme. The calves were given nutritious feed at subsidized rate for a period of 28 months or till first calving. The unit cost of the scheme is Rs. 15,000 of which Rs. 7,500 is subsidy and Rs. 7,500 is beneficiary share.

Goat rearing units

The climate, development scenario etc of the state in general and that of Cherpulassery in particular are favourable for promoting small scale goat farming. It is proposed to establish small units each of 10 goat. Cross breaded varieties may be chosen for rearing such farms.

Poultry farming

Back yard poultry farming is a method involving low investments but having higher returns. Significant saving in feed cost, better meat being lean and fat free compared to broiler grown in confined cages and better returns to the entrepreneurs makes this method more profitable. Training for the farmers and vaccination programme should be conducted at proper time in all the poultry farms. Ensure proper chicken manure management

Integrated Farming Practices

Integrated farming is an excellent innovation for the use of organic wastes. Use of cow / buffalo manure in fish farming is a commonly prevailing practice. In this system, farmer gets milk, fish and calf as well which increases revenue and reduces input costs.

As Cherpulassery municipality is very tiny in fisheries sector, integrated farming will provide livelihood as it has more area of water resources as ponds. Fisheries department provides technical and financial assistance for integrated fish farming. The integrated fish farming utilise the waste from different components of the system viz livestock, poultry etc.

The dropping of birds in this system is utilized to fertilize the pond. Poultry litter recycled into fish pond produces 6000 kg fish per hectare per year. Success in production depends mainly on the efficiency of farmer's experience, aptitude and ability in the management of flock.

31.1.7 Housing

Currently there is an absolute housing shortage of 127 houses. There are 2084 Kutcha houses which are not structurally strong and hence needs to be immediately repaired or demolished and rebuilt to make it safe for habitation.

In the initial phase the houseless families coming under BPL category can be included under housing schemes and programmes like Pradhan Mandhri Awas Yojana, LIFE mission (See section 18.2.2), Janakeeyasoothranam, etc for the construction of structurally sound pucca houses. APL families can be facilitated with loans from banks like co operative society. Also a portion of municipalities fund may also be set aside for the construction of low cost housings for the needed. It should also be ensured that all

the houses that are going to be constructed in the future shall be structurally strong pucca houses.

Other proposals in housing sectors are

- Utilisation of barren lands for providing housing for urban poor
- Promotion of communal living by promoting flats, apartments, housing colony projects, Communal Water Supply Schemes, Common Sewage plants etc
- Promoting the use of eco friendly alternative building materials for construction activities and Use of Low cost building techniques
- Long term projects for replacement of moderate buildings which needs reconstruction in future
- Special consideration to Minority Category in construction of houses
- Include rain water storage facilities, well recharge and waste disposal facilities in housing scheme

31.1.8 Water Supply

The water supply through the existing piped water supply scheme in Cherpulassery municipality is below 40 lpcd. The supply is quite insufficient to meet the water demand. The proposed scheme by KWA is a comprehensive scheme based on Thootha river as source.

The proposed scheme is designed based on the CPHEEO guidelines. The design period for project components is taken as 30 years. The supply rate envisaged as urban standard for Cherpulassery municipality. Common component includes water treatment plant, clear water sump cum pumping station, service reservoir and pumping main with capital investment of Rs.6000 lakhs.

The scheme CWSS to Cherpulassery Municipality and adjacent Panchayaths is a comprehensive water supply scheme to Cherpulassery Municipality, Anangandi, Thrikkediri and Chalavara Panchayaths with Thootha River as source. The project is proposed to be executed in 3 phases. Phase I comprises of the common components - Intake Well, Raw Water Pump House, Raw Water Pumps, Transformers, 22 MLD WTP along with the OHSRs, GLSRs, Clear Water pumps, Clear Water Pumping/Gravity mains, distribution network of the three panchayatha. Phase II & III comprises of the components required for providing water supply to Cherpulassery Municipality and providing FIITCs. Under Phase II it is proposed to lay 100 m of 400 mm DI K9 Pipe Clear Water Pumping Main, Supply and Erection of Clear Water Pumps, Design and Construction of 27 LL capacity OHSR and providing Distribution mains in Cherpulass-

ery Municipality and in Phase III The balance distribution network and providing FHTCs for the entire house holds are envisaged to be executed under AMRUT 2.0. The proposed project under the AMRUT 2.0 is intended for providing Comprehensive Water Supply Scheme to the entire population of Cherpulassery Municipality at the rate of 150 lped for the projected population of 45413 for the year 2050. The ultimate demand for the year 2050 is 8 MLD inclusive of 20% NRW

The Administrative sanction for the common components of the CWSS to Cherpulassery Municipality and adjacent Panchayaths along with the OHSRs, GLSRs, Clear Water pumps, Clear Water Pumping/Gravity mains, distribution network of the three panchayaths has been obtained under Jal Jeevan Mission 2021 (Phase-1) for Rs. 159.19 crores. The common components included under JJM head are 1) Check dam in the Thootha River 2) Construction of 9m diameter new intake well cum pump house at Papparambu in Thootha River in Cherpulassery Municipality 3) Supplying and Laying of 4510 m of 600 m DI K9 Raw Water Pumping Main 4) Supply and Installation of Raw Water Pumps, Flow meters 5) Construction of 22 MLD WTP 6) Supply and Erection of 750 KVA transformer and allied works at Raw Water Pump house 7) Supply and Erection of 415 kVA transformer and allied works at WTP 8) Road Formation at WTP site 9) Power Allocation charges 10) PWD road restoration charges for the Raw Water Pumping Main.

The Administrative and Technical sanction for the Phase II of the project has been obtained under State Plan Head of Account 4215-01-101-97(P) for Rehabilitation / improvement works of Urban Water Supply Schemes for an amount of Rs. 10.00 Crore Under the state plan head it is proposed to lay 100 m of 400 mm DI K9 Pipe Clear Water Pumping Main, Supply and Erection of Clear Water Pumps (2 Centrifugal pumpsets -89 lps & 26 m head, with one working and one standby), Design and Construction of 27 LL. capacity OHSR and providing Distribution Mains from OHSR for a length of 9580 m (600mm DI K9 pipe 460 m; 450mm DI K9 pipe 450 m; 400mm DI K9 pipe-1160 m; 350mm DI K9 pipe -500 m; and Rider line of 160 mm PE pipe PN8 for a length of 3525 m).

In this proposed project existing intake well cum pump-house at Kalikadavu is utilized as the source and Treatment plant site with OHSR is proposed at the land identified at Samiyarkunnu. To provide a comprehensive distribution network and to effect 100% FHTCs to all house holds in the Cherpulassery Municipality the cost of project will work out to Rs. 120 Crores including road restoration charges (both PWD and Municipal roads). According to KWA the implementation of the project shall ensure uninterrupted supply of quality drinking water to all the house-holds by improving the existing piped water supply scheme shall be ensured.

31.1.9 Drainage and Sanitation

A sewer system is a critical infrastructure for any town or city, essential for maintaining public health, sanitation, and environmental quality. It efficiently manages the collection and disposal of wastewater and sewage from homes, businesses, and industries, preventing the contamination of water sources and the spread of diseases. Properly designed sewer systems help to reduce flooding by diverting rainwater away from streets and properties, thus protecting the community from water damage and promoting urban resilience.

Moreover, a well-functioning sewer system supports sustainable development by enabling the safe treatment and reuse of wastewater, thereby conserving valuable water resources. It also enhances the overall livability of an area, contributing to higher property values and attracting residents and businesses. In essence, the need for a sewer system is paramount for ensuring a clean, healthy, and sustainable urban environment.

There is no planned drainage system in Cherpulassery town. Most of the existing drainage needs repair and maintenance. De-silting operation and side protection works must be carried out with immediate effect. Development of appropriate sewerage system with efficient sewage treatment is vital to facilitate balanced and harmonized development. There is no planned sewerage system in Cherpulassery town. A detailed liquid waste treatment plan must be prepared by the municipality to develop sewerage network and treatment plants.

In the initial phase a Sewage Treatment Plant with adequate facilities for treatment of faecal sludge having a capacity of 4 MLD is proposed to treat the sewage generated from the densely populated CBD area and faecal sludge generated by the whole municipality. Sewage generated can be collected through a sewerage network which can be laid under the roads and Fecal sludge generated from the other parts of municipality can be collected using sealed vehicles. The location selected for the proposed sewage Treatment Plant is **Special zone P7** at a land area of 0.41 hectares at the bank of Koramba thode near the proposed bus stand location and by pass. The selected location comes near the Paddy lands, so the nutrient rich treated effluent can be discharged into nearby paddy fields. The treatment plant is proposed in vicinity to the town for better connectivity. . Location and other details of this special zone are provided in figure 31.4(b) and table 31.1

Public toilets are needed at major junctions like Kacherikunnu, Town Jn, Puthanalkkal Jn, Thootha Jn, Eliyapetta Jn, Karalmanna Jn, and Madathiparambu Jn. Projects like Take a break can be suitably proposed in such locations if suitable location are identified so that the travellers going across the town could also use it as a place for refreshment.

31.1.10 Solid Waste Management

Effective solid waste management is essential for maintaining public health, environmental sustainability, and the overall well-being of a community. Properly managed waste prevents the spread of diseases by controlling the accumulation of garbage that can attract pests and pathogens. It also reduces environmental pollution, safeguarding air, water, and soil quality, which is crucial for both human health and the natural ecosystem.

Solid waste management systems help in the efficient collection, transportation, treatment, and disposal of waste. They promote recycling and reuse, conserving natural resources and reducing the burden on landfills. This process not only extends the lifespan of landfill sites but also lowers greenhouse gas emissions, contributing to the fight against climate change.

Moreover, a robust waste management system can enhance the aesthetic appeal of a community, making it a cleaner and more attractive place to live and work. It supports economic growth by creating jobs in waste collection, processing, and recycling industries. Educating the public about proper waste disposal and the benefits of recycling fosters a more environmentally conscious society.

Existing dumping yard is functioning in Cherpulassery town near existing municipal office at Kavuvattom. Solid waste management has to be carried out efficiently by segregating degradable and non-degradable at house hold, commercial, institutional and industrial level which is favourable for recycling and decomposition. As the scope for development of facilities are limited in the currently available space, an alternate location near Cheenikapara is found out for expansion of waste management facilities in future. Here, Solid waste management including windrow composting is proposed and a Bio-methanation plant is also proposed in the long run. The bio-wastes consisting of market wastes and slaughter house waste can be fed into this plant. The plastic shredding units are also proposed at this land. Land admeasuring 1.05 ha is earmarked for the development of the aforementioned facilities in the **Special Zone P8** which is reserved for Integrated waste management unit.. Location and other details of this special zone are provided in figure 31.4(b) and table 31.1

Segregated dry plastic covers can be compressed using bailing machines which makes easier to be transport. It can be shredded into smaller pieces which makes it easier to be used afterwards and can be easily handed over to Green Kerala Company or similar organisations.

Other suggested methods suitable for Cherpulassery town are Pit composting, Bucket / bin composting, bio gas, recycling and waste reduction and reuse.

Pit Composting

This type of composting has to be implemented in household and in school level. Leaching from waste can easily reach in contact with the water table that is lying at shorted depth from ground level. Polythene cover provided at the bottom could prevent the ground water from leachate form pit composting.

Biogas Plants

Plan to meet cooking gas demand by producing biogas locally. It can be implemented at household level and catering and hotels. Upcoming projects for hotels and food court in beach front should be strictly monitored as they provide a bio gas plant for disposing the organic waste.

Recycling, Reuse and Reduction of Waste

Recycling can prevent the waste of potentially useful material and reduce the consumption of fresh raw materials, thereby reducing energy usage, air pollution etc. Reused waste decreases the cost of waste management and minimizes the resultant environmental impact. Super market, textile units, community hall are the major sources generating plastic carry bags, cups and plates. Way to reduce waste includes optimum use of raw materials during production, less ornamental packing and reuses the material wherever possible.

31.1.11 Energy

There is no un-electrified area within the municipal town and serious problems of voltage fluctuations are not reported. But the increasing population and the existing and proposed industrial establishment etc will cause more consumption in the future.

In order to meet the power requirement of the Municipal office, solar panels can be installed with the help and assistants of ANERT. In second phase it can be implemented in major institution including government offices and schools. ANERT is inviting people in Kerala to register barren / uncultivated land for preparing a database of land suitable for setting up solar power plants.

31.1.12 Education

Proposed Educational Complex

Cherpulassery is deprived of higher order education facilities in government sector such as a government Arts and Science College, Law institutes etc. Hence, the municipality desires to earmark certain land for probable educational institutes which

may be allotted for the area in near future. Considering the good wish of the inhabitants in and around the town, they are very much of the thought that the lack of land availability shall not be an issue in establishing any such institutes in the town. Therefore, a **Special Zone P5** is earmarked for proposed educational complex near Arekkavu in the available private land, as proposed to be acquired for the development of educational sector. Location and other details of this special zone are provided in figure 31.4(b) and table 31.1.

Smart Class Rooms

Driven by new practices in teaching and learning that build on the recognition of the powerful impact that school design has on how well students do at school, we should create flexible learning spaces for smart class room designed to suit the individual needs of every student. Every school if possible should have flexible learning and teaching spaces for groups of various sizes including a resource area, wet area, individual class rooms, a presentation space and an outdoor learning area. The concept of smart class room becomes a blessing for students in the sense that it is always easy to understand and recollect what is visually taught rather than read through pages.

Incinerator for girls toilet

With increase in institutions like schools, anganavadi, health centres etc. disposal of waste is becoming a serious problem. Both non-degradable and biodegradable waste can prove hazardous for health, if proper complete disposal is not done. In schools, disposal of sanitary cloth and sanitary napkins in girl's toilet is a big problem. There is thus an imminent need to address this important sanitary waste disposal effectively especially in terms of developing cost effective and simple technology for composite waste disposal for school.

Municipal Office, Career guidance centre and Gender Park

A career guidance centre aiming to give specific information for choosing the higher education and carriers for educated peoples, it is proposed to establish within the municipality. Same as a gender park for conducting discussions, seminars, legal helps and any other specific activities especially for the women in the neighbour are also proposed with the career guidance centre. As a new space is earmarked for the expansion of the municipal office, existing infrastructure facilities available now can easily be utilised for such projects in future.

31.1.13 Health

Upgradation of CHC to Taluk Level Hospital Facility

In order to provide comprehensive secondary health care (specialist and referral

services) and thereby make the services more responsive and sensitive to the needs of the people of the Municipal area and its surrounding LSGIs, it is proposed to upgrade the existing Community health centre to a taluk level Hospital facility. A detailed master plan for the hospital area development is to be prepared for maximimum utilisation of available area for future development. The population of Cherpulassery Municipality and its immediate influence region sums up to nearly 1,40,000 as per 2011 reports.

As per Indian Public Health Standards (IPHS 2012) services provided in Taluk Hospitals include OPD, indoor and emergency services. Secondary level health care services grouped as **Essential Services (Minimum Assured Services) and Desirable Services.** Essential Services (Minimum Assured Services) include General Medicine; General Surgery; Accidents and emergency services including poisoning and Trauma Care; General Orthopaedic; Obstetrics & Gynaecology; FP services like Counseling, Tubectomy (Both Laparoscopic and Minilap), Follow up services Paediatrics including Neonatalogy and Immunization; Anaesthesia; Ophthalmology; ENT Radiology including Imaging services; Dental care; DOT centre; Designated Microscopy centre; AYUSH; Public Health Management; Integrated Counseling and Testing Centre; Disability Certification (as per guidelines notified by state Government) Therapy and Appliances Services provided under other National Health Programmes including lifestyle disorders Diagnostic and other Para clinical services: Laboratory services, X-ray, Ultrasound, ECG, Blood transfusion and storage.

31.1.14 Sports and Wellness

Sports is an integral part of a modern civilization that behold wellness and well-being of its citizens. A sports complex is a valuable addition to any city, offering numerous benefits that contribute to the overall well-being and development of the community. It provides residents with access to a variety of sports and recreational activities, promoting physical fitness, healthy lifestyles, and mental well-being. By encouraging active participation in sports, a sports complex helps reduce the prevalence of lifestyle-related diseases and enhances the quality of life.

Additionally, a sports complex serves as a social hub where people of all ages can come together, fostering a sense of community and social cohesion. It can host local, regional, and national sporting events, which not only boost civic pride but also generate economic benefits by attracting visitors and tourism revenue. The presence of a sports complex can also inspire young athletes, providing them with the facilities they need to train and excel in their chosen sports

Cherpulassery town area is deprived of higher order facilities in this sector. Hence, a sports complex is proposed to be provided in the available PWD land along

with **Special Zone G1**. Facilities such as indoor courts for badminton, table tennis, basketball, volleyball is supposed to be provided here and workout facilities for all age categories irrespective of their gender is also planned along with the facility.

The existing school ground of Cherpulassery HSS is to be developed for outdoor facilities such as synthetic track, outdoor games such as cricket, football, hockey etc. The ground is to be redeveloped by providing turf, practice area etc. duly ensuring safety to the sports enthusiasts performing and practicing there. In a long run, a gallery shall also be constructed with adequate green rooms and toilet facilities so that the town itself shall able to hosts big sports events in future.

31.1.15 Environment

Environment can be the most peaceful and calm place and at the same time it can be the most deadly. Natural disasters occur when the Mother Nature can no longer bear the pressure that we are putting on her. Environment protection has become imperative and an urgent requirement as against the over-exploitation of national resources in the name of development and as a result of desired replenishment of all the natural resources. A proper legislative and institutional framework must be evolved for the protection of such areas which are endangered. Consistent with the emphasis on conservation of bio-diversity, a time-bound program of the flora and fauna of the regions of our town must be formulated. The various environmental regulatory agencies must be re-organized to make them self-supportive.

The various environmental programs such as river cleaning projects must also be so designed as to become inherently viable. There is a great need to motivate the industries through incentives to be responsive to environmental protection measures and thereby cooperate with the regulatory agencies in their endeavour to implement environmental safe-guards. Environment education and awareness must be accorded top priority. The local institutions and the community must be involved in implementing environmental protection programs and bringing about environmental awareness.

The following proposals are suggested to save the Thootha River and other water bodies.

- Bank protection works.
- Greening with plantation of evergreen trees to form a buffer strip of 20 m width for Thoothapuzha and 5m green strip for 'Kakkathodu'
- Imposing restriction on illegal Sand mining.
- Banning of discharge of untreated sewage and solid waste into them.

- Take measure to check encroachment of its rivulets/canals.
- De-silting should be carried out periodically.
- Preparation of action plans for control of water and air pollution.

31.1.16 Governance

Municipal e-Governance aims at a web based application for covering services like Basic citizen services, Revenue earning services, Development services, Efficiency improvement services, Back office improvements and Monitoring. In this modern world, tedious procedure of registration, application and issuing has to be rectified. Major proposals are:

Application in e-governance through GIS support in Eight functional service are-as of ULBs-registration and issue of birth & death certificate, payment of property tax & utility bills, management of utilities that come under the ULBs, Citizen grievances & suggestions, Building plan approvals, procurement and monitoring of projects, health, accounting system and personal information system. Service Kiosks can be provided in each zone.

31.1.17 Disaster preparedness and mitigation measures

The 2018 witnessed unprecedented and heavy flood in majority of the rivers in kerala. Lack of awareness of disaster preparedness and management increased the severity of the damage the flood caused manifold. Banks of Thoothapuzha and Kakkathodu was also flooded in many locations. Residential areas near Kottakunnu and veetikadan hills experienced landslides to small extend. This calls for the need of preparation of a disaster management plan for the municipality.

The general approach about flood management has been in the form of physical measures to prevent the flood waters from reaching potential damage centers. Measures are also needed for preventing land slides caused out of man made disturb-ances. This includes

- River and bank protection programs
- Conservation of paddy fields
- Ensuring proper drainage facilities
- Un controlled slope deformations
- Un controlled Quarrying

In addition to these, plot level interventions are also required for controlling these

hazards which are discussed below.

Plot Level Mitigation Measures

The built environment guidelines can be introduced in the hazard prone areas. Separate guidelines for Flood Prone and Landslide Prone Area can be enacted.

Built Environment Guidelines for Flood Prone Areas

⇒ **Site Layout**

- Ground should be sloping away from the building
- Distance between any two buildings within a plot other than accessory buildings shall not be less than 3 meters.

⇒ **Foundation**

- Three types of foundations designs are suggested based on the soil conditions.
- Hard soil available at a depth of 60cm – Strip foundation can be adopted.
- Hard Soil available at a depth of 1.5m - brick pedestal piles may be used with a plinth level RCC beam at top to support the superstructure.
- Soft soil available at a larger depth – Deep RC pile foundation at a depth of 3m has been suggested with appropriate RC bulb at the foundation.

⇒ **Plinth**

- The plinth level of the house must be above the most common flood level in the area and naturally above the drain level in the village as far as possible.
- The plinth of the house must be made of non-eroding material such as reinforced concrete, plain concrete, masonry constructed in cement mortar etc.

⇒ **Superstructure**

- The superstructure walls can be constructed using different materials like brick work, concrete block work etc.
- Also if the inundation level rises, the wall material should not become soft and dissolve under water.
- At the top level of the walls there will have to be a horizontal frame work (lintel) or use of an eave level band beam or all around integrated with the superstructure walls/frame to provide integrity to all the enclosing wall system. In case, RC slab roofs such a band or beam may not be necessary.

⇒ **Floor level requirement**

- Unless otherwise specified by the appropriate authority,
- The finished floor level of habitable rooms must be above the flood hazard level

- The finished floor level of enclosed non-habitable rooms must not be more than 1.0 m below the Defined flood level (DFL).

⇒ **Requirement for Egress**

- Egress from a balcony, veranda, deck, door, window or the like must be available to allow a person in the building to be rescued by emergency services personnel, if rescue during a flood event up to the Designed flood elevation (DFE) is required.

⇒ **Roof**

- Houses in the flood prone areas should be made with flat horizontal roofs which could be used as the shelter by the family. This will become necessary when the flood water will rise above the waist level in the house.
- Also either a permanent stair system will have to be devised, or a ladder will have to be kept by the occupants of the house to use it for going to the roof at the time of the need. For the same reason the roof must be provided with a parapet for providing security to the people when they are using the roof for temporary living.

⇒ **Requirement for Enclosure below the Flood Hazard Level (FHL)**

- There shall be no enclosed space below the design flood level except for building access, exits, foyers, storages and parking garages.
- The total net area of openings for an enclosure shall be at least 0.4 m2, or 7 per cent of the floor area of the enclosure, whichever is greater.

⇒ **Requirement for Utilities**

- Electrical: Electrical switches must be placed above the flood Hazard Level (FHL). Electrical conduits and cables installed below the FHL must be waterproofed or placed in waterproofed enclosures.

⇒ **Requirements for Structural attachments**

- Erosion control structures that are attached to the foundation or superstructure of the building must be structurally adequate and not reduce the structural capacity of the building during the DFE.
- Decks, patios, stairways, ramps and the like below the Flood Hazard Level (FHL) that are attached to the building must be structurally adequate and not reduce the structural capacity of the building during the Designed flood elevation.

⇒ **Flood Damage**

- It is important that all parts of a building or other projections that are susceptible to flooding (including fasteners and connectors) be made of materials that are resistant to flood damage.

Built Environment Guidelines for Landslide Prone Areas

⇒ **Site Conditions**

- In order to ensure safety, it is necessary to investigate the geological quality of those areas, which were not severely damaged by the landslide and site which have landslides in its vicinity.
- Site the roads parallel to the contour lines in the demo housing area.
- Carry out geotechnical investigations prior to earthworks.

⇒ **Modification of slope geometry**

- To improve the geometry of a slope, the stability of the slope should be determined through the material the slope is made of, slope gradient, and the geological structure of the slope.
- Placing an appropriate cut or fill in the correct location of the slope will increase the slope stability. Geological and hydro geological conditions and soil parameters should be analyzed prior to cutting of the slope.
- Filling can be carried out at the toe of the slope to balance the driving force of loading from top, with proper gradation, compaction, and gradient.
- When selecting fill material, it is important to pay attention to their strength and deformation characteristics.

⇒ **Land development regulations**

- The houses could be designed with split levels to minimize disturbance to the hill slope, thus controlling erosion and earth slip
- Minimize the depths of cut and fill to the possible extent to preserve topography
- Use the engineered retaining walls in the selected areas of the sites and within the split level house.
- Implement storm water management practices such as permeable surfaces, retention basins to control the flow of water and reduce soil saturation.

⇒ **Improvement of drainage**

- A properly designed surface drainage network has to be constructed in order to prevent surface runoff from springs and rainfall infiltrating the slopes and/or landslide area to avoid increase in pore water pressure.

⇒ **Retaining wall construction**

- Stability of the slope can be improved by increasing the resisting forces by the construction of an appropriate type of retaining structure.
- Commonly used retaining structure types are masonry, reinforced concrete, Gabion wall and sheet pile walls, bored piles, steel sheet piles, reinforced soil walls.

⇒ **Green Stabilization**

- Retain natural vegetation to the maximum during site clearing.
- Delineated Protective buffer zones around slopes, water bodies, and other critical areas should be maintained as natural habitats, and the clearing the vegetation within them should be minimized to reduce the risk of slope instability
- Promote sustainable practices, including the use of native plants, erosion resistant land covers and integrate green infrastructures elements such as rain gardens and vegetation swales.

Non structural measures

Relief Camp Locations for each settlement

Relief locations and rehabilitation centers shall be set up in order to accommodate people affected by disaster. The camps should be set up in such a way that it is safe from all the hazards, accessible to possible affected communities and the service providers, have basic minimum capacity and facilities to accommodate people.

Identification of Safe Routes

Safe routes and alternate routes have to be mapped and communicated to the citizens through effective media to help the rescue operations. The proposed road network shall ensure reaching of every nook and corner of the planning area in case of a calamity. A crucial element in mitigation involves the smooth and efficient evacuation of people to the nearest safe town. Particularly during floods, where roads and bridges sustain the most damage. The Proposed roads will efficiently guide affected residents to the closest and safest nearby town, aiming to provide a convenient and secure evacuation route during challenging situations such as floods.

Life line store

Life line stores are to be constructed and equipped with all lifesaving tools and equipment's necessary for rescue and evacuation operations. The primary life line store

is identified near the municipal office complex itself. The item to be stored include fiber boats, life jackets, hammers, ropes, driller, wood cutter, concrete cutting machine, torch lights, candles, loudspeakers, generators, pumps, motors etc.

The selected camp locations and safe route to locations are shown in figure

Rapid Response Team

It is proposed to create a Rapid Response Team in the Municipality Level to act in case of emergencies. For this, the municipality should facilitate a control centre from where all the rescue operations may be handled and controlled. The RRT must have well trained volunteers who can be employed for emergency recue services. They must be well equipped for carrying rescue and rehabilitation operations, shelter management, controlling and coordinating life line store, warning systems and ensuring communication facilities etc.. The control room must have a unique control room number and must be facilitated with enough contact numbers of rescue teams

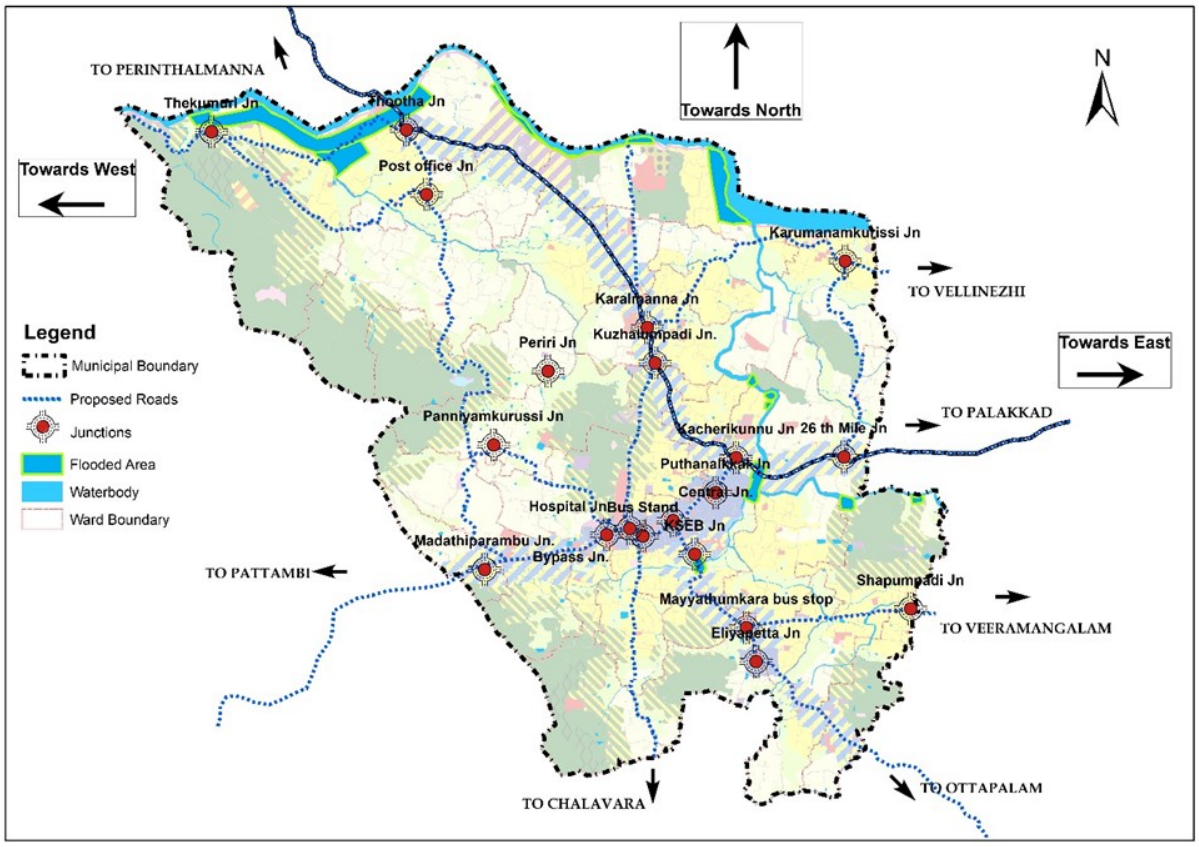
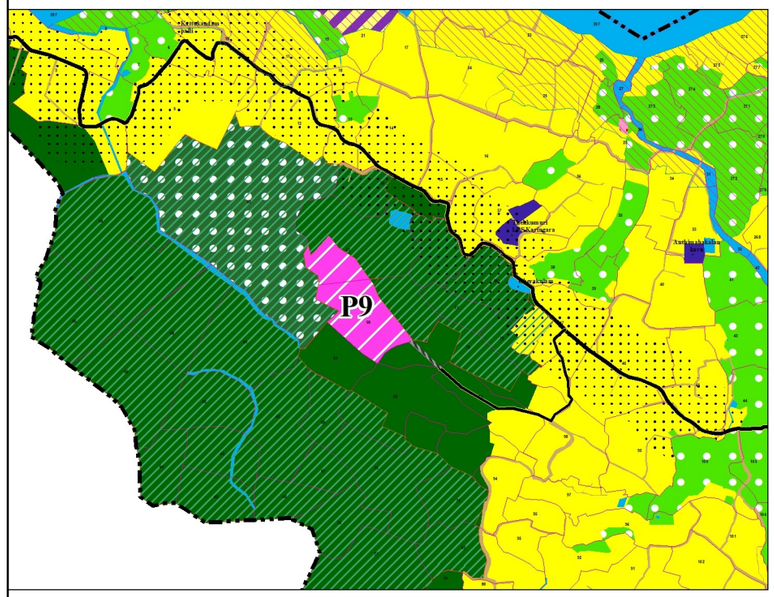


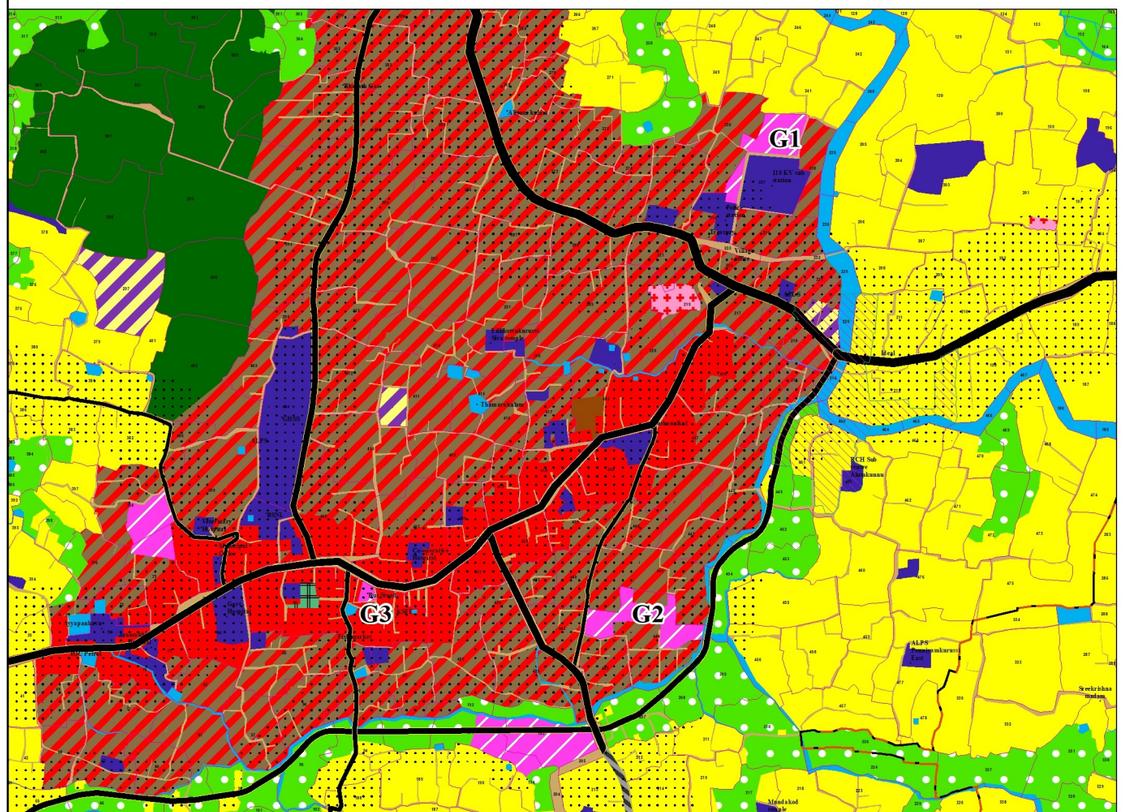
Fig. 31.3 Proposed Safe routes and relief camp locations mapped for Cherpulassery Municipality

Table 31.1 Details of Sectoral Proposals

Sl.no	Zone Name	Project Details	Area (Ha)	Revenue Details
1	G1	Community Hall, Mini civil station and Sports complex	1.44	Cherpulasseryppulassery village, Block number 42, survey number 23/1,2
2	G2	Town Park and congregation centre	1.80	Cherpulasseryppulassery village, Block number 42, survey number 444/1
3	G3	Bus bay and parking plaza	0.15	Cherpulasseryppulassery village, Block number 43, survey number 90/7
5	P1	Truck lay by and amenity centre	0.70	Cherpulasseryppulassery village, Block number 41, survey number 327/2
6	P2	Valluvanad Cultural Centre	1.06	Cherpulasseryppulassery village, Block number 41, survey number 382/8, 382/9
7	P3	Municipal complex	1.48	Cherpulasseryppulassery village, Block number 42, survey number 383/5, Block number 43, survey number 73/1
8	P4	Bus terminal cum Shopping centre	2.10	Cherpulasseryppulassery village, Block number 43, survey number 191/3,5,6, 193/5-14, 194/1,2,4
9	P5	Proposed educational complex	2.40	Cherpulasseryppulassery village, Block number 43, survey number 132/2-4, 133/1
10	P6	Cheenikkapara Tourism centre	3.55	Cherpulasseryppulassery village, Block number 42, survey number 1/2, survey number 2/2
11	P7	Sewage Treatment Plant	0.41	Cherpulasseryppulassery village, Block number 43, survey number 193/2,3, 193/4,5
12	P8	Integrated waste management unit	1.05	Cherpulasseryppulassery village, Block number 42, survey number 2/2
13	P9	Centre for Peacefulness and mind reclamation	3.63	Cherpulasseryppulassery village, Block number 41, survey number 50/3, 51/2



P9 - Centre for Peacefulness and mind reclamation
3.63 Ha



G1 -Community Hall ,Mini Civil staion and Sports Complex
1.44 Ha

G2 -Town Park and Congregation centre
1.80 Ha

G3 -Bus bay and Parking Plaza
0.15 Ha

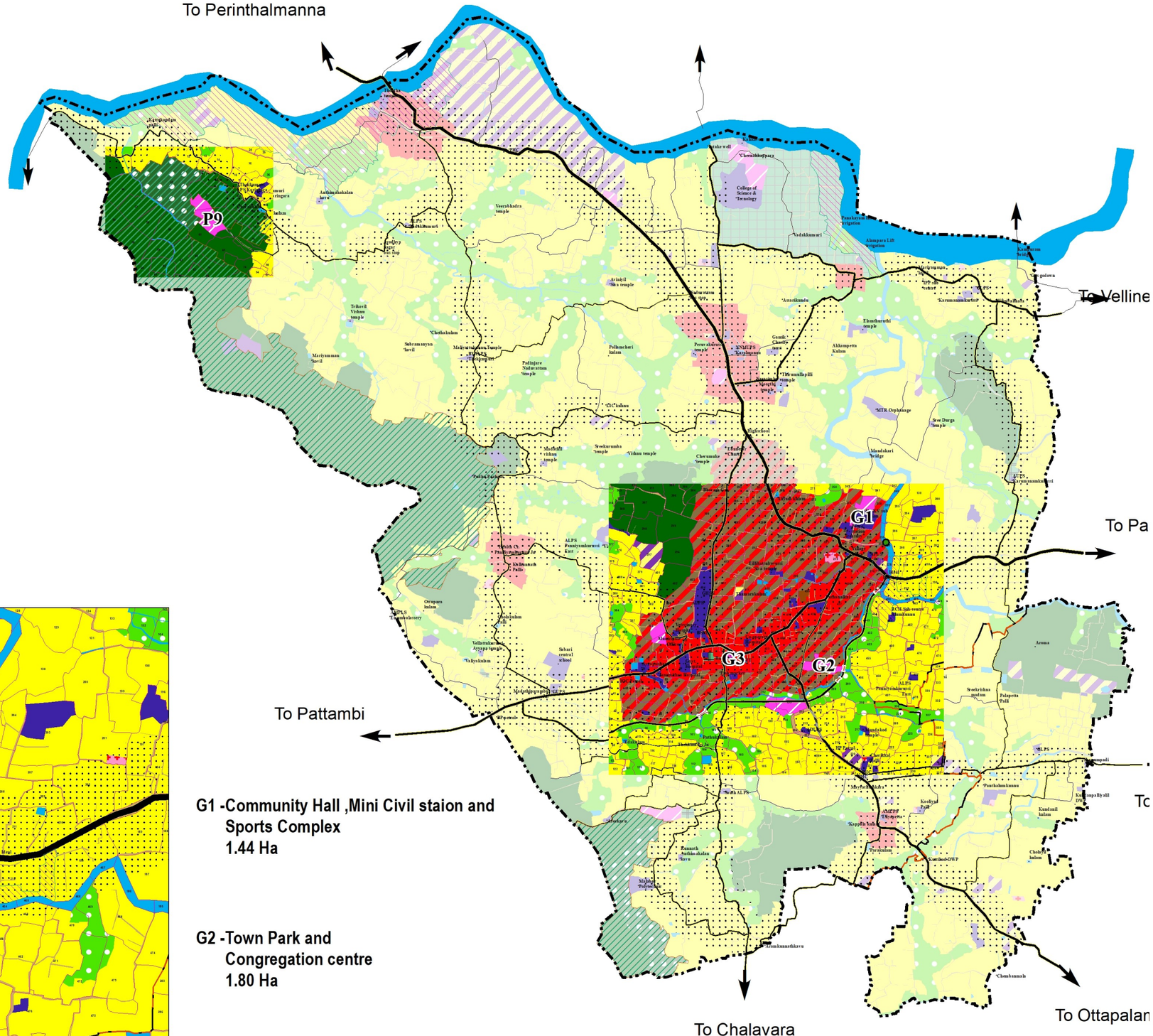
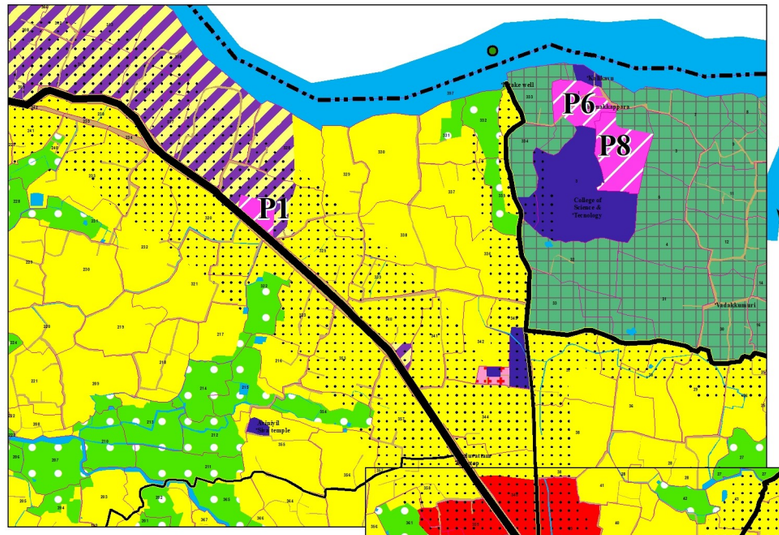


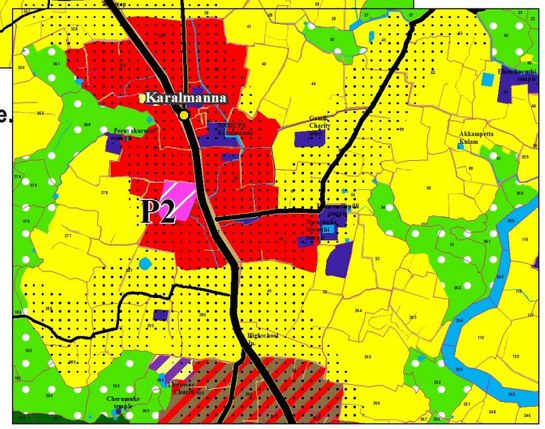
Fig No.31.4(a) Special Zones



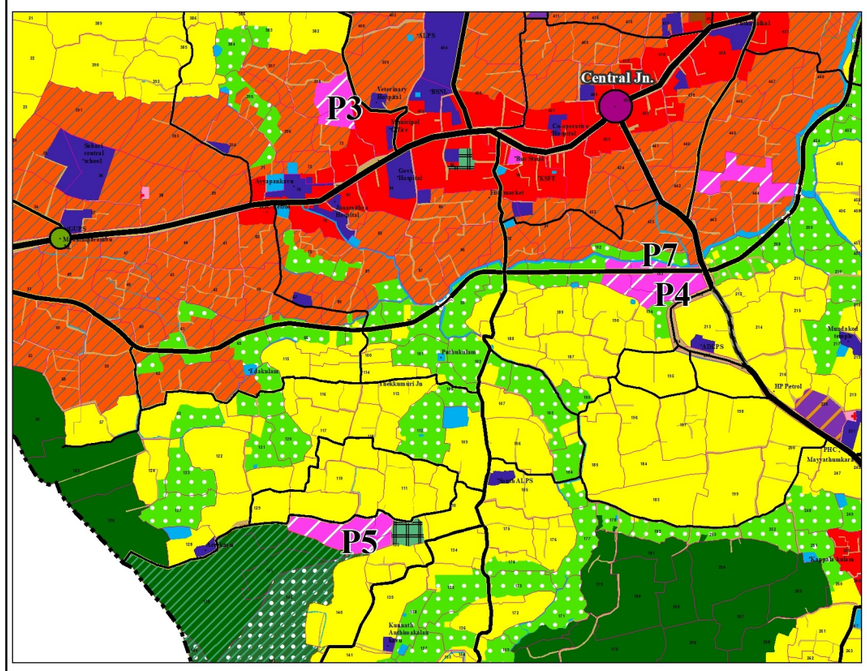
P1 - Truck lay by and amenity centre.
0.70 Ha

P6 - Cheenikkapara Tourism centre
3.55 Ha

P8 - Integrated Waste Management Unit
Area : 1.05 Ha



P2 - Valluvanad Cultural centre
1.06 Ha



P3 - Municipal Complex
1.48 Ha

P4 -Bus terminal cum Shopping centre
2.10 Ha

P5 - Proposed Educational Complex
2.40 Ha

P7 -Sewage Treatment plant
0.41 Ha

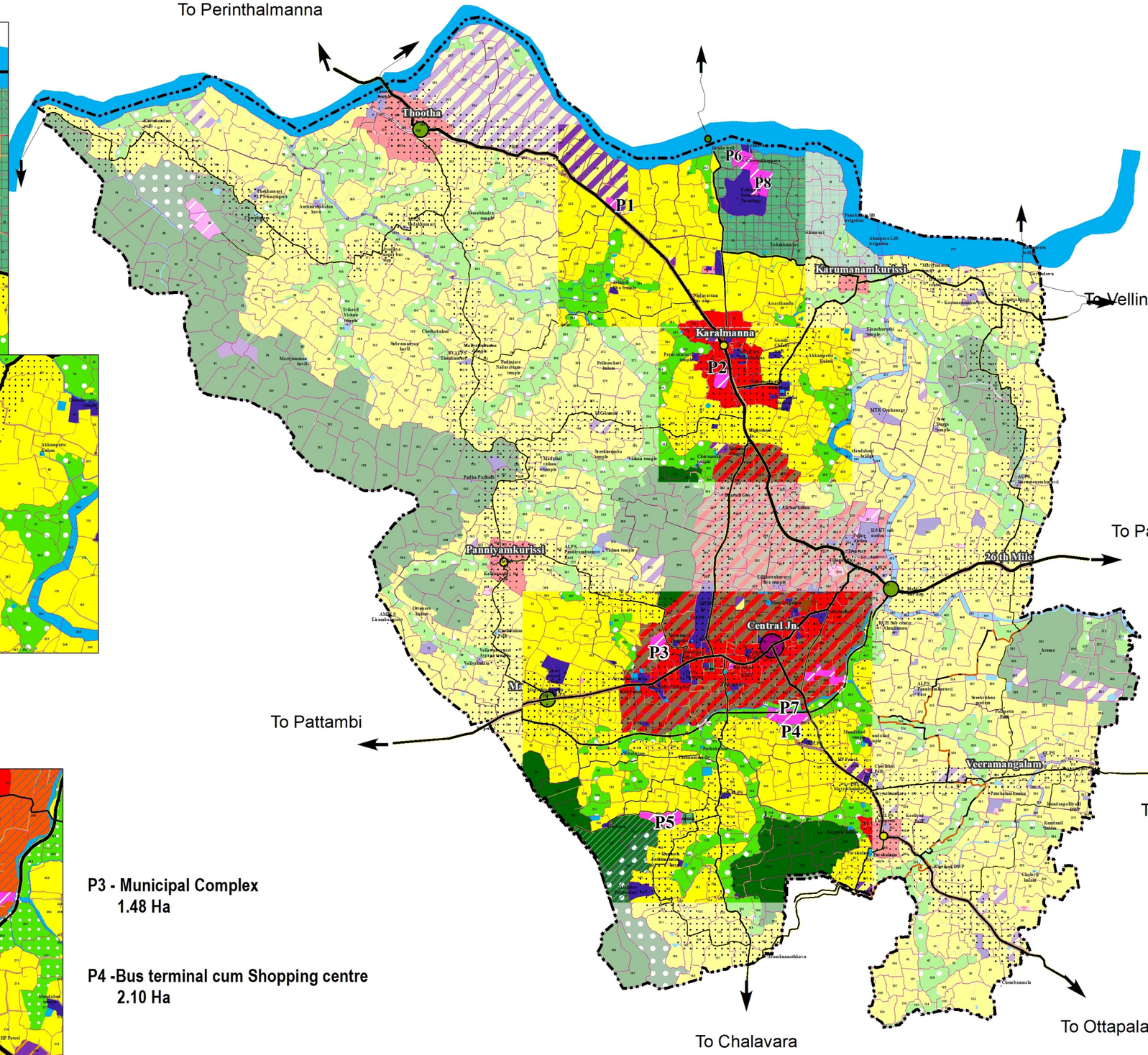


Fig No.31.4(b) Special Zones

32.PRIORITY PROJECTS, ACTION PLAN & PHASING

In this chapter various projects proposed in traffic and transportation plan and sectoral proposals are prioritised based on their importance and urgency, the action plan to execute the projects and its scheduling or phasing is also described here.

32.1 Feasibility of Implementation through Public-Private Partnerships

As per Asian Development Bank, the term "public–private partnership" describes a range of possible relationships among public and private entities in the context of infrastructure and other services. PPPs present a framework that—while engaging the private sector—acknowledge and structure the role for government in ensuring that social obligations are met and successful sector reforms and public investments achieved. The private partners can be local or international and may include businesses or investors with technical or financial expertise relevant to the project. Increasingly, PPPs may also include nongovernment organizations (NGOs) and/or community-based organizations (CBOs) who represent stakeholders directly affected by the project. The local bodies contribution to a PPP may take the form of capital for investment (available through tax revenue), a transfer of assets, or other commitments or in-kind contributions that support the partnership. They also provides social responsibility, environmental awareness, local knowledge, and an ability to mobilize political support. The private sector's role in the partnership is to make use of its expertise in commerce, management, operations, and innovation to run the business efficiently. The private partner may also contribute investment capital depending on the form of contract. The structure of the partnership should be designed to allocate risks to the partners who are best able to manage those risks and thus minimize costs while improving performance.

Here, many of the sectoral proposals discussed opens up a scope of implementation through Public Private Partnership projects. This would ease out the implementation to a larger extend and helps its to get completed in a time bound manner. Projects that requires a large scale investment such as bus terminal, tourism project, cultural centre, truck layby etc are some of the examples for such sort of implementation.

However, some of the projects that are to implemented solely in view of social responsibility without any profit motive shall be implemented under the execution capacity of the Local body itself. For such projects the municipality shall be responsible for finding resources as well as implementation mechanism. Some of the projects that are to prioritised on the basis of the urgency of implementation with phasing and costing is detailed hereunder.

Table 32..1 Priority Action plan, Phasing and Costing

Sl. No	Name of Project	Priority	Phasing	Fiscal Requirement (in crores)	Implementation mechanism	Resource mobilisation
1	Integrated waste management unit	Top	0-5	1.02	Municipality with the help of KSWMP & Suchithwa mis-	Funds from state and central governments
2	Sewage Treatment Plant	Top	0-5	31	Municipality with the help of KWA & Suchithwa mission	Funds from state and central governments
3	Cherpulassery By pass	High	5-10	51.50	PWD	State Plan Fund
4	Bus terminal	High	5-10	6.20	PPP/ BOT	Municipal Own Fund/ Investors
5	Shopping centre	High	5-10	5.30	PPP/ BOT	Municipal Own Fund/ Investors

Sl. No	Name of Project	Priority	Phasing	Fiscal Re-quirement (in crores)	Implementation mechanism	Resource mobilisation
6	Cheenikkapara Tourism centre	High	5-10	3.70	Municipality with the help of KTDC, KTIL etc.	State plan fund, investors
7	Town Park and congregation centre	High	5-10	3.0	Municipality	Own fund
8	Community Hall and Mini civil station	Medium	10-15	20	Municpality/ PWD	State plan fund, own fund, MP/ MLA funds
9	Valluvanad Cultural centre	Medium	10-15	3.25	State cultural dept/ Lalithakala Acade-my	State plan fund, donations and sponsorships
10	Truck Lay by and amenity centre	Medium	10-15	5.00	PPP/BOT	Municipality and investors

32.2. Integrated Waste Management unit

32.2.1. Location details

The selected location for the Integrated waste management plant proposal lies in a land selected for Office complex and integrated waste management unit in 1.05 Ha land on Block number 42, survey number 2/2 behind Cheenikkapara. The location is accessible from Kalikadavu—Karumanamkurissi road and Karalamanna junction via Kalikadavu road. This is a rocky vacant land in the vicinity of the municipality. The location is selected away from town and also from densely populated areas within the town. The selected land is a Private land.

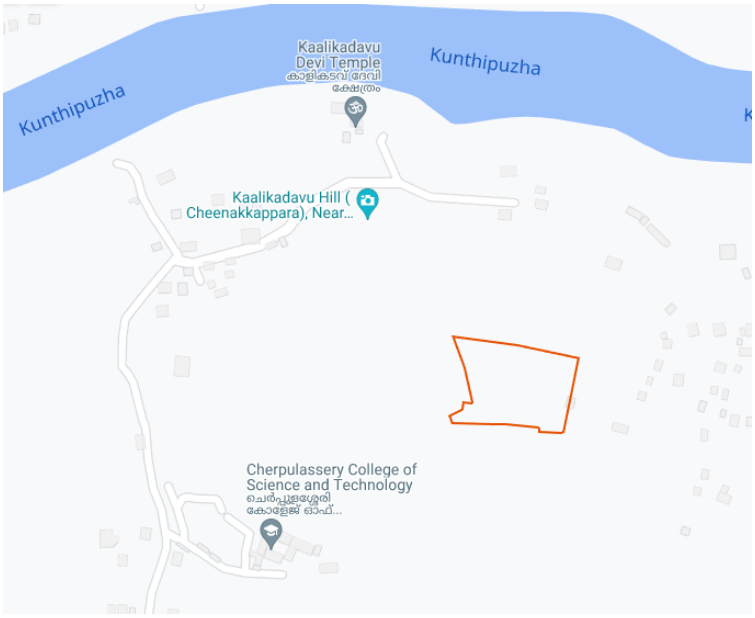


Fig.32.1. Location of Proposed Integrated Waste Management unit

32.2.2. Project Brief

The proposed project include the construction of a solid waste management system for the disposal of bio degradable and non bio degradable solid waste.

It includes the construction of

- Mini material collection facility in each ward
- Resource recovery facility with Plastic shredding and bailing units for the disposal of plastic
- Glass crushing unit
- Aerobic bin composting unit Thumboormozhi model 6 numbers
- Offices and parking facility
- And other associated facilities

The shredded plastic can be recycled or can be used for making tar. Recovered broken glass can be crushed and used in asphalt pavement. Colour-sorted glass is crushed and sold to glass manufacturers as cullet, an essential ingredient in glassmaking. Composts can be bagged and distributed for agricultural purposes. The leachate generated can be transported to sewage treatment plant and can be treated along with sewage.

32.2.3. Need for the project

Proper management of waste is important for building sustainable and liveable towns. Due to increased population, mounts of waste is generated in the municipality everyday. If not managed properly it can cause soil, water and air pollution and hence pose serious health threats to the residents of the municipality. A proper system must be set up in the municipality for the collection, transportation and disposal of solid waste generated. The waste can be segregated at the source itself by the usage of different coloured dust bins for different types of waste. A fees can be set up per the amount of waste generated from large waste generators. The waste can be collected door to door by waste collectors and can be transported to the facility in closed vehicles to avoid odour nuisance. The products from treated waste like bio gas, manure, plastics, broken glass, paper etc can be used for generation of energy or agricultural purposes or can be sold to generate revenue.

Table 32.2 Responsible agencies for the project

Responsible agencies	Role
Suchitwa mission/ KSWMP	• Scrutinize the Designs and DPRs • Channelise funds from state and central gocernment for the implementation of the projects.
Municipality	• Purchase the land and prepare a solid waste management plan • Prepare local bye-laws for waste management • prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorised agency; • Create public awareness through information, education and communication campaign • Allocate funds and allot agencies for the development of infrastructure.
Kudumbashree	Collection of segregated solid waste through Haritha karma sena
Green Kerala Company	Collection of Plastic and by products
Consultant	Preliminary estimate, Functional design, Engineering design, Detailed estimate, detailed project report,
Contractor	Construction of infrastructure

32.2.4. Suggested implementation mechanism

The suggested location falls in privately owned dry land. The Municipality can procure the land by suitable means. The power and responsibilities of constructing sanitation facilities rests with Local self government. Suchitwa Mission under the LSGD is responsible for providing technical and managerial support to the LSGI. The operation and maintenance of the treatment plant can be done by the municipality through user levies or from various funds allocated by government.

32.2.5. Other associated issues to be addressed

- This main road access is proposed to be widened to a width of 15 m. The connection road to the facility shall have a minimum access width of 8m.
- Awareness creation among the people in the municipality about the importance of waste management.
- Necessary clearances from various agencies
- Creation of green buffer strip around the plant.
- Development of a safe and healthy collection and transfer system of solid waste.

33.2.6. Approximate project cost and funding.

Table 32.17shows approximate project cost for the construction of treatment plants. The total project cost comes around 138 Lakhs. The project should be implemented in first phase itself.

Table 32.3 Approximate project cost for the project

Sl No	Item	Amount in lakhs
1	Cost of Land as per fare value	14.90
2	Mini material collection facility (33 Nos)	22.77
3	RRF in 2000 Sq.feet including construction of building,Water supply & Sanitary arrangements, Plastic shredding machine and Bailing Machine with necessary accessories, electrification etc	22.6
4	Composting facilities for bio degradable waste.	12.36
5	Glass crushing unit, office, parking, and others	30
	Grand Total	**102.63**

32.3 Sewage treatment plant(STP/FSTP)

32.3.1 Location details

The selected location for the sewage treatment plant proposal lies in a 0.43Ha area in Block number 43, survey number 193/12, 193/13. The location is near to the town and its elevation is lower than the town. So the sewerage generated in the town core area can be transported to the plan through sewer lines under gravity flow. The selected site is in proximity of cultivated paddy fields. Hence the nutrient rich treated effluent can be discharged into the paddy field. This will improve the soil fertility and boost agricultural economy. The proposed bypass available to the location ensure its connectivity to road network. The selected land is a private land.

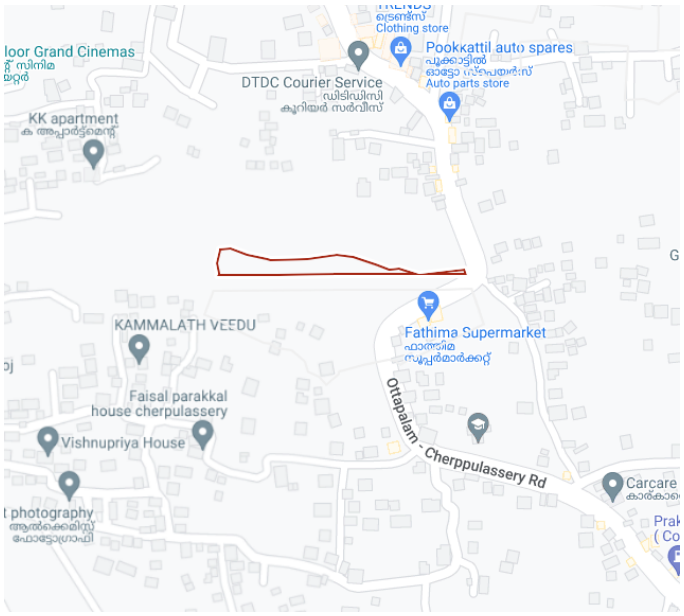


Fig.32.2. Location of Proposed Sewage Treatment Plant

32.3.2. Project Brief

Increased population density and use of leach pits and improperly constructed septic tanks for sewage disposal is polluting the ground water. The e-coli content in ground water samples are found to be dangerously high. Hence there is a urgent need of construction of sewage treatment system in the Municipality.

In the initial phase a Sewage Treatment Plant with adequate facilities for treating faecal sludge having a capacity of 4MLD is proposed to treat the sewage generated from the densely populated CBD area and faecal sludge generated by the whole municipality. Sewage generated can be collected through a sewerage network which can be laid under the roads. Faecal sludge generated from the other parts of municipality can be collected using vehicles with closable containers.

The project can be executed as a part of the Rebuild Kerala initiative programme . It can be implemented by IMPACT Kerala, LSGD through public private partnership under 'Design Build Finance Operate and Transfer (DBFOT)' model. Table 32.14 shows the possible responsible agencies for the implementation of project.

32.3.3. Need for the project

Currently there are no sewerage treatment facility in Cherpulassery Municipality.

The sewerage generated in households and various establishments are disposed into on-site sanitation systems (septic tanks or leach-pits) where their partially treated wastewater and solids settle in on-site systems, leaching out under the ground Polluting the ground water and posing severe risks to public health. The sullage (grey water) from the households directly flows into the roadside open drains and the waste water finds its way towards natural streams (nallahs) or canals. This leads to wastewater stagnation, ground and surface water pollution, odour nuisance, insanitary conditions mosquito breeding, and the spread of water borne & vector borne diseases. To protect the residents of Cherpulassery Municipality from these adverse ill effects, it is very much essential to have a separate Sewerage System and Sewage treatment plant with septage treatment facility for the Municipality.

Table 32.4 Responsible agencies for the construction of Sewage treatment plant

Responsible agencies	Role
Revenue department	Land acquisition
Municipality	Demand assessment, operations and maintenance, Arrange funds
State and central government, KIIFB	Finance
SPV	Administrative approval,technical sanction, Contract management, Quality management, Monitoring
Consultant	Preliminary estimate, Functional design, Engineering design, Detailed estimate, detailed project report,
Contractor	Construction of infrastructure

32.3.4. Suggested implementation mechanism

The suggested location falls in privately owned dry land currently used for agricultural purpose, hence no rehabilitation is required. Considering the income that the families get from the proposed land, the Municipality/Agricultural department can acquire the land by giving adequate compensation as per the RFCTLAR&R Act 2013 and Kerala rules 2015.

As per the 74th constitutional amendment the power and responsibilities of constructing sanitation facilities rests with Local self government bodies. Suchitwa Mission

under the LSGD is responsible for providing technical and managerial support to the LSG. It is also responsible for conceptualizing, action planning, conducting creative workshops, organizing training programs, initiating sector related studies, initiating action research, and conducting monitoring in Waste Management Sector.

Sewerage systems, including sewage treatment plants and network of sewers, trunk mains, pumping stations, etc. come under the purview of the Kerala Water Authority (KWA) by law. The design and construction of the STPs and the networks can be managed by the KWA or KSDIC through Public Private Partnerships under 'Design Build Finance Operate and Transfer (DBFOT)' model.

The local governments are supported by Local Self Government Department (LSGD) and SPVs like Kerala Suchitwa Mission, Haritha Keralam Mission, Clean Kerala Company, Kerala Sustainable Urban Development Project (KSUDP) and Kerala State Industrial Development Corporation Limited (KSIDC) are involved in planning and implementing waste management programs and projects.

33.3.5. Other issues associated to be addressed.

- The selected location is near to residential area. This can cause opposition from the locals, "not in my backyard" (NIMBY) or "not in my local area" (NIMLA) syndrome. Hence there is a need to engage with public to create awareness to gain their acceptance and support for the project.
- The core area of the town is developed haphazardly this could make the design of sewerage network difficult. Mostly the sewer lines will be laid under roads this can cause traffic problems and the roads may need to be re constructed.

Following are the clearances required for the implementation of the project

- Clearance from KSPCB for implementation and commissioning
- Clearance from KSEB
- Clearance from LSGD planning department
- Clearance from Electrical Inspectorate
- Clearance from fire and rescue department
- Building permits from municipality

33.3.6. Approximate project cost and funding.

Detailed project report prepared by Ottapalam municipality is used as a base for calculating the cost for STP and guidelines given in world bank report on Human Excreta Management in Urban Kerala: Towards Sustainable Options State-Wide is taken as a base for calculating cost for FSTP. Proposed capacity for the project is taken from Liq-

uid waste management plan for cherpulassery municipality prepared by the LSGD Planning, Palakkad. Proposed capacity is calculated by projecting the liquid waste generated by major establishments and population for the year 2040. The quantity of grey water generated for the population is considered as 75% of the total water consumption. Water consumption is calculated assuming a requirement of 70 lpcd. Table 33.3 shows approximate project cost for the construction of treatment plants. The total project cost comes around 31crores.

Table 32.5 Approximate project cost for the construction of STP/FSTP

Sl.No	Location	Type	Proposed capacity (MLD)	Approximate Project cost (in crore)
1	Secretary padi	STP	4	30
		FSTP	6 (KLD)	1
	Land cost			0.05
			Total	**31.05**

The Municipality can find funds from KIIFB, Kerala state pollution control board, and other sources. The operation and maintenance cost need to be born by the ULB and can be recovered from households and other users on a monthly basis.

Proposals on waste management sector are given highest priority but implementation of the whole project should be done in first phase itself .

32.4. Cherpulassery By Pass

32.4.1 Location details

The location of the proposed by pass is towards the southern side of the existing town. The By Pass is proposed to connect all the three major roads of the town namely Palakkad—Perinthalamanna SH, Ottpalam Road and Pattambi road starting from Kakkathodu bridge near Kacherikkunnu Junction at SH and ending at Manjakkal at Pattambi road by passing the existing core commercial area.

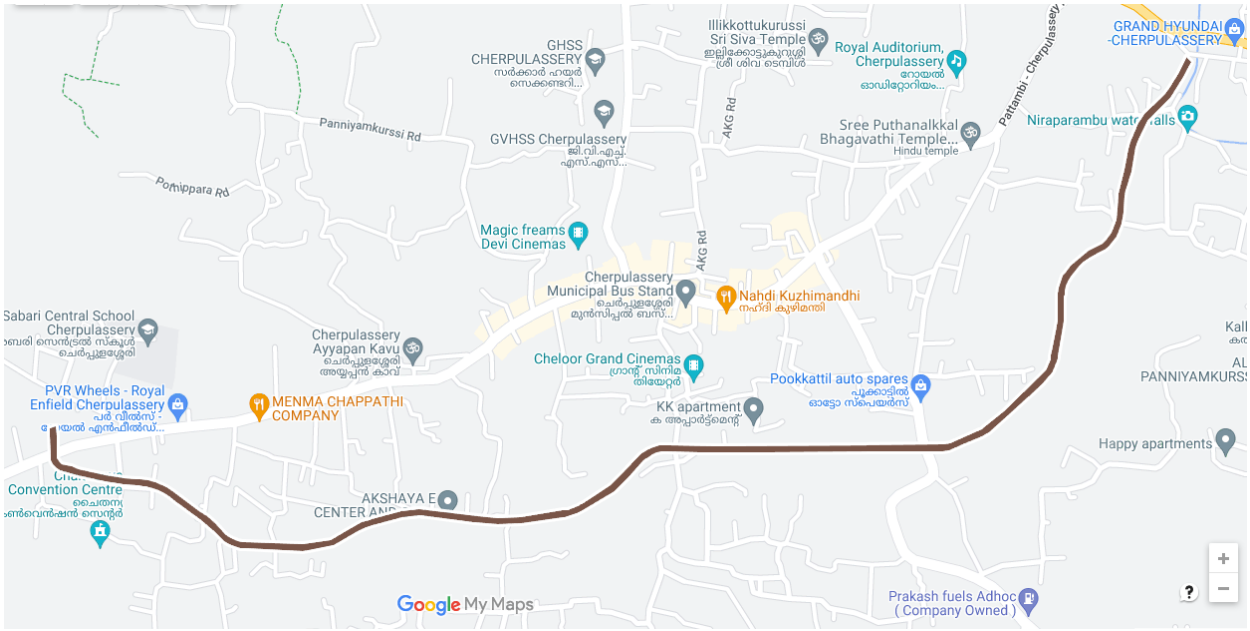


Fig. 32.3 Location of Proposed Cherpulassery By– Pass

32.4.2. Project Brief

A new by pass road having a length of 3.5Km with a ROW width of 15 is proposed in this plan to de-congest the existing core commercial area. This proposed alignment would connect Palakkad road, Otapalam road and Pattambi road and would also ease out the traffic congestion of the town core by deviating the vehicles passing through the town and restricting the entry of heavy vehicles into it. Starting from Kakkathodu bridge near Kacherikunn at Palakkad—Perinthalmanna road, this would keep its alignment along the alignment of the nearby stream to cross Ottapalam road and progress towards crossing EMS road and Kavuvattam area en route and would also pass nearby Anapparambu to reach Manjakkal at Pattambi road. The proposed by pass shall have underpasses at Ottapalam road and EMS road to facilitate easy traffic. Service roads with ramp in access provision to the by pass will also be provided near the proposed bus stand between Ottapalam road and EMS road so that the traffic arising due to bus entry and exit would not affect the smooth vehicular flow along the by pass

32.4.3. Need for the project

Bypass proposals should be considered wherever in urban areas, improvement to two lanes of the existing road is not possible. Locations where alignment is passing through congested areas and roadway improvements would have severe social impact and difficulty in acquiring required ROW, have been resolved by providing short bypasses. Locations not confirming to design standards for the design speed limit as per IRC standards, sharp right angle turns and sections prone to accidents have been improved by such ancillary roads. Bypasses are good because they reduces the amount of traffic in the centre where the people live and work. It makes it much safer for them to cross the roads, and reduces pollution. It is better for the vehicles passing the town because their journey is made quicker.

32.4.4. Suggested implementation mechanism

The project can be materialised with the help of State Public works department. The land for the by pass will have to be made available through land acquisition following the stipulated procedures and the PWD or any allied SPVs such as KRFB can be entrusted with the development of the project.

Table 33.6 Responsible agencies for the construction of By pass

Responsible agencies	Role
Revenue department	Land acquisition
Municipality	Coordination and initiation to implement the project and Arrange funds
State and central government, KIIFB	Finance
PWD/KRFB	Preliminary estimate, Functional design, Engineering design, Detailed estimate, detailed project report, Administrative approval, technical sanction, Contract management, Quality management, Monitoring
Contractor	Construction of infrastructure

32.4.5. Other associated issues to be addressed

- Public hesitation against land acquisition
- Land conversion as per paddy and wet land act
- Timely distribution of compensation
- Availability of soil for land fill

33.4.6. Approximate project cost and funding.

Detailed project report is to be prepared after thorough field analysis and studies before arriving at the project cost. Only after such detailed consultations, it will be possible to find out the funding methods also. However the land acquisition cost can be ascertained only at the time of inception project as it is largely influenced by the market rate. A rough estimate cost for the project is given below which may be taken as a bare minimum value.

Table 32.7 Approximate project cost for the project

Sl No	Item	Amount in Crores
1	Cost of Land for 130 cent (roughly @ 2lakhs per cent for paddy and 4 lakhs per cent for Paramabu, ascertaining 70% comes under paddy and 30% under Parambu)	34.00
2	Road formation cost @5cr per Km	17.50
	TOTAL	51.50

32.5. Bus Terminal

32.5.1 Location details

The location selected for the proposed bus terminal is near the Ottapalam road. The project location falls in the proposed special zone for bus terminal cum shopping centre in a 2.09 Ha land in Block number 43, survey number 191/2-6, 193/4-14, 194/1,2,4. The selected land is Private land under different owners.

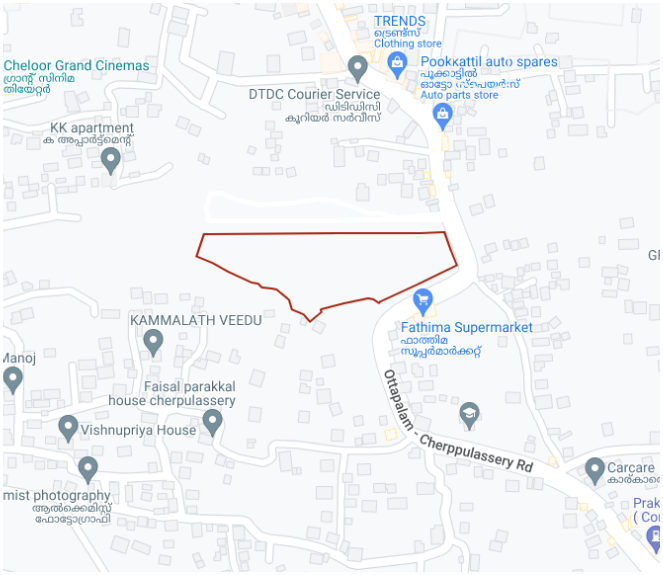


Fig. 32.4 Location of Proposed Bus Terminal and market

32.5.2.. Project Brief

The project involves the construction of a modern bus terminal with the following facilities

1. Bus, Car/taxi, two wheeler parking areas, auto taxi stands, idle bus bays
2. Circulation area with CCTV and Wifi facilities, commercial shops, waiting areas, tea stalls, hotels, dormitories, Public lobby, Breast feeding cubicles for women.
3. Fuel filling stations, work shop, sub station
4. Store room, clock rooms, security rooms, medical centre.
5. Resting facilities for staffs
6. Separate rest rooms for passengers and staffs.
7. Information centres, police out posts.
8. Ticket counter, ticket offices etc



32.5.3. Need for the project

The existing bus stand is located at the heart of the town to and from the bus station have to make right turn movements hindering traffic flow on the main roads.

And also the bus station is found to have inadequate space. By shifting the bus stand from the town core to the selected location the traffic congestion caused by plying of buses in the town core area, lack of parking space for vehicles coming to puck up or drop off passengers etc can be reduced. And also since the proposed bus stand is near the proposed market , it will facilitate the sales in the market.

32.5.4 Suggested implementation mechanism and Approximate project cost

The project can be implemented by the Municipality through PPP model. Funding can be done by suitable developer chosen by Municipality through EOI. Table 32.18 shows the possible responsible agencies for the project. The constructed facilities can be operated by the developer. Table 32.19 shows the approximate project cost excluding the cost of land and it comes around 5 crores. As a high priority project may be implemented in first phase itself.

Table 32.8 Agencies responsible for the construction of interstate bus terminal

Responsible agencies	Role
Municipality	Demand assessment, Administrative approval, technical sanction, Contract management, Quality man-
KIIFB	Funding
Consultant	Preliminary estimate, Functional design, Engineering design, Detailed estimate, detailed project report,
Developer	Construction of infrastructure

Table 32.9 Approximate project cost for the construction of bus terminal

Sl No	Item	Amount in Lakhs
1	Construction CC road, parking lots	150
2	Land cost as per fare value	17.25
3	Bus bay and shelter	100
4	Bus stand building accommodating passenger and staff amenities	300
5	Miscellaneous	25
	Grand Total	**617**

32.6.Shopping Centre

32.6.1 Location and Ownership details

The location selected for the proposed wholesale market is along the proposed bypass adjacent to the proposed bus stand. This will make the location more accessible to customers and will facilitate weekly market for agricultural and traditional products. The project location falls in the proposed special zone for bus terminal and market in a 2.09 Ha land in Block number 43, survey number 191/2-6, 193/4-14, 194/1,2,4. The selected land is Private land under different owners. The location is shown in figure 32.3.

32.6.2. Project Brief



The proposed shopping centre includes an exclusive wholesale market for perishable items like vegetables, fruits meat, fish etc. The market should be provided provisions of cold storage, waste disposal facilities, public toilets, drinking water facilities, adequate facilities for parking of customers vehicles, loading and unloading space and all other necessary infrastructure facilities. A large scale shopping mall or a hypermarket can also be constructed in this area in the second phase.

32.6.3. Responsible agencies

Revenue department, LSGI, Vegetable and fruit promotion council and private partners selected by the LSGI are the various agencies responsible for the implementation of the project. Figure 32.1 enlists various agencies and their role in implementing market complex.

Table 32.10. Agencies responsible for the implementation of market complex

Responsible agencies	Role
LSGI	Land purchase and Development of infrastructure for the market
Vegetable and fruit promotion council	Set up the vegetable and fruit market
Private partners	Financing, Construction, operation, Maintenance of shopping mall

32.6.4. Need for the project

There is a lack of an organised market within the municipality. The existing market located at EMS road will soon become insufficient to cater the needs of the town. The market location falls in the core area of town and can cause traffic problems. Also the existing market lacks in necessary infrastructure facilities like parking, storage facilities for perishable items, rest rooms, waste management facilities etc. Hence it is proposed develop a modern market will all the facilities by shifting the existing market to the above mentioned location near the High school road.

There is also a proposal for bus stand adjacent to this location, proximity of this bus stand and improved infrastructure facilities will significantly increase the likelihood of sales at the market and hence boost the economy of town. Shifting the current market to this location will also reduce traffic congestion and parking problems in the core area of town. By providing market for the locally grown products, the need for private traders and middleman can be eliminated. The increased commercial potential of this location due to the nearness of bus stand can be effectively utilised by the construction of the shopping mall.

32.6.5. Suggested implementation mechanism

The suggested location falls in privately owned land currently used for agricultural purpose, hence no rehabilitation is required. The land can be procured by the municipality either through acquisition procedures or any other suitable means. Municipality can develop the necessary infrastructure facilities for the market . Municipality's plan fund, MLA fund, MP fund etc may be used for this purpose.

The construction of shopping mall can be implemented in PPP mode. Municipality need to prepare a detailed project report. One or more suitable private partners can be selected through an open and transparent tendering process. The project can be executed in Build finance operate transfer mode where the private partner design, finance, build infrastructure, operate and maintain these facilities for a certain period. During this period the private party has the responsibility to raise the finance for the project and is entitled to retain all revenues generated by the project. The facility will be then transferred to the municipality at the end of the contract period.

32.6.6. Approximate project cost and funding

Activities involved in the development of market involves development of land, landscaping, Truss roof structures with flooring for selling vegetables and fruits , provision of amenities like cold storage, toilets, waste management facilities, public rest room complex etc. The approximate cost for the development of market and construction of shopping complex is given in table 32.2. It comes around 5.3 crores.

The purchase of land, development of infrastructure for market can be completed in first phase itself. The construction of shopping mall can be done in second phase.

Table 32.11. Approximate project cost for the development of shopping centre.

Sl No	Item	Amount in lakhs
	Development cost	
1	Construction of infrastructure facilities for the market	100
2	Construction of shopping mall	400
	Sub total (A)	500
	Overheads	
1.	O&M charges @0.2% of (A)	1
2	Inflation at 6% of A	30
	Grand Total	**531**

32.7. Cheenikkapara Tourism Centre

32.7.1 Location and Ownership details

The location of the proposed project is situated near thootha puzha at Kaalikadavu which has high tourism development potential due to its natural scenic beauty. A land with an extend of 1.78 Hecters in Sy. No 1/2 in block 42, is earmarked for this project. The selected location is private land.



Fig.32.5 Location of Proposed Park & Open air Auditorium

32.7.2. Project Brief

The project includes the construction of an open air theatre with stage and seating facilities to conduct cultural activities, performances, exhibitions, seminars, film festivals etc. with a well landscaped park with side benches, grass lawns and playing area for children, drinking water and rest room facilities, dust bins, light refreshment shops. Adventure activities such as ziplining, rock climbing etc can also be easily done here to attract tourists. An installation or sculpture over the rock that could attract tourists is also proposed here.





32.7.3. Need for the project

Park and open spaces has an important role in creating healthier and more liveable communities by providing positive environmental, social and economic benefits. There is a deficiency of organised park and open space in Cherpulassery municipality. Also Cheenikkapara has the potential to attract tourists and to develop as a tourism destination with presence of a beautiful hillock from where the aesthetic beauty of thoothapuzha can be enjoyed. By proposing open air theatre and park the existing tourism potential of this location can be enhanced. This will also promote the socio cultural activities of the residential communities. Tourism development, employment generation for local people, and overall development.

32.7.4.. Suggested implementation mechanism

Municipality can acquire the land giving adequate compensation. A detailed project report with architectural design is a mandate for implementing the project. This can be done with the help of Kerala Tourism Infrastructure Limited (KTIL) or by the municipality itself with the guidance of KTDC and DTPC.

32.7.5 Approximate project cost and funding

Municipality can select and direct interested corporate agencies to develop the park and open air auditorium as a part of their corporate social responsibility. The LSGI shall also materialise the concept through a BOT project. RFP may be invited from interested investors who could built, operate and transfer back the project after certain period. The maintenance of the park can then be done by the corporate itself or can be entrusted with resident association, clubs or educational institutions.

Approximate cost for the development of park and open air auditorium is 2 crores. The project can be implemented in the first phase itself.

Table 32.12. Approximate project cost for the development of tourism centre

Sl No	Item	Amount in lakhs
	Development cost	
1	Construction of infrastructure facilities	100
2	Landscaping, construction of park, eqipments etc	100
3	Sculpture	150
	Sub total (A)	350
	Overheads	
1.	O&M charges @0.2% of (A)	0.7
2	Inflation at 6% of A	21
	Grand Total	**372**

32.8. Town Park and Congregation centre

32.8.1. Location and Ownership Details

A town park and a congregation centre is proposed to be provided for ensuring enough recreational space within the town in a land area of 1.80 Hectares in Sy.No. 44/1, Block – 42, on the compound of Kanjirapuzha irrigation project. The Land is currently under irrigation department and different government offices are currently functioning here. But once the mini civil station is completed, the available land can be suitably transformed into this facility.

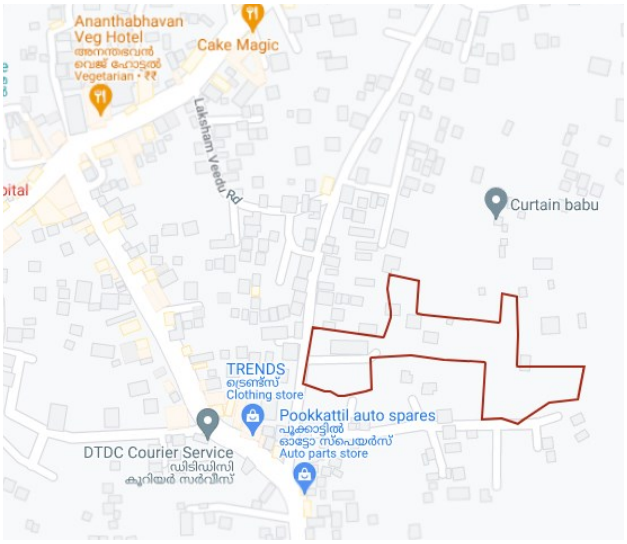


Fig.32.6. Location of Proposed town park

32.8.2 Project brief

The proposal involves transforming the KPIP Project Compound at Cherpulassery municipality into a recreational space providing vibrant activities, with a holistic approach of incorporating mobility elements—e.g. footpaths and cycle tracks, as well as additional elements such as trees, street furniture, and organised vending spaces in an integrated design. The town also lacks a common place where people can gather for meetings, programs or processions without disturbing the daily life of other as well as vehicular movement. Hence, an open air theatre that facilitate such events is also to be incorporated here.

33.8.3. Need for the project, implementation.

The availability of recreational space is very meagre in the town area. But as a small town , the URDPFI guideline itself suggest an allocation of 15% of its land use for recreational activities. In the typical residential pattern of or state, it is difficult to allocate such a huge space for such uses. But instead efforts should be made to provide all possibilities for recreational amenities through the planned development envisaged in this masterplan. Hence, the greenish public land available as under utilised within the town is an easy and most suitable option for allocating a recreational space for the people living here. The plot is very much accessible from the town at the same time it is half organised which makes the transformation much possible. The recreational space is intended to be provided with all the basic amenities for elders and toddlers as well as it shall also bring vibrant and dynamic activities required for the public under one roof. It should include exclusive non motorization within the activity zone but providing a parking space for the visitors. While designing this space, it must be

ensured that all spaces are accessible to all users, regardless of age, gender, and physical ability. The space should include gardens, fountains, children's park, open gym, open air auditorium and any other amenities as required for a recreational space and to transform the whole compound into a beautifully landscaped area with maximum leisure and recreational elements. If possible, buildings within the compound may be face lifted to make it suitable for related amenities of the recreational space but without contrasting with the overall character of the facility. Elements such as footpaths, cycle tracks, street furniture, compound walls, street vending booths etc. are to designed and positioned to best practice standards providing a suitable character design that resembles the heritage of Palakkad. The design must also include an entrance to this proposed iconic park and the elements and paintings must resemble the art forms, culture and heritage of Valluvanad. The existing trees or any other elements may be retained as far as possible as integrated into the functional character of the compound.

Table 32.13. Agencies responsible for the implementation of Town park

Responsible agencies	Role
Municipality	Coordination, monitoring, funding, development of infrastructure, Operation and maintenance

33.8.4. Suggested implementation mechanism.

The selected location is currently under the ownership of Dept of Irrigation, Kerala Government and is being used as Kanjirapuzha irrigation project offices. Municipality shall take initiation to taker over the land after obtaining due sanction from the government. As the major portion of the plot is kept un utilised by the irrigation department, and the offices functioning there can be shifted to the proposed mini civil station upon its completion, Municipality can use its plan fund and directly execute the project.

32.8.5. Approximate project cost and funding

Municipality can select and direct interested corporate agencies to develop the park and open air auditorium as a part of their corporate social responsibility. The LSGI shall also materialise the concept through a BOT project. RFP may be invited from interested investors who could built, operate and transfer back the project after certain period. The maintenance of the park can then be done by the corporate itself or can be entrusted with resident association, clubs or educational institutions.

Approximate cost for implementing this project is 3 crores

32.9. Community Hall and Mini civil station

32.9.1 Location and Ownership details

A community hall of municipality along with a mini civil station for gathering is proposed in a land with an area of 1.20 Hectres in survey number 237-pt in block 42 ward 12 Kacherikkunnu. Also a park is proposed in a land area of 0.28 Ha near to this. The location selected is near to the PWD rest house. The location is situated near Perinthalmanna-Cherpulassery - Palakkad highway and hence is easily accessible from the town core area. The selected land is government property

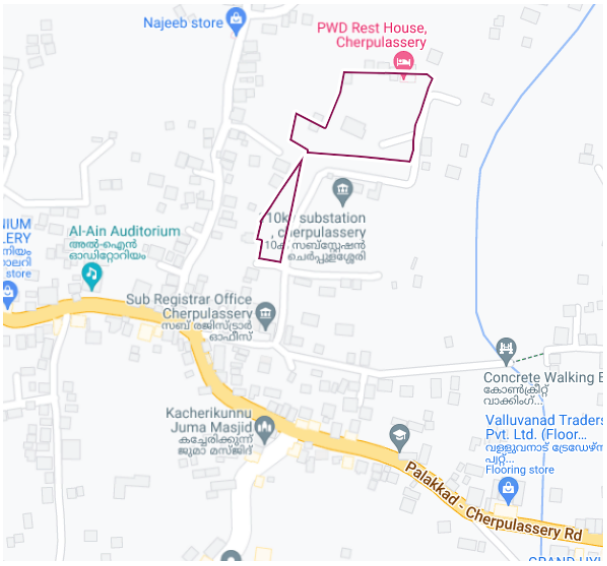


Fig.32.7. Location of Proposed Municipal Town Hall and Park

32.9.2 Project brief

The proposed project includes the construction of municipal town hall building for conducting public meetings, seminars and entertainments etc in Cherpulassery municipality. It should have main function hall for meetings and gatherings, Conference rooms, Kitchen, office rooms, sufficient bathrooms, drinking water facilities, circulation area, parking and landscaping. For providing sufficient access to this building the the existing 6.5 m municipal road to this location is proposed to be widened to 8.00 m. The project also involves the development of a mini civil station where different government offices functioning within the town can be brought under one roof. The town hall project is proposed to be implemented by the municipality using their own fund, while the mini civil station is to be developed by the PWD. Table 32.5 shows various agencies and their role in implementation of the project.

32.9.3. Need for the project

The municipal town hall is presently located at the heart of the town. It has inadequate facilities such as insufficient parking, inadequate toilet facilities and is not accessible for physically challenged persons. Also there is a deficiency of organised building for government offices in the municipality. The proposal of the mini civil station can meet up this deficiency and the public can easily get their services done by reaching a single destination. Also, it will reduce the burden on the government by paying rent to various government offices as most of them are functioning in rented buildings. The available land in the hands of PWD on the location would enable the government to take up the work as quickly as possible.

Responsible agencies	Role
Municipality	Coordination, monitoring, funding, development of infrastructure
PWD	Construction of mini civil station

Table 32.14. Agencies responsible for the implementation of Municipal town hall and park

32.9.4. Suggested implementation mechanism, project cost and priority

The selected land is vacant government land. Municipality can directly implement the project using its plan fund, MP's fund, MLA's fund, Loan etc. PWD can develop the infrastructure facility for mini civil station also.

The approximate project cost for the construction of town hall and development of Municipal park is listed out in Table 32.6.

Table 32.15. Approximate project cost for the implementation of municipal town hall and park

Sl No	Item	Amount in lakhs
	Development cost	
1	Construction of community hall and associated facilities	1000
2	Development of Civil station	1000
	Overheads	
1.	O&M charges @0.2% of (A)	3.2
2	Inflation at 6% of A	96
	Grand Total (A+B)	2096

32.10. Valluvanad Cultural centre

32.10.1 Location and Ownership details

To promote the art and culture of the municipality and to uplift the status of existing auditorium associated with Kunju Nair memorial trust, a classic art promotion centre is proposed in an area of 2.31 Hectares in Sy. No—382/8 pt, 382/18 pt, block –41, ward –5 Karalmanna. The location is Private land under different owners

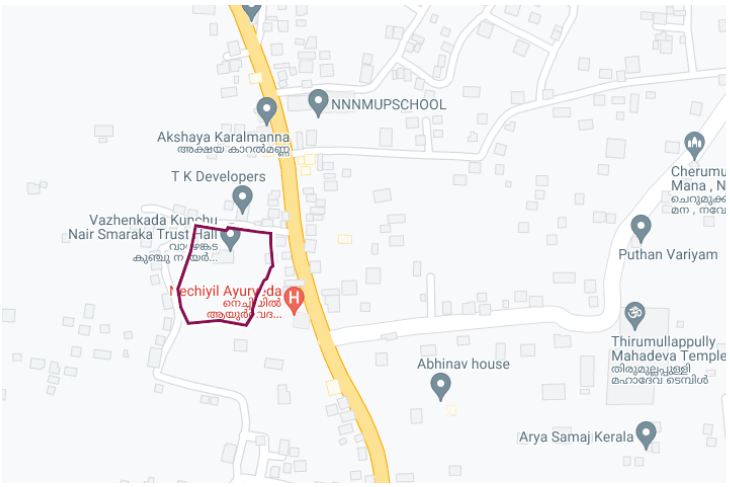


Fig.32.8. Location of Proposed Valluvanad cultural centre

32.10.2. Project Brief

The project proposal includes

- Upgradation of the existing auditorium
- Construction of art gallery, art museum and exhibition centre, Reading and listening libraries,
- Facilities for conducting workshops, Lectures etc for the promotion of art and associated facilities etc.



LSGI, Vazhenkada Kunju Nair memorial trust, DTPC etc may be entrusted as the agencies responsible for the implementation of the project. Table 32.4 shows various agencies responsible for the project and their role in implementation.

Table 32.16. Agencies responsible for the implementation of project

Responsible agencies	Role
LSGI, DTPC, Dept of Culture along with academies	Initiation, Coordination, monitoring, funding
Kunju nair memorial trust	Operation and maintenance
Private partner	Development of infrastructure

32.10.3. Need for the project

Art has a monumental impact on culture and society. It transcends political, social, cultural boundaries seeking to bring people together. But due to the busy life style ,the interest of people in arts is diminishing day by day. Art and culture bring communities together. They are an excellent source of wonder, delight, and wisdom, and offer intellectual and emotional experiences, which promote either contemplation or celebration which can improve creativity and productivity. Kerala has a spectacular heritage of cultural expressions across many art forms and customs. But due to the present busy life and the ingress of mobile phones and social media the appeal of art and culture is decreasing in younger generations.

The proposed project is to preserve and promote classical art forms within the state especially in the Valluvanad region aiming particularly the cultural uniqueness of this town. The area around Cherpulassery is well known for its contributions to the art and cultural prosperity of the state through various artists. Kathakali artists from Vellinezhi, the unique puppet dance, Kathakali Chutti makers, various performers of instrumental music, etc add on to this. The implementation of this project will also improve the tourism potential of the region. Presently the classical art performs and trainings are conducted in the existing auditorium associated with Kunju Nair memorial trust. The proposal is to upgrade and add to the facilities available here.

32.10.4. Suggested implementation mechanism

Municipality can purchase the land or get it sponsored. The project can be funded and implemented by the municipality in association with and Vazhenkada Kunju nair memorial trust. Suitable developers can be selected through open tendering for the development of infrastructure. The project may be further developed into an off campus centre of Kalamandalam, through which various art forms can be taught here to the aspirants across the region. The approximate project cost comes around 325 Lakhs for the first phase of the project. In later stages, further developments shall be made to incorporate facilities required for upgrading it to a university sub centre of Kerala Kalamandalam.

Table 32.17. Approximate project cost for cultural centre

Sl No	Item	Amount in lakhs
	Development cost	
1	Construction of cultural centre and associated facilities (1500M^2)	300
2	Land Cost	25
	Grand Total	325

32.11. Truck lay by and amenity centre

3.11.1. Location and Ownership details

0.70 Ha Land in sy. No 327/2 in block 41 is earmarked for the development of proposed parking for trucks and for other allied amenities. The major goods traffic is happening through this Perinthalmanna–Palakkad route. Hence the location is selected near to the SH on the northern side of the road near existing NAYARA petrol pump. The selected land is Private land under different owners.

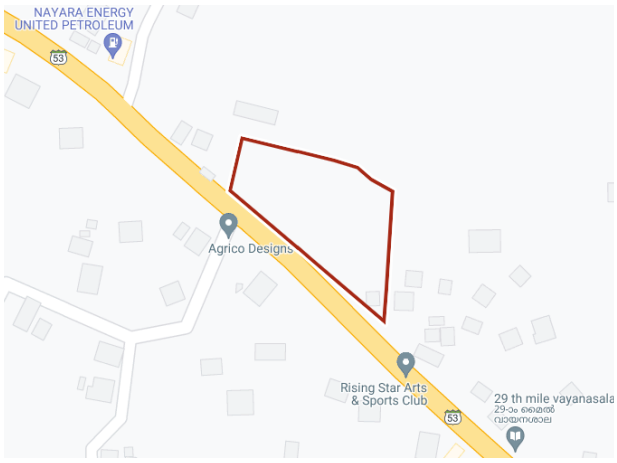


Fig.32.9. Location of Proposed truck lay by and amenity centre

32.11.2. Project Brief

A truck parking facility with loading and unloading platforms and required machineries is proposed to accommodate approximately 50 number of trucks. The area can also be provided with a small cold storage facility for perishable goods. The parking lots can be allotted based on vacancy availability through computerised reservation system.

A travel lounge for the road users, cafeterias, dormitory for drivers to stay, toilets, bathrooms, washing, drinking water, ATM, fuel station, service station, weigh bridge, and office for the maintenance staffs also needs to be provided here.

32.11.3. Need for the project

Currently Cherpulassery market is located close to the town centre, where there are no facilities for parking of truck and cars. During loading and unloading of goods this can cause traffic congestion in this area. The proposed location is outside the core town area. After implementation of this project loading and unloading from large vehicles can be done in this parking space and the goods can be brought into the town area in smaller vehicles. This will reduce traffic congestion due to plying of large vehicle within the town. And this will also reduce parking of trucks on the road side.

Being a busy state highway used for freight movement between industrial cities like Coimbatore and Mangalore, the town acts as a host for the commuters and truckers to rest, unload/ load, refresh. Hence, a comprehensive facility on this highway side will benefit not only the goods traffic but also for passenger movement by serving itself as a place of rest, leisure and relax. It may boost the economy of the town also by acting as a left base between this major transport corridor.

32.11.4 Suggested implementation mechanism

The suggested location falls in privately owned vacant dry land. The municipality can either procure the land through suitable means or can get it implemented in built -own-operate-transfer (BOOT) mode. Municipality can purchase the land or get it sponsored. The land can be handed over to a private partner who is competent to invest and execute the project. The private partner can own and operate the project for a period of 10-15 years under a contract and then return the assets back to municipality. Table No 32.20 enlist various agencies responsible for the implementation of the project and their role.

Table 32.18 Agencies responsible for the construction of truck terminal

Responsible Agencies	Role
Municipality	Identification of location, Standardization of performance standards, Providing collection of parking fees rights to developers
Developer	Design, finance, construct, operate, maintain and manage the facilities including supporting ancillary infrastructure, Meet the requirements laid down by the Competent Authority, Operate& Maintain the commercial facility in order to recoup the investment incurred

32.11.5 Approximate project cost and funding.

Table 32.21 shows land use breakup and approximate project cost for the project. The approximate project cost comes around 5 crores. Approximate time required for the execution of the project is 1 year . The project is proposed to implemented in the first phase itself.

Table 32.19 Approximate project cost for the implementation of the project

Sl No	Item	Land use	Area in hectare	Approximate development cost in lakhs
1	Truck parking space	50	0.405	150
2	Road and circulation	30	0.243	45
3	Green area and landscaping	10	0.081	5
4	Other infrastructure facilities	10	0.081	300
	Grand Total	**100**	**0.81**	**500**

33. ZONING REGULATIONS

33.1 ZONING REGULATIONS

1. All future developments in the area covered under this plan shall be in conformity with the provisions of Master Plan for Cherpulassery Town.

2. For the implementation and enforcement of the proposal envisaged in the Master Plan for the town, areas have been zoned under various uses such as Residential zone, Commercial zone, Future urban zone, Industrial zone, Industrial mix zone, Public and semi public zone, Tourism Development zone, Recreational zone, Traffic and transportation zone, land reserved for roads, Dry agriculture zone, Wet agriculture zone, Forest, Crematorium and Burial ground, water body zone, flodd prone area (overlay), Landslide prone area (overlay) and special zones. Details regarding the nature of uses 'permitted' and uses 'restricted' in each zone are given in table 34.1. These regulations shall be enforced in conjunction with other specific provisions if any mentioned elsewhere in the Master Plan.

3. Uses **'Permitted '** in a zone cover the uses that can be normally accommodated in the relevant zone. Such uses may be permitted by the Secretary of Cherpulassery Municipality (herein after referred to as Secretary) if in accordance with other relevant rules/orders concerned in force. In some cases it may be possible to permit some other uses also which are not likely to affect the quality and environment in a zone specified for a particular use. Such cases have to be individually studied based on their performance characteristics and special location factors. Such cases which come under this category are classified as "**Uses Restricted 1 and Uses Restricted 2 "**.

   a. "Uses restricted 1 " category deals with the uses that shall be permitted by the Secretary, Cherpulassery municipality with the concurrence of the Town Planner of the District office of the Local Self Government Department (Planning), Palakkad. (hereinafter referred to as Town Planner)

   b. "Uses Restricted 2" category deals with the uses that shall be permitted by the Secretary, Cherpulassery Municipality with the concurrence of the Chief Town Planner concerned of the Local Self Government Department (Planning).

4. "**Uses prohibited"** enlists the various objectionable uses in each zone which shall not be permitted under normal circumstances.All uses which does not come under 'Uses Permitted' or 'Uses Restricted' will be considered as 'Uses *prohibited'*

5. Any use which is not specified either in the 'Uses Permitted', 'Uses Restricted 1' ancillary nature to the uses permitted or uses restricted in a zone, may be permit-

ted in such zone with the concurrence of the District Town Planner.

6. Zoning regulations are not intended to prohibit existing uses that have been lawfully established prior to the enforcement of these regulations, unless otherwise specifically mentioned in this Master Plan. Zoning Regulations are essentially intended to help the competent authority in taking decisions regarding granting or refusal of permits for land development and construction of buildings/ structures.

7. If any portion of a zone is put to a *"Use Prohibited"*, before coming into operation of this Master Plan, such use shall be termed as *non-conforming use*. A non-conforming use may be allowed to continue in its existing location and essential repairs and maintenance for the structure may be permitted by the Secretary, provided that the said use create no adverse environmental influence in the zone. Addition, alteration or reconstruction, if found necessary as part of any mitigation measures may be permitted for such uses by the Secretary with the concurrence of the Town Planner. The total built up area of such non-conforming use shall not exceed 1.5 times the existing built up area.

8. Existing areas and structures of archaeological importance, agricultural uses and religious uses may be permitted to continue in all zones and shall not constitute non-conforming uses.

9. Subject to the zoning regulations of the respective use zones, more than one uses may be combined in a building, or as a group of building, provided that the floor area of any such use in the plot shall not exceed the maximum floor area permitted in that particular use zone for such use. For the purpose of these regulations, floor area means the total floor area of the building on all floors.

10. All future developments shall also be in conformity with the provisions of Kerala Municipality Building Rules, unless otherwise specified in these regulations or in any Detailed Town Planning Scheme in force.

11. (a) Provisions under The Disaster Management Act, Archaeological Sites and Remains Act, Coastal Zone Regulations, Aircraft Act 1934, Environment Protection Act 1986 and any other applicable statutes as amended from time to time will prevail over the respective provisions of this Master Plan.

(b) Provisions under the Kerala Conservation of Paddy Land and Wetland Act 2008, and its amendments from time to time, will prevail over the respective provisions of this master plan, but shall conform to widening of roads or new road alignments, Special zones, Water body zones and Recreational zone envisaged in this plan.

12. Silence Zone, as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000 under the Environment (Protection) Act, 1986 and its subsequent amend-

ments, shall be applicable to the area under this Master Plan.

13. **Road Proposals:** Regulation of constructions and land developments on the sides of new roads or roads proposed for widening as per the Master Plan **(Refer Table 30.2)** shall be governed by the distance from the centreline of the road, unless otherwise specified in this Master plan, Detailed Town Planning Scheme in force or any Detailed Road Alignment approved by Government. If widening on one side of any stretch of the road is constrained due to the physical barriers of water body zone, railway land and protected archaeological monuments/sites the road widening in that stretch shall be accounted from the other side . However, compound walls may be permitted in the land under road widening subject to the condition that the owner shall demolish it in his risk and cost during road widening.

14. In the event of change in alignment of *new road* proposal included in the Master Plan, after the commencement of land acquisition of the new alignment, the land parcels in stretches excluded from the original alignment may be changed to adjacent suitable land use zone with concurrence of the Town Planner. This provision is applicable only to new road development proposals and not to road widening proposal.

15. Operational constructions as defined in the Kerala Town and Country Planning Act, 2016 shall be treated as permitted use in the scheme area.

16. The Government shall have the power to issue clarifications in respect of technical interpretations, if any, required on any of the provisions of the Master Plan in consultation with the Chief Town Planner concerned of the Local Self Government Department (Planning).

17. Expansion of existing Public and Semi Public Institutions and existing Industrial units including their incidental uses to adjacent plots shall be treated as permitted use irrespective of the zone in which such adjacent plot lies, except in recreation zone, traffic and transportation zone, wet agriculture zone, land reserved for road and water bodies and the development regulations imposed by such zoning, subject to the provisions of Paddy land and Wetland act in force, if applicable, or other applicable statutes.

18. Disaster mitigation projects by competent authorities shall be permitted in all zones.

19. Transmission / telecommunication towers, wireless station, ATMs, drinking water tanks, waste management units and public utility buildings/structures shall be treated as permitted uses in all zones except in water bodies

20. Projects of Central/ State Government, Local Self Government Institutions, Public Sector Undertakings and other Government Institutions may be permitted with concurrence of the Town Planner in all built up zones such as Residential zone, Commercial zone, Future urban zone, Industrial zone, Public and semi-public zone, Industrial mix zone, Dry agriculture zone, Recreational zone and Tourism Development zone, if such uses are not included in the permitted uses or restricted uses as per the zoning regulations applicable but shall conform to widening of roads or new road alignments envisaged in the scheme.

21. No building construction other than mentioned hereunder shall be allowed **up to a depth of 10m** on the landward side of the Thootha river.

Wells, compound wall, Pump houses, Road, Park, walkways and landscaping. repair/ addition/ alteration of existing buildings without exceeding 1.5 times the existing built up area. However, for KMBR provisions, this land may be considered in the plot area calculation and mandatory open spaces .

22. In case of uncertainty in identifying the alignment and boundary or a change in alignment or shift in plotting of thodu, canal, river, existing public road, and in the absence of survey boundaries for the same in the Proposed Land Use Maps, it shall be referred to the actual position on ground as well as revenue records and decision taken by the Secretary in this regard shall be final.

23. The areas specially demarcated for certain projects as Special Zones such as bus terminal cum shopping complex are to be procured as per the provisions of the Kerala Town and Country Planning Act 2016, by Cherpulassery Municipality or other agencies concerned. Initiation of land acquisition for special zones shall be started within a period of 7 years from the date of sanctioning of this plan. Otherwise the land use zone of that particular land shall deemed to be changed to adaptable zones as specified in table 33.1, by the Secretary based on the application for building permit received.

24. If different land use zones falls within a single plot, all uses permitted as per zoning regulations of such land use zones may be permitted by the Secretary in the plot. If application submitted includes any of the restricted uses and not included in such permitted uses, the Secretary shall issue permit with the concurrence of the Town Planner/Chief Town Planner, as the case may be. However, for the part of the plot which comes under water body zone, special zones, Recreational zone, and wet agriculture zone, this provision shall not be applicable.

25. Electric charging stations for vehicles may be permitted in all zones

26. Large Scale development projects in an area 1 hectare or more, exceeding an investment of Rs.100 Crores, which provide direct employment (after commission-

ing of the project) to the tune of not less than 500 may be permitted in all zones other than water body zone if not included in the permitted uses or restricted uses as per zoning regulation applicable. In such cases, the recommendation of a committee constituted as below shall be obtained, subject to satisfying the procedures laid out here under and the Secretary shall comply the same while issuing permit. Also, Adequate provision shall be made for supporting infrastructure such as water supply, sewerage, solid waste management, power supply etc. Separate systems for management of solid waste and sewage shall be provided and maintained by the developer at his cost. The project shall be completed within a period of 5 years or as suggested by the Committee.

Additional Chief Secretary/Principal Secretary/Secretary to Government, Local Self Government Department	Chairperson
The Director, Local Self Government Department (Urban)	Member
The Chief Town Planner, Local Self Government Department (Planning)	Convenor
The District officer of the LSGD (Planning) having jurisdiction over the district concerned	Member
Secretary(s) of Local Self Government(s) concerned	Member(s)

Procedure to be followed:

(a) The developer shall submit the project report, detailing the demand, feasibility and Environmental Impact Assessment aspects of the project, together with the approval, if necessary, obtained from the Ministry of Environment and Forests, Government of India to the Convener of the committee and the Convener shall make all arrangements for convening meeting of the committee at the earliest and the committee shall consider and dispose of the project report within a period of one month from the date of receipt of the same.

(b) The Convener shall fix the venue, date and time of the meeting in consultation with chairperson and shall be responsible for safe custody of records and communications thereof.

(c) The meeting shall be presided over by the Chairperson or in his absence by a member authorised by him.

(d) The quorum of the meeting shall be majority of the total number of members of the committee for the project.

(e) The developer shall also produce before the committee, all required clearances from the State and Central Government agencies concerned.

27. Any plot which falls in Industrial zone or Public and Semi Public zone or Crematorium and Burial grounds as per this master plan, and if the land use/ building occupancy is changed/ proposed to be changed from its original use or any addition/extension/alteration of existing building is proposed, then the Secretary may permit change in use or occupancy with the concurrence of the Municipal council by considering the uses permitted and restricted in the surrounding land use zones.

28. **PROVISION FOR MIXED USE:**

a) Uses permitted in Residential zone, Commercial Zone, Industrial zone and public and semi public zone shall also be permitted by the Secretary in Residential zone Commercial zone, Future urban zone, Public and Semi Public zone, Industrial zone, Industrial mix zone and Dry agriculture zone if not otherwise allowable as per zoning regulations applicable, on both sides to a certain depth of certain roads with proposed width as detailed in the table below.

b) Uses restricted in Residential zone, Commercial Zone, Industrial zone and public and semi public zone shall also be permitted by the Secretary in Residential zone Commercial zone, Future urban zone, Public and Semi Public zone, Industrial zone, Industrial mix zone and Dry agriculture zone if not otherwise allowable as per zoning regulations applicable, on both sides to a certain depth of certain roads with proposed as detailed in the table below, but with the concurrence of the Town Planner or The Chief Town Planner as the case may be.

Sl. No	Proposed ROW in Metres	Depth (in metres) on both sides of the road up to which above provisions are applicable
1	12 & 15	100
2	18 & 23	150

c) For those roads which are not developed to such proposed width, the municipality may at any time levy development charges from the applicant for availing the above benefit. Such development charges shall be levied subject to the provisions of Kerala Town & Country Planning Act 2016 and rules made there under, and with the previous sanction of the government, by a notification published in the official Gazette.

d) The above benefits may be extended to the whole plot, even if any part of it falls under the mandated depth.

e) Any new roads developed/widening of existing roads to such width mentioned in the above table shall also be eligible for the said benefits, even if it is not included in this plan.

29. Uses permitted/restricted in Residential zone, Commercial Zone, Industrial zone and public and semi public zone shall also be permitted by the Secretary in Residential zone Commercial zone, Future urban zone, Public and Semi Public zone, Industrial zone, Industrial mix zone and Dry agriculture zone if not otherwise allowable as per zoning regulations applicable, to any plot for which an access width of 8m or as demanded by prevailing KMBR, whichever is higher is available. In these cases, extra provision for 20% additional off street parking shall also be provided.

30. Both side yards may be exempted for Group F occupancy buildings (defined as per KMBR 2019) in commercial zone and Future Urban zone, if the owner of the plot abutting the property under construction voluntarily agrees for the same in writing. Such buildings are also eligible for an excess coverage of 10% over and above the KMBR provisions. The municipality may at any time levy development charges from the applicant for availing the above benefit. Such development charges shall be levied after due notification of the same, published in the official Gazette, subject to the provisions of Kerala Town & Country Planning Act 2016 and rules made there under, and with the previous sanction of the government. However, this provision is not applicable to high rise buildings.

31. For lands which are classified as water body or similar use as per revenue records or as per data bank, zoning regulation of water body zone will be applicable, even if it is not included in water body zone as per proposed land use map.

32. In the case of construction, addition or alteration of a single family residential building in a plot, part of which comes under proposed road widening, the following provisions are applicable:

    a. If the plot area is less than 5 cents, reservation of land for road widening need not be mandated.

    b. If the plot area is greater than 5 cents, excess plot area over and above 5 cent or the actual land required for road widening which ever is lesser shall be reserved for road widening.

    However, if such building falls under the land reserved for actual road widening, an agreement shall be executed between the owner and the secretary of Cherpulassery municipality to the extent that the owner will not claim any compensation for the constructed building in the event of the acquisition of the building in full or part, in future.

33. For plots from which the land is surrendered free of cost for any new municipal roads as per this plan, mandatory open space on the side abutting that road as per prevailing KMBR may be relaxed subject to a minimum building line of 1m

only, until the road is notified as per the respective provisions of Kerala Municipality Act. However, the surrendered land may be considered in the plot area for FSI and Coverage as per KMBR. If the road divides a plot, all such plots may be considered as a single plot in case of providing mandatory provisions as per KMBR. These benefits shall be applicable only if the land is surrendered for the implementation of scheme in total.

34. All area restrictions mentioned hereunder shall be considered as floor area, if not specified otherwise.

35. Where any land in Forest zone is situated outside the designated Forest, with due confirmation of the Forest Department, the development of such land shall conform to the Regulations applicable to the adjacent zone;

36. On a corner plot bounded by a vehicular road in any land use zone, nothing shall be erected, placed, planted or allowed to grow in such a manner so as to materially impede the vision to avoid accidents and for smooth running of vehicular traffic.

37. In abandoned Quarries, Comprehensive development/rejuvenation of these areas for recreational purposes based on a site specific DPR may be permitted by the Secretary with approval/NOC from respective departments and after obtaining concurrence from the Town Planner.

Table 33.1 Zoning Regulations

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
38	**Residential Zone**			
38.1	All Residential Buildings including flats/apartments, Hostels and Boarding houses , Night Shelter, Orphanages/ Old age homes/ Dharmasala, Guest houses / Lodges/ Home stays/resorts			
38.2	All places of worships & religious study centre and residential uses incidental to main use			
38.3	All commercial establishments, All Offices IT/ Software units, Banking and Financial institutions, Non hazardous Godowns/ Warehouses/ storages/ Automobile showrooms. Weigh bridge, movie halls Total floor area of building limited to 2000 sq. m.	Movie halls above 2000 sqm		
38.4	Cottage Industries, Automobile workshops and service stations, , Service industries of non-nuisance nature (See Annexure -I) , Water and sewage treatment plants below 5MLD, IT hardware/Electronic Industries, Total floor area of building limited to 500 sq. m.	Spray painting workshops, IT hardware/ Electronic Industries above 500 sqm		
38.5	All educational institutions and research centres, Local, State and Central Government Offices, Public Sector Offices, Hospitals and Health centre - IP up to 50 beds, All assembly buildings upto 2000 sq.m	Hospital and Health centre above 50 beds		
38.6	Recreational parks/Fair grounds, Open Air theatre, open grounds, walk ways, cycling tracks, Swimming pool, Tot lots, parking grounds, Gymnaseum, Yoga centre, Health club, Indoor Courts			
38.7	Taxi/Jeep/Auto rickshaw stands, Parking Plaza			

Table 33.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
39	**Commercial Zone**			
39.1	All commercial establishments, All Offices, IT/ Software units, Banking and Financial institutions	Fuel filling stations	Multiplex, Bus/ Truck Terminals	
39.2	Godowns / warehouse / storage of Non-hazardous materials, stacking yards.			
39.3	Gymnasium, Yoga centre, Health club, Indoor Courts, Movie halls, All assembly buildings - Total floor area up to 3000 sqm			
39.4	Cottage Industries, Automobile workshops & service stations, Service industries of non-nuisance nature (See Annexure-I) Water and sewage treatment plants , IT hardware/ Electronic Industries.			
39.5	Residential Building, Residential flats/apartments, quarters Total floor area up to 1000 sq. m. Hostels and Boarding houses, Night Shelter, Orphanages/ Old age homes, Guest houses / Lodges, Hotels			
39.6	All educational buildings			
39.7	Clinics, diagnostic centres and hospitals			
39.8	Swimming pool, Tot lots/ Parks/Fair grounds, Open Air theatre, other recreational facilities , Gymnasium, Yoga centre, Health club, Indoor Courts			
39.9	Plant nursery, Storage of agricultural produces and seeds, Pump House, Wells and Irrigation Ponds			
39.10	Taxi/Jeep/Auto rickshaw stands, Parking Plaza		Transport terminals	
40	**Future Urban Zone**			
40.1	All activities permitted in Residential zone, Commercial Zone and Public and Semi-public zone	All activities in uses restricted-1 in Residential zone, Commercial Zone and Public and Semi-public zone	All activities in uses restricted-2 in Residential zone, Commercial Zone and Public and Semi-public zone	

Table 33.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
41	**Industrial Zone**			
41.1	All industries other than obnoxious and nuisance type industries as per annexure I, Automobile Workshops and Service Stations, Spray Painting Workshops, Saw Mills, Timber Yard, Ice Factory, Fish and Meat Processing Units, Water Treatment Plants, Marble and Granite Storage and Cutting Centres, Hardware/ Electronic Industries, Industrial Estates and Industrial Parks. Quarries	Obnoxious/ nuisance type industries as per Annexure II		
41.2	Public sector office incidental to main use, Clinics (Out patient), Public utility buildings and areas, Social welfare centres up to 500 sq. m.	Hospitals and health centers up to 50 beds incidental to main use		
41.3	Godowns/Warehouses/Storage of non hazardous material, stacking yards, weigh bridge.	Fuel filling Stations.		
41.4	Dairy and Dairy Farms, Dairy related Industries, Poultry Farms, Piggery Farm, Smoke House.			
41.5	Tot lots/Parks/Fair grounds, Open Air theatre, Swimming pool, other recreational facilities.			
41.6	Autorikshaw stands, Parking grounds, parking plaza, Taxi/ Jeep stand,			
41.7	Residential use incidental to industrial use, Restaurants/ Canteen/hotels/shops up to 500 sq.m	Dumping yard, Sewage treatment plants, storage of explosives of minor nature.		
42	**Industrial Mix Zone**			
42.1	All Uses permitted in industrial zone	Uses restricted 1 in industrial zone	Uses restricted 2 in industrial zone	
42.2	Single family residential buildings and commercial buildings- floor area limited to 300Sq M			

Table 33.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
43	Public and Semi-public zone			
43.1	All offices and assembly buildings, Banking and Financial institutions.	Cremation ground/ Crematorium, Burial ground, common vault		
43.2	Residential use incidental to Public and Semi public use, hostels and boarding houses, night shelters, Orphanages/old age homes/, guest houses /lodges,	Fuel filling stations		
43.3	All commercial establishments, - Floor area limited to 500 sq. m.			
43.4	All educational institutions. All places of worships & religious study centre			
43.5	Diagnostic Centres, Hospitals, Geriatric & Palliative care centres			
43.6	Cottage Industries associated with public utility, Service industries of non - nuisance nature (See Annexure- I) Spray painting, Automobile work shops & service station, IT hardware and electronic industries, Water treatment plants			
43.7	Tot lots/Parks/Play grounds, Taxi/Jeep/Auto rickshaw stands, Parking Plaza,	Indoor /Outdoor Stadium,	Bus/Truck Terminals	
43.8	Plant nursery, Green houses, Agriculture and Horticulture, Pastures and Grazing Grounds, Fodder Cultivation, Pump Houses, Wells and Irrigation Ponds, Fish farms, Seed Farms, Storage of Agricultural produces and seeds			

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
44	**Tourism Development Zone**			
44.1	All accommodation facilities including single family residential buildings upto 300 sq.m, guest houses, resorts, home stays and assembly buildings up to 300 sq.m incidental to resorts			
44.2	Restaurants, Commercial buildings up to 500 sq.m incidental to main use, hotels and lodging facilities			
44.3	Park and open spaces, open grounds, Tot lots, open air auditorium, Walkways, cycling tracks, museums			
44.4	Gymnasium, yoga center, health club, Indoor courts, Parking grounds	Parking Plaza		
44.5	Plant nursery, Green houses, Farms house Agriculture and Horticulture, Pastures and Grazing Grounds, Fodder Cultivation, Pump Houses, Wells and Irrigation Ponds, Fish farms, Seed Farms, Storage of Agricultural produces and seeds.			
45	**Recreational zone**			
45.1	Open Air Stadium, Open Air Theatre,, Any construction/land development essential for the development/ improvement of open air recreational facilities.			
45.2	Amusement parks, Tot Lots, Park, Play Grounds, bath houses, Swimming Pools, Zoological & Botanical Garden, Bird Sanctuary, Indoor games and stadiums, Gymnasium, Pavilions and grant stands, radio & television station, Watch Towers, Eco Walk Ways, Cycling tracks, Water Sports Facilities, Fair Grounds, parking grounds , Parking plaza, etc.			
45.3	Public utility areas and buildings, People service centres, crèche and kindergartens , residential colony offices and its Incidental uses which will not affect the character of the area namely conference halls, restaurants, canteen, curio shops, retails shops, cyber café with total area limited to 100m2			

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
46	**Traffic and Transportation Zone**			
46.1	Roads, walkways, cycling tracks, flyovers, over bridges and under passes, All buildings and uses connected with Transport and communication such as Transport terminals including Bus /Lorry Terminal, auto taxi Stand, Railway Station, essential repair and service shops related to the transportation and communication use, Parking grounds, Parking plaza, Traffic park.	Fuel filling stations	Multiplex complex-incidental to main use	
46.2	Any remunerating uses attached to the transport terminals as value capture mechanism such as retail shops, restaurants, canteen, movie halls, night Shelters, Guest houses, lodging and dormitory, Tot lots, Parks or Any other use which form an integral part of transportation use			
46.3	Police post/ Station, Fire Post/Station, Post & Telegram office, Telephone Exchange, Electric substation, Clinics (Out Patient), Offices, storage, Social Welfare center, Public Utility and related buildings incidental to main use.	,		
46.4	ATMs, Weigh bridges, Water& Sewage treatment plant			
47	**Land reserved for Road**			
47.1	Includes existing roads, land under proposed road widening and new roads. Roads, walkways, cycling tracks, flyovers, underpasses and other uses which forms an integral part of the right of way are permitted here.			

Table 33.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted - 2	Conditions
	(1)	(2)	(3)	
48	**Dry agriculture Zone**			
48.1	Agriculture, Horticulture, and fodder cultivation, pastures, grazing ground, and other types of cultivation including social forestry. Storage of agricultural produces			
48.2	Fish farm, Seed farms, Animal husbandry related farms			
48.3	Pump Houses, Wells and Irrigation Ponds,			
48.4	All Residential Buildings including flats/apartments,Hostels and Boarding houses , Night Shelter, Orphanages/ Old age homes/ Dharmasala, Guest houses / Lodges/ Home stays/resorts			
48.5	All places of worships & religious study centre.			
48.6	All commercial establishments, All Offices, IT/ Software units, Banking and Financial institutions, Godowns/ Warehouses/ storages .	Fuel filling Stations	Bus/Truck Terminals	
48.7	Cottage Industries, Service industries of non - nuisance character (See Annexure-I)			
48.8	Day care and creche, Nursery/ Kinder Garten/Primary School, Reading rooms, Public utility areas and buildings			
48.9	Auto rickshaw stands, Taxi/Jeep Stand.			
48.10	All assembly buildings, Educational institutions and hospitals			
49	**Wet Agriculture zone**			
49.1	Paddy fields, All kind of Agriculture and Horticulture, Pastures and Grazing Grounds, Fodder Cultivation, Fish and Seed farm, Well and irrigation ponds, Drying yard with out roof, Pump houses,up to 20 sq. m. Plant nursery, Green houses	Dairy & Poultry Farms. Minor Public Utility areas & Public utility buildings incidental to main use - Area up to 100 sqm.		

Table 33.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted - 2	Conditions
	(1)	(2)	(3)	
49.2	Constructions/ land developments in conformity with the Kerala Conservation of Paddy Land and Wet Land Act 2008 and its amendments in force in the State. For land which are legally converted to dry land by order of the competent authority, developments / constructions shall be permitted for the uses for which it was converted.	Dairy & Poultry Farms. Minor Public Utility areas & Public utility buildings incidental to main use - Area up to 100 sqm.		
49.3	In the cases where permitted uses are not specified in the land conversion orders or In the case of land which are already classified as dry as per revenue records, the Secretary may, considering the zoning regulations of surrounding land, permit constructions and land developments.			
50	**Forest**			
50.1	Only forest related activities by the Forest Department are Permitted			
51	**Crematorium and Burial grounds**			
51.1	Cremation grounds, Burial grounds. Modern crematoriums, Buildings/ Structures incidental to the permitted use of the Zone.			
52	**Waterbody Zone**			
52.1	All water bodies shall be conserved. Bridges, Side protection walls, Walk ways and cycling tracks around the water body, Bathing Ghats, Floating jetty, boat docking facilities etc may be permitted based on community level requirements .			

Table 32.1 continues..

Sl. No.	Uses permitted	Uses restricted -1	Uses restricted -2	Conditions
	(1)	(2)	(3)	
53	**Flood prone Area (overlay- based on Flood Hazard Probability of Kerala based on RCP8.5 Climate Change Scenario(100year), Hazard Map published by KSDMA)**			
a	**Land Use Regulations**			
53.1	All uses permitted/restricted in accordance with the Zoning Regulation of the respective Land Use Zone lying under the Flood Prone Area			
53.2	Buildings for public purposes/ Public amenities & services/ Disaster mitigation projects/ measures.			
53.3	Bridges, Side protection walls, Bathing Ghats, Constructions for drinking water and Irrigation schemes, Floating jetty, Pump house, Fish landings, Boat Jetties, Guided Boat rides, Watch Tower, Eco Walk ways, Water Sports Facilities, Fairground, park and open spaces, cycling track etc.			
53.4	Social forestry activities like bamboo cultivation, agriculture and horticulture, wells, ponds, ticket counter, Bird sanctuaries etc.			
53.5	The flood prone area is applicable to the complete area under the survey number over which it falls.			
b	**Built Form Regulations**			
53.6	New constructions shall have at least a balcony or an open verandah or an open terrace in the upper floor(s) or an open stair connecting the upper floor (s) to the ground. Such balcony or open verandah or open terrace or open stair shall face the yard abutting the adjoining street to facilitate easy evacuation.			
53.7	In the case of new buildings or constructions involving addition/extension of upper floor (s), at least 50% of roof terrace area so constructed, shall be kept open to the sky and made accessible to facilitate easy evacuation.			
53.8	The regulation cited above shall be adopted for addition/extension for upper floors to an existing building, wherever practical.			
53.9	Height of any newly constructed compound wall shall not exceed 1.2 m and no sharp edged projections shall be fixed on the compound walls or gates.			
54	**Land slide prone area (overlay)**			
54.1	All uses permitted/restricted in accordance with the Zoning Regulation of the respective Land Use Zone lying under the landslide Prone Area. However activities involving use of excavators or similar machineries for slope deformation, cutting & filling of land, expansion of existing quarrying activities etc all are prohibited in these areas.			

55	**SPECIAL ZONES: Developments in this zone may be permitted by Secretary of Cherpulassery Municipality. For the Projects proposed in paddy land or wet land, developments shall be subject to the provision of Kerala Conservation of Paddy Land and Wet land Act in force in the state. The proposals which are marked as G1, G2, G3etc... are proposed in government/ local body owned land. Municipality shall take initiation to get the project implemented by the respective department through proper intervention and if required, take necessary steps for transferring the ownership of such lands to the local body or concerned department/agencies implementing the project. Proposals which are marked as P1, P2, P3 etc.. are proposed in privately owned lands and shall be implemented by the municipality through land procurement by suitable means. For proposals P1, *P2, P4, P5, P6 and P9,* the project may also be implemented by the land owner or developer or by any other interested agencies but with the concurrence of the municipal council subjected to the conditions (if any) put forth by them. Initiation of land procurement if required for special zones shall be started within a period of 7 years from the date of sanctioning of this plan. Otherwise the land use zone of that particular land shall deemed to be changed to adaptable zones as specified in column 5.**

Number (1)	Zone Name (2)	Project Details (3)	Location and extend (4)	Adaptable zones (5)
55.1	G1	Community Hall, Mini civil station and Sports complex	1.44Ha in Block number 42, survey number 237/1pt, 2	Public and Semi public zone
55.2	G2	Town Park and congregation centre	1.80 Ha in Block number 42, survey number 444/1pt	Public and Semi public zone
55.3	G3	Bus bay and parking plaza	0.15Ha in Block number 43, survey number 90/7pt	Transportation zone
55.4	P1	Truck lay by and amenity centre	0.70Ha in Block number 41, survey number 327/2pt	Commercial Zone
55.5	P2	Valluvanad Cultural Centre	1.06 Ha in Block number 41, survey number 382/8, 382/9	Commercial zone
55.6	P3	Municipal complex	1.48 Ha in Block number 42, survey number 383/5pt, Block number 43, survey number 73/1pt	Commercial zone
55.7	P4	Bus terminal cum Shopping centre	2.10 Ha in Block number 43, survey number 191/3pt,5,6, 193/5pt, 6-11,12pt, 13pt,14, 194/1,2,4	Future Urban Zone

Number (1)	Zone Name (2)	Project Details (3)	Location and extend (4)	Adaptable zones (5)
55.8	P5	Proposed educational complex	2.40 Ha in Block number 43, survey number 132/2-4, 133/1pt	Dry agriculture zone
55.9	P6	Cheenikkapara Tourism centre	3.55 Ha in Block number 42, survey number 1/2pt, 2/2pt	Tourism development zone
55.10	P7	Sewage Treatment Plant	0.41 Ha in Block number 43, survey number 191/2pt,3pt, 193/4pt,5pt	Future Urban Zone
55.11	P8	Integrated waste management unit	1.05 Ha in Block number 42, survey number 2/2pt	Future Urban Zone
55.12	P9	Centre for Peacefulness and mind reclamation	3.63Ha in Block number 41, survey number 50/3, 51/2	Dry agriculture zone

ANNEXURE I

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

1. Aerated waters and fruit beverages
2. Apparel making
3. Assembly of air coolers and conditioners
4. Assembly of bicycles, baby carriage and other small non motorized vehicles
5. Atta -Chakkies
6. Ayurvedic medicinal formulations ,Ayurvedic health club
7. Bakery products ,biscuits ,confectionaries
8. Bamboo and cane products (only dry operations)
9. Block making for printing
10. Card-board box and corrugated paper and paper products
11. Carpet weaving
12. Cement and concrete products
13. Chilling plants and Cold storage
14. Coir (without bleaching /dyeing)
15. Concrete batching plants
16. Copper, brass and metal utensils
17. Cotton and woolen hosiery/Cotton and silk printing
18. Domestic electrical appliances
19. Electronics and electrical goods
20. Electroplating
21. Embroidery and Lace manufacturing
22. Engineering workshop and general fabrication works
23. Flour mills
24. Foam beds, Latex thread
25. Footwear (PVC and rubber)

26. Fountain pen
27. Furniture making
28. Garment stitching, tailoring
29. Gold and silver smithy
30. Gold and silver thread saree work
31. Ice cream or ice making
32. Insulation and other coated papers(paper and pulp manufacturing excluded)
33. Jobbing and machining
34. Laundry, dry cleaning and dying
35. Light engineering
36. Manufacture and repair of musical instruments
37. Manufacture of soaps involving process without generation of trade effluents (Saponification of fats and fatty acids only
38. Manufacture of tobacco products
39. Manufacturing of formulated synthetic detergent products
40. Mineralized water
41. Oil ginning /expelling
42. Optical frames
43. Padlock
44. Paint (by mixing process only)
45. Paper pins and U- clips
46. Photo and picture framing
47. Power looms /hand looms (without dyeing &bleaching)
48. Pressure testing units
49. Printing press
50. Radio servicing and repairing
51. Rice mullers
52. Rope (Cotton and Plastic)
53. Rubber gloves other than that for surgical and medicinal purpose

54. Rubberized coir mattresses
55. Sanitary fittings and other similar industries
56. Scientific and mathematical instruments
57. Small foundries
58. Small foundries
59. Sports goods
60. Steeping and processing of grains
61. Tissue culturing
62. Toy making
63. Watch, pen and Spectacle repairing
64. Water softening and demineralization plants
65. Wooden and electrical accessories

ANNEXURE II

List of obnoxious or nuisance industries subject to objectionable odours, fumes, effluents or processes, located in hazardous zones.

(Grouped under Indian Standard Industrial Classification)

I. Manufacture of food stuff:

1. Slaughtering, preservation of meat and fish and canning of fish

II. Manufacture of Beverages:

2. Production of distilled spirits, wines, liquor etc., from alcoholic malt, fruits and malts in distillery and brewery
3. Production of country liquor and indigenous liquor such as toddy, liquor from malwa, palm juice.

III. Manufacture of wood and wooden products:

4. Sawing and planning of wood
5. Wood seasoning and creosoting
6. Manufacture of veneer and plywood
7. Paper, pulp and straw board

IV. Manufacture of leather and leather products:

8. Currying, tanning and finishing of hides and skins and preparation of finished leather

V. Manufacture of rubber, petroleum and coal products:

9. Manufacture of tyres and tubes
10. Manufacture of industries and synthetic rubber
11. Reclamation of rubber
12. Production of petroleum, kerosene and other petroleum products in refineries
13. Production of coal tar and coke in coke oven

VI. Manufacture chemicals and chemical produces

14. Manufacture of basic industrial chemicals such as acids, alkali and their salts not elsewhere specified (especially sulphurous, sulphuric, nitric, hydrochloric etc., acids) ammonia, chlorine and bleaching powder manufactures.

15. Manufacture of dyes, paints, colors and varnishes, printing ink
16. Manufacture of fertilizers (specially from organic materials)
17. Manufacture of disinfectants and insecticides
18. Manufacture of ammunition; explosive and fire works
19. Manufacture of matches

VII. Manufacture of non-metallic mineral products other than petroleum and coal:

20. Manufacture of cement and cement products
21. Manufacture of lime
22. Manufacture of plaster of Paris

VIII. Manufacture of basic metals and their products.

23. Manufacture of iron and steel including smelting, refining rolling and conversion into basic forms
24. Manufacture including smelting, refining etc., or nonferrous metals and alloys in basic forms
25. Manufacture of armaments

IX. Manufacture of machinery (other than transport) and electrical equipments

26. Manufacture of all kinds of battery

X. Miscellaneous items not covered above:

27. Incineration, reduction or dumping of offal, dead animal's garbage or refuse
28. Manufacture of gelatin and glue
29. Fat, tallow, grease or lard refining of manufacture
30. Bone meal, bone grist and bone powder and other similar types of nuisance industries.

MASTERPLAN FOR CHERPULASSERY TOWN
EXISTING LAND USE MAP-2016 --MP / 01

INDIA



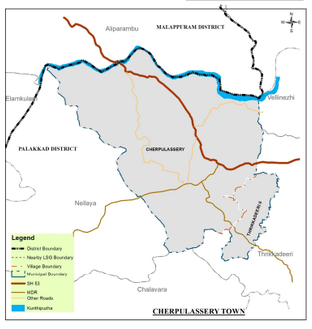
KERALA



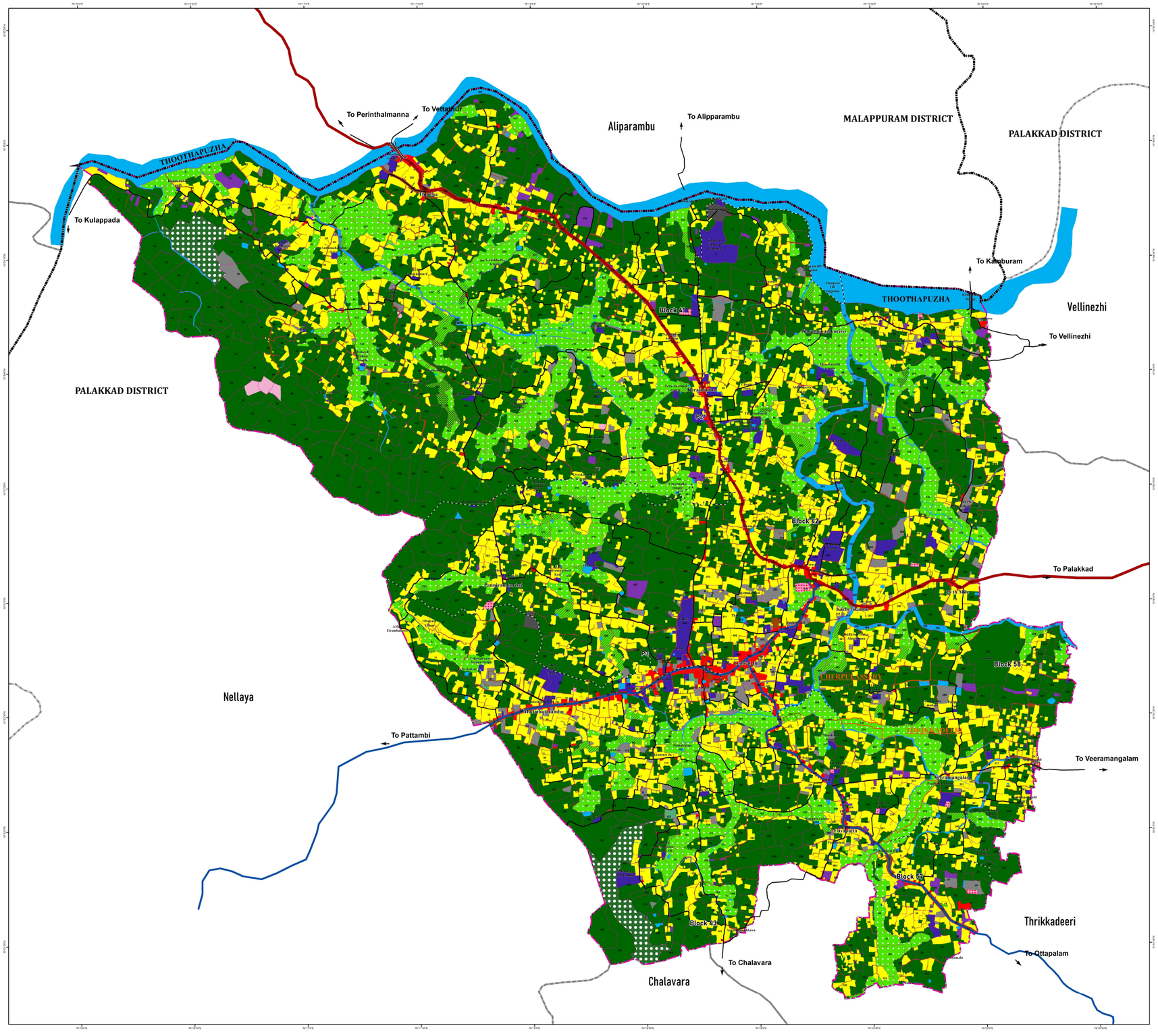
PALAKKAD



CHERPULASSERY



CHERPULASSERY TOWN



Legend

- Residential
- Commercial
- Industrial
- Public and semi public
- Paddy Active
- Paddy Non active
- Paddy Converted
- Dry Agriculture
- Forest
- Traffic and Transportation
- Park and Open space
- Crematorium/Burial Grounds
- Vacant Land
- Quarry
- Hillock and Rocky Area
- Waterbody
- Survey Boundary
- Block Boundary
- Village Boundary
- Municipal Boundary
- Panchayath Boundary
- District Boundary
- State Highway
- Major District Roads
- Other Roads
- Bridges/Culverts

SCALE : 1:10000

0 125 250 500 750 1000 Meters

CHERPULASSERY MUNICIPALITY

Secretary Chairperson

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) PALAKKAD

Draftsman

Assistant Town Planner

Deputy Town Planner

TOWN PLANNER

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) GOVERNMENT OF KERALA

Assistant Town Planner

Deputy Town Planner

Town Planner

Senior Town Planner

CHIEF TOWN PLANNER (Planning)

LOCAL SELF GOVERNMENT DEPARTMENT GOVERNMENT OF KERALA

Principal Secretary to Government

MASTERPLAN FOR CHERPULASSERY TOWN
PROPOSED LAND USE MAP-2036 --MP / 02 / I

INDIA

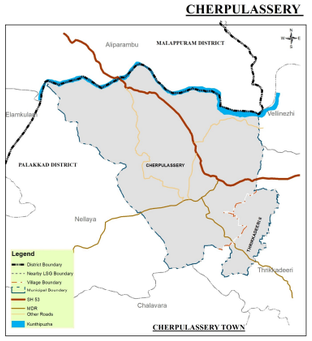


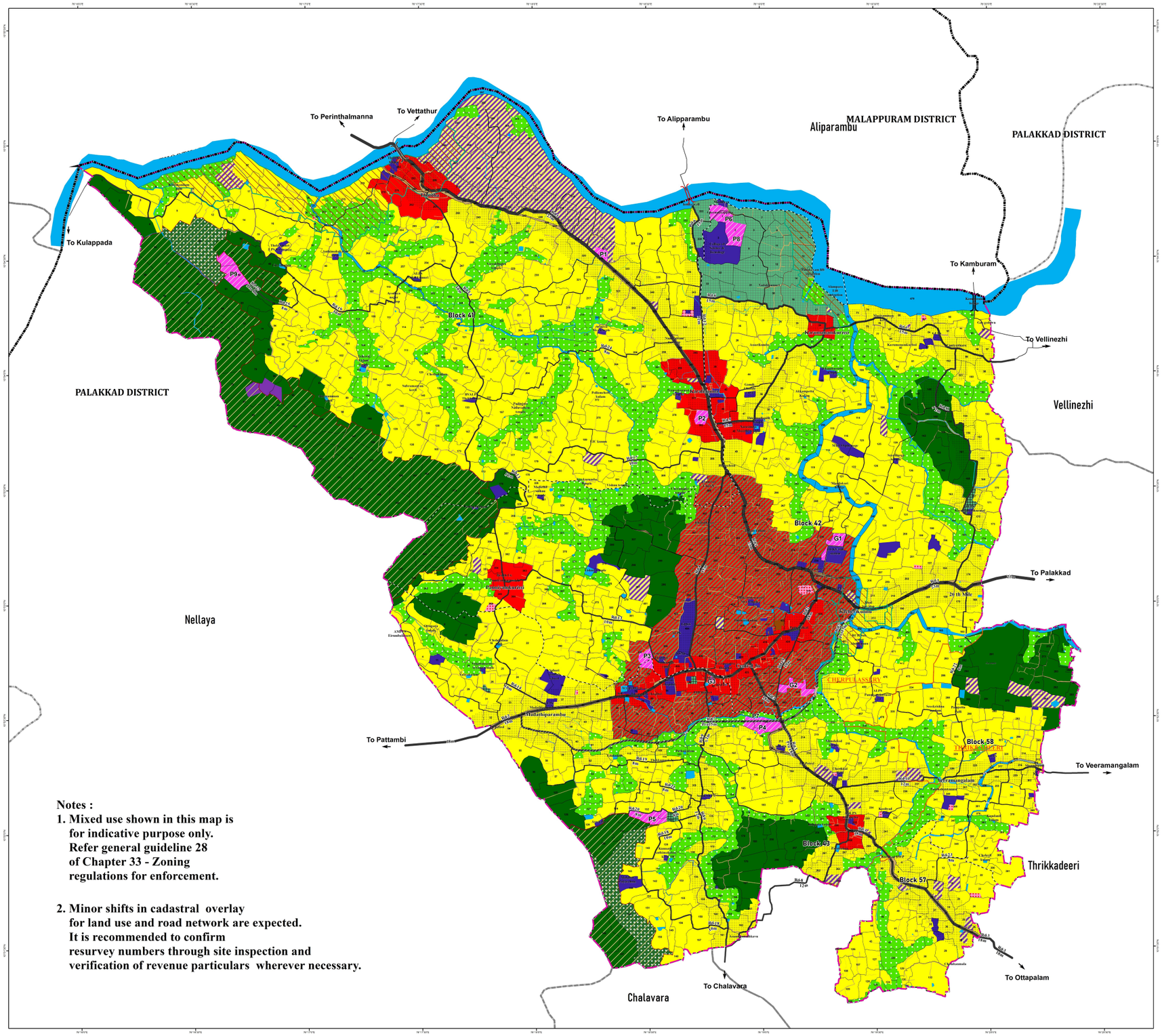
KERALA





CHERPULASSERY





Notes :

1. **Mixed use shown in this map is for indicative purpose only. Refer general guideline 28 of Chapter 33 - Zoning regulations for enforcement.**

2. **Minor shifts in cadastral overlay for land use and road network are expected. It is recommended to confirm resurvey numbers through site inspection and verification of revenue particulars wherever necessary.**

Legend

- Residential Zone
- Commercial Zone
- Future Urban Zone
- Industrial Zone
- Industrial Mix Zone
- Public and semi public Zone
- Tourism Development Zone
- Recreational Zone
- Traffic and Transportation Zone
- Land Reserved for Road
  - Existing Roads
  - Roads to be Widened
  - New Roads
- Dry Agriculture Zone
- Wet Agriculture Zone
- Forest
- Crematorium and Burial Grounds
- Water body Zone
- Special Zones
- Flood Prone Area (as overlay)
- Landslide Prone Area (as overlay)
- Mixed Use (as overlay)

- Survey Boundary
- Block Boundary
- Village Boundary
- Municipal Boundary
- Panchayath Boundary
- District Boundary

Bridges/Culverts
- Existing
- Proposed

- Other Roads

SCALE : 1:10000

0 125 250 500 750 1000 Meters

CHERPULASSERY MUNICIPALITY

Secretary Chairperson

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) PALAKKAD

Draftsman

Assistant Town Planner

Deputy Town Planner

TOWN PLANNER

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) GOVERNMENT OF KERALA

Assistant Town Planner

Deputy Town Planner

Town Planner

Senior Town Planner

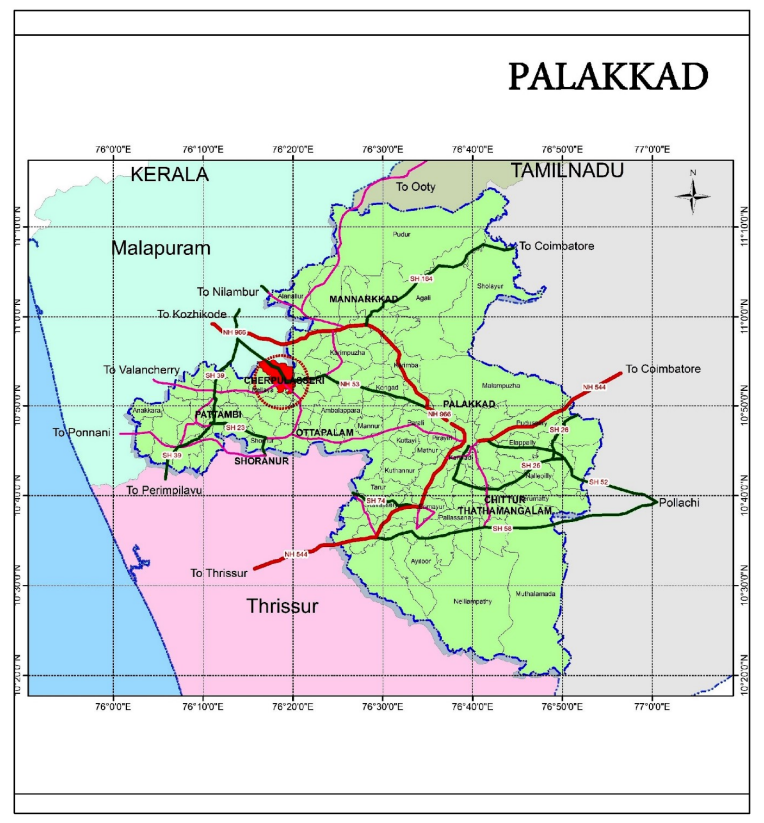
CHIEF TOWN PLANNER (Planning)

LOCAL SELF GOVERNMENT DEPARTMENT GOVERNMENT OF KERALA

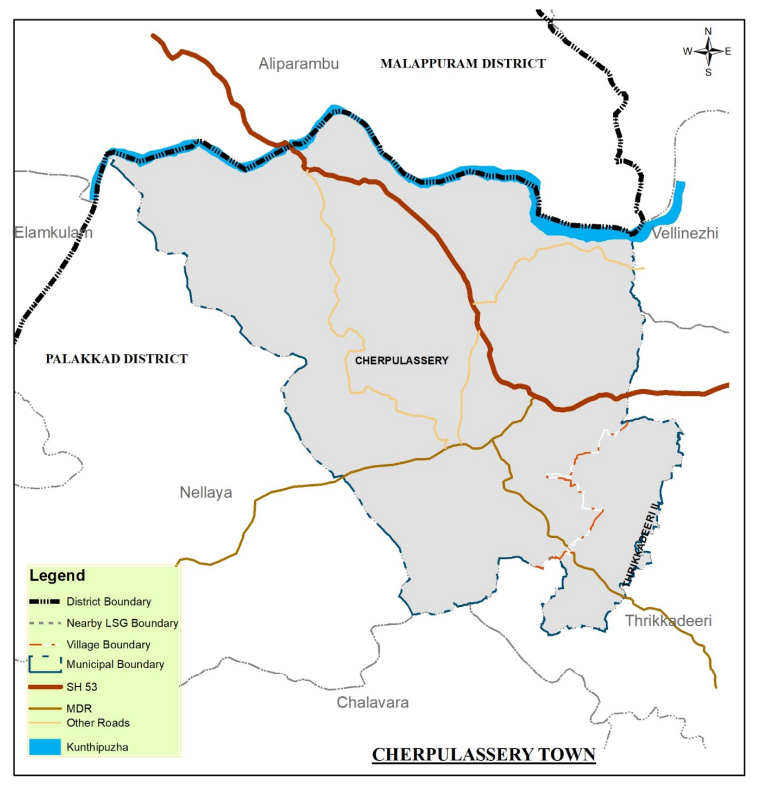
Principal Secretary to Government

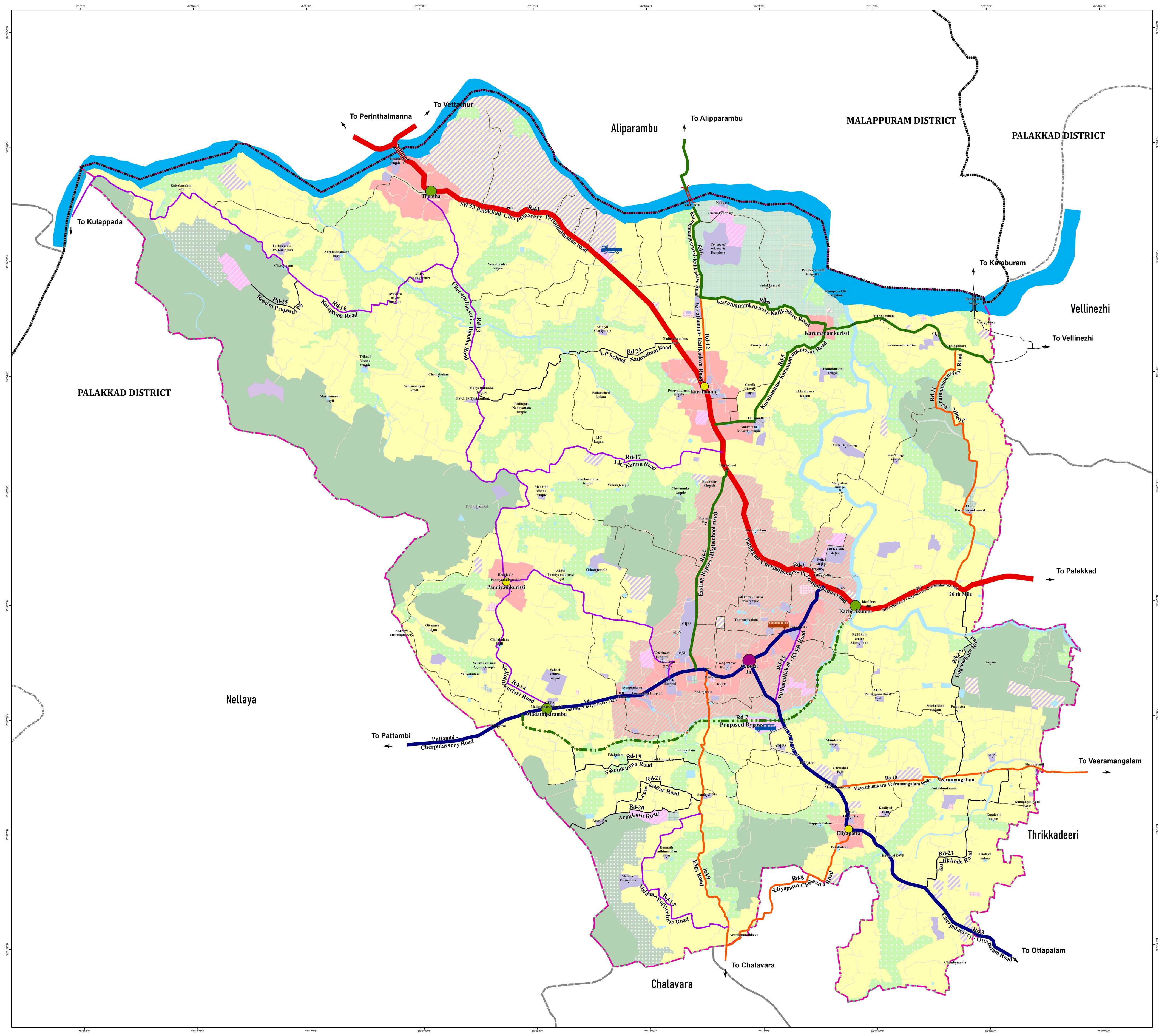






CHERPULASSERY





MASTERPLAN FOR CHERPULASSERY TOWN
PROPOSED ROAD LAY OUT-2036 --MP / 02 / II

Legend

Proposed Nodes

- First Order
- Second Order
- Third Order
- Bus stand
- Proposed Bus stand
- Proposed Truck Terminal
- Existing Bridges
- Proposed Bridges/Culverts

Widening Roads

- 23m
- 18m
- 15m
- 12m
- 10m
- 8m

New Roads

- Proposed 18m
- Proposed 15m
- Proposed 8m

- Other Roads
- Waterbody
- Municipal Boundary
- Panchayath Boundary
- District Boundary

SCALE : 1:10000

0 125 250 500 750 1000 Meters

N W E S

CHERPULASSERY MUNICIPALITY

Secretary

Chairperson

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) PALAKKAD

Draftsman

Assistant Town Planner

Deputy Town Planner

TOWN PLANNER

LOCAL SELF GOVERNMENT DEPARTMENT (PLANNING) GOVERNMENT OF KERALA

Assistant Town Planner

Deputy Town Planner

Town Planner

Senior Town Planner

CHIEF TOWN PLANNER (Planning)

LOCAL SELF GOVERNMENT DEPARTMENT GOVERNMENT OF KERALA

Principal Secretary to Government








CHERPULASSERY MUNICIPALITY
LOCAL SELF GOVERNMENT DEPARTMENT PLANNING, KERALA

OCTOBER 2024