EVOLVING PLANNING GUIDELINES FOR SMART GROWTH IN INDIAN CONTEXT - A CASE OF CHENNAI CITY

A DISSERTATION

Submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF URBAN AND RURAL PLANNING

By

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CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in this thesis entitled **"EVOLVING PLANNING GUIDELINES FOR SMART GROWTH IN INDIAN CONTEXT – A CASE OF CHENNAI CITY"** in partial fulfilment of the requirement of the award of the Degree of Master of Urban and Rural Planning submitted in the Department of Architecture and Planning, Indian Institute of Technology Roorkee, is an authentic record of my own work carried out during the period from July 2008 to June 2009 under the supervision of R.SHANKAR, Professor and Former Head, Department of Architecture and Planning Indian Institute Of Technology Roorkee.

The matter embodied in thesis has not been submitted by me for the award of any other degree.

Dated: 29 June 2009
Place: Roorkee

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

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EXECUTIVE SUMMARY

The Indian cities are witnessing a sprawl form of urban growth with low density and auto oriented suburban development. The sprawl and haphazard growth are owing to many reasons like cheap availability of land, convenience for of the developer to develop in the fringes of the city, people's preference to live in the suburbs due to low rents and the use of personalised mode of transportation providing convenient access to the city. There is no integration of land use, infrastructure development and public transportation in the cities. The urban sprawl is associated with many other issues like high infrastructure cost and adverse impact on the environment and health. In totality the way the metropolitan growth and development is occurring in India, it is no longer desirable and sustainable.

In response to a similar situation the western world has come up with new alternative urban development approaches like smart growth, new urbanism, compact city and transport oriented development – all of which aiming at sustainable urban development. This dissertation aims at creating a substantive understanding of Smart Growth Concept as evolved in the western countries and its relevance in Indian context. After the general study of urban development in India the development scenario of Chennai metropolis is studied in detail and the second master plan of Chennai is evaluated; from the point of view of smart growth the new town area of Maraimalainagar is identified as application area and a smart growth based conceptual plan is prepared for the same.

In chapter 1 the background for the study is discussed followed by the aim, objectives scope and limitation for the dissertation. The methodology for the dissertation is evolved followed by the schedule of work to be carried out during the dissertation work.

In chapter 2 literature based study has been done on the concept of smart growth. Chapter 2 introduces the concept of smart growth and outlines the smart growth principles. The chapter discusses how the smart growth principles can be applied by creating goals and strategies. The benefits and challenges of implementing smart growth are discussed. The communities implementing smart growth are mentioned in this chapter.

In Chapter 3 Four case studies from western context have been studied to understand the concept, principles and strategies of smart growth as evolved in western countries and to know how smart growth is implemented. Useful lessons have been inferred from each case study and planning guidelines for smart growth is evolved.

In chapter 4 urban growth trends in Indian cities have been studied to assess the relevance of smart growth in Indian context. The urban planning system in India and the significance of master plan in the process of development of the city has been discussed. A review on the status of master plan has been done. Overview of master plans prepared in India in light of smart growth principles is done by reviewing Delhi master plan and by presenting a general overview of master plans prepared in India. The problems faced by Indian cities due to urbanisation are also discussed in the chapter.

In chapter 5 development scenario in Chennai metropolis has been studied. The study on Chennai city has been made on the current trends of development in Chennai by direct observation, photo study and from secondary data. An overview of Chennai city is presented, then the evaluation of Chennai Master Plan based on smart growth principle has been done, the development along two major corridors of Chennai city is discussed and the development of new townships and the analysis based on smart growth principles is done.

In chapter 6 selected area of Chennai metropolis, Maraimalai Nagar is studied. The evaluation of Maraimalai Nagar development plan based on smart growth principle has been done. A detail study has been carried out on various aspects of Maraimalai Nagar and the application potential of smart growth oriented development for Maraimalai Nagar has been assessed in this chapter.

In chapter 7 the proposals for 'smart-growth-oriented-development' for Chennai city and Maraimalai Nagar Township are presented. The proposals are based on the study made on Chennai city and Maraimalai Nagar Township. A re-planning has been attempted for Chennai city based on the accessibility to transportation corridor and density of population. For Maraimalai Nagar a plan strategy is prepared for smart-growth-oriented-development. Necessary modifications in the existing planning and developmental provisions for the application of smart growth principles in Chennai city and Maraimalai Nagar are provided.

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ABBREVIATION AND ACRONYMS

CMA	Chennai Metropolitan Area
Ccc	Chennai City Corporation
CMDA	Chennai Metropolitan Development Authority
DCR	Development Control Rules
EWS	Economically Weaker Section
ECR	East Coast Raod
EPA	Environmental Protection Agency
FSI	Floor Space Index
GST	Grand Southern Trunk
GWT	Grand Western Trunk Road
HIG	High Income Group
IT	Information Technology
ITES	Information Technology Enabled Services
IRR	Inner Ring Road
IPT	Intermediate Para Transit
ISTEA	Inter-modal Surface Transportation Efficiency Act
LIG	Low Income Group
LEED	Leadership in Energy and Environmental Design
MIG	Middle Income Group
MUDP	Madras Urban Development Program
MRTS	Mass Rapid Transportation System
MMA	Madras Metropolitan Area
MMDA	Madras Metropolitan Development Authority
MEPZ	Madras Export Processing Zone
NH	National Highway
OMR	Old Mahabalipuram Road
SEZ	Special Economic Zone
SIPCOT	State Industries Promotion Corporation of Tamil Nadu
STPP	Surface Transportation Policy Project
TNUDP	Tamil Nadu Urban Development Project
TNHB	Tamil Nadu Housing Board
TNSCB	Tamil Nadu Slum Clearance Board
USGBC	U.S. Green Building Council
UEDD	Urban Economic Development Division
WMATA	Washington Metropolitan Area Transit Authority

CHAPTER 1 INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 Background to the Study

The process of rapid and extensive urbanisation in India has put many of the Indian cities under great pressure. The pressure is not only on the resources and environment but also on the people living in the city and the government which provides the infrastructure and other amenities. The pattern of spatial development of the Indian cities is haphazard and Indian cities lack infrastructure facilities .The major problem faced by Indian cities is the urban sprawl. Urban sprawl puts the burden on government to come up with a solution to accommodate the desires for a rural lifestyle and urban services while protecting health, safety and environment. The pattern of growth of Indian cities witnessed a major change after 1990's.The cities like Mumbai, Delhi, Chennai, Bangalore etc. became the globalisation hot spots. The Indian cities became the magnet for foreign direct investment due to the economic liberalisation of 1991. This led to the major restructuring in the pattern of cities growth.

1.2 Identification of the Problem

With the increase in the population in the cities and the present trends of haphazard urban sprawl of the cities are witnessing many problems. The lack of infrastructure facility has greatly affected the quality of life. People living in the cities are facing miserable situation due to lack of public transport, housing , traffic jams, frequent power cuts, inadequate water supply, lack of fresh air and green open spaces to socialize and the list is never ending. The government faces the problem of providing infrastructural facilities and good environmental condition for the ever growing city. The lack of public transportation, and presences of work place and facility away from home, forces people to have their own vehicles like car and motor bikes which add to traffic congestion and pollution. In a nut shell, in the name of development, the cities are spreading their landscape and are deteriorating the living conditions for the people and there is no vision for future development.

In this context, smart growth is one such urban development alternative which needs to be studied in detail for adaptation to Indian situation to make Indian urban development sustainable.

1.3 Aim

To evolve planning and development guidelines for achieving smart growth in Indian cities.

1.4 Objectives

1. To understand the concept, principles and strategies of smart growth as evolved in western countries.
2. To infer lessons and useful planning guidelines from relevant case studies of smart growth,
3. To review the recent trends of urban development in India and assess the relevance of smart growth in Indian context.
4. To study the development scenario of Chennai metropolis and evaluate the master plan of Chennai in the light of smart growth principles.
5. To evaluate the development plan for the selected area of Chennai metropolis (Maraimalai Nagar Township) and prepare a plan strategy for its 'smart-growth-oriented-development'.
6. To recommend necessary modifications in the existing planning and developmental provisions for the application of smart growth principles in Chennai.

1.5 Scope

- The studies of smart growth experiments and smart growth guidelines have been based on the available data from the secondary sources. Though the study is primarily confined to Chennai metropolis and its development from the point of view of smart growth principles, the application of smart growth principles finds relevance in the present and future urban scenario in other metropolitan cities of developing countries in general and India in particular.
- The proposals and recommendations made in the dissertation are suitable for application with suitable alterations in other cities of India also.

1.6 Limitation

- The scope of work has been be limited by the available data and due to time constraint only selected area of the Chennai metropolis has been taken up for analysis and application from the point of view of smart growth.

1.7 Methodology

Important stages of work for dissertation

- Discussions and background studies on smart growth.
- Extensive literature study and case study to understand smart growth concept, its principles and strategies as evolved in western countries. Literature study on Indian urban development scenario and the development pattern of Chennai city and the problems related to the growth of the city.
- Initial processing and compilation of data, inferences, guidelines, principles and strategies from literature study.
- Collection of data and maps on the Chennai city and selected area of Chennai metropolis by field survey, photo study, informal interview, direct observation and collection of secondary data from government agencies, research institutions, libraries, internet and by discussion with officials.
- Digitization of maps, creating a database from the collected data and analysis of data.
- Preparation of guidelines strategies and standards for smart growth application based on the analysis.
- Identifying the application potential for smart growth oriented development in Chennai metropolis and preparations of plan strategy for same and for the selected area of Chennai metropolis for its smart growth oriented development.
- Policy recommendation for modified institutional provision, development regulations and byelaws.

The chart below (Refer Fig 1.1) gives the methodology adopted for the dissertation work

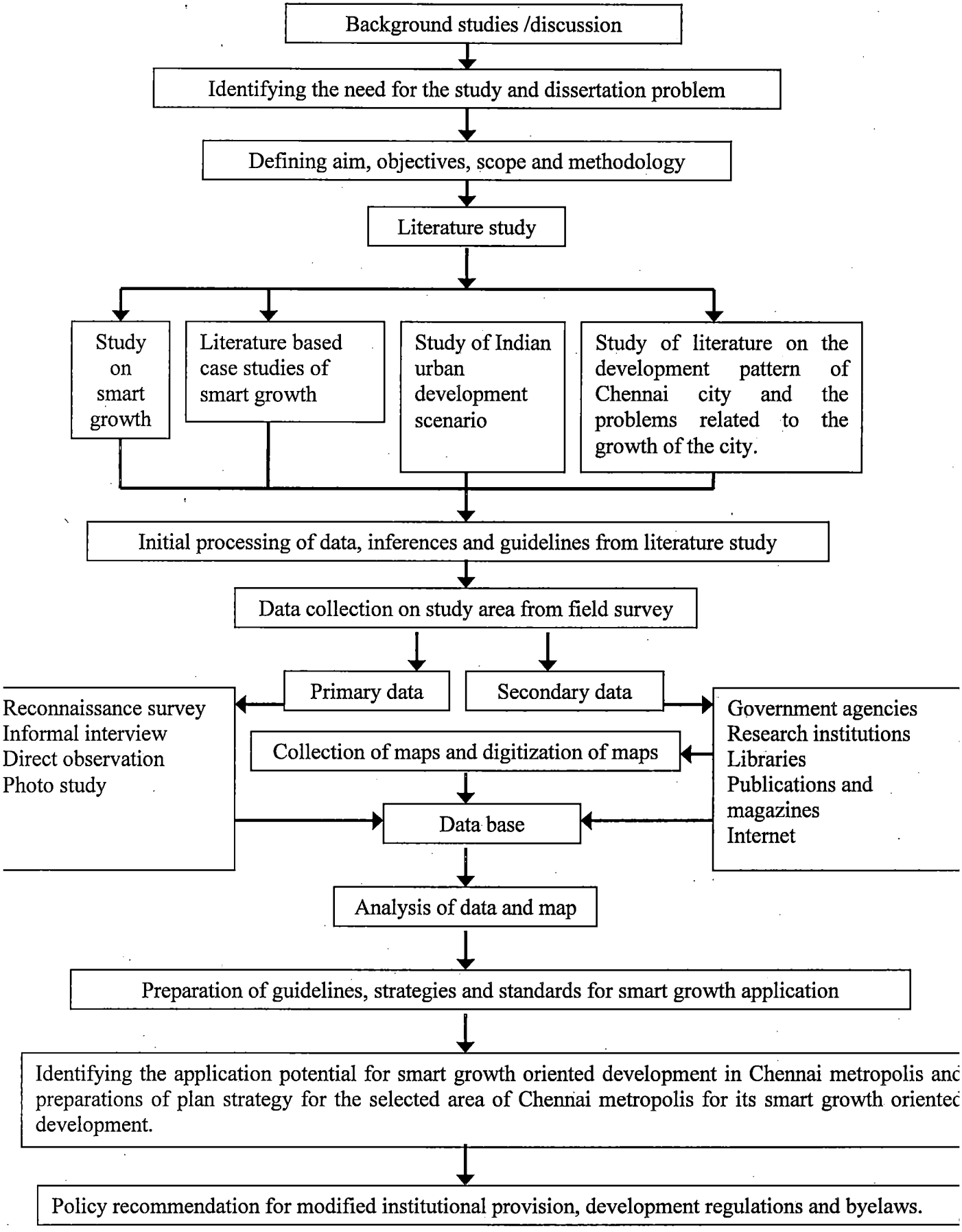


Fig 1.1: Chart Showing the Methodology for Dissertation Work

1.8 Schedule of Work

The table below (Table 1.1) gives the schedule of work for the dissertation work. It describes the various activities carried out during various months during the course of the dissertation.

Table 1.1: Schedule of Work

Month	Activities
June – July 2008	• Secondary data collection from Chennai Metropolitan Development Authority.
August – September	• Literature on smart growth.
September	• Presentation for the first review.
August – November 2008	• Literature and case studies on smart growth. Literature study on Indian urban development scenario and the development pattern of Chennai city and the problems related to the growth of the city.
November 2008	• Presentation for the second review.
December 2008	• Secondary data collection from various government agencies, libraries, publications, magazines and internet.
January- February 2009	• Field study of Maraimalainagar. • Field study in Chennai city along the corridors of development. • Collection of maps from Maraimalainagar municipality and Chennai Metropolitan Development Authority. • Visit to various new township development in Chennai city. • Visit to Fair pro the Chennai's biggest property fair. • Discussion with officials in Chennai Metropolitan Development Authority and Maraimalainagar municipality.
March 2009	• Digitization and preparation of maps. • Analysis of the data • Study on the development of Chennai city.

	• Evaluation of Chennai master plan based on smart growth principles. • Evaluation of the selected township development based on smart growth principles. • Evaluation of Maraimalainagar master plan based on smart growth principles.
April 2009	• Pre-final presentation
April- May 2009	• Preparation of maps. • Preparations of plan strategy for Chennai metropolis and Maraimalainagar. • Policy recommendation for modified institutional provision, development regulations and byelaws.
June 2009	• Finalisation of plan proposals, recommendations, report and submission.

CHAPTER 2 LITERATURE STUDY

CHAPTER 2
LITERATURE STUDY

2.1 Introduction

In this chapter literature based study has been done on the concept of smart growth. The origin and history of smart growth has been studied. The chapter introduces the concept of smart growth and outlines the smart growth principles. An overview of smart growth concept is presented.

2.1.1 Origin

When sprawling growth took place there were two camps one to have growth at any cost and the other was no growth movement. People realised that growth at any cost let to haphazard development and the development was costly and on the other hand no growth movement would not help the community to create a better environment .The interested people along with architects, planners developer, government talked of how the communities can be planned for economic and population growth so that the communities become stronger as they grow. This new approach aimed at improving the quality of life for the people and to remove the unwanted side effects of poorly managed growth. This idea of **people oriented planning** is known as smart growth. The planning ideas that came to be known as smart growth started by asking **how our communities can get less of what we don't want and more of what we do.** [1]

Transportation and community planners began to promote the idea of compact cities and communities in the early 1970s. The cost and difficulty of acquiring land to build and widen highways caused some politicians to reconsider basing transportation planning on motor vehicles. [2]

Architect Peter Calthorpe promoted and popularized the idea of urban villages that relied on public transportation, bicycling, and walking instead of automobile use. Architect Andrés Duany promoted changing design codes to promote a sense of community, and to discourage driving. Colin Buchanan and Stephen Plowden helped to lead the debate in the United Kingdom. [2]

2.1.2 History of Smart Growth

The origin of smart growth is unclear. Though the origin has been traced back to pre Second World War time serious efforts were taken in 1990's.The historical roots of Maryland's smart growth program started when Maryland established the nation's first State Planning Commission. A steady stream of planning legislation followed and in 1996, following an extensive listening campaign, many meetings, and frequent forums, the Governor's office of Maryland developed five initiatives that made Maryland the undisputed leader of smart growth policy reforms. [3]

The precursor to the smart growth includes the growth controls of the 1960s and the growth management revolution of the 1970s and 1980s. Smart growth also shares principles with new urbanism and sustainable development. This concept became well established during 1990's.The Surface Transportation Policy Project (STPP) was established in 1990 in Washington and it was instrumental in the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA). The passage of ISTEA led to the creation of the Urban Economic Development Division within the U.S. EPA Office of Policy, Economics and Innovation. Under the leadership of Harriet Tregoning, the UEDD created the Smart Growth Network and provided funding for a variety of smart growth activities. This network, administered by the International City/County Management Association, consists of some 36 organizations, most of them not-for-profit interest groups, several trade organizations, two federal agencies (EPA and NOAA) and one state (Maryland). Members of the network are active all over the nation, but the headquarters of most are located in Washington. [3]

Though its origin is unclear, these three projects show the rapid ascendance of smart growth concept. [3]

- In the mid 1990s, the American Planning Association launched Growing Smart, an ambitious project that in 1997 produced the first edition of the Growing Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change.
- In 1997 the Natural Resources Defense Council and the Surface Transportation Policy Project published, The Took Kit for Smart Growth, which promoted compact growth, mixed land uses, and transit oriented development.

- In 1997, the State of Maryland passed the Smart Growth and Neighbourhood Conservation Act.

2.2 Definition of Smart Growth

Smart growth is an urban planning and transportation theory that concentrates growth in the center of a city to avoid urban sprawl; and advocates compact, transit-oriented, walk able, bicycle-friendly land use, including neighborhood schools, streets that work for everyone, mixed-use development with a range of housing choices. [2]

Smart growth concept helps the communities grow in ways that sustain quality of life, provide plentiful options in housing and transportation preserve our built and natural heritage and promote a healthy economy. [1]

To grow "smart" means involving citizens in choosing a future that provides housing options for people of all incomes and ages; protects farmland and open space; revitalizes neighbourhoods and offers a variety of convenient options for getting around. [1]

The goal is to manage growth so that it improves, rather than degrades quality of life, but without shutting down economic growth. [1]

Smart Growth has two primary features: the "where" and the "how". It happens "where" development" can be accommodated with minimal adverse impact to the environment, and in places where development takes maximum advantage of public investment already made. Smart growth also addresses "how" the finished development will work with neighbouring development to restore choices that are missing in places marked by sprawl such as the choice to walk or use public transit, the choice to live in an apartment, a house, or a condominium. [4]

The Audubon Society's definition of "Smart Growth": "At the heart of the "Smart Growth" dialogue is the renewed interest in reinventing our urban centres and older suburbs as liveable places of sustainable economic vitality and cultural enrichment, while protecting our environment and rural working landscapes." [5]

To achieve smart growth, the smart growth principles are applied from regional scale to individual sites. The best development practices incorporate smart growth principles and they lead to good development.

2.3 Why We Need Smart Growth?

The haphazard and unplanned development of cities with low density and auto oriented development is creating many problems. The sprawl pattern of development of the city is the major issue in the context of which smart growth is essential. The haphazard extension of cities has to be controlled as it has impact not only on the municipal budget but also on the human health and environment. The quality of life is deteriorating in the cities. The horizontal expansion of the city increases the urban distances and thus increases the commuting time and creates congestion and pollution on the roads. The expansion of the cities leads to loss of rural land. The rate at which the loss of rural land is occurring is increasing. If this rate continues then the day will come when we will be left with no land.

There is major strain on the open spaces and infrastructure facilities. Many cities lack facilities like parks, play field and quality open spaces for recreation. The haphazard development is due to no proper vision to development. The planning laws and guidelines remain weak and municipalities often ignore their own planning rules at the request of eager developers. The land Developers draw up and implement plans for land development and they often maximize their profits by building single-use developments like all houses or a mega-retail complex. The result is mammoth development that eliminates agricultural land and paves over natural areas. Some developers influence the government to amend official plans and zoning bylaws in order to get approval for their projects. Public participation in the development of the cities is minimal.

There are many other problems faced by the people living in the city. Thus in this context ,the planners should come up with other innovative concepts for the development of cities and anti-sprawl works are essential .To counter sprawl we must understand the decision-making process and how to organize effectively for change, for this smart growth is the most effective solution. We should adopt stronger planning rules that encourage compact development and stop sprawl.

2.4 Principles of Smart Growth

These ten principles are the central principles which are recognized as defining Smart growth

1. Create a range of housing opportunities and choices.
2. Create a walkable neighbourhood.
3. Encourage community and stakeholders collaboration.
4. Foster distinctive, attractive communities with a strong sense of place.
5. Make development decisions predictable, fair and cost- effective.
6. Mix land use.
7. Preserve open space, farmland, natural beauty and critical environmental areas.
8. Provide variety of transportation.
9. Strengthen and direct development towards existing communities.
10. Take advantage of compact building design. [6]

2.5 Goals and Strategies

Some goals and strategies have to be adopted for achieving smart growth. The goals and strategies are context oriented and can be modified according to the need of the project. In British Columbia smart growth practises are prevalent; recognising the leadership role of British Columbia the West Coast Environmental Law has developed Smart Growth Bylaws Summary by Deborah Curran. It gives description of Goals and Strategies to achieve smart growth and Case studies have been discussed. A brief summary of goals and strategies has been reviewed which gives an overview of setting goals and strategies for smart growth project. These goals and strategies can be taken as examples for carrying out good development based on smart growth. [7]

Goal 1: Promote urban revitalization and rural preservation.

The new developments should be carried out such that it does not interfere with the agricultural land. The developments can be carried out by adaptive reuse of building, strategic infill development or by brownfield redevelopment.

Strategies

(i) Contain urban area

(ii) Channel development into existing neighbourhood

(iii) Adopt integrated planning and management approaches

(iv) Stick to municipal plans

(v) Use performance indicators

- Contain urban area

The urban growth boundaries should be well defined in plan. It provides the developer also an idea to which extent development can occur. It helps in channelising growth with in the city.

- Channel development into existing neighbourhood

The new developments should be set up on the existing infrastructure so that there is decrease in servicing cost. The development with in the neighbourhood will lead to mixed use.

- Adopt integrated planning and management approaches

Systems approach to planning should be adopted. Hierarchy of plans from regional level to neighbourhood level should be prepared. Community participation should be encouraged for effective planning.

- Stick to municipal plans

The municipal plans are prepared with long term visions. Frequent changes in the plan should not be permitted as it hinders the achievement of long term vision.

- Use performance indicators

Indicators should be developed for monitoring the quality of life. These indicators help the local government in establishing priorities and setting policies.

Involved smart growth principles

(i) Make development decisions predictable, fair and cost- effective.

(ii) Preserve open space, farmland, natural beauty and critical environmental areas.

(iii) Strengthen and direct development towards existing communities.

Goal 2: Incorporate the green infrastructure and working lands into communities

The green infrastructure requires less investment than hardscapping. They not only improve the aesthetics of the area but also the environment quality is improved. The green infrastructure also helps in stromwater management and for recharging streams and aquifers.

Strategies

(i) Connect the green infrastructure

(ii) Manage stromwater throughout the green infrastructure

(iii) Permit the green infrastructure to shape the block

(iv) Support working lands

(v) Support working watersheds

- Connect the green infrastructure

The quality and quantity of land is important. Public and private natural areas can be connected for water infiltration.

- Manage storm water throughout the green infrastructure

Many of the communities face the problem of water shortage. The storm water management has to be done throughout the green infrastructure so as to recharge the aquifers.

- Permit the green infrastructure to shape the block

The development or design of building should be carried out incorporating the existing green infrastructure and topography of the site.

- Support working lands

The farmlands and lands put to agricultural industry use should be free from the intervention of any kind of developments.

- Support working watersheds

The existing water sheds have to be managed and use of recycled water should be promoted so that there is a continuous supply of adequate quality and quantity of water.

Involved smart growth principles

(i) Preserve open space, farmland, natural beauty and critical environmental areas.

Goal 3: Create compact complete communities

Creating mixed land uses creates vibrant communities. Provision of affordable and mix housing, jobs and shopping centres within walkable distance. The housing density should support commercial centres and transit facilities.

Strategies

(i) Mix housing, Jobs and green infrastructure.

(ii) Doing more with less land

(iii) Encourage Transit supportive land uses

(iv) Design great neighbourhoods

- Mix housing, Jobs and green infrastructure.

The quality of life is determined by the access to variety of recreation, employment, shopping and entertainment to a place where one lives. The mix of public building residences, commercial centres and offices makes the community more vibrant.

- Doing more with less land

To avoid suburban sprawl the municipalities should focuses on the use of serviced land more efficiently. Infill projects can be carried out conversion of single family house to multi-unit dwelling.

- Encourage transit supportive land uses.

Intensifying development along transit corridor. Mixed-use and higher density development along transit corridors generate significant ridership and will generate good pedestrian access.

- Design great neighbourhoods

Designing neighbourhood that have sense of place and carrying out infill development. The development must match with the streets character so that there is a sense of belonging to a single neighbourhood.

Involved smart growth principles

(i) Create a range of housing opportunities and choices.
(ii) Create a walkable neighbourhood.
(iii) Foster distinctive, attractive communities with a strong sense of place.
(iv) Make development decisions predictable, fair and cost- effective.
(v) Mix land use.
(vi) Preserve open space, farmland, natural beauty and critical environmental areas.
(vii) Provide variety of transportation.
(viii) Strengthen and direct development towards existing communities.
(ix) Take advantage of compact building design.

Goal 4: Increase transportation choices through land use decisions

The streets are the largest segment of public space in a community. There should be mobility choices for the users. The design of streets should be safe for all the users. There should be good walking and cycling infrastructure.

Strategies

(i) Connect destinations and transportation types

(ii) Tailor road requirements to their preferred uses

(iii) Scale parking to neighbourhood needs

(iv) Manage Transportation demand

- Connect destinations and transportation types

Streets should form a well connected network. The interconnected streets shorten the distance between destinations and make the trip by cycle and foot attractive.

- Tailor road requirements to their preferred uses

The roads should be designed according to use so that the cost of construction and maintenance is decreased. The traffic speed should be determined for each type of roads to ensure safety.

- Scale parking to neighbourhood needs

In a smart growth neighbourhood the parking lines the streets to create a buffer for pedestrians and to reduce the amount of land dedicated to off-street parking. The parking should be based on minimum parking standards and the parking lot should be located behind the building so as to minimize the impact of parking on the neighbourhoods.

- Manage Transportation demand

It focuses on reducing the demand for road capacity. This can be achieved by increasing transportation choices, integration of landuse pattern with the transit lines carpooling etc.

Involved smart growth principles

(i) Create a walkable neighbourhood

(ii) Provide variety of transportation.

(iii) Take advantage of compact building design.

Goal 5: Create inclusive neighbourhoods

Create of diversity of housing types and making it accessible to a wide range of people of different age groups, family type and income. The housing should be affordable.

Strategies

(i) Diversify housing

(ii) Legalize secondary suites

(iii) Great neighbourhood by design

- Diversify housing

Infill offers greater potential for increasing hosing affordability. Infill can be achieved through conversion of single family dwellings into multiple dwellings without changing the building footprint or character of existing structure. The municipalities can use density bonuses to encourage medium density mixed use and high density developments. A developer who opts for a density bonus receives more unit in return for providing amenities such as underground parking, parkland, landscaping, public art, day-care facilities, price controlled units, rental units and preservation of heritage features.

- Legalize secondary suites

A secondary suite is an accessory dwelling located within the structure of a principal single-family detached dwelling, townhouse or strata titled apartment. Secondary suites create affordable housing in serviced areas without changing the character of neighbourhoods. They increase the number of residents living in an area, thus making neighbourhood commercial uses and transit more viable, and increase the diversity of housing types. They also increase property tax.

- Great neighbourhood by design

The design of neighbourhood and any new development should be attractive. There should be guidelines for development.

Involved smart growth principles

(i) Create a range of housing opportunities and choices.
(ii) Encourage community and stakeholders collaboration.
(iii) Foster distinctive, attractive communities with a strong sense of place.
(iv) Make development decisions predictable, fair and cost- effective.
(v) Strengthen and direct development towards existing communities.

Goal 6: Maximize the enduring benefits of developments

Each site is unique in nature therefore the municipalities should develop standards to site-specific conditions using zoning.

Strategies

(i) Use of site resource wisely
(ii) Redevelop brownfields and grey fields
(iii) Create high performance buildings

- Use of site resource wisely

The local government should use tools like subdivision standards, development permits etc. so as to maximise the use of the site for private and public means.

- Redevelop brownfields and grey fields

The local government can plan for mixed use development in brown fields and grey fields. Brownfields are unused industrial lands that may or may not be contaminated, or that have been remediated. Greyfields are aging strip malls and shopping centres. Both of them offer great opportunities for growth as the land is already serviced and these are sizeable tracts of land.

- Create high performance buildings

Construction of buildings based on sustainable principles.

Involved smart growth principles

(i) Foster distinctive, attractive communities with a strong sense of place.

(ii) Make development decisions predictable, fair and cost- effective.

(iii) Mix land use.

(iv) Preserve open space, farmland, natural beauty and critical environmental areas.

(v) Strengthen and direct development towards existing communities.

(vi) Take advantage of compact building design.

Goal 7: Support municipal goals through cost recovery

A part of the costs for roads, parks, sewer and water infrastructure is recovered in case of new development based on smart growth.

Strategies

(i) Fine tuning development cost charges

(ii) Providing Fiscal incentives property taxes

(iii) Understanding fiscal impact analysis

- Fine tuning development cost charges

The development charges are less for municipalities if the existing infrastructure can be shared by more than one unit. The demand for infrastructure is reduced and it encourages more efficient development.

- Providing Fiscal incentives property taxes

The local government can give tax incentives to the owner who sustains green infrastructure. This provision of incentives makes fiscal sense as the landowner who helps to maintain the green infrastructure will decrease the municipal cost over long term.

- Understanding fiscal impact analysis

The cost and benefits of new development is complex and are dependent on various other factors. Their evaluation methods should be understood correctly.

Involved smart growth principles

(i) Encourage community and stakeholders collaboration.

(ii) Make development decisions predictable, fair and cost- effective.

(iii) Strengthen and direct development towards existing communities.

Goal 8: Promote smart growth throughout the development process

There should be promotion of the concept of smart growth throughout the development process.

Strategies

(i) Gains community support

(ii) Integrate project management

(iii) Provide clear directions

(iv) Asses the merits of development

(v) Address risk

- Gains community support

The developers have to gain community support so that the project addressees the neighbourhood concern.

- Integrate project management

The municipality should address the problem or delay in approvals and there should be integrated project management.

- Provide clear directions

The municipality should provide the developer with its priority and provide them with clear performance standards or specific objectives.

- Asses the merits of development

The individual projects should be assessed quantifying the real benefits and cost of new development. Checklist should be provided to asses the project for community's long term goals and standards.

- Address risk

Concern about liability stops innovative projects the developers and the municipalities should address risks through adaptive management agreements and monitoring.

Involved smart growth principles

(i) Encourage community and stakeholders collaboration.

(ii) Make development decisions predictable, fair and cost- effective.

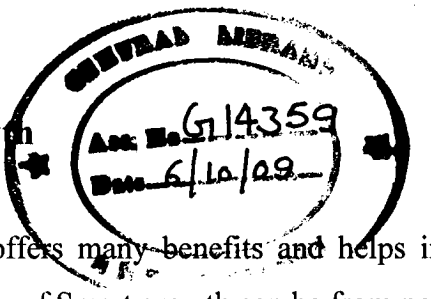
Table 2.1: Matrix Showing the Involved Smart Growth Principle for the Goals

Principles	G1	G2	G3	G4	G5	G6	G7	G8
1. Create a range of housing opportunities and choices			✓		✓			
2. Create a walkable neighbourhood			✓	✓				
3. Encourage community and stakeholders collaboration					✓		✓	✓
4. Foster distinctive, attractive communities with a strong sense of place.			✓		✓	✓		
5. Make development decisions predictable, fair and cost- effective.	✓		✓		✓	✓	✓	✓
6. Mix land use.			✓			✓		
7. Preserve open space, farmland, natural beauty and critical environmental areas.	✓	✓	✓			✓		
8. Provide variety of transportation.			✓	✓				
9. Strengthen and direct development towards existing communities.	✓		✓		✓	✓	✓	
10. Take advantage of compact building design.			✓	✓		✓		

Note: G1 to G8 refers to the goals discussed in the section 2.5

Source: By Author

In this example of Smart Growth Bylaws Summary by Deborah Curran for British Columbia the major emphasise is on the principle make development decisions predictable, fair and cost- effective and strengthen and direct development towards existing communities. Goal 3 create compact complete communities includes maximum number of smart growth principles. (Refer Table 2.1). The goals and strategies for smart growth are context specific but the principles are universal.



2.6 Major Benefits of Smart Growth

The Smart growth development offers many benefits and helps in achieving a better quality of environment. The application of Smart growth can be from neighbourhood level to regional level. The benefits of smart growth are [8]

(i) Smart growth decreases the cost of development.
(ii) Smart growth decreases municipal services costs.
(iii) Smart growth decreases long-term operating costs.
(iv) Smart growth creates more affordable housing.
(v) Smart growth increases property values.
(vi) Smart growth creates safer neighbourhoods.
(vii) Smart growth attracts footloose, new economy business.
(viii) Smart growth supports local economies.
(ix) Smart growth enhances the working land base.
(x) Smart growth enhances the existing natural and built assets of communities.
(xi) Smart growth makes transit and other non-automobile transportation mode viable.
(xii) Smart growth creates safer streets.
(xiii) Smart growth supports healthy children.
(xiv) Smart growth protects drinking water supplies.
(xv) Smart growth builds social capital.
(xvi) Smart growth supports a healthy environment.
(xvii) In practice, these techniques have created tangible environmental improvements.

2.7 Challenges of Smart Growth

Smart growth brings many benefits to the community however the municipalities face problem with decision inherent in managing change. [8]

(i) Smart growth requires changes to bylaws and engineering standards.

Some technical standards are expensive solutions and zoning and other byelaws do not permit for mixed use development and diversity in housing. There are many inflexible regulations and engineering standards. Thus there needs to be a change in the byelaws and engineering standards. Form based codes should be prepared

(ii) Smart growth requires a shift away from relying solely on the automobile for transport.

Smart growth emphasizes on non automobile transportation infrastructures in to landuse. This includes connected pedestrian and bikeways and decreasing the demand for road spaces.

(iii) Smart growth may require different risk management

Each smart growth development involves different risk in new designs .Mitigating those risks through professional undertakings and monitoring becomes essential.

(iv) Smart growth needs a knowledgeable development industry, municipal culture and citizenry.

Changing how development happens is difficult. The lack of public knowledge about new technologies creates uncertainty for development approvals and market risk for developers. Citizens are generally unfamiliar with good design that makes complete communities vibrant so awareness has to be created.

2.8 Communities Implementing Smart Growth

There are many communities implementing Smart Growth principles America some of them recognized by the agencies are mentioned below.

The United States Environmental Protection Agency has recognized these cities for implementing smart growth principles:

- Arlington, Virginia, United States
- Minneapolis & Saint Paul, Minnesota, United States

- Davidson, North Carolina, United States
- Denver, Colorado, United States

The Smart Growth Network has recognized these cities for implementing smart growth principles

- The Kentlands; Gaithersburg, Maryland, United States (for live-work units)
- East Liberty; Pittsburgh, Pennsylvania, United States (establishing downtown retail)
- Moore Square Museums Magnet Middle School; Raleigh, North Carolina, United States (for being located downtown)
- Garfield Park; Chicago, Illinois, United States (retaining transit options)
- New Jersey Pineland; Southern New Jersey, United States (for transfer of development rights away from undeveloped land) [2]

2.9 Summary

Smart growth is explained in terms of principles and how it can be applied by creating goals and strategies. The benefits and challenges of implementing smart growth is discussed. The communities implementing smart growth are mentioned.

There are social, economic and environmental benefits of smart growth. The use of smart growth approach will lead to a good development. It leads to efficient use of land and resources and for creating a quality environment for the people. To tackle the problems created by present trends of urbanization, smart growth approach to development is an appropriate approach to development. The concept of smart growth is not prevalent in India .It has been successful in America. The Indian cities are facing the problems of unplanned development and the impact of sprawl is felt. In this context the study of smart growth concept is essential and its application potential to be studied .Smart growth approach is highly essential for creating and maintaining livable cities.

CHAPTER 3 CASE STUDIES

3.5 Case study 4: Rhode Island's

3.5.1 Location

3.5.2 Site

3.5.3 Project and Context Description

3.5.4 Smart Growth Principals Adopted

3.5.5 Implementation

3.5.6 Evaluation of the Case Study

3.5.7 Inferences

3.6 Inferences and Guidelines from Case Studies

CHAPTER 3

CASE STUDIES

3.1 Introduction

Four case studies have been studied to infer useful lessons and planning guidelines for smart growth. The case studies range from neighbourhood level project to regional level projects in America. Each case study begins with the description of the location, site, project and context description. This is followed by the smart growth principles adopted and its implementation. Then a critical evaluation of the case study is done describing its success and achievements. Inferences are drawn from each case study and finally inferences and guidelines from case studies are prepared.

3.2 Case Study 1: Twinbrook Station

3.2.1 Location

Twinbrook Station is located on a 26-acre site in suburban Maryland. [9] The location of Twinbrook station is shown in Fig 3.1

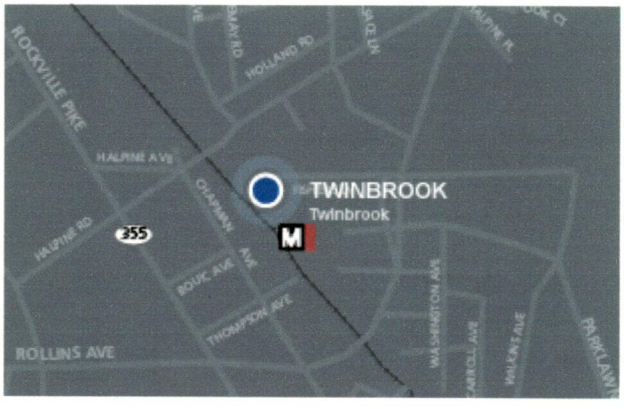


Fig 3.1: Location of Twinbrook Station

Source: www.twinbrookstation.com

3.2.2 Site

The site is adjacent to the city of Rockville's retail corridor and residential neighborhoods, and Montgomery County's office district. The site includes the following areas

- 10 acres on the west side of Twinbrook Metro station
- 16 acres on the east side of the Twinbrook Metro station

The site is roughly bordered by Chapman Avenue to the west, Twinbrook Parkway to the east and south, and Ardennes Avenue to the north. [9] The existing condition of the Twinbrook station is illustrated in the figure below showing number of surface parking lots in the site (Refer Fig 3.2)

Fig 3.2: Map Showing the Existing Condition

Source: www.wikimapia.org

3.2.3 Project and Context Description

The aim of development of Twinbrook Station is to provide transit-oriented development. The Goal of the project was to reduce the number of people who rely on single occupancy vehicle to commute to work. There is a demand for new housing with the increase in population. To maximize the use of public transportation the location of new housing units adjacent to metro station is a good solution. [9] The project brief describes the existing condition, project developers and the development program carried out in Twinbrook Station (Refer Table 3.1).

Table 3.1: Project Brief

Existing condition	The property consists of the 26 acres of land surrounding the Twinbrook Metro Station that currently includes the surface commuter parking, buses, and kiss and ride spaces.
Owner of the property	Washington Metropolitan Area Transit Authority (WMATA)
Project developers	• Washington Metropolitan Transit Authority (WMATA) • Twinbrook Station, LLC (The JBG Companies) • Architect & Master Planner: Torti Gallas and Partners • Office Architect: David M. Schwarz • Landscape Architect: EDAW • Zoning Counsel: Holland & Knight LLP • Civil Engineer: Johnson Bernat Associates, Inc • Traffic Engineer: Wells & Associates
Development program	The total project build-out will include • Office space: 325,000 sq.ft. • Ground floor retail: 220,000 sq.ft. • Multi-family residential units: 1,595. All of the existing commuter parking, bus bays and kiss and ride spaces will be replaced and upgraded. The Metro entrance facade and pedestrian access ways would undergo extensive upgrades. Enhanced streetscape to provide safe, pedestrian connections

Source: Data compiled by author from [9]

3.2.4 Smart Growth Principals Adopted

The smart growth principles adopted in the case study are discussed below and the level of achievement of each principle is shown in the table below. (Refer Table 3.2)

Table 3.2: Smart Growth Principals Adopted and Level of Success.

Smart growth principles adopted	Level of success		
	High	Medium	Low
1. Range of Housing Choices	✓		
2. Walkable Neighbourhoods	✓		

3. Community and Stakeholder Participation				
4. Distinctive and Attractive Places		✓		
5. Predictable and Fair Decision Making			✓	
6. Mixed Land Uses		✓		
7. Preserve Open Spaces and Farmland			✓	
8. Transportation Choices		✓		
9. Development in Existing Communities		✓		
10. Compact Building Design		✓		

Source: By Author

In the case study the major emphasis is on the principle of transit-oriented smart growth and redevelopment of existing area by mix landuse and addition of housing units with range of housing choices and creating a walkable neighbourhood.

Description of the smart growth principle as adopted in Twinbrook station

a. Range of housing choices

The housing styles include high-rise apartments, low-rise apartments, "walk-ups" (front door accessible from the street), courtyard housing, live/work units, and lofts.

b. Walkable neighbourhoods

Improving the existing pedestrian facilities and providing good pedestrian link to the metro station. The design of pedestrian-focused thoroughfare which includes outdoor cafes, retail shops, street trees, lighting and furnishings.

c. Distinctive and attractive places

The entire area is unified with a distinctive identity and sense of place. There is public space, and a variety of building uses and architectural styles.

d. Mix land uses

Integration of the mixed-use development into the surrounding retail corridor, office/service district, and adjacent residential neighbourhoods, the mix of building uses includes commercial office, street-level retail, and residential.

e. Preserve open spaces and farmland

The master plan emphasises on the creation of quality open spaces.

f. Transportation choices

The emphasis is on transit oriented development. A metro railway station is present and the streetscapes are developed to provide for a mix of traffic.

g. Development in existing communities

The existing site is being redeveloped with mix of uses ranging from commercial to housing. The densities are increases with in the site. Thus the existing infrastructure can be utilised.

h. Compact building design

The development addresses density. Buildings with the highest density 8 to 14 stories are located closest to the Metro station, gradually transitioning to the lowest density buildings 4 to 6 stories at the edge of the site. The highly public or "civic" spaces are concentrated around the Metro station at the center of the development, while the semi-public and private spaces are located away from the village center, helping to buffer the existing residential neighbourhood communities. [9]

3.2.5 Implementation

The master plan of the Twinbrook station is based on the principle of transit oriented smart growth. The concentration of the development is around the redline's Twin brook Metro Station. The development fully integrates mix use development in to the surrounding also. The public spaces are located near the Metro Station and the semi-public and private spaces are located little away. The whole development has a compact design and walkable neighbourhood is created. Variety of housing choices is provided. The range of housing choices includes high rise apartments, low rise apartment, live cum work unit, walk ups and lofts. The mix use includes commercial, retail and residential uses. Redevelopment schemes have been worked out and they are illustrated in the figures below. [9] (Refer Fig 3.3 to Fig 3.9). The figures showing the existing condition depict low rise development and the proposed redevelopment depicts high density mix use development.

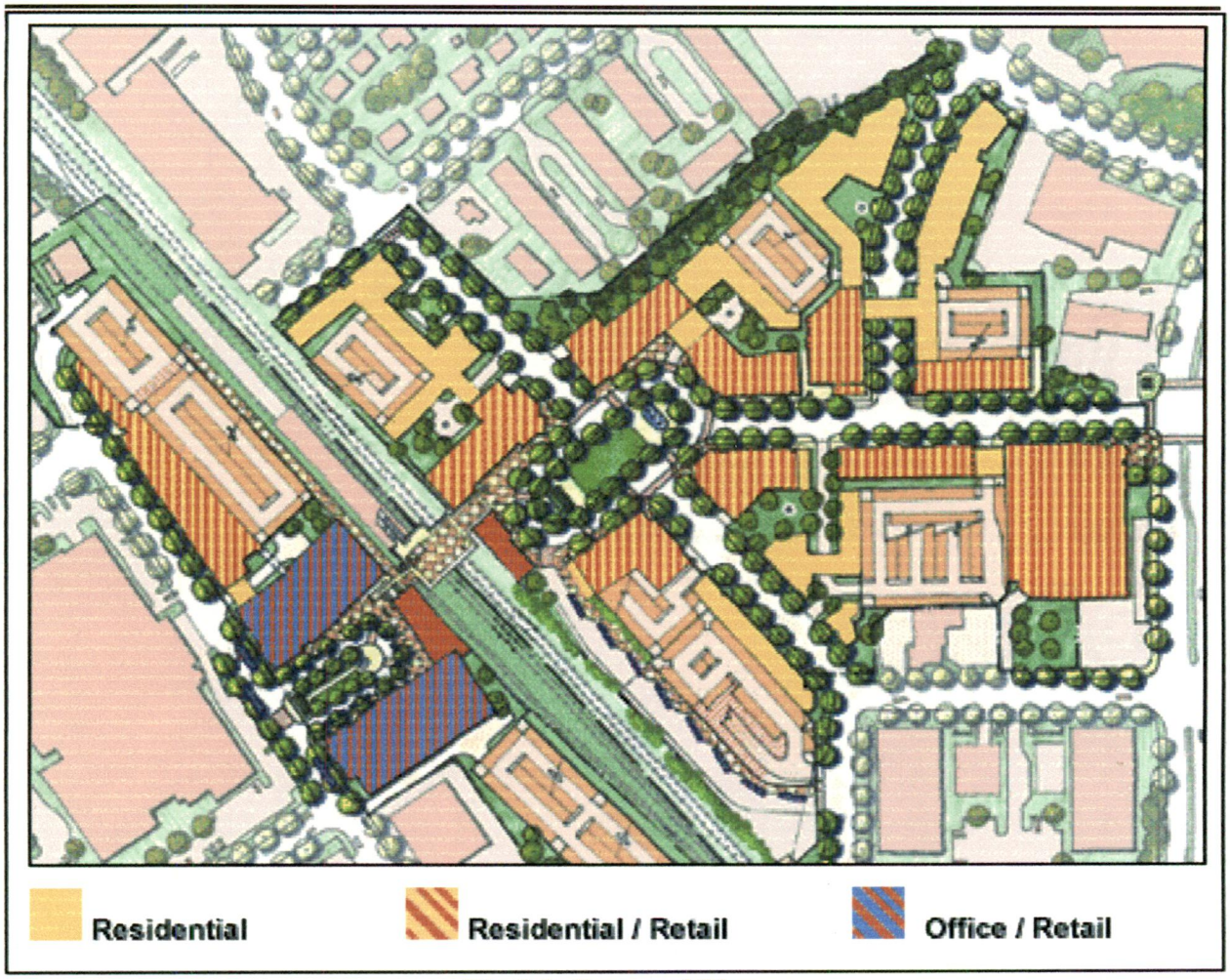


Fig 3.3: Proposal Plan

Source: www.twinbrookstation.com

Fig 3.4: The Above Images Illustrate the Existing Conditions and Proposed Redevelopment of Main Street in Twinbrook.

Source: www.twinbrookstation.com

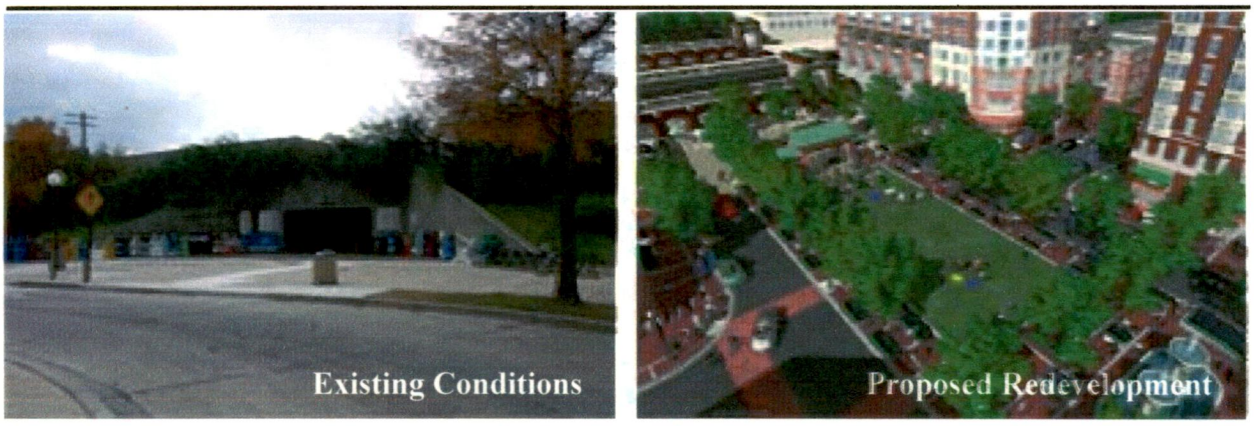


Fig 3.5: The Existing Conditions and Proposed Redevelopment of Main Street in Twinbrook.

Source: www.twinbrookstation.com

Fig 3.6: Proposed Redevelopment of the Central Area.

Source: www.twinbrookstation.com

Fig 3.7: Proposed Design of the Retail Area and Pedestrian Environment.

Source: www.twinbrookstation.com

Fig 3.8: Proposed Street Elevation

Source: www.twinbrookstation.com

Fig 3.9: Proposed Development

Source: www.twinbrookstation.com

The master plan emphasises on design of public districts which gives the development an urban scale and vitality to the development. The five districts are discussed below with illustration.

a. **Civic area:** It consists of the "village green" and transit components of the site. The figure below show the view of civic area with huge open space to recreate. (Refer Fig 3.10)

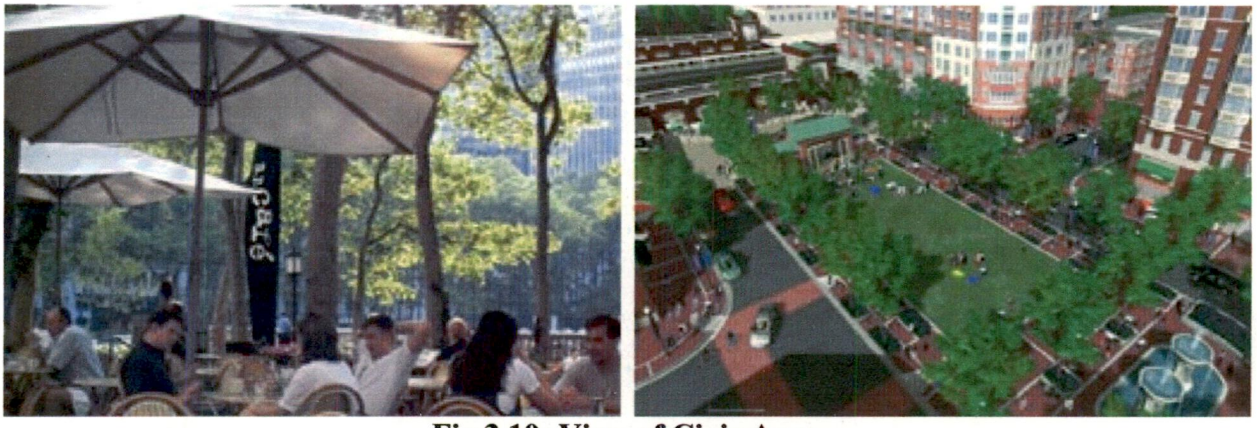


Fig 3.10: View of Civic Area

Source: www.twinbrookstation.com

b. **Main street area:** Fisher's Lane is the development's main street. Fisher's Lane connects Twinbrook Parkway with the central village green. The design of the Main Street Area is pedestrian oriented with pedestrian amenities. The figure below illustrates a proposed redevelopment of central area which provides good pedestrian environment and also accommodates vehicular movement (Refer Fig.3.11)

Fig 3.11: Proposed Redevelopment of the Central Area.

Source: www.twinbrookstation.com

c. **Neighbourhood areas:** The three neighbourhood areas of the master plan are characterized by small, quiet streets typical of traditional single-family residential neighbourhoods. The three neighbourhood areas of Twinbrook Station are in the following locations:

- Between Fisher's Lane and Ardennes Avenue
- Along Parklawn Drive from the village green to Twinbrook Parkway
- Between the village green and Halpine Road

The figure below shows the neighbourhood area with distinct character (Refer Fig.3.12)

Fig 3.12: Neighbourhood Area

Source: www.twinbrookstation.com

d. **Courtyard areas:** The courtyard areas are the most intimate, private spaces. A series of small-scale, semi-public courtyards feature landscaped gardens, patios, and small plazas. The figure below shows the image of private courtyards (Refer Fig.3.13).

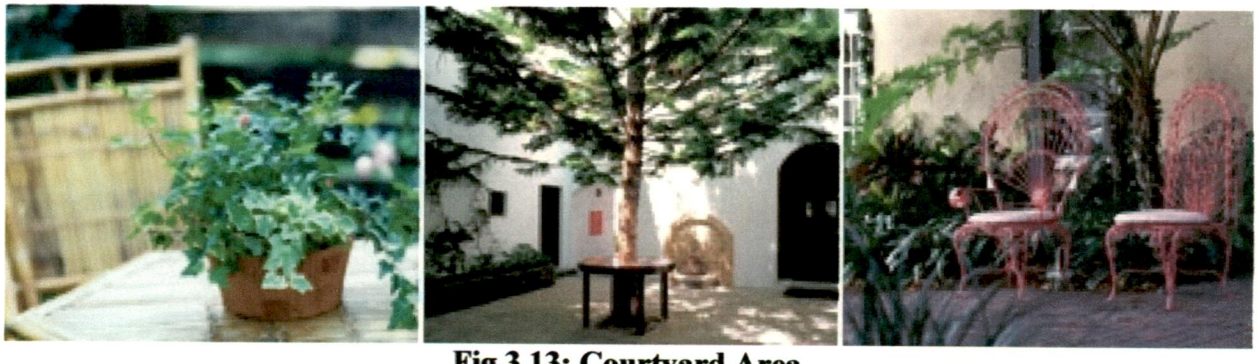


Fig 3.13: Courtyard Area

Source: www.twinbrookstation.com

e. **Retail:** 220,000 square feet of retail area is planned. The figure below shows the retail space mix with residences and office structures, creating new street front shopping districts[9] (Refer Fig.3.14)

Fig 3.14: Retail Area with Mixed Development.

Source: www.twinbrookstation.com

3.2.6 Evaluation of the Case Study

The case study demonstrates how an under utilised parking lot can be converted in to vibrant transit oriented and pedestrian friendly community. The plan emphasizes on the use of public transportation. The public uses are arranged near the metro transit station. The mix use development is encouraged. There is redevelopment of the neighbourhood streetscape and increase in green spaces with active open spaces. The plan emphasises on improving the existing Metro Station infrastructure and the existing inter- modal transit program. By the redevelopment there will be increase in property value and enhancement of the environment. Good amount of rental and sales taxes will be generated by the development.

The project has received many awards and certification out of which some are Smart Growth Alliance's Quarterly Award in November 2003, Smart Growth Alliance Jury Recognized the Development Proposed Next to Twinbrook Metro for Wise Land Use, Efficient Design on November 20, 2003 (The JBC Companies). Recently in November 2008 it was certified for LEED (Leadership in Energy and Environmental Design) Gold Neighborhood Development plan by the U.S. Green Building Council (USGBC). [10]

3.2.7 Inferences

This case study puts forward a thoughtful redevelopment of the underutilized parking lot. The development along a transit corridor has many benefits and helps in attracting people towards the development. The required densities can be achieved when proper infrastructure facilities and amenities are provided. Addition of amenities helps to attract population. The density should support the development. The development of streetscape for both traffic and people and giving more importance to the pedestrians by providing proper pedestrian amenities will promote more people to walk on the streets. A mix of housing type provides variety of housing choices. The compact development reduces the distance to be travelled and provides more space for providing open spaces. The development of quality open space is essential to provide a healthy environment. Landscape enhancement in development makes the development attractive. If the design of the neighbourhood provides a pedestrian friendly environment, then people will automatically prefer walking thus reducing the use of vehicles and will help in maintaining a healthy environment. The development should promote high quality of life.

3.3 Case Study 2: Hismen Hin-Nu Terrace, Oakland, California

3.3.1 Location

Hismen Hin-Nu Terrace is located in the San Antonio district of Oakland, California (Refer Fig.3.15). Hismen Hin-Nu Terrace is located on the major east-west boulevard of Oakland near the elevated tracks of BART which serves commuters to and from San Francisco. [11]

Fig 3.15: Location of Oakland

Source : http://www.cnn.com/US/9910/23/no.crack.babies/california.oakland.jpg

3.3.2 Site

The site area is about 1.5-acre. [11] The figure below shows the existing condition of site with parking lots. (Refer Fig.3.16)

Fig 3.16: Location of Hismen Hin-Nu Terrace

Source: www.wikimapia.org

3.3.3 Project and Context Description

The project was undertaken to mend the deteriorating neighbourhood. The need for development in this area arose due to the underutilized lots (parking and one-story retail); and, to the south, a suburban, auto-oriented pattern of single story buildings surrounded by parking. The site originally was occupied by a supermarket and its parking. Suburban development and declining neighbourhood incomes caused the market to close. A consortium of small vendors operated a flea market in the existing building. Smart growth was essential to make the area vibrant. [11] The project brief describes the existing condition, project developers and the development program carried out in Hismen Hin-Nu Terrace (Refer Table 3.3).

Table 3.3: Project Brief

Existing condition	Underutilized parking lots, abandoned site and deteriorating.
Project developers	• The San Antonio Community Development Corporation

	• East Bay Asian Local Development Corporation • Oakland Redevelopment Agency • Architect: Michael Pyatok
Development program	• Redeveloped an abandoned grocery store site. • Provision of affordable housing. • New Construction Mixed-use Rental housing; flats and townhouses over parking and retail/commercial

Source: Data compiled by author from [11]

3.2.4 Smart Growth Principals Adopted

The smart growth principles adopted in the case study are discussed below and the level of achievement of each principle is shown in the table below. (Refer Table 3.4)

Table 3.4: Smart Growth Principals Adopted and Level of Success.

Smart growth principles adopted	Level of success		
	High	Medium	Low
1. Range of Housing Choices	✓		
2. Walkable Neighbourhoods	✓		
3. Community and Stakeholder Participation	✓		
4. Distinctive and Attractive Places	✓		
5. Predictable and Fair Decision Making			
6. Mixed Land Uses	✓		
7. Preserve Open Spaces and Farmland			
8. Transportation Choices			✓
9. Development in Existing Communities	✓		
10. Compact Building Design		✓	

Source: By Author

The major emphasis is on the range of housing choices and community participation in the process of development. Participatory workshops were also created in which the vendors were also involved. The whole process of development is to revitalise the community by directing development in to the existing community. Particular architectural style is adopted for the development of the facades. Safe walkable environment is created. The housing choice caters to many income groups.

Description of the smart growth principle as adopted in Twinbrook station

a. Range of housing choices

The housing ranges from one- and two-bedroom apartments to three- and four-bedroom townhouses (Refer Fig 3.17). The units provide high-quality homes for lower income families and seniors, as 40 percent of the units will be available to households at 35 percent of median area income, with the remainder for those at 50 to 60 percent of median area income. The resident profile are singles, couples & families with incomes $19,350 - $43,800 (family of 8) per year.

Fig 3.17: Range of Housing Choice

Source: http://www.ebaldc.org/pg/16/properties/residential-properties/rf/7/Hismen-Hin-Nu-Terrace

b. Walkable neighbourhoods

The streets with the landscaping provide safe environment for walking. The mix landuse promotes a walkable neighbourhood.

c. Community and stakeholder participation

Michael Pyatok, the project architect, engaged community members in interactive design workshops. The workshop participants decided to step down the height of the building from four stories in front to three stories in back to create courtyard space for children's play while maintaining a relatively high residential density of 61 units per acre to keep the units affordable. In response to the expressed preferences, all family dwellings are townhouses organized around courtyards to foster neighbourliness and for security. In addition, the community chose a variety of finishing materials because they were perceived as more environmentally friendly. The architect held participatory workshops with participants from the neighbourhood to gather their input on plans for the site and to acquaint them with the implications of the density of the project. The vendors also participated in the design workshops, which resulted in the design of a double-height market hall for them to continue their businesses. As a result, the developer was able to pre-lease the market, thereby reducing the risk of empty retail space in a transitional neighbourhood. The figure below illustrates the development based on community's decision (Refer Fig 3.18).

Fig 3.18: Development Based on Community's Decision

Source: http://www.ebaldc.org/pg/16/properties/residential-properties/rf/7/Hismen-Hin-Nu-Terrace

d. Distinctive and attractive places

In Hismen Hin-Nu Terrace a variety of outdoor art is displayed based on the cultural diversity of the residents and the neighbourhood. A central courtyard above the parking garage providing safe environment for playing for children (Refer Fig 3.19).The new building is a prominent landmark for hundreds of thousands of people each day, (buses, autos, and BART commuters), the architects have enhanced the symbol of racial diversity and unity with artistic contributions from different ethnic groups (Refer Fig 3.20). The building reflects the Mission Revival style of older apartment buildings in the neighbourhood.

Fig 3.19: A Central Courtyard above the Parking Garage.

Source: http://www.epa.gov/dced/case/hismen.htm

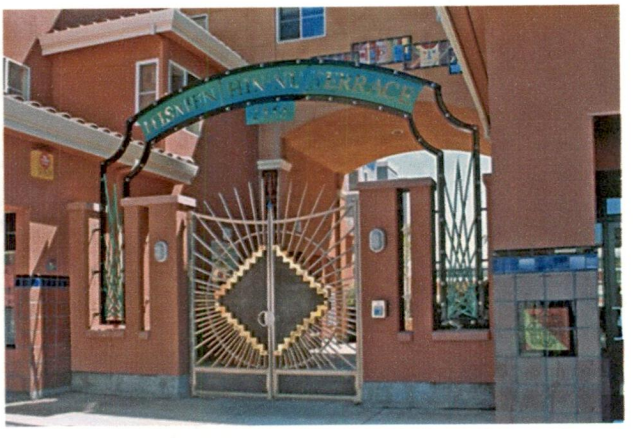


Fig 3.20: Art Work Reflecting the Many Cultures of The Tenants.

Source: http://www.epa.gov/dced/case/hismen.htm

e. Mix land uses

The housing development is along with commercial units. On the street front there is a two-story market hall that houses local vendors and start-up businesses both inside and outside along the building's façade (Refer Fig 3.22). This entrepreneurial activity contributes to the vibrancy of the street, creating, together with the landscaping, a comfortable, safe, walkable neighbourhood. The building is the retail and community center of the larger neighbourhood of 75,000 people. In order to assist the entrepreneurial potential of the low-income families and new immigrants to the area, the architect has incorporated street-side niches for very small vendors between the columns of the exterior street wall (Refer Fig 3.21). During the day small vendors can sell their wares under multi-colored awnings and at night the tiled walls and pavement can be hosed down. Not only does this design strategy contribute to local economic

development, but also it helps to 'activate' the street with people, contributing to a livelier, more attractive, and safer environment.

Fig 3.21: Vending Stalls on a Major Commercial Street are Ideal for People Who Want to Start a Retail Business But Have Limited Funds.

Source: http://www.epa.gov/dced/case/hismen.htm

Fig 3.22: Mixed Use Development Accommodating the Local Vendors and Façade Depicting Mission Revival Style of Architecture.

Source: http://www.epa.gov/dced/case/hismen.htm

f. Transportation choices

The building is on a major bus route that connects to the Fruitvale BART station two-thirds of a mile away.

g. Development in existing communities

It has also spurred redevelopment in the surrounding neighbourhood, including a new housing development across the street, a convenience store, and the renovation of two neighbourhood restaurants.

h. Compact building design

The density of the Flats is 85 units/acre and the town houses is 35 units /acre. [11]

3.3.5 Implementation

The project was a joint venture of The San Antonio Community Development Corporation, East Bay Asian Local Development Corporation and Oakland Redevelopment Agency. The design of the whole project was discussed with the community members by conducting participatory workshop and necessary modifications were made before implementation. The people's participation leads to the success of the project. [11]

3.3.6 Evaluation of the Case Study

The project demonstrates the revitalization of distressed community. The range of housing choices is not only limited to the size of the housing but caters to various income groups. The project demonstrates how an abandoned site can be redeveloped by providing high quality affordable homes. The main boulevard was restored with housing over shops thus revitalizing the neighbourhood. The neighbourhood has more amenities like community centre, childhood education centre, non-profit offices, convenience store, commercial spaces, market space for street vendors and three courtyard spaces for children to play.

The project has received many awards like the Rudy Bruner Award for Excellence (1997), Pacific Coast Builders Conference Gold Nugget Award (1995), National Association of Housing and Redevelopment Officials National Award of Merit. [12]

3.3.7 Inferences

This is good example which demonstrates how to increase the economic and environmental vitality of the place. The planning for variety of housing choices should not only be limited to the sizes but also must include different income group. The development of affordable housing is essential in a development. The planning process should involve the people. There must be public participation and the valid suggestions given by the public must be incorporated in the development. The development should cater to all the users. In the case study it is seen that the street vendors are also involved in the development process and their requirement is also taken care of thus there would be no nuisance of street vendors on the road. They are allotted space for their functioning. For creating distinctive and attractive neighbourhood the character of the space as earlier should be maintained or particular architectural style should be adopted.

3.4 Case study 3: Smart Growth Niagara

3.4.1 Location

Located in Southern Ontario, the Region of Niagara is situated between two urban areas – Toronto – Canada's largest City – and Buffalo, New York. [13] (Refer Fig 3.23)

Fig 3.23: Location of Niagara with in Ontario.

Source : http://en.wikipedia.org/wiki/File:Map_of_Ontario_NIAGARA.svg

3.4.2 Site

The Regional Municipality of Niagara is a regional municipality comprising twelve municipalities of southern Ontario, Canada (Refer Fig 3.24). The region occupies most of the Niagara Peninsula. Its eastern boundary is the Niagara River, which is also the border with the United States. It is bounded on the north by Lake Ontario and on the south by Lake Erie. The total area is about 1,852 km² (715.1 sq mi). The population of the region is 427,421 and population density is about 223.5/km² (578.9/sq mi). [14]

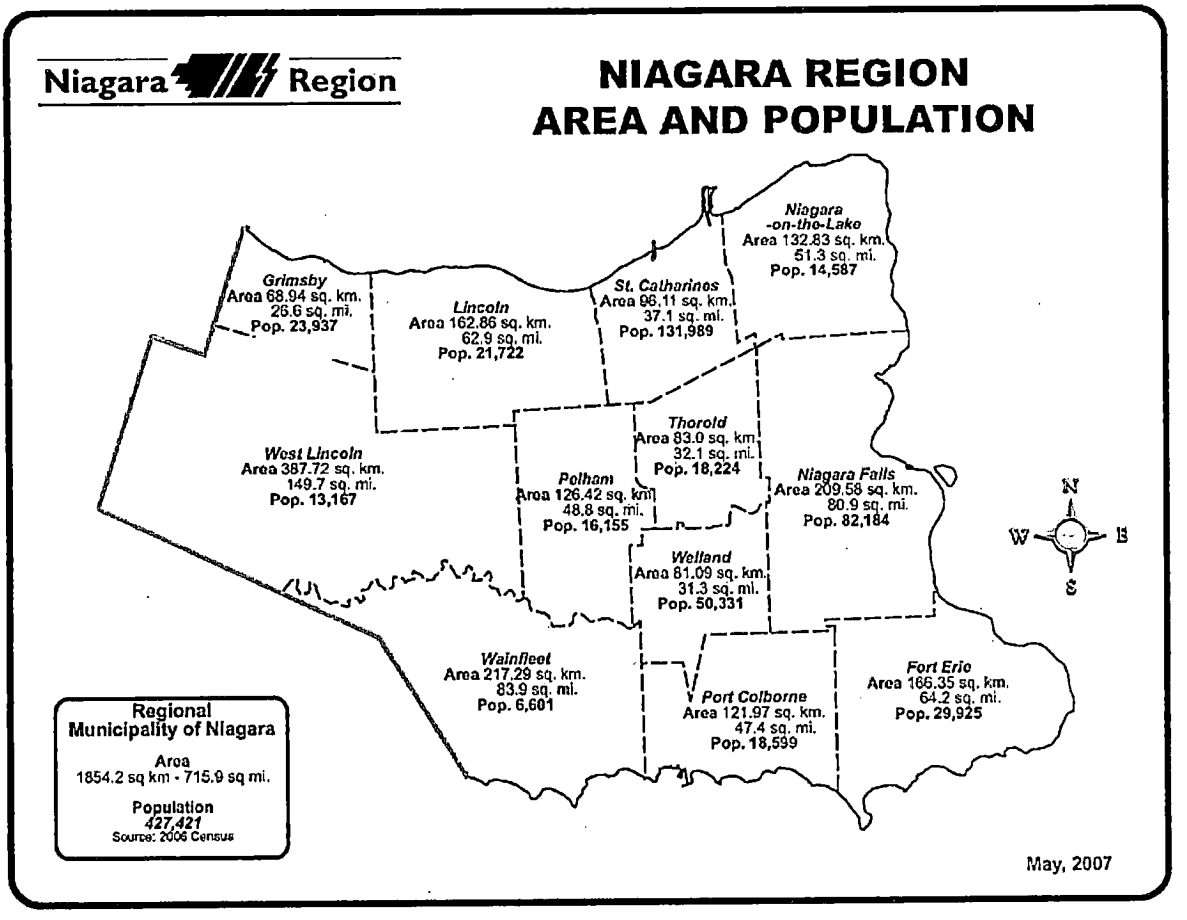


Fig 3.24: The Map Shows the Region Municipality of Niagara With its Area and Population.

Source: http://www.niagararegion.ca/living/icp/images/Area-Pop-07-6.jpg

3.4.3 Project and Context Description

Unique natural landscapes make the Niagara Region an important centre for agriculture and tourism in Canada. The most important agricultural enterprise in Niagara is viticulture, or winemaking. The Niagara Wine Route, which connects visitors to dozens of wineries, is a growing tourism draw while the internationally-renowned Niagara Falls is one of Canada's major tourist attractions. Along with Shaw Festival, held annually in Niagara-on-the-Lake, and the Welland Canal, the Regional Municipality of Niagara receives up to 12 million visitors each year. Regional Niagara is a combination of large urban centres, small towns and rural areas, the Niagara Escarpment and the Falls, two Great Lakes, the Welland Canal and the many historical sites, all located within attractive and sometimes unique farmland. [14] The figure below shows the popular tourist attractions (Refer Fig.3.25).The project brief describes the existing condition, project developers and the development program carried out in Niagara region (Refer Table 3.5).

Fig 3.25: Showing the Popular Tourist Attraction in Niagara Region.

Source:

http://angelodelosangeles.blog.friendster.com/files/mapnr.JPG,http://www.iloveny.com/Images/Regions/large/large_Niagara%20Falls4300.jpg, http://www.oneworldyouthproject.org/images/image.jpg, http://vinyl2.sentex.net/~tcc/LH/isthmus_bay.jpg

Table 3.5: Project Brief

Existing condition	Niagara has a very distinctive character that includes unique agricultural and tender fruit lands, expansive waterfront, older urban areas, the Niagara Escarpment and Niagara Falls – one of the largest tourist attractions in the world. Because of its uniqueness, the Region of Niagara and its citizens recognize the need to protect the existing character to ensure that inappropriate development does not forever change this special place. (Peter J. Smith & Company, Inc.)

Project developers	• Smart growth in Niagara report was prepared under the Leadership of the Regional Chair and Regional and local municipal Councillors and a Technical Advisory Committee composed of Regional and local municipal staff was formed to prepare the report.
Development program	• The report provides a direction forward on how the smart growth concepts can be applied in the regional municipality of Niagara. Five Scenarios have been developed for the application of smart growth. Recommendation for the implementation of smart growth principles in Niagara region is provided

Source: Data compiled by author from [13]

3.4.4 Smart Growth Principals Adopted

The smart growth principles adopted in the case study are discussed below and the level of achievement of each principle is shown in the table below. (Refer Table 3.6)

Table 3.6: Smart Growth Principals Adopted and Level of Success.

Smart growth principles adopted	Level of success		
	High	Medium	Low
1. Range of Housing Choices			✓
2. Walkable Neighbourhoods	✓		
3. Community and Stakeholder Participation	✓		
4. Distinctive and Attractive Places	✓		
5. Predictable and Fair Decision Making			
6. Mixed Land Uses		✓	
7. Preserve Open Spaces and Farmland	✓		
8. Transportation Choices		✓	
9. Development in Existing Communities	✓		
10. Compact Building Design		✓	

Source: By Author

The main emphasis is on protecting the existing character of the region and to preserve the open spaces and farmland and promoting development with in existing communities.

3.4.5 Implementation

The following recommendations were proposed to implement the "Smart Growth" principles in Niagara region.

a. The Region should develop a "Smart Growth" policy framework for implementation with local municipalities.
b. Regional and local municipal planners should work with their Council members and the community to assist them in understanding and implementing "Smart Growth" principles. This could include preparing reports or giving presentations on the principles. The Region could provide technical assistance, as needed, for municipalities in the form of presentations, development of written materials and conferences on the importance of "Smart Growth" for the Region. New types of development in other communities could be used as examples of how "Smart Growth" works.
c. The Region and local municipalities should continue to work together on implementing "Smart Growth" principles for all of Niagara. Cooperation among planners is essential to maintaining and protecting the character of the Region as well as the individual identity of each community.
d. The local municipalities should review and revise their official plans and zoning by-laws to reflect the principles of this study. Official Plans should identify areas in which new growth, infilling and redevelopment will be encouraged. Zoning, one of the most important tools a municipality has to manage growth, tends to be rigid and not fully address the issues of "Smart Growth". As part of the updated zoning by-laws, each municipality should prepare and implement design standards that should be based on the principles outlined in this study. A development permit system should also be considered.
e. Development applications should be considered on a broad level as opposed to site by site. Municipalities should require that proposals illustrate the linkages and cooperation with surrounding developments. This would help eliminate piecemeal development that often negatively impacts a community. In addition, municipalities should work to streamline their development review process within the urban areas; this is an important "Smart Growth" principle that should be encouraged.
f. Urban boundary expansions of municipalities should only be considered collectively as part of the five-year Regional Policy Plan Review so that all municipal requests can be

addressed together. The financial implications of urban boundary expansions should be an important part of this review.

g. In designating urban areas, the potential for servicing should be an important consideration. Emphasis should be given to upgrading the capacity of servicing in existing urban areas to accommodate intensification before new expansions are considered. [13]

Approach to planning

The smart growth principles are implemented both regionally and locally. The plan stresses the need to increase the densities of residential, commercial and industrial development within the existing urban areas. By focusing new development within the urban boundaries, abandoned commercial and industrial areas can be renewed to provide economic opportunities. There will be less dependency on automobiles because places to work, shop and recreate will be located near to each other. The overall general principle for each area and then specific policies that should be considered by both the regional and local communities is outlined.

a. Land use

The communities in Niagara will promote land use decisions that result in compact, mixed-use, developments. The figure below depicts a decision in which compact development is achieved by increasing the densities. (Refer Fig.3.26)

Fig 3.26: Forty Infill Townhouse Units Replace Six Singles in Grimsby to Increase Densities.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

b. Transportation and infrastructure

Efforts will be made to integrate transportation decisions and land use planning to promote pedestrian, bicycle and transit friendly communities. (Refer Fig.3.27)

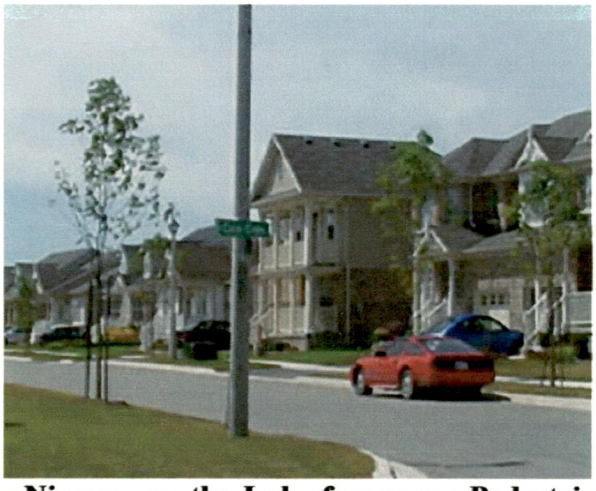


Fig 3.27: Development in Niagara-on-the-Lake focuses on Pedestrian Scale and Amenities.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

c. Coordinated approach

Communities in Niagara will consider the entire Region and available resources when making future housing, economic development and environmental protection decisions. The figure below shows an infill development (Refer Fig.3.28)

Fig 3.28: This Large-Scale Development (38 New Units) Replaced Three Single-Family Homes in the Urban Area in Niagara Falls.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

d. Economic development

The Niagara municipalities will encourage, where feasible, the use of brownfield sites, existing buildings and infill opportunities especially in downtowns and on urban arterials as preferred locations for new businesses. The figure below illustrates adaptive reuse of existing building. (Refer Fig.3.29).

Fig 3.29: Restored Industrial Site in St. Catharines Being Converted to Office Space.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

e. Environment

The Region will promote cooperation among municipalities, developers and environmentalists to preserve unique natural features. [13] A balanced development with green spaces and housing on a common green space (Refer Fig.3.30).

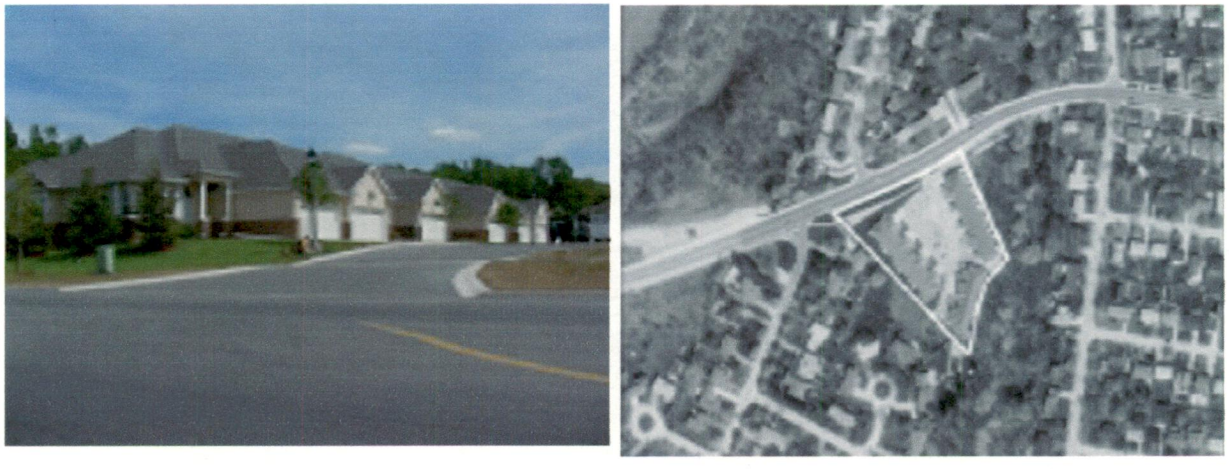


Fig 3.30: Townhouse Development in St. Catharines Centres on Common Green Space.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

Niagara initiatives

The report illustrates how the smart growths principles can be implemented in typical scenario. The following five scenarios were selected as primary areas for "Smart Growth" to occur: Village centres or "Main Streets", urban arterials, suburban shopping centres, former industrial sites or "brownfields" and Greenfields and suburbia. The concept plans were prepared for the first four scenarios. The model concept outlines the goals of developing and/or intensifying each type of site.

Scenario 1 Village centres or "Main Streets"

Goals
- Increase commercial density
- increase residential densities
- Implement traffic calming techniques
- Create green streetscape
- Create high density focal point at intersection

Achievements
On Vineland's main street, the overall parking area could be reduced by 30% . This reduction would accommodate an additional 200 residential units, as well as parking for twice the existing amount of commercial space.

Scenario2 Urban arterials

Goals
- Create attractive streetscape
- Increase commercial/office areas
- Organize circulation patterns
- Create infill parks
- Link with surrounding features

Achievements
In the Lundy's Lane model, the parking and road area have been reduced by 42% and the excess pavement has been replaced by the addition of commercial, residential and landscaped areas. The existing commercial and office capacity have been increased by 43% and 50 additional residential units were added. Nevertheless, the remaining parking spaces still exceed the required number for the final development with its increased capacity.

Scenario 3 Suburban shopping centres

Goals
- Create mixed use development
- Create city centre/common
- Reorganize circulation patterns
- Strengthen retail streetscape
- Organize a matrix of green space and infill parks

Achievements
In the concept developed for the Seaway Mall, 2,000 square metres (21,000 sq.ft.) of commercial space has been added along the arterial roads. An appealing "urban village" becomes possible with the introduction of 650 residential units.

Scenario 4 Former industrial sites or "brownfields"

Goals
- Increase Residential Densities
- Ensure Site Clean Up
- Reuse Industrial Sites For Redevelopment
- Consider Historic Features In Redevelopment
- Organize Matrix Of Green Space And Infill Parks

Achievements
Redevelopment of these lands will be sound community economic development strategy

Scenario 5 Greenfields and suburbia

Goals
- Create compact mixed use development
- Create attractive streetscape
- Link with existing commercial centres
- Increase residential densities
- Organize circulation

Achievements
High density mix use developments are highly marketable.

Source: By Author

a. Scenario 1: Village centre/ main street redevelopment

The village centre chosen to illustrate the Smart Growth principles is the central part of Vineland in the Town of Lincoln. (Refer Fig.3.31). The illustration showing how the redevelopments of village centre main street has to occur is shown below (Refer Fig.3.32). The Model Village Centre/"Main Street" are illustrated in the figure below (Refer Fig.3.33).

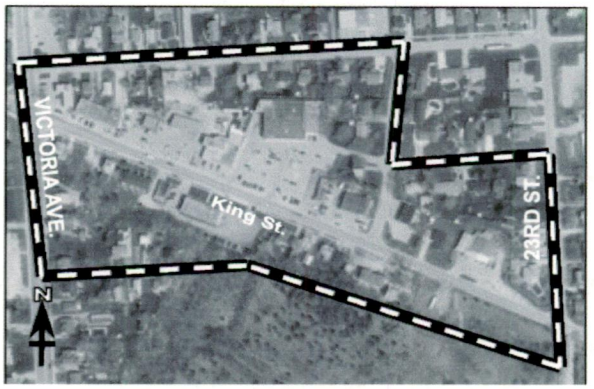


Fig 3.31: Vineland Business Area Town of Lincoln

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

Goals

- Increase commercial density.
- Increase residential densities.
- Implement traffic calming techniques.
- Create green streetscape.
- Create high density focal point at intersection.

Fig 3.32: Village Centre/"Main Street" Redevelopment

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

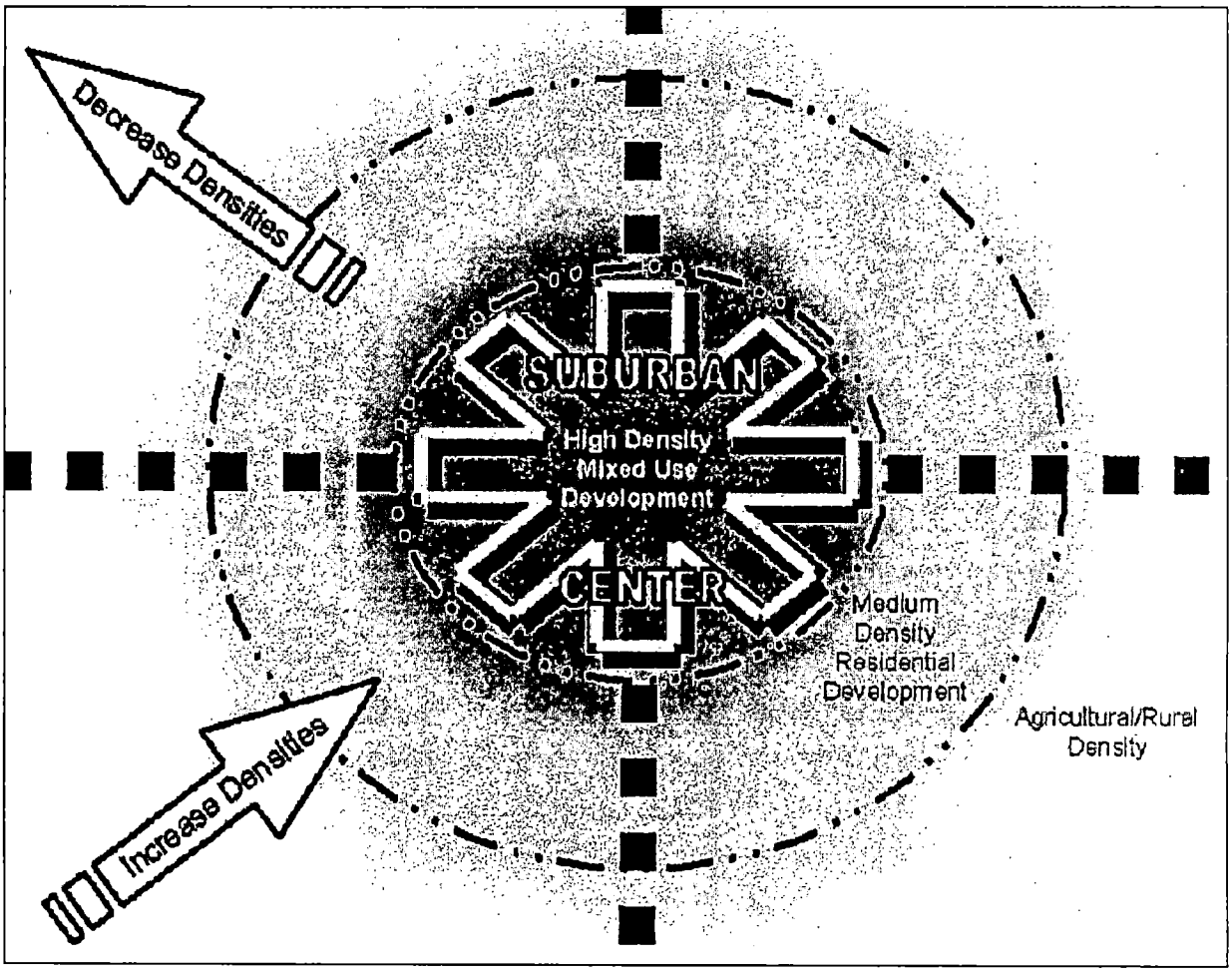


Fig 3.33: Model Village Centre/"Main Street"

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

b. Scenario 2: Urban arterial

The urban arterial chosen to illustrate the Smart Growth principle is the Lundy's Lane, Niagara Falls, Ontario. The site is shown in the figure (Refer Fig.3.34).

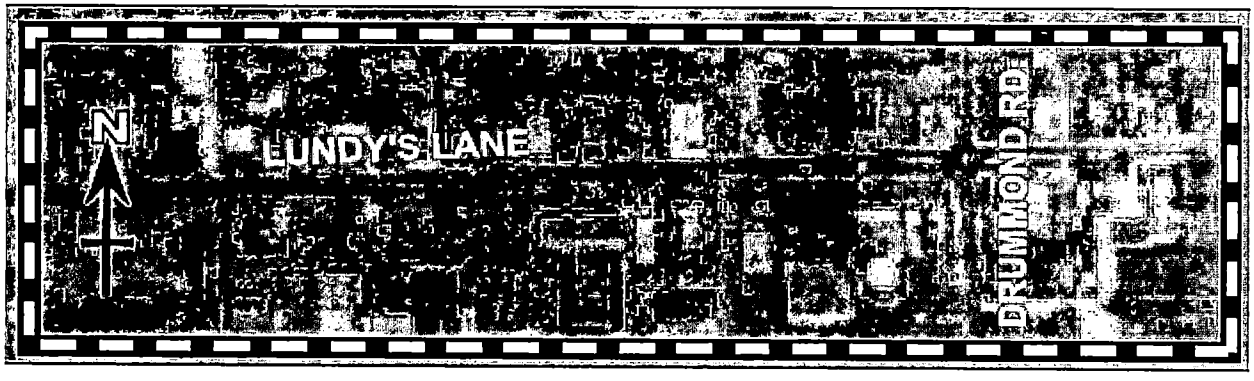


Fig 3.34: Lundy's Lane Niagara Falls, Ontario

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

Goals

- Create attractive streetscape.
- Increase commercial/office areas.
- Organize circulation patterns.
- Create infill parks.
- Link with surrounding features.

The urban arterial redevelopment and model urban arterial are illustrated in the figures below (Refer Fig.3.35 and Fig.3.36 respectively).

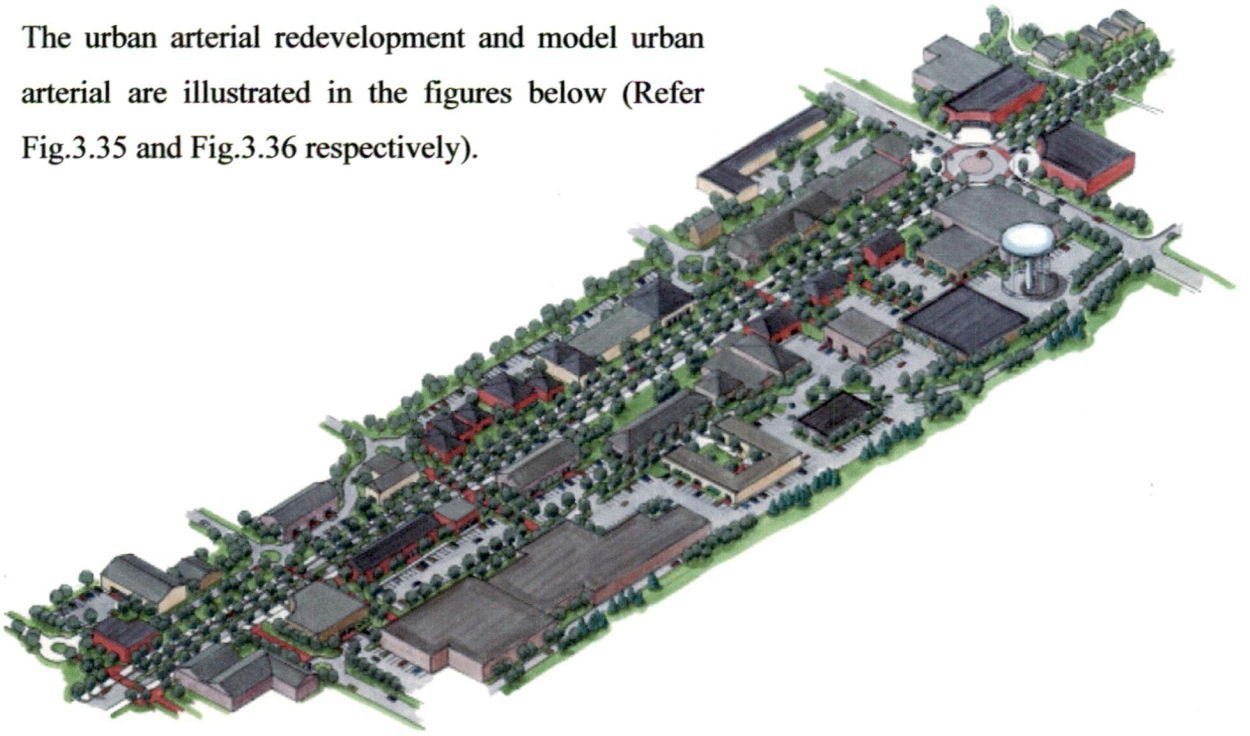


Fig 3.35: Urban Arterial Redevelopment

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

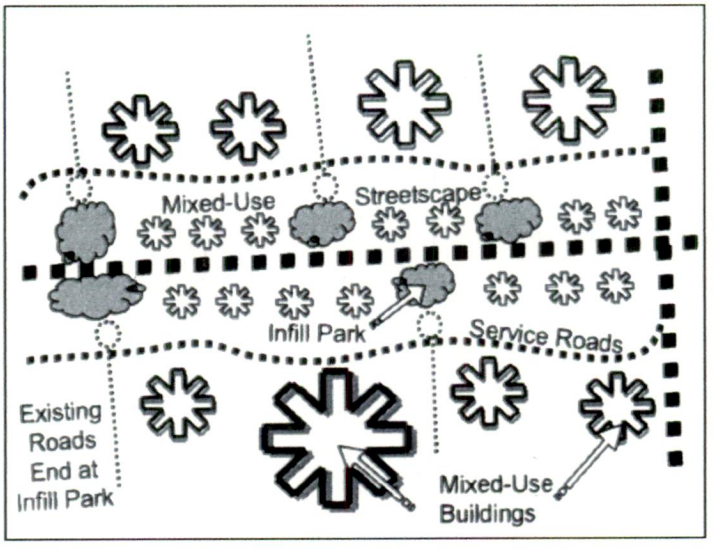


Fig 3.36: Model Urban Arterial

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

c. Scenario 3: Suburban shopping centre

The Suburban Shopping Centre chosen to illustrate the Smart Growth principle is the Seaway Mall Welland, Ontario. The site is shown in the figure (Refer Fig.3.37).

Fig 3.37: Seaway Mall Welland, Ontario.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

Goals

- Create mixed use development.
- Create city centre/common.
- Reorganize circulation patterns.
- Strengthen retail streetscape.
- Organize a matrix of green space and infill parks.

Fig 3.38: Suburban Shopping Centre Redevelopment.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

The figure above illustrates the suburban shopping centre redevelopment by creating mix landuse and strengthening retail development. (Refer Fig.3.38). A model of suburban shopping centre is illustrated below (Refer Fig.3.39).

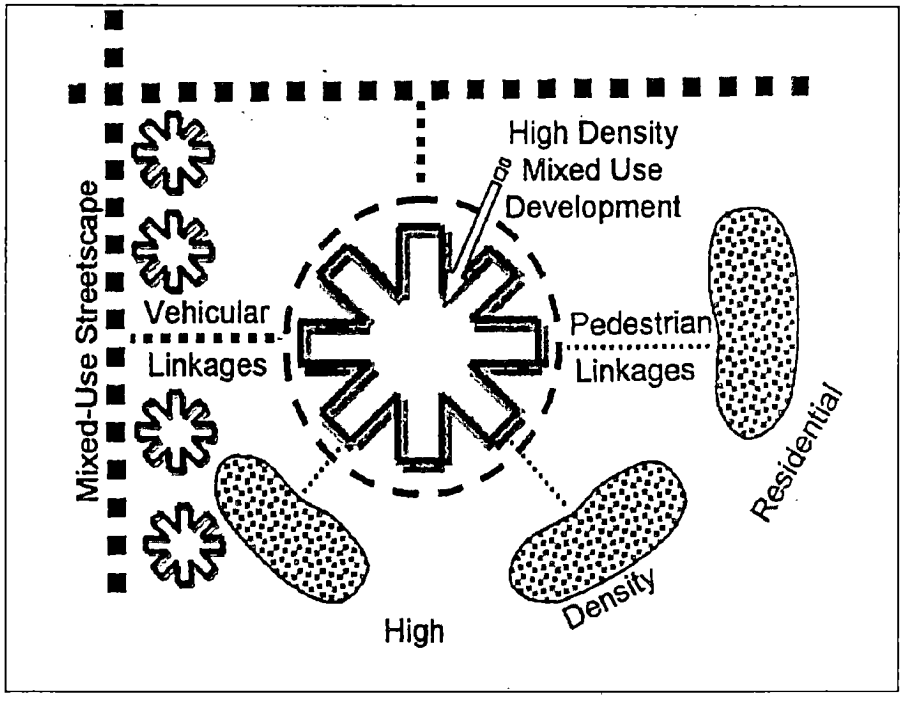


Fig 3.39: Model Suburban Shopping Centre

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

d. Scenario 4: Former industrial or brownfield site.

The Former Industrial or "Brownfield" Site chosen to illustrate the smart growth principle is the Central St. Catharines, Ontario. The site is shown in the figure (Refer Fig.3.40).

Fig 3.40: Central St. Catharines, Ontario

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

Goals

- Increase residential densities.
- Ensure site clean up.
- Reuse industrial sites for redevelopment.
- Consider historic features in redevelopment.
- Organize matrix of green space and infill parks.

The figure 3.41 shows the brownfield site and the model of brownfield redevelopment is illustrated below. (Refer Fig.3.42).

Fig 3.41: Brownfield Site.

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

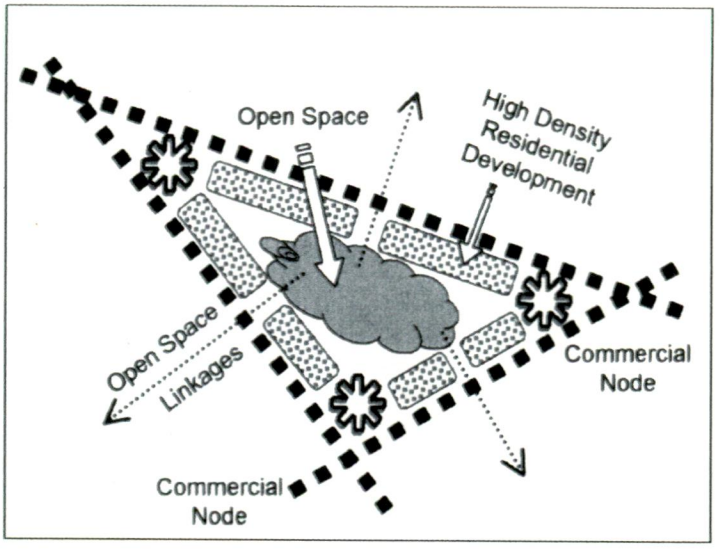


Fig 3.42: Model Brownfield Redevelopment

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

e. Scenario 5: Greenfields and suburbia

The Greenfields and Suburbia chosen to illustrate the smart growth principle is the new suburban development in Southern Ontario. The figures below illustrated the various principles of smart growth adopted (Refer Fig.3.43 to Fig.3.46). The model for greenfields suburban development is illustrated in the figure below (Refer Fig.3.47)

Goals

- Create compact mixed use development
- Create attractive streetscape
- Link with existing commercial centres
- Increase residential densities
- Organize circulation [13]

Fig 3.43: Mixed Use: Residential With Commercial at Grade.
Source:http://www.regional.niagara.on.ca/living/smart growth/pdf/Smart_Growth_in_Niagara.pdf

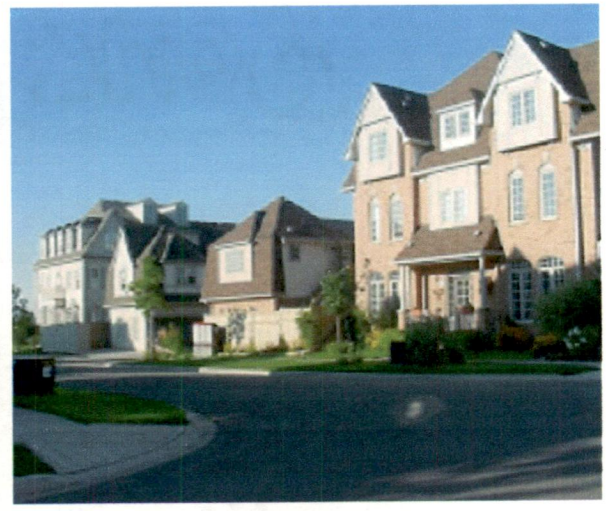


Fig 3.44: Residential Units with Accessory Apartments over Garages.
Source:http://www.regional.niagara.on.ca/living/smart growth/pdf/Smart_Growth_in_Niagara.pdf

Fig 3.45: Walkable Communities.
Source:http://www.regional.niagara.on.ca/living/smart growth/pdf/Smart_Growth_in_Niagara.pdf

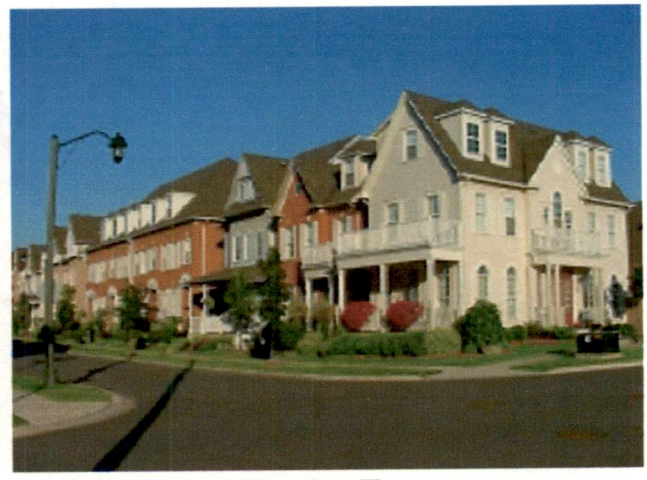


Fig 3.46: Mix of Housing Types.
Source:http://www.regional.niagara.on.ca/living/smart growth/pdf/Smart_Growth_in_Niagara.pdf

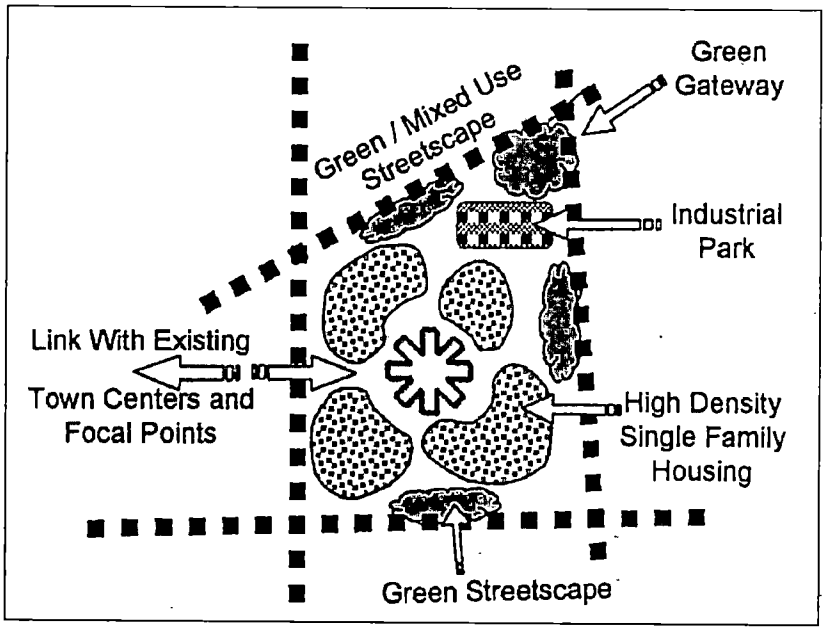


Fig 3.47: Model Greenfields Suburban Development

Source: http://www.regional.niagara.on.ca/living/smartgrowth/pdf/Smart_Growth_in_Niagara.pdf

3.4.6 Evaluation of the Case Study

The case study demonstrates how smart growth concepts can be applied to both local and regional level. The scenarios developed in the report provide a prototype for implementation of smart growth in Niagara region. The village centre or "Main Street" concept illustrates a more efficient use of the land by accommodating additional residential and commercial uses. The Lundy's Lane redevelopment plan illustrates ways to create an attractive, pedestrian-friendly environment while maintaining a thoroughfare for the automobile. It illustrates successfully how the reduction of road and parking and excess pavement area can be put to use for residential and commercial purposes. The scenario of suburban shopping centre, the redevelopment of Seaway Mall illustrates how the redevelopment of commercial area can occur. The development of commercial area along the arterial road and development of residential area by creating an urban village will improve the quality of life for the residents and lessen their dependence on the automobile. Redevelopment of brownfield site provides opportunities for infill development and development on existing infrastructure thus reducing the taxes and preserving open spaces. The green field and suburbia development allows for creating a compact and mix use neighbourhood. Examples have demonstrated that higher densities and mixed-use communities can be both attractive and marketable.

The case of smart growth Niagara illustrates many benefits of smart growth like the fiscal, environmental benefits by directing growth in the existing development. This leads to preserve the open spaces and reduce the cost of development. The smart growth in Niagara will lead to more compact and intense development with the urban area and thus the natural resources of Niagara will be protected. The quality of life will be improved by creating walkable and compact communities.

3.4.7 Inferences

This case study exemplifies how the implementation of smart growth principle can be done both at regional and local level. It lays importance on the implementation of the principles. To guide any new development first the smart growth principles have to be set out. The smart growth principles must be reflected in all the plans prepared for development. The city or the region must first prepare a smart growth policy frame work for implementation with in the region or city. Then a site specific policy should be evolved. Awareness among the officials from top to bottom level must be created, to "What smart growth is?" by presentation, by showing examples of successful implementation of smart growth and by other means. Capacity building is highly essential the official and people involved in development must be trained through workshops. The development plans must be prepared at a broader scale, which is the region so that piecemeal development doesn't occur. There should be coordination among the authority at regional and local level to carry out development.

3.5 Case study 4: Rhode Island's

3.5.1 Location

The State of Rhode Island and Providence Plantations, colloquially known as Rhode Island, is a state in the New England region of the United States. It is the smallest U.S. state by area. Rhode Island borders Connecticut to the west and Massachusetts to the north and east, as well as New York by sea to the southwest. [15] The location of Rhodes Island is shown in the map (Refer Fig.3.48).

3.5.2 Site

The total area is about 1,545 sq mi (3,144 km²) and population is about 1,057,832 (2007 est.). The density is about 1,012.3/sq mi (390.78/km²).[15] The major cities of Rhodes Island is shown in the figure below (Refer Fig.3.49)

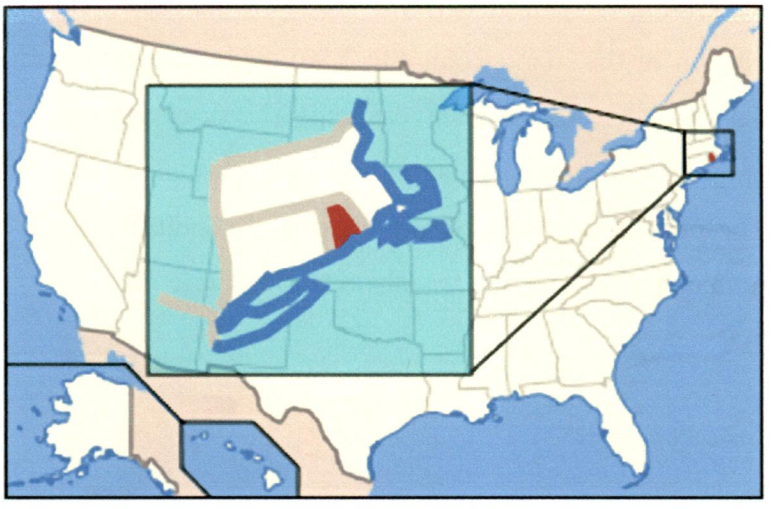


Fig 3.48: Location Map

Source: http://en.wikipedia.org/wiki/File:Map_of_USA_RI.svg

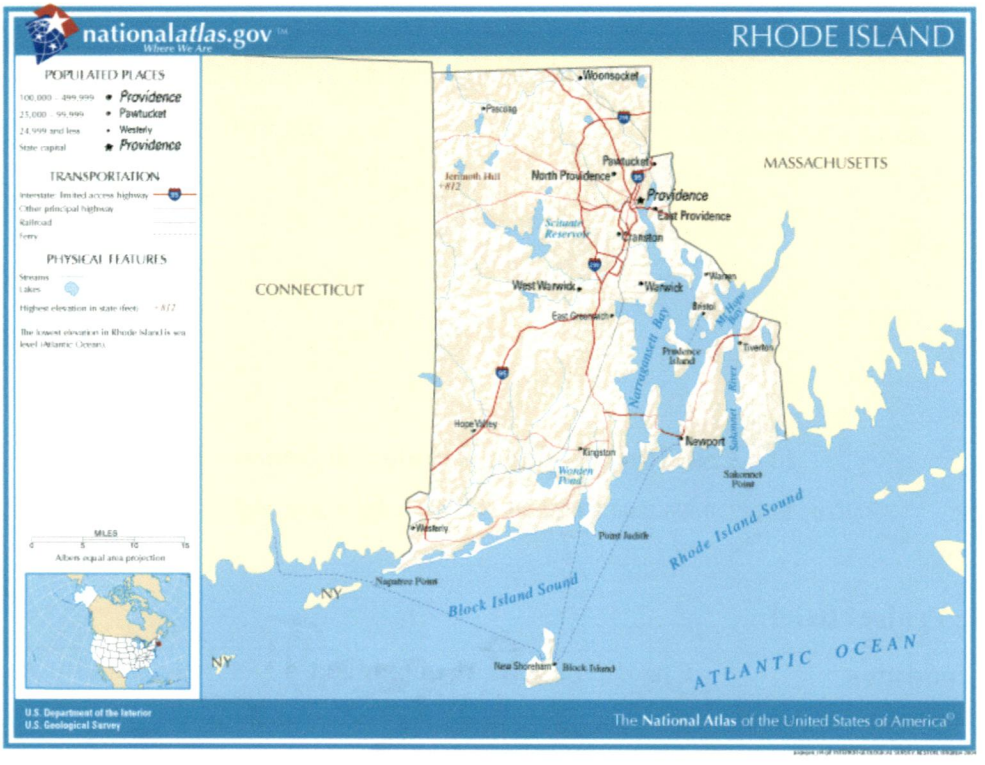


Fig 3.49: Map of Rhodes Island Showing Major Cities and Road.

Source: http://en.wikipedia.org/wiki/File:National-atlas-rhode-island.png

3.5.3 Project and Context Description

The Rhodes Island is experiencing a chaotic pattern of unplanned, inefficient growth which is degrading the countryside, replacing farm, forest, and open space with rows of strip malls and low-density residential development far from town and village centers. This development is penetrating deeper in to rural areas of the state. The population density in Rhodes Island is shown in the map (Refer Fig.3.50). The historic centre of commerce and culture has suffered from decades of disinvestment. The price for this is paid in the form of higher taxes, racial and economic polarization, and, ultimately, in less quality economic development. [16] The project brief describes the existing condition, project developers and the development program carried out in Rhodes Island (Refer Table 3.7).

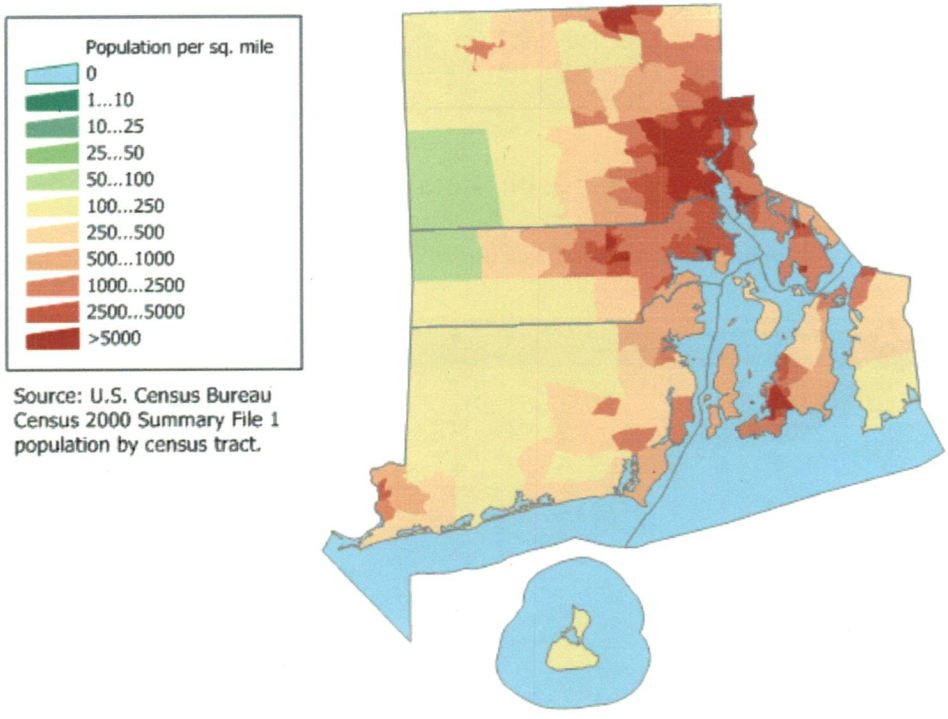


Fig 3.50: Rhode Island Population Density Map

Source : http://en.wikipedia.org/wiki/File:Rhode_Island_population_map.png

Table 3.7: Project Brief

Existing condition	Chaotic pattern of unplanned development and use of rural land for development.
Project developer	Grow Smart Rhode Island
Development program	The main aim is to fight suburban sprawl and urban decay. The

	Issues addressed are systemic reform, urban and town center revitalization, and increasing state and local growth management capacity.

Source: Data compiled by author from [15]

Findings of the study The Costs of Suburban Sprawl and Urban Decay in Rhode Island in the year 2000 shows that the

Economic costs of continued sprawl are huge.

a. As of 1995, there were roughly 11,000 vacant lots in our five core cities of Woonsocket, Central Falls, Pawtucket, Providence and Newport. This represents a tremendous drain on these communities' quality of life and tax base—an estimated $1.3 billion in lost property value for these cities. A modest shift to more compact urban oriented development patterns could shrink the number of vacant lots to 3,000 by 2020, but a continuation of our current development patterns may, over the same period, raise their number to 20,000.
b. Between 1961 and 1995 Rhode Island's consumption of land increased at 9 times the rate of the population growth.
c. More residential, commercial and industrial land has been developed in the last 40 years than in the previous 325 years.
d. Our 15 rural communities, including Exeter, Charleston and Hopkinton, Foster, Glocester, Burrillville, etc., are likely to lose their rural character by the end of this century if sprawl continues unabated.

The Grow Smart Rhode island group was formed due to the concern created by the destructive land use trends. [16]

3.5.4 Smart Growth Principals Adopted

The smart growth principles adopted in the case study are discussed below and the level of achievement of each principle is shown in the table below. (Refer Table 3.8)

Table 3.8: Smart Growth Principals Adopted and Level of Success.

Smart growth principles adopted		Level of success		
		High	Medium	Low
1. Range of Housing Choices		✓		
2. Walkable Neighbourhoods				

3. Community and Stakeholder Participation	[redacted]		✓	
4. Distinctive and Attractive Places	[redacted]		✓	
5. Predictable and Fair Decision Making				
6. Mixed Land Uses	[redacted]		✓	
7. Preserve Open Spaces and Farmland	[redacted]	✓		
8. Transportation Choices	[redacted]	✓		
9. Development in Existing Communities	[redacted]	✓		
10. Compact Building Design				

Source: By Author

3.5.5 Implementation

Issues identified for smart growth in Rhodes Island

a. Systemic reform

- Promote smart economic development.
- Expand the role of statewide planning.
- End Rhode Island's over reliance on the local property tax.
- Expand housing opportunities and neighbourhood revitalization.
- Establish a balanced transportation system.

b. Urban and town center revitalization

- Promote targeted State support for growth centers (priority investment areas).
- Maintain the State Historic Preservation Investment Tax Credit.
- Provide additional state incentives for brownfields assessment and remediation.

c. Increasing state and local growth management capacity

- Provide training and technical assistance to build municipal capacity.
- Protect our special places through aggressive land conservation.
- Local Policy Reforms for achieving smart growth in your city or town. [15]

Local smart growth initiatives in Rhode Island

The following is a sampling of some municipal tools and/or local initiatives being developed and/or enacted around Rhode Island to achieve several of the goals.

a. Growth centers (Priority investment areas)

The concept of "growth centers" (or priority investment areas) has been advanced by the Governor's Growth Planning Council as a way to "encourage compact, mixed-use development; preserve open space; conserve natural resources; fit the type of development to the capability of the land to support development; and promote a sense of community." To help communities incorporate growth centers into municipal comprehensive planning, the Office of Statewide Planning has prepared an amendment to "Handbook 16" providing clear direction.

b. Portsmouth proposed town center plan

The Portsmouth Economic Development Committee and the Newport County Chamber of Commerce commissioned a comprehensive town center study in December 2003. The goal of this project was to create a town center that met the needs of the community and the desire to create economic opportunities for business to broaden the tax base in a way that enhances the quality of life for its residents. The study resulted in the development of a conceptual plan that the town is pursuing with several local and state partners.

c. Commercial design review regulation

Bristol, RI - In an effort to preserve Bristol's historic character, the Town Council adopted regulations earlier this year (2004) that will require chain stores and franchises to meet a strict set of guidelines before they can open branches downtown.

d. "Conservation development" ordinance

Richmond RI - Conservation development is a creative land use technique that allows a community to guide growth to the most appropriate areas within a parcel of land in order to minimize negative impacts to the environment and preserve community character. The goal is to protect at least 50% of the parcel in perpetuity as meaningful open space, with no cost to the community. Richmond, RI adopted such an ordinance in September 2003.

e. RI department of education addendum to school siting guidelines

The Rhode Island Department of Education amended its school siting guidelines in 2001 for communities that wish to implement smart growth solutions for school siting issues. The amendment is consistent with recommendations from the Governor's Growth Planning Council of which Grow Smart Rhode Island is a participant. The result is that

communities now have a nationally endorsed set of guidelines for siting schools where they can best serve the needs of a community.

f. **Handbook 16: State guidelines for affordable housing plans**
The Rhode Island Statewide Planning Program provides guidance to municipalities in the development of state-approved affordable housing plans. Handbook 16 is a reference guide to the Local Comprehensive Plan process that includes an element specific to the development of affordable housing plans. This publication was updated in late 2003. As of press time, the towns of Cumberland and Burrillville have successfully enacted state-approved housing plans.

g. **South county design manual**
This award-winning publication published by the RI Department of Environmental Management illustrates how methods to control suburban sprawl ("smart growth, sustainable design," etc.) can be implemented in local towns, and depicts projected results. The manual has received national as well as local praise. [15]

3.5.6 Evaluation of the Case Study

The case study demonstrates the regional level implementation of smart growth. It lays emphasise on the preservation of open spaces and natural assets and directing development in to the existing community. The case study shows ways by which the economies of the region can be strengthened. The case study suggests policies to prevent urban sprawl and decay. It lays emphasis on capacity building like training and technical assistance to build municipal capacities. This case study gives an outline of systematic reforms needed for smart growth.

3.5.7 Inferences

To achieve the goals of smart growth municipal tools should be developed and enacted. Capacity building is highly essential for implementing smart growth. Reform in the traditional approach to planning and planning process is highly essential for the implementation of smart growth. A coordinating mechanism for growth management is highly essential. The planning program for the whole region has to be created. Task force must be created for implementation

of smart growth goals and officials and staffs must be appointed for implementation. There should be integration of decision making process between the local and regional level.

3.6 Inferences and Guidelines from Case Studies

From the above discussion of four case studies it is clear that sprawling development is not desirable and need for an alternative approach to development. Smart growth is highly essential for sustainable development and to improve the quality of life. In Indian context the application of smart growth principle finds it highly relevant and is the need for the hour. The Indian cities are witnessing unplanned and haphazard development and are facing the associated problems with sprawl pattern of development. The rate of urbanisation is high in Indian cities and the migration of people to the bigger cities in search of better opportunities for work, education and living has become inevitable. Thus an integrated approach to planning is essential. We should learn lessons from the developed countries which are case in point for sprawl pattern of development and its ill effects. The developed countries have become conscious of the kind of development essential for maintaining the quality of life and have restored to better way of planning cities and communities.

To achieve smart growth in any development goals and strategies have to be established. The goals and strategies vary from project to project and are context specific.The table below illustrates the goals and strategies adopted for the case studies. (Refer Table 3.9) From the table it is clear that to achieve the same goal the strategies can be different. In all the case study there is emphasis on promoting development with in the existing communities, strengthening of the existing communities and improving the quality of life. All the goals direct towards planned development to achieve a livable environment.

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Table 3.9: The Goals and Strategies Adopted in the Case Studies

Goals	Strategies			
	Twinbrook Station	**Hismen Hin-Nu Terrace, Oakland, California**	**Smart Growth Niagara**	**Rhode Island's**
Promote revitalization of existing area	a. Use of underutilised parking lot for development. b. New development directed in to the existing community. c. Increase of housing units. d. Promoting mix land use development. e. Streetscape improvement. f. Putting the existing site resource to efficient use.	a. Use of underutilised parking lot for development. b. Redeveloping the abandoned grocery site. c. New development directed in to the existing community. d. Promoting mix land use development. e. Putting the existing site resource to efficient use.	a. Increasing the densities of the existing residential, commercial and industrial development with in the existing urban area. b. Redevelopment of brown field sites. c. Creating high density mix use development in Greenfield sites and suburbia d. New development directed in to the existing community. e. Promoting mix land use development. f. Streetscape improvement. g. Putting the existing site resource to efficient use. h. Reducing road space and parking space and putting the land for useful development.	a. Contain growth in the urban area.

Goals	Strategies			
	Twinbrook Station	**Hismen Hin-Nu Terrace, Oakland,**	**Smart Growth Niagara**	**Rhode Island's**
To provide range of housing choices	a. Provide housing for various income groups. b. Provide housing for various age groups. c. Provide housing of various housing types. d. Providing new	a. Provide housing for various income groups. b. Provide housing for various age groups. c. Provide housing of various housing types. d. Affordable housing		a. Guidelines for affordable housing plans
To improve the quality of life	a. The development of walkable neighbourhood. b. Creating quality open spaces. c. Creating transit oriented communities. d. Promoting mix land use development. e. Improve the streetscape.	a. Development of walkable neighbourhood. b. Creating quality open spaces. c. Promoting mix land use development. d. Improve the streetscape. e. Create an equitable community.	a. Preserve the open space	a. Creating quality open spaces. b. Promoting mix land use development. c. Create an equitable community. a. Create economic opportunities.

Goals	Strategies			
	Twinbrook Station	**Hismen Hin-Nu Terrace, Oakland, California**	**Smart Growth Niagara**	**Rhode Island's**
Strengthening the communities	a. Promote the development for economic revitalization of the communities. b. Create an equitable community c. Mix use development.	a. Promote the development for economic revitalization of the communities. b. Create an equitable community	a. Promote the development for economic revitalization of the communities. b. Create an equitable community c. Mix use development.	a. Promote the development for economic revitalization of the communities. b. Create an equitable community c. Mix use development. d. Designating priority
Promoting smart growth throughout development process		a. Conducting participatory workshop. b. Conducting interactive design workshop. c. Community and stakeholders collaboration. d. Involve whole of the community in the process of development.	a. Community and stakeholders collaboration. b. Preparing reports c. Giving presentations to the community as well as to the municipalities. d. Providing technical assistance to the municipality. e. Coordination between the region and local municipality.	

Goals	Strategies			
	Twinbrook Station	**Hismen Hin-Nu Terrace, Oakland, California**	**Smart Growth Niagara**	**Rhode Island's**
To create distinctive character for the development.		a. Mission revival style adopted for developing the façade. b. Mission revival style of architecture adopted. c. Artistic contribution from different ethnic group displayed.	a. While redeveloping brownfield sites consider historic features in redevelopment. b. Create attractive streetscape. c. Link the new development with the surrounding features.	a. Strict guidelines for the development of commercial area in the historic centres
Preserve the existing natural resources and open spaces	a. Creating quality open space.		a. Contain development with the boundaries. b. Create compact developments c. Organise green space in development. d. Create infill park e. Promote cooperation among municipalities, developers and environmentalists to preserve unique natural feature.	

Goals	Strategies			
	Twinbrook Station	**Hismen Hin-Nu Terrace, Oakland, California**	**Smart Growth Niagara**	**Rhode Island's**
To create a compact development	a. Promote infill development. b. Promoting mix land use development. c. Integration of transportation and landuse.			
To reduce the number of people who rely on single occupancy vehicle to commute to work	e. Promotion of transit oriented development. f. Create a walkable environment. g. Promoting mix land use development. h. Improvement of the metro station and it's connectivity to other part of the community. i. Developing new housing units adjacent to the metro station.	a. Locating the development near public transportation system.		a. Provide transportation choices. b. Create compact mix use development.

Source: By Author

The ten principles of smart growth are appropriate for development in Indian cities. Though all the principles can not be applied to a particular situation efforts should be made to apply the maximum. Reformation in the institutional set up, planning process and capacity building will be very much essential for implementation of smart growth in Indian context.The inferences drawn from the case studies are relevant for application of smart growth in Indian context are given below.

- Encourage development along transit corridors.
- Create walkable environment in the neighbourhood and create pedestrian precincts.
- Provide transportation choices.
- Provide better accessibility to work, public facilities, recreational and open spaces by providing different modes of transport and encourage the use of public transportation modes.
- Integrate landuse and transportation network.
- Make compact high density urban development.
- Provide a variety of housing choices to all section of the urban community.
- Preserve socially and environmentally appropriate open spaces.
- Direct development in to existing communities.
- Conserve and redevelop historic sites and old buildings can be put to adaptive reuse.
- Encourage mixed use development and make efficient use of the available land resource.
- The development should increase economic and environmental vitality of the place.
- Encourage and promote public participation in the developmental process.
- Create distinctive and attractive communities.
- Think in terms of smart growth principle right from the beginning and from the broadest level so the development is not piecemeal.
- Make appropriate policy frame work for the implementation of smart growth principles.
- Create Capacity building among planners, architects, urban designers, decision- maker, community leaders and other professionals.
- Encourage coordination among the authorities
- Ensure integration of decision making process between the local and regional level for implementation of smart growth.
- Prepare appropriate building bye-laws, zoning rules and development regulation specifying the appearance, height density of buildings, the design of streets landuse, development etc.

CHAPTER 4 REVIEW OF URBAN DEVELOPMENT TRENDS OF INDIA

4.1 Urbanization in India

4.2 Trends of Urbanisation

4.3 Urban Planning in India

4.4 Overview of Master Plans Prepared in India in Light of Smart Growth Principles

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4.6 Conclusions

CHAPTER 4

REVIEW OF URBAN DEVELOPMENT TRENDS OF INDIA

4.1 Introduction

In this chapter urban growth trends in Indian cities has been studied to assess the relevance of smart growth in Indian context. The urban planning system in India and the problems faced by Indian cities due to urbanisation are discussed in the chapter.

4.2 Urbanization in India

The Indian cities are witnessing rapid urbanisation. The cities are swelling in size in terms of urban population. The economic reforms have increased the pace of urbanisation. By 2030, 40.76 per cent of India's population will be living in urban areas compared to about 28.4 per cent now. [17] Though the urbanisation level when compared to other countries of the world is low in India the growth of urban population is more. The level of urbanisation has increased from 10.8% to 27.8 % and the total urban population has increased by 11 folds with in a century. The pace of urbanisation has gained momentum after 1951. There has been a steady increase in the number of towns over the years. The table below gives an overview of urbanisation trends in India. (Refer Table 4.1)

Table 4.1: Number of Towns and Population (In Million) of Urban Agglomerations and Towns in India (1901-2001).

Census Year	Number of UAs/Towns	Total Population	Urban Population	Urban Population as % of Total Population	Decennial Growth (%)
1901	1,830	238,396,327	25,851,873	10.8	-
1911	1,815	252,093,390	25,941,633	10.3	0.35
1921	1,944	251,321,213	28,086,167	11.2	8.27
1931	2,066	278,977,238	33,455,989	12.0	19.12
1941	2,253	318,660,580	44,153,297	13.9	31.97
1951	2,822	361,088,090	62,443,934	17.3	41.42

1961	2,334	439,234,771	78,936,603	18.0	26.41
1971	2,567	548,159,652	109,113,977	19.9	38.23
1981	3,347	683,329,097	159,462,547	23.3	46.14
1991	3,769	846,387,888	217,551,812	25.7	36.47
2001	4,378	1,028,610,328	286,119,689	27.8	31.13

Source: Census of India 2001

The concentration of population in class I cities is maximum, about 61.48% of urban population lives in this category. (Refer Table 4.2)

Table 4.2: India – Class – Wise Number of Towns and Cities and Their Population, 2001.

Class	Population Size	Number	Population (Million)	% Of total Urban Population	% Growth 1991-2001
All classes		5161	285.35	100	31.13
I	1,00,000 and more	423	172.04	61.48	23.12
II	50,000 - 99,999	498	34.43	12.3	43.45
III	20,000 – 49,999	1386	41.97	15.0	46.19
IV	10,000 – 9,999	1560	22.6	8.08	32.94
V	5,000 – 9,999	1057	7.98	2.85	41.49
VI	Less than 5,000	227	0.8	0.29	21.21

Source: Census of India 2001

There has been a continuous increase in the number of the cities with million populations. The period from 1971 to 2001 has shown a drastic increase in the number of million plus cities. About 38.60 % of urban population live in million plus cities. (Refer Table 4.3)

Table 4.3: Number and Percentage of Urban Population in Million-Plus Cities in India 1901-2001.

Census Year	Number	Population (in	Population per	% to Urban
1901	1	1.51	1.51	5.84
1911	2	2.76	1.38	10.65
1921	2	3.13	1.56	11.14
1931	2	3.41	1.70	10.18
1941	2	5.31	2.65	12.23

1951	5	11.75	2.35	18.81
1961	7	18.10	2.58	22.93
1971	9	27.83	3.09	25.51
1981	12	42.12	3.51	26.41
1991	23	70.66	3.07	32.54
2001	35	107.88	3.08	38.60

Source: Census of India 2001

According to 2001 census there are 35 cities or urban agglomerations with a population of 1 million or more the list of which are given in table. (Refer Table 4.4)

Table 4.4: Cities or Urban Agglomerations with a Population of 1 Million.

Rank	City / Urban area	Population
1	Mumbai (Bombay)	16,368,000
2	Kolkata (Calcutta)	13,217,000
3	Delhi	12,791,000
4	Chennai	6,425,000
5	Bangalore	5,687,000
6	Hyderabad	5,534,000
7	Ahmadabad	4,519,000
8	Pune	3,756,000
9	Surat	2,811,000
10	Kanpur	2,690,000
11	Jaipur	2,324,000
12	Lucknow	2,267,000
13	Nagpur	2,123,000
14	Patna	1,707,000
15	Indore	1,639,044
16	Vadodara	1,492,000
17	Bhopal	1,455,000
18	Coimbatore	1,446,000
19	Ludhiana	1,395,000
20	Kochi	1,355,000
21	Visakhapatnam	1,329,000
22	Agra	1,321,000
23	Varanasi	1,212,000
24	Madurai	1,195,000
25	Meerut	1,167,000
26	Nashik	1,152,000
27	Jabalpur	1,117,000
28	Jamshedpur	1,102,000
29	Asansol	1,090,000
30	Dhanbad	1,064,000
31	Faridabad	1,055,000

32	Allahabad	1,050,000
33	Amritsar	1,011,000
34	Vijayawada	1,011,000
35	Rajkot	1,002,000

Source: Census of India 2001

Though the increase in million and cities provide greater opportunities for employment, education and other facilities, their haphazard development has put strain on the infrastructure like water supply ,housing ,sewage ,transportation and sanitation.

4.3 Trends of Urbanisation

In India the urbanisation pattern is characterised by concentration of population and activities in large cities. The pattern of growth of Indian cities witnessed a major change after 1990's.The cities like Mumbai, Delhi, Chennai, Bangalore etc. became the globalisation hot spots. The Indian cities became the magnets for foreign direct investment due to the economic liberalisation of 1991. This led to the major restructuring in the pattern of cities growth. The main aim of economic liberalisation was to link the country's economy with the global economy and boost urban growth. The liberalisation has led to the setting up of work centres by multinational companies in major Indian cities. Thus the job opportunities have increased in the cities and more number of people is attracted to these cities thus putting pressure on the existing infrastructure. Though the government is taking steps to provide infrastructure facilities, the rate at which they are provided is not adequate and thus there is strain on existing resources.

The foreign investments and development of special economic zones are limited to selected sectors and their concentration is only in and around select metro cities. Many Indian states have liberalised their economic policies to attract private corporate investment. The changing trend of investments in the city has led to high real estate price. The Indian cities are growing beyond their capacities in terms of infrastructural facilities. Land has become a scarce resource in all major cities of India many of the development authorities are now debating on the issues of increasing the FSI in the city centre. In city like Chennai the issue of premium FSI has been raised so that high destinies can be accommodated, though in reality no significant increase in FSI has been made so far.

The new trends of economic development are concentrating developments in mega cities and the small towns are not much benefited. Earlier the concentration of activities and population was in the centre of the city. With the development of communication and road

construction and congestion in the city core suburbanisation took place and urban sprawl started. The development along the periphery was not regularised and was haphazard. With the liberalization, privatization and globalisation huge land areas are developed for private townships, special economic zones and huge office complexes with in or in the outskirts of the city. Many of the townships claiming to be integrated township do not serve the purpose as the people who own a house there are not employed in the firms or offices within the township and people commute to the township for work. The townships are located away from the city and are along major highways but they are not connected by good public transportation thus forcing the people residing in the township to use their personal vehicles to commute adding to the problem of congestion on the city roads. The townships do not cater to the housing shortage and are targeted for only high income group people the housing need of low income group and economically weaker section are not catered. Though the townships advertise of providing all the facilities they actually do not as they do not have enough population to support the facilities and thus the people living in the township have to commute to the city to avail the facilities. The figure illustrates the layout of integrated township with various facilities in the outskirts of the city (Refer Fig.4.1). The layout and view show that in the township development compact development has been achieved by high rise building. The residential development in the townships is in the form of apartment buildings (Refer Fig.4.2).

Fig 4.1 Layout of Aquapolis a 152 Acre Integrated Township on the Outskirts of Delhi

Source: http://www.skyscrapercity.com/showthread.php?t=455370&page=9

Fig 4.2: View of Water Front Apartments in Aquapolis

Source: http://www.ansalapi.com/aquapolis.as

In the metropolitan cities the population densities are high but the spread of the city is more due to low FSI permitted with in the city.

4.4 Urban Planning in India

In India the planning process is a multi tiered system. There are three levels of urban planning and development administrations in India i.e. federal, state and local level. The Ministry of Urban Development and the Housing and Urban Development division of the Central Planning Commission are the two authorities for urban planning and development at the central level. At the central level the arrangements are in the form of policy planning and allocation of plan funds to the state and providing central level schemes for development. At state level there are town planning departments. The urban planning and development at sate level are directed by the respective town planning acts and other development act. The town planning departments prepare master plan, regional plan and various developmental plans and schemes. At local level the planning development authorities of metropolitan cities are involved in the preparation of master plan and development plans and their implementation. The

development authorities also give development permission. In cities where the development authorities don't exist the state town planning department prepares the development plan and gives the development permission.

According to a study conducted by the Town and Country Planning Organisation (TCPO), 879 Master Plans have been prepared under the state Town and Planning Acts, Town Improvement Trust Acts, City Development Acts and other legislations. 319 towns are in the plan preparation process and draft stage. Absence of proper legislation leads to non-statutory plans in some states. The study by TCPO also indicates that there are 150 city development authorities. [18] The table below gives an overview of the master plans prepared. (Refer Table 4.5)

Table 4.5: Status of Master Plans in India

States/Union Territory	Plans approved by the Govt.	Draft plans prepared	Plans under preparation	Total
All States and UTs	879	158	161	1198
Gujarat	106	-	-	106
Maharashtra	230	4	14	248
Haryana	36	2	15	5
Delhi	1	-	-	1

Source: A Report - Master Plan Approach Efficacy and Alternatives by Town and Country Planning Organization, 1998

However, the plan implementation is not up to desired and optimum level due to various intrinsic and extrinsic factors such as, local bodies poor monetary position, lack of technical know how, cumbersome procedures, administrative delays in land acquisition, multiplicity of agencies and less institutional support. Another important factor is that the owners of land take-up the matter for higher compensation to the Courts by equating their land potentials like strategic locations, vantage areas, higher productivity and market value etc. thereby delaying the acquisition in many cases. [18] Many of the Indian cities do not have master plan, to guide their development.

4.5 Overview of Master Plans in Light of Smart Growth Principles

A review of Delhi Master Plan in light of smart growth principle is presented below followed by general overview of the master plans prepared in India in light of smart growth. A detailed evaluation of the Chennai master plan based on smart growth principle is done in chapter 5. By reviewing the master plan of Delhi based on smart growth principle the following observation has been made.

Principle 1: Create a range of housing opportunities and choices

The master plan has strategies for providing affordable housing for the poor. The housing strategy doesn't mention the provision of range of housing choice for all income groups. The strategy for housing in new development mention that about 50% of the housing unit must be in the form of one or two bedroom housing units with a plinth area of 25 m^2 to 40 m^2. It is not mandatory to provide 50 – 55% of housing to low income group in newly developed area, according to location it can vary to 75% for low income group and in some cases the proportion of other income groups may be more. The control for building / building with residential premises describes the controls for various housing types like residential plot- plotted housing, residential plot group housing, cluster court housing, low income housing, hostel/bed and breakfast accommodation, guest house/lodging and boarding houses/ dharamsala. The guidelines or strategies do not mention mandatory provision of housing by industrial or institutional set up for their employees. The master plan gives emphasis to transit oriented development and location of work centres and mix use development with residential use near transit station.

Principle 2: Create a walkable neighbourhood

There is a mention of incorporation of cycle track in the sub-arterial primary collector road and segregated pedestrian and cycle tracks in the residential neighbourhoods. Guidelines for other modes of transport like cycle rickshaws are also provided. There is no mention on the retrofitting of residential roads with side walks. No model for development of road section is provided in the master plan. The master plan does not provide any incentives for development of walkable neighbourhood.

Principle 3: Encourage community and stakeholders collaboration

Preplanning consultation for the preparation of master plan was done with the public and the stakeholders but the master plan doesn't mention any strategy or policies for community and stakeholders participation in the development process.

Principle 4: Foster distinctive, attractive communities with a strong sense of place

The master plan deals with the issue of urban design and provides policy for various aspects which affect the urban fabric. The master plan discusses about the various aspects like visual integration, the beautification of the urban corridor, MRTS corridor, hoarding street furniture and signages and creation of pedestrian friendly city. It gives urban design guidelines for each aspect. The master plan envisages a five tier system of commercial area. The master plan envisages the preparation of integrated plan for metropolitan city centre incorporating urban design, landscape, traffic and transportation scheme, safe pedestrian walkways, parking areas recreational and cultural areas etc. The master plan has planning norms for informal trade. The planning norms mention the integration of informal sector market in residential area. The incorporation of informal sector market in residential area will make the residential area livelier and would help in creating an attractive community.

Principle 5: Make development decisions predictable, fair and cost- effective

The master plan doesn't give any policies or guidelines for the coordination of the agencies involved in the development process. The development regulations and byelaws are made available in the form of booklet and thus are available to the public. The financial details on the investment on the infrastructure are not detailed out. There are no maps showing the density of people in various zones.

Principle 6: Mix land use

The master plan give strategies for mix land use in both already existing development and new development also. It clearly defines the permissible and non permissible use in a mix use development. The master plan specifies in case of already existing development a conversion charge has to be levied from the beneficiaries.

Principle 7: Preserve open space, farmland, natural beauty and critical environmental areas

The master plan emphasises on the conservation of natural resources and preservation of open spaces. But the master plan also mentions a contradictory statement mentioning the constrain of land availability and the area designated under rural area being under tremendous pressure and utilizing it for various urban activities. The master plan envisages the area under the existing designated rural area to be absorbed for urban extension from time to time for the balanced development of the city. As the part of environment and the natural resource conservation and management the issues related to water, air and noise are discussed. In order to protect the air from air pollution the emphasis is laid on the use of public transportation.

Principle 8: Provide a variety of transportation

The master plan of Delhi the concept of re- densification / intensification and redevelopment along MRTS corridor has been mentioned. The aim is to achieve integration of landuse and transportation. The plan and strategy in the master plan stress on the public transportation and on the integrated multi-modal transport system and on reduction of private vehicles on the road. The master plan lays emphasis on the MRTS and high capacity bus transportation system. It also gives importance to the integration of landuse and transportation network. The master plan also addresses the parking issues.

Principle 9: Strengthen and direct development towards existing communities

The master plan also mentions the redevelopment of existing urban area by improving the infrastructure facilities in the existing area and by increasing the FAR in some area and by the application of the concept of mix-use zones. The master plan suggests approaches to redevelop the walled city area and walled city extension area. The accessibility of the walled city area will be improved by MRTS. The master plan lays emphasis on the conservation of heritage building and area. It gives conservation strategies and listing of heritage zone is done in the master plan.

Principle 10: Take advantage of compact building design

There are no strategies suggesting compact building design. The development regulation permits development with low FSI thus encouraging sprawl development.

From the review of the Master Plan of Delhi it is clear that the policies, goals and strategies should be detailed out further and must have sustainable approach to development. Though some aspects of smart growth are dealt with in the master plan a detailed understanding of this concept is essential and it is application potential and its advantages must be considered and applied while preparing the master plan.

Reviewing the master plans prepared in India in light of smart growth principle, the master plans lack vision for future sustainable development. The policies, strategies and regulation in the master plan generally promote low density sprawl development. The cities have low FSI of 1.5. Only in some master plan an FSI of 2.75 or 3 is permitted for multi-storeyed building construction. The policies and strategies for housing do not lay emphasis on affordable housing for all income groups but special emphasise is given to low income group or economically weaker sections. The housing policies in master plan do not emphasize on provision of housing near employment centres and transit oriented development. There are no incentives provided for the private developer to provide affordable housing.

Creation of walkable neighbourhoods or communities do not find mention in the master plan nor does the master plan provide any model plan for development of walkable neighbourhood. There is no talk about of retrofitting of sidewalks in the existing development. In India footpaths as an important element in the city transportation system has not been identified. There is lack of pedestrian amenities in Indian cities. Very few cities in India have a well developed pedestrian precinct as in Chandigarh. The figure below illustrates ramp provided

Fig.4.3: Provision of ramp for universal accessibility in Sector 17 Chandigarh.

Photo credit: Prof. R.Shankar

Fig.4.4: Raised Pedestrian Foot Path Making It Difficult To Climb For Elderly, Children And Physically Challenged.

Photo credit: Author

for universal accessibility in Sector 17 possibly it is one of the well designed pedestrian environment in India (Refer Fig. 4.3). The universal accessibility is not considered while developing the pedestrian foot path in many of the Indian cities (Refer Fig. 4.4). The provision of walkable environment in the city must be taken up seriously and strategies must be formulated for the same and its implementation must be monitored.

The master plan preparation process involves the public only after the tentative drafts are prepared. The public participation at initial stages and all stages of master plan preparation is essential. The master plan does not emphasise on the architectural style for particular area. Most of the master plan state about the conservation of historic area and buildings.

The concept of mix land use is not much prevalent and their application is limited. Many cities still have zoning regulations. The issues of integration of landuse with transportation network and densification of development along transit corridors are not dealt in great extent in the master plans. The master plans do not mention about strengthening and directing development in to the existing communities and there are no provisions to promote redevelopment of brown field and grey field or to promote infill developments. In most of the master plans for Indian cities the planning parameters mentioned in DCR promote medium to low rise development.

4.6 Problems Faced By the Indian Cities Due To Urbanisation

The process of rapid and extensive urbanisation in India has put many of the Indian cities under great pressure. There is a spatial spread of urban areas due to the rapid growth of the city. There is unplanned and haphazard growth of the city into the adjoining rural area this process of expansion of the city is known as suburbanization. People migrate from the city to suburban area owing to the cheap land availability and housing. The suburban areas don't have basic urban amenities like piped water supply; sewerage etc. The suburban areas are generally outside the municipal limit and thus the municipal regulations are not applicable to these areas. The cities are witnessing wide gaps between demand and supply of infrastructural services. The pressure is not only on the resources and environment but also on the people living in the city and the government which provides the infrastructure and other amenities. The pattern of spatial development of the Indian cities is haphazard and Indian cities lack infrastructure facilities. The lack of infrastructure facility affects the quality of life. The people living in the cities have to

face miserable situation due to lack of public transport, housing , traffic jams, frequent power cuts, inadequate water supply, inadequate sewerage and storm water network ,no good quality of air to breath, no open spaces and green parks to socialize, chaotic growth of the city and the list is never ending. The rapid urbanisation has lead to increase in slums and degradation of quality of life in cities.

The government faces the problem of providing infrastructural facilities and good environmental condition for the ever growing city. The major problem faced by Indian cities is the urban sprawl. Urban sprawl puts the burden on government to come up with a solution to accommodate the desires for a rural lifestyle and urban services while protecting health, safety and environment. The urban sprawl, lack of public transportation system and the presences of work place away from home forces people to have their own vehicles like car and motor bikes which adds to traffic congestion and pollution. The problems faced by the Indian cities are illustrated in the figures below (Refer Fig. 4.5 to Refer Fig. 4.8).

Fig.4.5: Crowded Train in Chennai
Photo credit: Author

Fig. 4.6: Traffic Jam on the Road in Chennai
Photo credit: Author

Fig 4.7: Development of Slums along the River in Chennai.
Photo credit: Author

Fig 4.8: Water Supply by Tanker Lorries in Chennai.
Photo credit: Author

The cities do not have a walkable environment. The pedestrian safety is not ensured. The attributes to be taken care of while planning the pedestrian environment like safety and security, convenience, attractiveness, maintenance, universal accessibility and dimensional adequacy are not taken care of. There is mismatch in the development of facilities like the bus stops and the railway transit stations are not planned and located near by. There is no integration between the various modes of transport. The planning and location of foot over bridges and subways in many cases are not appropriate. In places where the pedestrian paths are present they are ill maintained or are encroached (Refer Fig. 4.9). The streetscape design doesn't favour pedestrian movement instead they encourage vehicular movement (Refer Fig. 4.10).

Fig 4.9: Encroached Foot Path by Shop Keepers Making the Movement of Pedestrian Difficult.

Photo credit: Author

Fig 4.10: Pedestrian Foot Paths Are Not Present In Front of a School In Chennai. The Road is occupied By Vehicles and Makes the Movement of Pedestrian Unsafe.

Photo credit: Author

4.7 Conclusions

Management of rapid process of urbanisation and the growth of the cities is highly essential to cope up with the growing economic rate. The cities are to be made more liveable and thus appropriate growth management strategies have to be developed for Indian context. The master plans must be created with vision for sustainable development. The urban development should be contained within boundaries and strategies for containing sprawl should be developed. The cities should provide equal opportunities for the rich and the poor. Good public transportation system must be developed and walkable neighbourhoods must be created. Infrastructure development to cope with the increasing population should be given prime importance while developing a city. The infrastructure development must be sustainable. The quality of life has to be improved in Indian cities.

CHAPTER 5 DEVELOPMENT SCENARIO OF CHENNAI METROPOLIS

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5.2 Chennai Metropolitan Area

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5.2.3 Climate

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5.4 Development trends in Chennai City and Metropolitan Area

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CHAPTER 5

DEVELOPMENT SCENARIO OF CHENNAI METROPOLIS

5.1 Introduction

In this chapter the main aim is to study the development scenario in Chennai metropolis. The study on Chennai city has been made on the current trends of development in Chennai by direct observation, photo study and from secondary data. An overview of Chennai city is presented, then the evaluation of Chennai Master Plan based on smart growth principle has been done, the development along two major corridors of Chennai city is discussed and the development of new townships and the analysis based on smart growth principles is done.

5.2 Chennai Metropolitan Area

5.2.1 In General

Chennai is the capital of Tamil Nadu. Chennai is the fourth largest metropolitan area in India, with a population of 7.5 million in 2007. The city has a diversified economic base, with well-developed industrial and tertiary sectors. Chennai is the main automobile production and assembly center in India, and it is gaining momentum as a back-office and IT center.

5.2.2 Location

Latitude: between 12°50'49" and 13°17'24" [19]

Longitude: between 79°59'53" and 80°20'12" [19]

The location of Chennai city in Tamilnadu is shown in the map below. (Refer Fig 5.1)

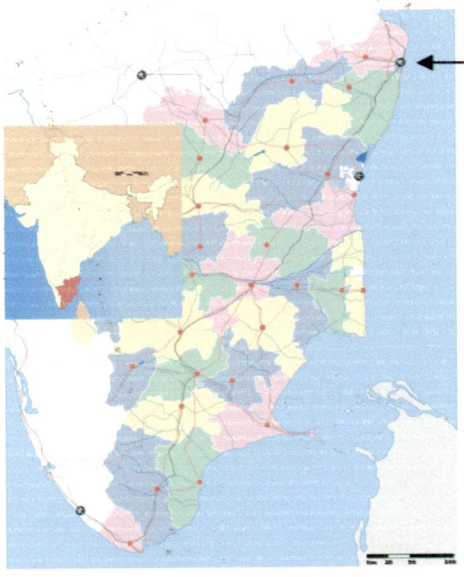


Fig 5.1: Location of Chennai

Source : http://en.wikipedia.org/wiki/File:Tamil_Nadu_locator_map.svg

5.2.3 Climate

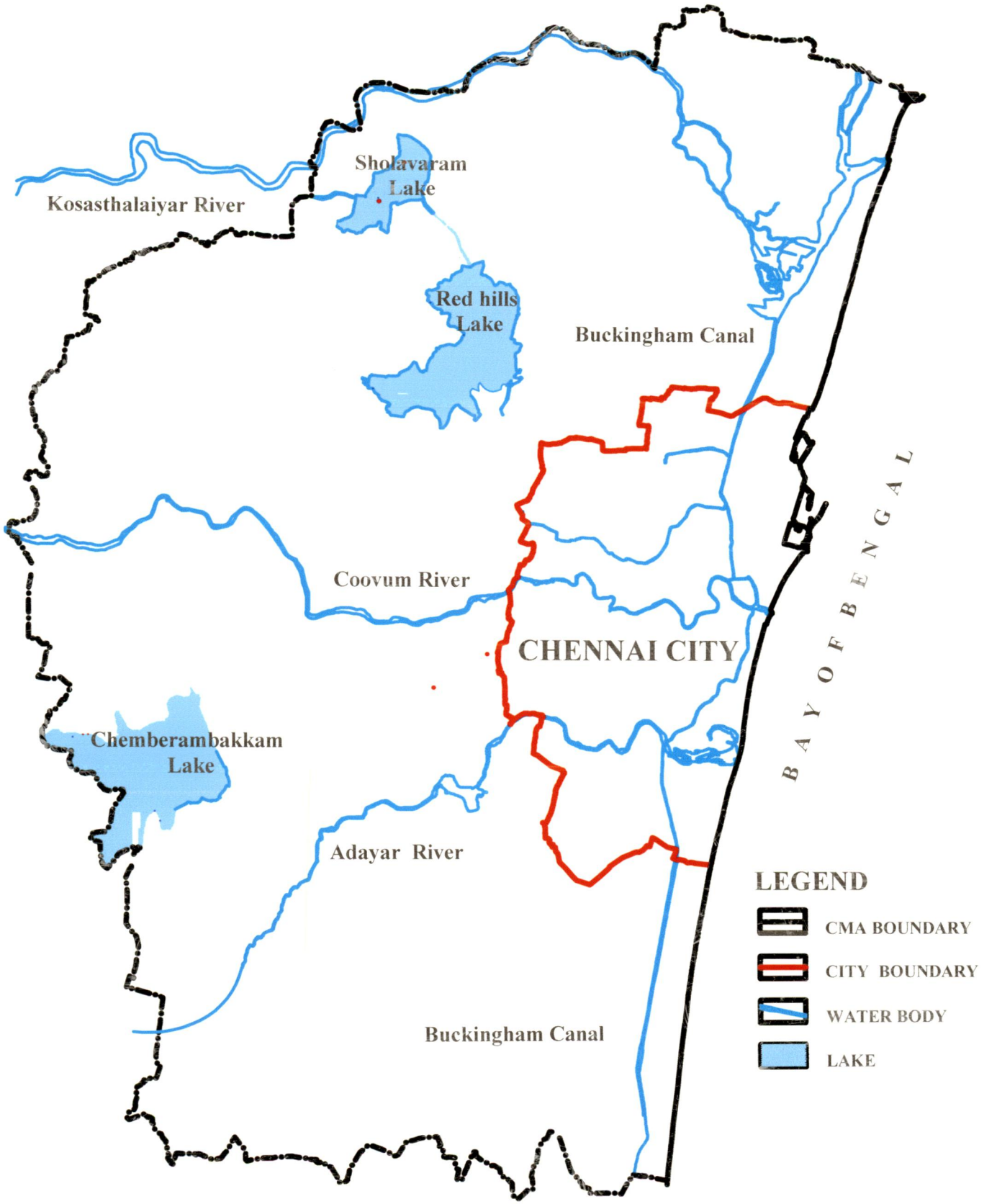
Chennai lies close to the equator and most of the year it is hot and humid. Highest temperature attained in May-June is usually about 40°C for a few days. The coldest time of the year is early January when the temperature is about 20°C. Predominant wind direction is from South East to North West. [19]

5.2.4 Geography

Chennai situated on the shores of the Bay of Bengal It is located on the coramandal coast in southern India and the land is a flat coastal plain. Three rivers pass through Chennai Metropolitan Area Kosasthalaiyar river, Cooum river and Adyar river. The Buckingham Canal, a man made canal. There are three large lakes Sholavaram lake, Red Hills lake and Chembarambakkam lake in the Chennai Metropolitan Area. [19] (Refer Map 5.1). The marina beach runs 12km along the shore line of the city. [20]

5.2.5 Demographics and Density

Chennai is the fourth largest metropolis in terms of population. The table below gives the population, area and density of Chennai city and Chennai metropolitan area. (Refer Table 5.1). The map shows the boundary of city and metropolitan area. (Refer Map 5.2).



RIVERS AND LAKES IN CHENNAI

N

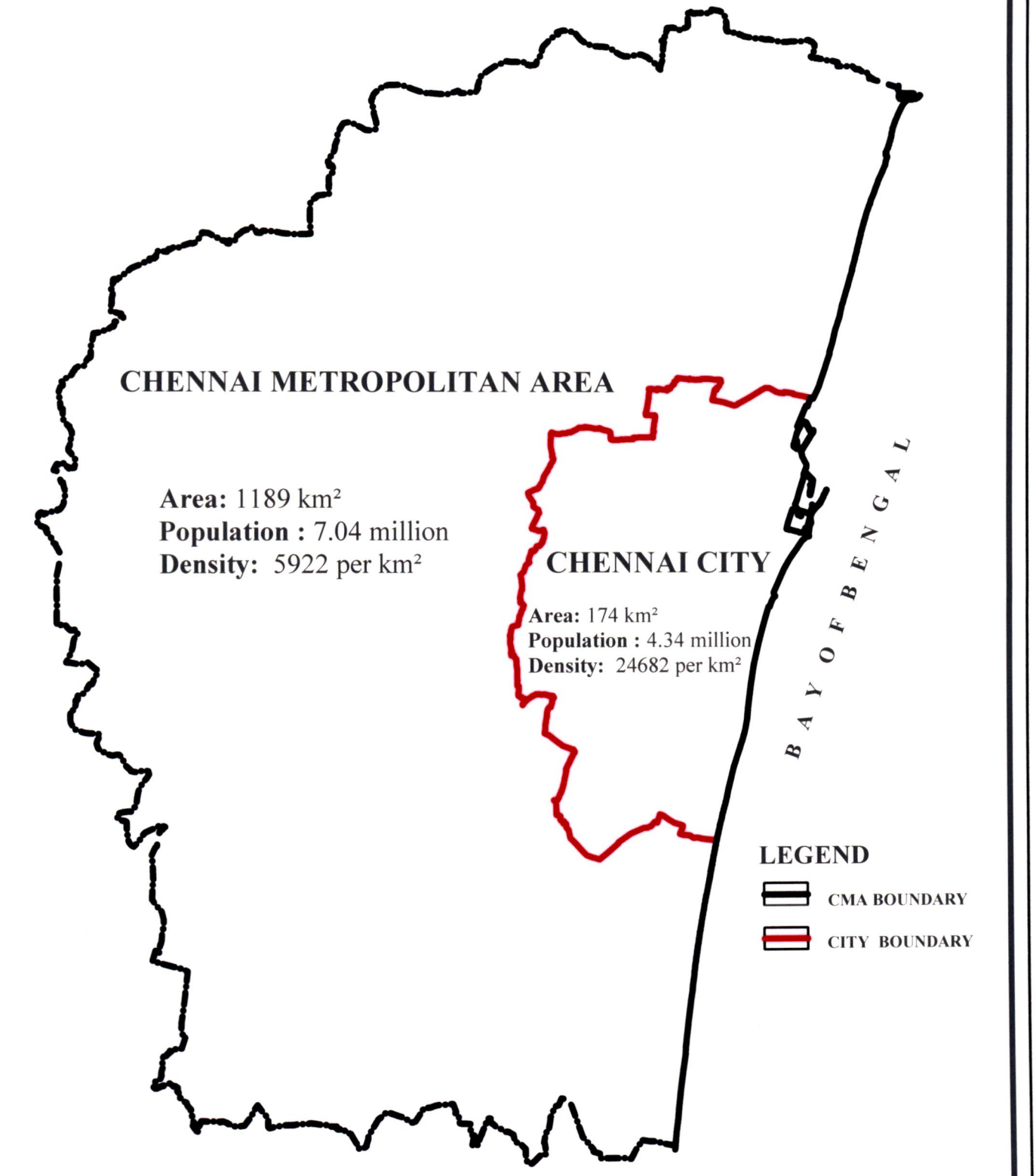
MAP NO: 5.1

SCALE

1.0 0 1.0 2.0

Km

Source: Redrawn By Autho



CHENNAI CITY AND METROPOLITAN AREA

N

MAP NO: 5.2

SCALE

1.0 0 1.0 2.0

Km

Source: Drawn By Author

Table 5.1: Population, Area and Density in Chennai City and Chennai Metropolitan Area

	Population [21]	**Area** (km^2) [22]	**Gross Population Density** (per km^2) [2]
Chennai city	4.34 million	174	24,682
Chennai Metropolitan Area	7.04 million	1189	5,922

Source: 2001 census [21] (David E. Dowall and Paavo Monkkonen 2007) [20]

5.2.6 Administrative Divisions

The Chennai metropolitan development authority was constituted in 1973 it became a statutory body by Act amendment in 1974 (Tamil Nadu Act 22 of 1974) and notification of the CMA was made in 1975. The first master plan was approved in 1976. [19] The administrative division of the Metropolitan Area is given and illustrated in the table (Refer Table 5.2) and Figure (Refer Fig 5.2) below respectively. There are seven taluks in Chennai metropolitan Area. (Refer Map 5.3).

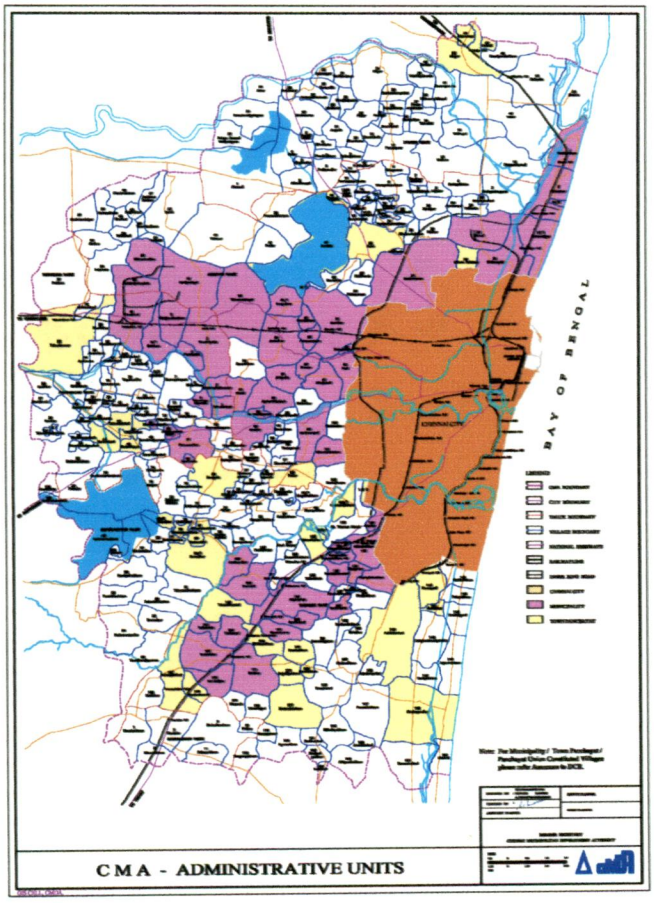


Fig 5.2: Map of Chennai Metropolitan Area Administrative Units

Source: CMDA.

Table 5.2: Administrative Division of Metropolitan Area

Chennai City Corporation (Ccc)	1
Municipalities	16
Special Grade Village Panchayats	20
Villages	214

Source: CMDA.

5.2.7 Transportation

The city is served by both rail and road network.

Road network

The total length of road network in Chennai City is 2780 km. Chennai has radial and ring pattern of road network. Prime radial network comprises

(i) Anna Salai (NH45)

(ii) Periyar EVR Salai (NH4)

(iii) Chennai-Kolkotta Salai (NH5) and

(iv) Chennai-Thiruvallur Salai (NH205).

Other radial roads include Kamarajar salai, East Coast Road, Rajiv Gandhi Salai (OMR), NSK Salai (Arcot Road) and Thiruvottiyur High Road. Orbital road network implemented as per the

First Master Plan comprises Jawaharlal Nehru Road (IRR) and Chennai By-pass Road. The orbital road network has improved the accessibility and reduced the congestion on the radial network particularly Anna Salai and Periyar EVR. Salai. [19] The road and rail network in Chennai city is illustrated in the map. (Refer Map 5.4).

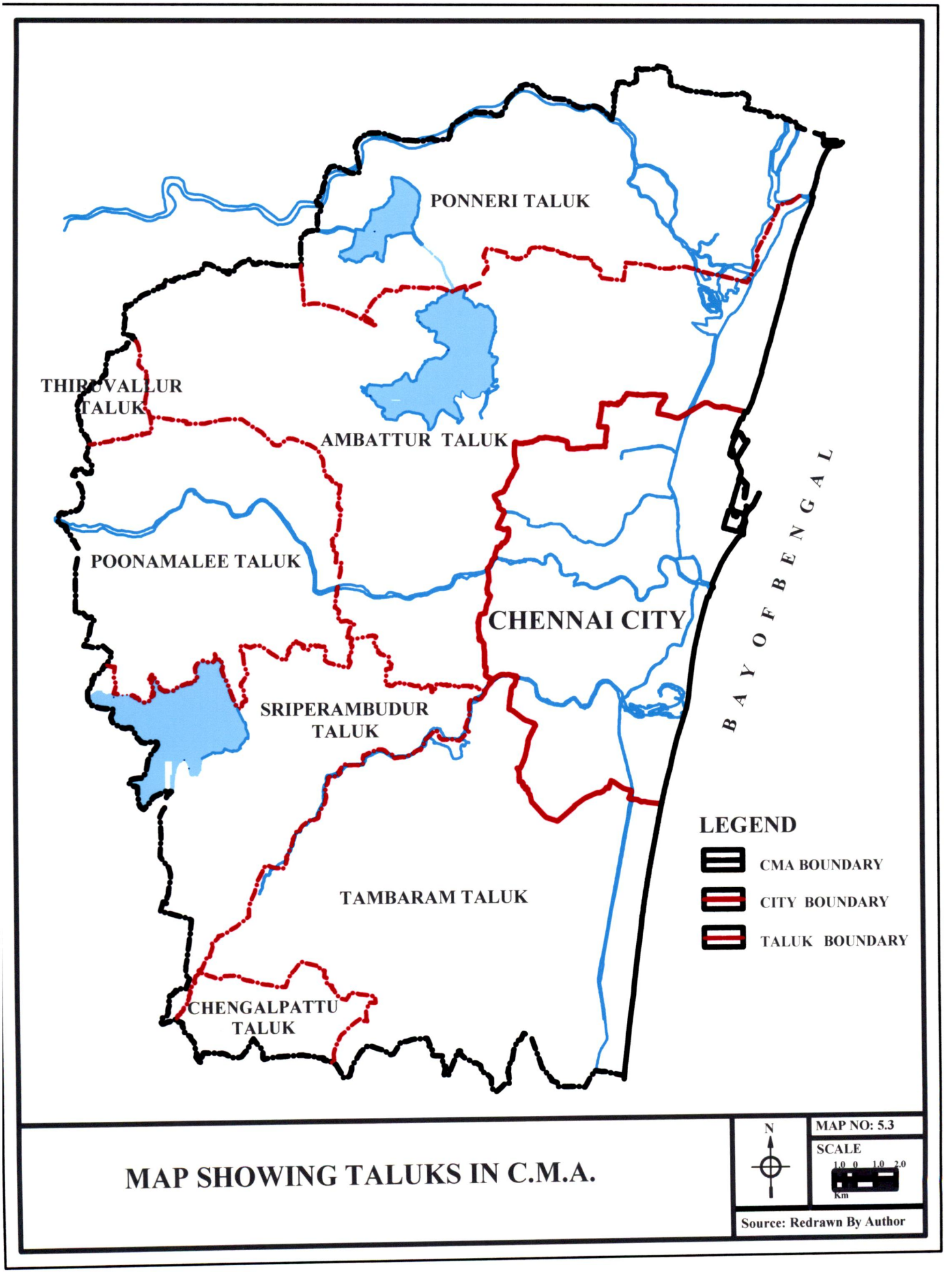
Rail network

There are 3 rail lines with in CMA

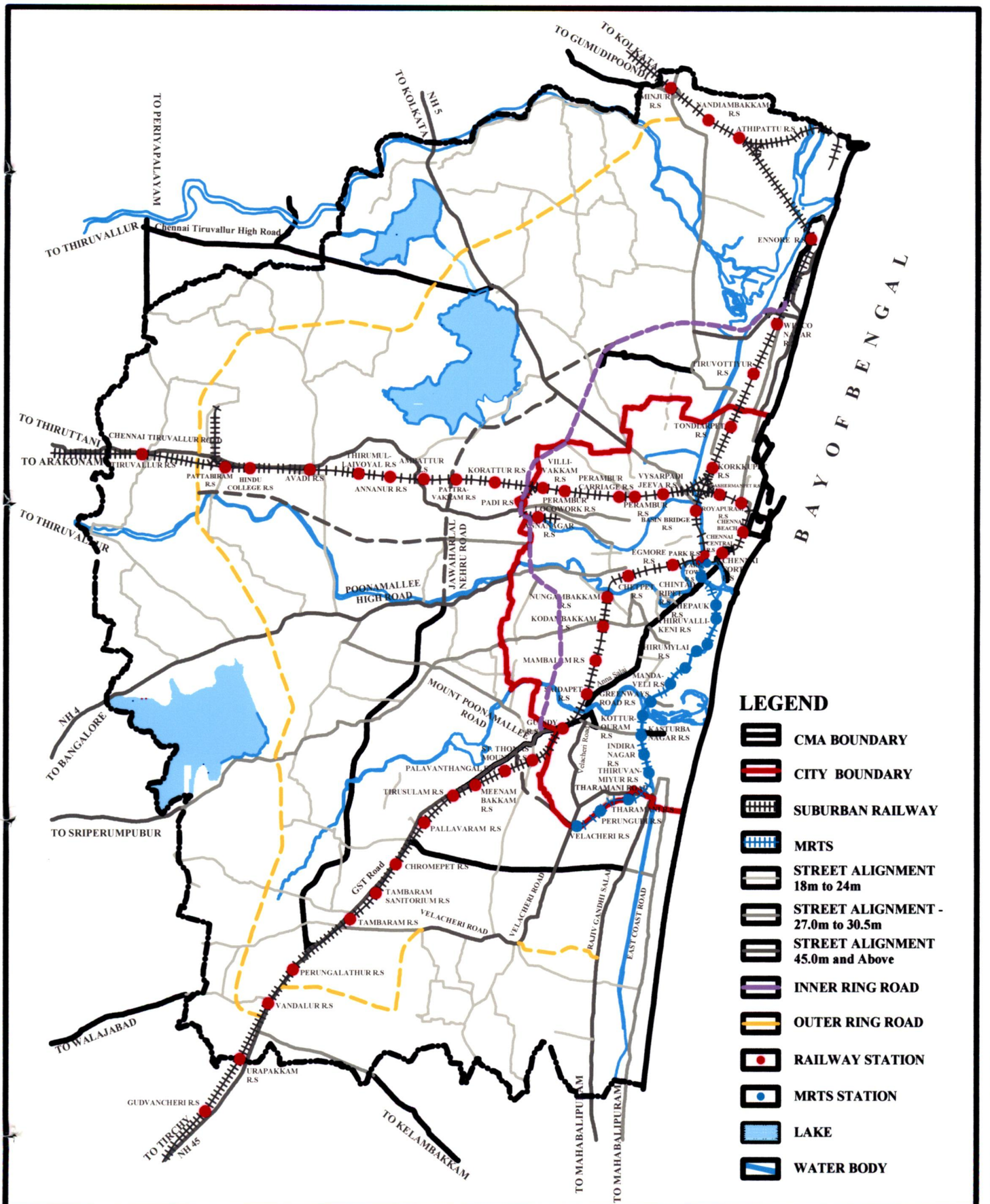
i. Chennai Beach - Tambaram, running south-west

ii. Chennai Central – Thiruvallur, running west and

iii. Chennai Central – Gummidipoondi, running north.



MAP SHOWING TALUKS IN C.M.A.



ROAD AND RAIL NETWORK IN CHENNAI METROPOLITAN AREA

MAP NO: 5.4

SCALE 1 0 0 1 0 2 0 Km

Source: Redrawn By Author

The first 2 lines have dedicated tracks for commuter trips. The 3rd line, however, caters to both suburban and inter-city passenger movement. In addition phase I and phase II of MRTS are currently in operation. [19]

5.2.8 Landuse

The urban development in Chennai city is along the major transportation corridors both along the rail network and road network. The present urban form is due to the result of improved accessibility and due to the development of ring road. The landuse is regulated by zoning and development regulations mentioned in the master plan. The main objective of the second master plan is optimum utilisation of the land by channalising development in the right directions. The other major objective of the second master plan is to integrate land use and transportation. These objectives are not fulfilled effectively. The concept of mix land use is prevalent from the first master plan to make the concept more effective a new zone called urbanisable zone is introduced in the second master plan so that unnecessary freezing of the land is eliminated. To preserve the natural environment non urban use zone is created. The existing land use 2006 and the proposed land use 2026 is given in tables below (Refer Table 5.3 and Table 5.4). It is evident from the proposed land use 2026 table that a new use zone like mixed residential use zone and urbanisable use zone are introduced. The existing landuse 2006 illustrated in the figure (Refer Fig 5.3) and proposed land use 2026 is illustrated in the figure (Refer Fig 5.4). The proposed landuse shows the development along the transportation corridor and the development of land uses on the existing green wedges of the CMA. In ground reality this has not been achieved.

Table 5.3: Existing Land Use 2006

	Chennai City		Rest of CMA	
	Extent in Hectares	%	Extent in Hectares	%
Residential	9523.18	54.25	22876.51	21.87
Commercial	1244.81	7.09	390.04	0.37
Industrial	908.42	5.17	6563.40	6.28
Institutional	3243.39	18.48	3144.35	3.01
Open space & Recreation	366.43	2.09	200.26	0.19
Agricultural	99.29	0.57	12469.65	11.92

Non Urban	82.46	0.47	2433.30	2.33
Others (Vacant, Forest, Hills, Lowlying, Water Bodies etc.,	2086.93	11.89	56506.60	54.03

Source: Second Master Plan for Chennai Metropolitan Area, 2026.

Table 5.4: Proposed Land Use 2026

	Chennai City		**Rest of CMA**	
	Extent in Hectares	**%**	**Extent in Hectares**	**%**
Primary Residential use zone	5916.35	33.58	29705.21	29.32
Mixed Residential use zone	2426.90	13.78	12392.07	12.23
Commercial use zone	714.24	4.05	746.08	0.74
Institutional use zone	2868.97	16.28	3238.50	3.20
Industrial use zone	691.83	3.93	6678.86	6.59
Special and hazardous Industrial use zone	130.67	0.74	3355.09	3.31
Open space & Recreational use zone	1000.65	5.68	416.45	0.41
Non Urban	113.31	0.64	11019.60	10.88
Urbanisable			1882.01	1.8
Others (Roads, water bodies, Hills, Redhills catchments area, forests etc.,	3754.79	21.31	31864.54	31.46
Total	17617.70	100.00	101298.42	100.00

Source: Second Master Plan for Chennai Metropolitan Area, 2026.

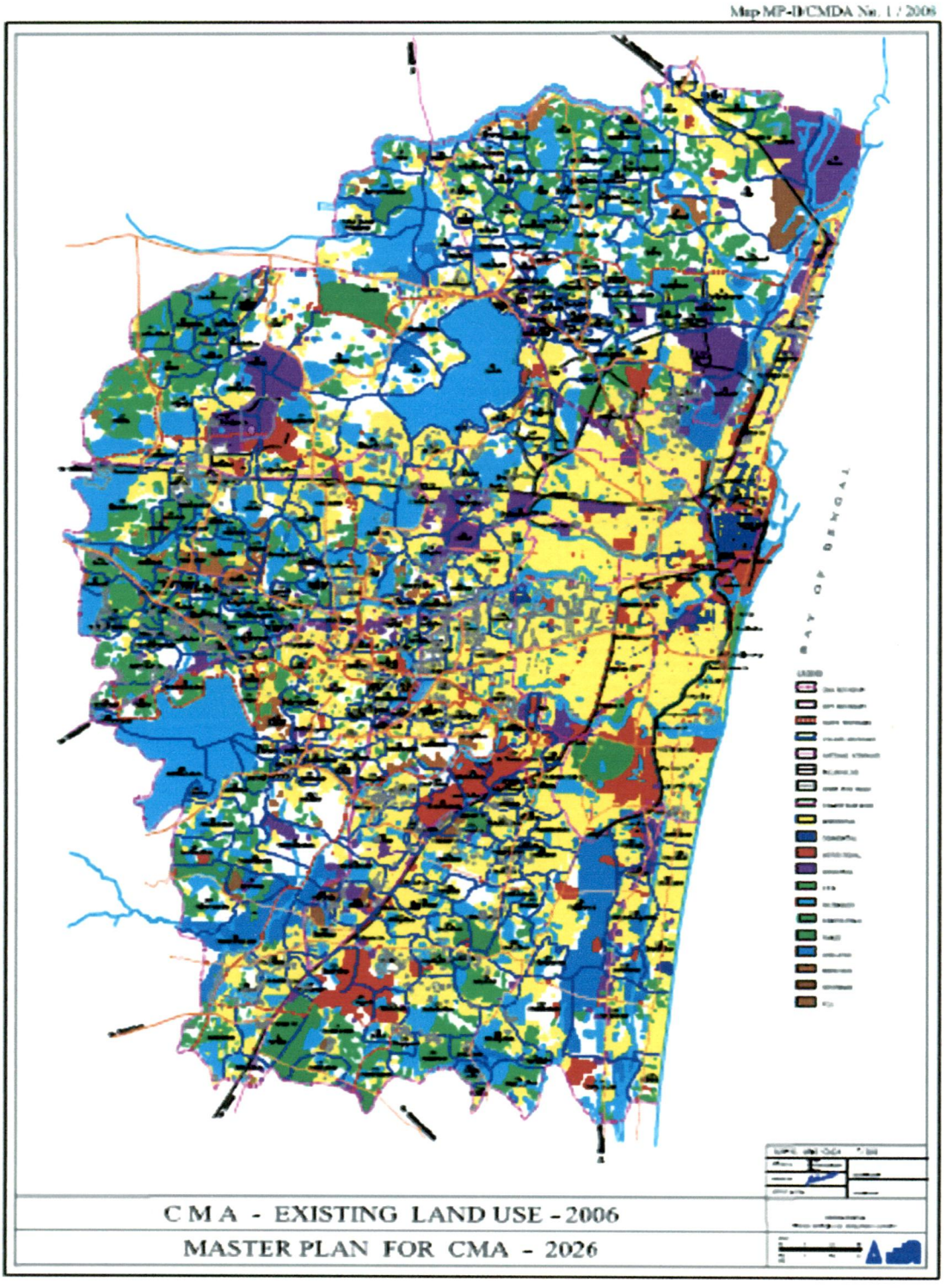


Fig 5.3: Existing Landuse of CMA 2026

Source: Second Master Plan for Chennai Metropolitan Area, 2026.

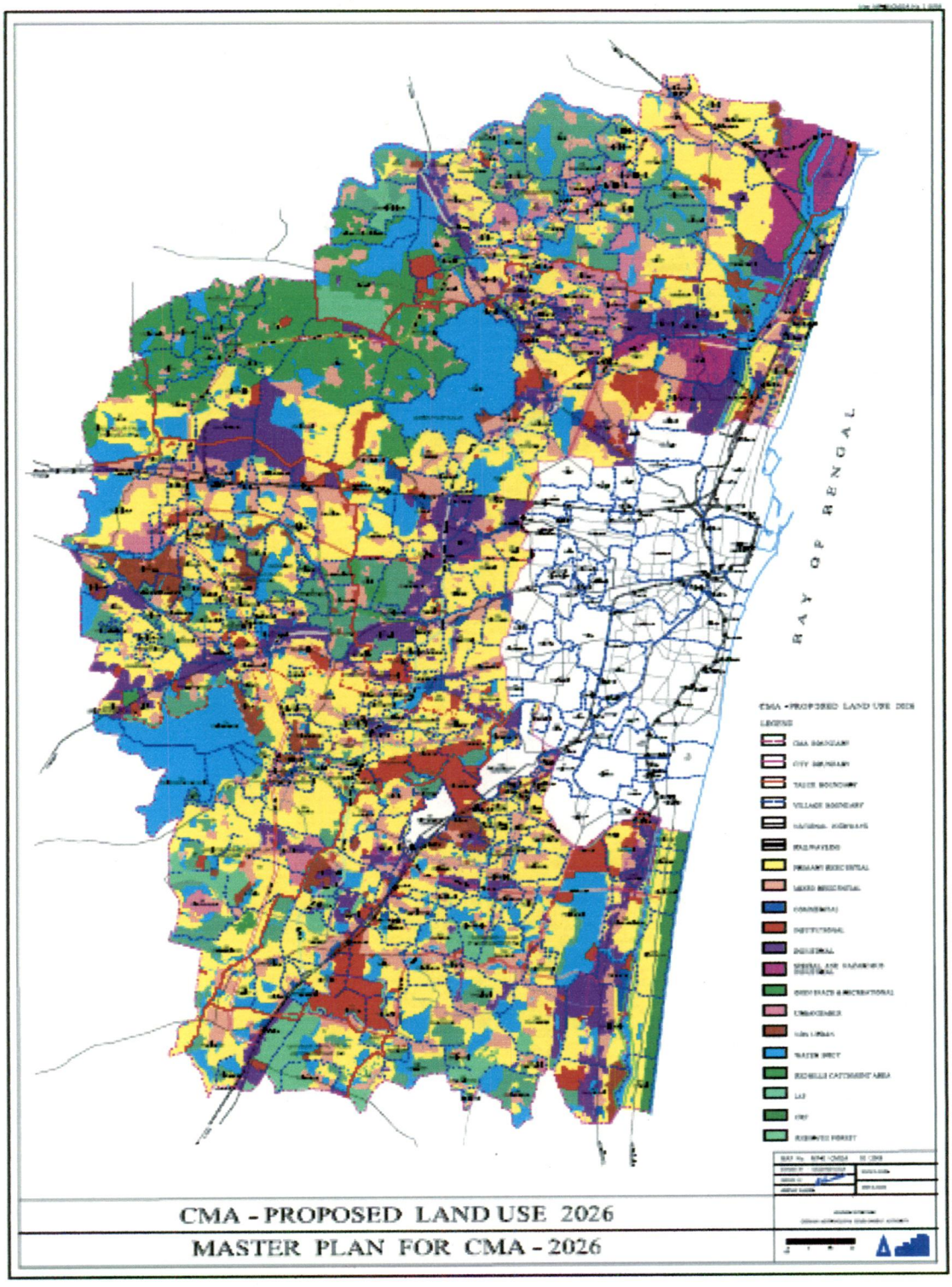


Fig 5.4: Proposed Landuse of CMA 2026

Source: Second Master Plan for Chennai Metropolitan Area, 2026.

5.3 Planning for the Development of Chennai Metropolitan Area

5.3.1 Introduction

Chennai is one of the metropolitan cities of India and like any other metropolis faces the pressure of urbanisation. It faces the crunch of infrastructural inadequacy. The major problem is the water supply and the city faces the problem of shortage of water supply. There is significant hike in the land value and there is a short supply of affordable housing. There is inadequacy in the availability of public transportation system. The solid waste management is also inefficient and inadequate. Flooding during rainy season can be seen in the many parts of the city. There are many other problems faced by the city. To improve the urban situation and to induce development in right direction and for better planning and management of the city many initiatives were taken which are discussed below.

5.3.2 Initial Planned Development

In 1950's land development were carried out through the planning and implementation of the town planning schemes under the Madras Town Planning Act 1920. [23] This was followed by development of major neighbourhoods in 1960's and 1970's in the city by the Tamil Nadu Hosing Board such as Anna Nagar, K.K.Nagar, Indira Nagar, Sastri Nagar etc. [23]

5.3.3 Formation of Madras Metropolitan Development Authority (MMDA)

With the increase in migration to the city and increase in the decadal growth rate by 60% the planners and administrators felt responsible to take necessary initiatives to manage the growth of the city and it's development. The immediate initiatives were the Madras Interim Development Plan and the Madras Metropolitan Plan 71-91. One significant off-shoot of this plan is the creation of Madras Metropolitan Development Authority. [23]

The Madras Metropolitan Development Authority now known as Chennai Metropolitan Development Authority (CMDA) was constituted as an ad-hoc body in 1972 and it became a statutory body in 1974 under the Tamil Nadu Town and Country Planning Act 1971. [24] After its formation the first master plan for Madras Metropolitan Area (MMA) was prepared. The major function of the CMDA is to carry out survey and prepare report for Chennai Metropolitan planning area, to prepare master plan, detailed development plan or a new town development

plan, to prepare existing landuse maps and other maps for preparing development plan. It can entrust or authorise any local body to carry out the work of development plan. [24]

5.3.4 First Master Plan for Chennai City

The First Master Plan was notified in the Government Gazette on 5th August 1975 calling for objections and suggestions and it was approved in 1976. [19] Strategies were proposed in the first master plan for the planned development of the metropolitan area. The strategies were to decongest the city area by development of satellite towns and urban nodes, to decentralise the economic and industrial activities in to the urban node and satellite towns, promote large scale industrialization to create an economic base and to provide employment, optimise the existing infrastructural facilities and to develop road and rail networks.

The population as projected in the master plan for 2001 for the city and CMA tallied with that of census 2001. Out of the three satellite town and six urban node developments was taken up in one satellite town Maraimalainagar and one urban node Manali where the proposed population was not achieved. To decongest the city the whole sale market of perishables was shifted to Koyambedu, the iron and steel market was developed in Sathangadu, the bus terminal from central business district was shifted to Koyambedu and the truck terminal in Madhavaram was completed and truck terminal along GST road and GWT road could not be taken up due to non-availability of land and vicinity to airport. A number of small scale and medium scale industries were developed in areas zoned for industries and industrial estates were developed. Optimisation and electrification of suburban train northern and western corridor was done in the First master plan period. The MRTS project was carried out but it didn't find much patronage due to various problems like poor accessibility, lack of inter-modal transfer facility etc. Major roads were widened during this period and inner ring road was completed. Intermediate ring road was formed. The outer ring road could not be taken up due land acquisition problem. Several projects were carried out for development like the MUDP – I, MUDP – II and TNUDP. The housing was developed by TNHB and serviced plots were provided at affordable costs, improvement of slum areas was done. The strategy of providing water supply of 227 lpcd could not be achieved and the targeted capacity of sewage treatment unit also could not be achieved. Periodic review of landuse zoning has been made and reclassification has been done. Development of unapproved layouts in agricultural area and deviation from development regulations can be seen, the regularisation scheme in 1999 and 2001 could not yield a desirable result. [19]

5.3.5 Initiatives after the First Master Plan Period

The Second Master Plan for Chennai Metropolitan Area – 2011 was submitted by CMDA and had got consent for publication of notice and the government had notified for objection and suggestion from public on 12.07.1995. After considering for objection and suggestion received, the authority had submitted the draft plan for approval of the government on 21.12.1995. In the meanwhile a writ petition was filed in the High court of Madras against the finalisation of the plan. The writ petition was dismissed by Hon'ble High Court in its order dated 10.07.01. Due to the long gap in this process the government directed the CMDA to modify the draft second Master Plan and the updated master plan was submitted to the government in December 2005. The government gave directions to prepare a fresh Second Master plan incorporating further development. The second master plan was prepared keeping the horizon year as 2026. The existing landuse plans were prepared using satellite imageries and remote sensing techniques were used. [36]

5.4 Development trends in Chennai City and Metropolitan Area

5.4.1 Introduction

There is fast pace of development in Chennai city. The new urban development is concentrated in the southern and the western suburb. This development is due to the IT corridor and the new ring road in the west. The metropolitan area is expanding in low density pattern along the periphery. The issue of housing development and affordable housing has been discussed. The recent development of townships is discussed in the later part of the chapter. These new township developments do not cater to the need of affordable housing instead they are more investment oriented and cater to high income group people. Due to time constrain the development along only two fast growing corridors of Chennai city has been studied.

5.4.2 Housing Development

The supply of housing is done by public agencies and by private developers. The public agencies include TNHB and TNSCB. The private developers include the private individuals, real estate developers and builders. The fully serviced site is provided by TNHB. The TNHB was established as a statutory body in 1961 and it undertakes site and service scheme under

MUDP- I and MUDP- II. It implements various social housing schemes for EWS, LIG and MIG. Plots were also developed under TNUDP by TNHB. The site and service scheme was developed in Ambattur, Madhavaram, Avadi, Maduravoyal, Velachery, Maraimalainagar, Tirur and Gummidipondi. The site and service scheme was not developed in city area owing to the high cost of land acquisition except in Arumbakkam, Villivakkam and Kodungaiyur under MUDP-I. The site and service scheme under MUDP- II include the scheme in Mogappair East, Mogappair West, Maduravoyal, Manali I and Manali II. The TNSCB provides housing for slum and pavement dwellers and it carries out many slum improvement programmes. The housing for HIG is taken care of by the private developers. The recent trend is development of integrated townships with all amenities which are developed for HIG income group.

The development of unauthorised subdivisions and layouts were taking place in Chennai Urban agglomeration before the year 2000 till the government took necessary action for curbing the new unauthorised layout development. The unauthorised layout contained substandard roads and no well developed infrastructure like street lighting, water supply, drainage etc. In many cases they were built in low lying areas and are flooded during rainy season.

5.4.3 Driving Force for Development in Chennai

The Tamil Nadu government provides for an investor friendly environment. Tamil Nadu has a booming economy and ranks three among the Indian states attracting domestic and foreign investment. The Driving force for development in Chennai is as follows

- Investor friendly environment in Chennai attracts development.
- Infrastructure development in Chennai is rated among the best than other cities. Chennai has excellent communication infrastructure and ranks first in bandwidth availability of 13.52tbps the largest in India
- Continuous power supply, good sea and air connectivity attracts the investors. Chennai has India's most efficient container port. It has good connectivity by air to Europe, USA, the Gulf and East Asia. Chennai also ranks one in health care facilities.
- There is good social infrastructure and educational facilities and the cost of living is low.

- Number one in skilled manpower availability in India. There are many technical institutions in Chennai and each year a good number of students graduate.
- Chennai has a peaceful labour climate. [26]
- Land availability and Cost effective real estate.
- Good literacy level and English speaking work force.

5.4.4 Industrial Development in Chennai Driving Its Economic Development.

- The Tamil Nadu government had instituted industry specific parks that help to promote products from each industry.
- Chennai has become an automobile manufacturing centre and ranks among the ten global automobile manufacturing centres. Ford motors, Hyundai, Renault –Nissan Daimler and Hero groups have established their base in Chennai.
- Caterpillar USA, Komatsu Japan and Doosan South Korea have chosen Chennai for establishing large earth moving equipment manufacturing plants.
- Sriperumpudur located near Chennai has become India's largest electronics hardware cluster. Nokia has established world's largest mobile handsets manufacturing facility in Sriperumpudur. Motorola and Sony Ericson handsets are also produced in Sriperumpudur. The electronic manufacturing services companies like Foxconn, Flextronics, Jabil and Sanminia SCI have established their facilities in Sriperumpudur. DELL computers, Samsung, Nokia- Siemens, BYD have their plants in Sriperumpudur Cluster. It Is Also An Emerging Hub Of Producing Photo Voltaic Panel.
- The Mahindra world city was promoted in private public partnership it is a self contained industrial park[26]
- The other industrial parks and complexes developed and developing in and around Chennai are SIPCOT - Hyundai-heavy industries, Glass making, 1000 acres of developed land, exclusively for IT industry, at Siruseri 20 kms from Chennai. 1400 acres of land, The Chennai IT Park is exclusively for IT industry and GST Road – The SEZ corridor of Chennai.

5.4.5 Development in Two Major Corridors Chennai

The major development in Chennai is taking place in Old Mahabalipuram Road now known as Rajiv Gandhi Salai and along the GST road. Both the growth corridor consists of major global capital investment.

5.4.5.1 Development in IT Corridor

The IT corridor begins from Madhya Kailash and ends at ECR near Mahabalipuram. There are two phase of development of IT corridor. The first phase being the 20.1 km between Madhya Kailash temple junctions (Refer Map 5.5) to Siruseri and the 2.1km long ECR link road connecting IT corridor at Sholinganallur and east coast road at Kudumiyandithoppu is also included in the phase I. The phase II development will be from Siruseri to Mahabalipuram. The current development of buildings in Siruseri is shown in the figure below (Refer Fig 5.6). The map shows OMR corridor with the location of township, hospitals, institutions offices and other buildings and development occurring in this corridor. (Refer Map 5.5)

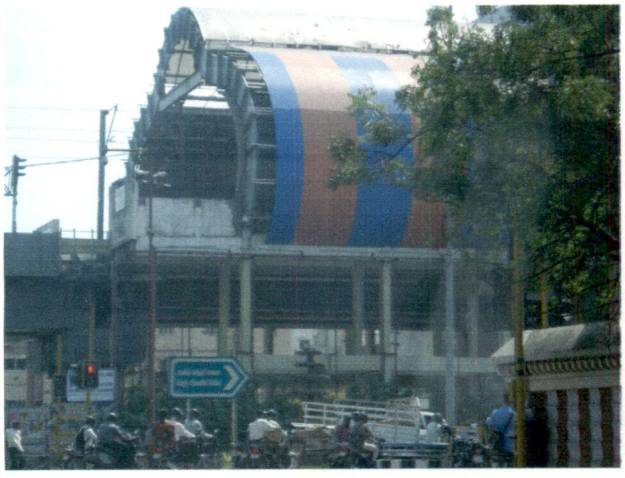


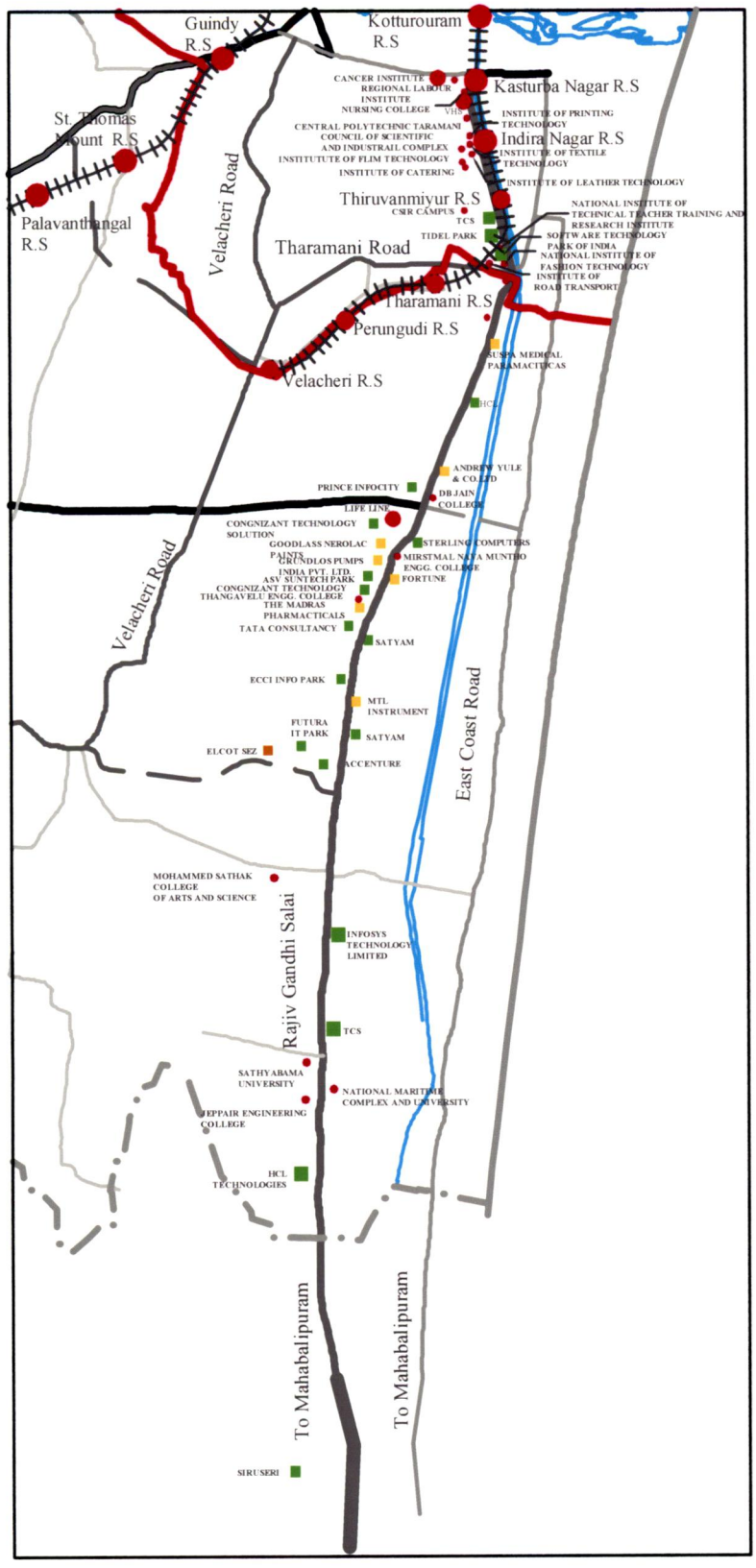
Fig 5.5: Entry to Rajiv Gandhi Salai at Madhya Kailash Junction. Kasturibai Nagar Metro Station.

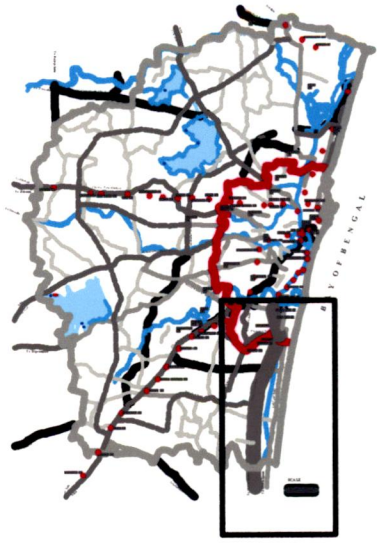
Photo credit: Author

Fig 5.6: Development in Siruseri

Photo credit: Author

The whole stretch is landscaped and has foot over bridges. The road section is designed as dual three lane carriageway with median. The roads section also has a service road, pedestrian foot paths, and dedicated lane for non motorised vehicles (Refer Fig 5.7).Good landscaping is done with planters strip and sculptures (Refer Fig 5.8). There are foot over bridges to cross the





KEY PLAN

LEGEND

- CMA BOUNDARY
- CITY BOUNDARY
- RAILWAY LINE
- STREET ALIGNMENT - 18m to 24m
- STREET ALIGNMENT - 27.0m to 30.5m
- STREET ALIGNMENT - 45.0m and Above
- RAILWAY STATION
- LAKE
- WATER BODY
- INSTITUTIONAL
- INFORMATION TECHNOLOGY
- OTHER OFFICES/ / INDUSTRIES
- TOWNSHIPS
- HOSPITALS

DEVELOPMENT ALONG OMR CORRIDOR

N

MAP NO: 5.5

SCALE
1.0 0 1.0 2.0
Km

Source: Drawn By Author

road (Refer Fig 5.9). The MRTS stations and bus stands are made accessible through foot paths. Service trenches and ducts for utility lines are provided and the water and sewer lines will be conveyed under the foot path.

Fig 5.7: A View of the Rajiv Gandhi Salai at Thiruvanmiyur Junction and the Chennai MRTS.

Source : http://en.wikipedia.org/wiki/Old_Mahabalipuram_Road

Fig 5.8: A View of the Rajiv Gandhi Salai Showing the Planter Strip and the Carriage Way

Photo credit: Author

Fig 5.9: A View of the Rajiv Gandhi Salai Showing the Foot Over Bridge.

Photo credit: Author

The Rajiv Gandhi Salai is also known as IT corridor as it houses many IT firms. The Tidel park houses many IT and ITES companies .The companies like TCS, HCL, Sathyam, Wipro ,Infosys ,Accenture ,Cognizant technology solution, Photon Infotech etc are present. The corridor stretches form Tidel Park in Tharamani to SIPCOT IT Park in Siruseri. SIPCOT has

developed a cyber city over 8Km^2.The figures below show the development of multi- storied office complexes in the corridor. (Refer Fig 5.10 to 5.17)

Fig 5.10: Tidel Park at Rajiv Gandhi Salai

Photo credit: Author

Fig 5.11: HCL Located in Rajiv Gandhi Salai

Photo credit: Author

Fig 5.12: IT Complex Located in Rajiv Gandhi Salai

Photo credit: Author

Fig 5.13: Cognizance Located in Rajiv Gandhi Salai

Photo credit: Author

Fig 5.14: 3i Infotech Located in Rajiv Gandhi Salai

Photo credit: Author

Fig 5.15: TATA Consultancy Offices Located in Rajiv Gandhi Salai

Photo credit: Author

Fig 5.16: Infosys Located in Rajiv Gandhi

Photo credit: Author

Fig 5.17: Vestas Located in Rajiv

Photo credit: Author

There are many institutions also in this stretch like the National Institute Of Technical Teachers Training And Research, National Institute of Fashion Technology, Sathyabhama Deemed University, St. Joseph College of Engineering, SSN College of Engineering, Jeppiaar Engineering College and St. Marys School of Managemental Studies and National maritime university in Sholinganallur. The figures below show the development of institutions and campuses in the corridor. (Refer Fig 5.18 and Fig 5.19)

Fig 5.18: National Institute of Technical Teachers Training and Research

Photo credit: Author

Fig 5.19: National Institute of Fashion Technology

Photo credit: Author

The real estate development in this area is high and the prices have been raised more than 40 to 50 %. Large number of residential apartments is being developed in this area. Some of the developers carrying out projects in this area are L&T constructions, DLF, RMZ, Arihant ,Doshi, Jain housing and constructions ,Hiranandani etc. Large scale construction work is being carried out in Siruseri. (Refer Fig 5.20 to 5.23)

Fig 5.20: Construction Work in SIPCOT, Siruseri

Photo credit: Author

Fig 5.21: Office Complex SIPCOT, Siruseri

Photo credit: Author

Fig 5.22: Development of IT Buildings in SIPCOT, Siruseri

Photo credit: Author

Fig 5.23: Construction Work in SIPCOT, Siruseri

Photo credit: Author

5.4.5.2 Development along GST Road

The development along GST road is taking place at a high pace. The development along this corridor is occurring due to good rail and road connectivity and proximity to airport. The

suburban train route runs parallel to the GST road. (Refer Fig 5.24). The view of GST road is shown in the figure below. (Refer Fig 5.25)

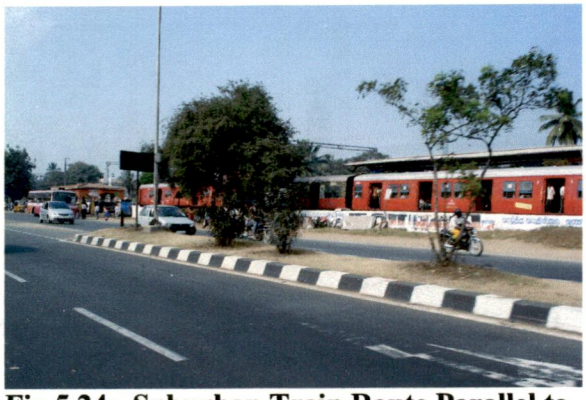


Fig 5.24: Suburban Train Route Parallel to GST Road

Photo credit: Author

Fig 5.25: GST Road

Photo credit: Author

The area has witnessed huge amount of construction activity from the year 2006. It is being developed as SEZ corridor. Apart from the advantage of connectivity huge amount of land is available for development. The roads are developed with service lanes where required. Unlike the OMR road the GST road already has infrastructure in place. MEPZ houses several export units and in Maraimalai Nagar there are many industrial units. The map illustrates the development along GST corridor. (Refer Map 5.6)

Ford, Visteon and other auto component units have set their base in Maraimalai nagar. Other industries in Maraimalainagar are AUDCO India limited, Tamilnadu Steel tubes limited, UCAL Fuel Systems Limited, Unity Forge, Midas Rubber Limited, International components India limited, SPEL semiconductors limited. The industrial development in Maraimalainagar is illustrated in the figure below. (Refer Fig 5.26)

Fig 5.26: Industries and Manufacturing Units in Maraimalai Nagar

Photo credit: Author

Fig 5.27: Shriram the Gateway Special Economic Zone.

Photo credit: Author

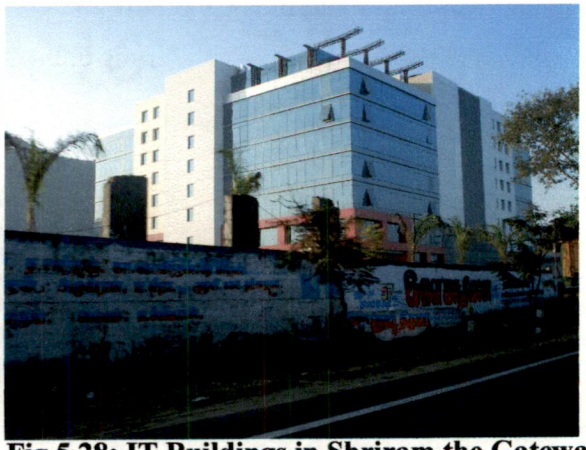


Fig 5.28: IT Buildings in Shriram the Gateway Special Economic Zone.

Photo credit: Author

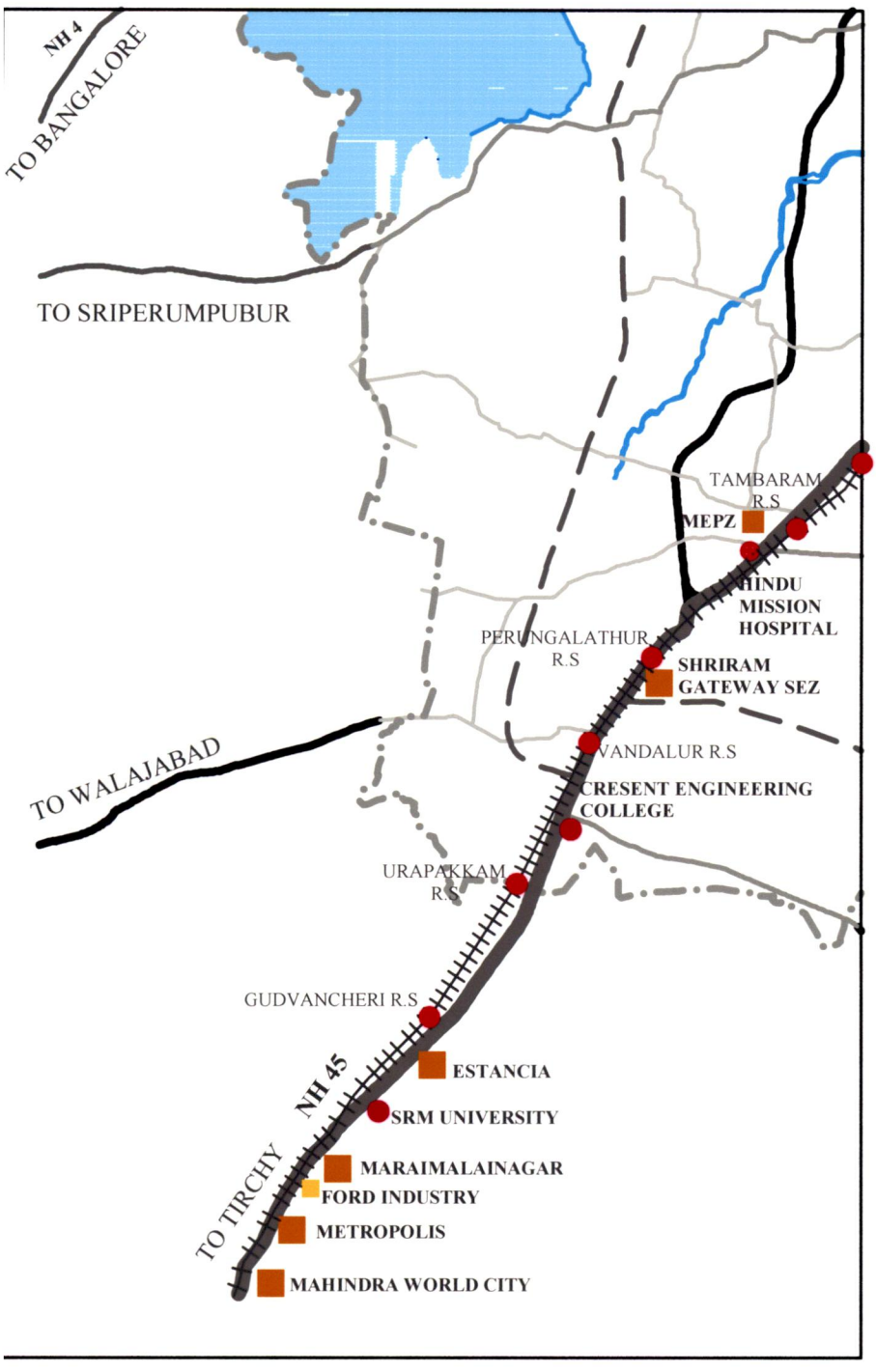
Along the GST corridor there is development of SEZ. The Mahindra global city, Shriram Gateway (Refer Fig 5.27 and Fig 5.28) and L & T ARUN Excello are the SEZ developing along the corridor. Estancia is an integrated township with IT SEZ (Refer Fig 5.29) .Infosys has set up its largest development centre in Mahindra SEZ. The GST stretch is being developed as IT and manufacturing hubs and there are large scale residential projects coming up in GST road like the metropolis developed by Akshya homes has 436 units over an area of 10.36 acres. The residential township Estancia will house 2000 units (Refer Fig 5.29). The Hallmark construction is going to launch a project with 2000 units on the GST road. The on going Residential project by South India Shelters Pvt. will have 261 apartments on a land area of 4.34 acres. (Refer Fig 5.30). High rise residential development along GST road can be seen.

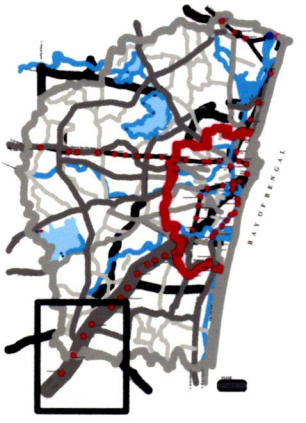
Fig 5.29: Estancia Integrated Township

Photo credit: Author

Fig 5.30: Residential Project by South India Shelters Pvt.

Photo credit: Author





KEY PLAN

LEGEND

- CMA BOUNDARY
- CITY BOUNDARY
- RAILWAY LINE
- STREET ALIGNMENT 18m to 24m
- STREET ALIGNMENT 27.0m to 30.5m
- STREET ALIGNMENT 45.0m and Above
- RAILWAY STATION
- LAKE
- WATER BODY
- INSTITUTIONAL
- INFORMATION TECHNOLOGY
- OTHER OFFICES / INDUSTRIES
- TOWNSHIPS / SEZ
- HOSPITALS

DEVELOPMENT ALONG GST CORRIDOR

N

MAP NO: 5.6

SCALE
1.0 0 1.0
Km

Source: Drawn By Author

There are well established education facilities along GST road like SRM University (Refer Fig 5.31 and Fig 5.32) and the Cresent engineering college. There is a Zoo in Vandalur.

Fig 5.31: SRM University

Photo credit: Author

Fig 5.32: Residential Complex Developed Along GST Road

Photo credit: Author

5.4.6 Inferences

The development along both the corridor has an economic base. Both the corridor has good connectivity to the city. The development along Rajiv Gandi Salai is more IT oriented and along GST road is SEZ oriented. In all the development occurring the housing component should be considered and development of housing for the employees should be made mandatory for large scale development. The development like Estancia and Mahindra city should be encouraged to create a walk to live, work, play and shop environment but options of affordable housing should be worked out. Schools should also be located with in the town ship. In case of type of development occurring in Rajiv Gandhi Salai the public transportation should be strengthened so that the use of private individual mode of transport is reduced and congestion and air pollution on road is reduced.

5.5 Second Master Plan

The second master plan for Chennai Metropolitan Area is for the period from 2006-2026. The vision of the second master plan is to make Chennai a prime metropolis which will be more liveable, economically vibrant and environmentally sustainable and with better assets for future generation. [19] The goals, objectives and strategies are developed for each aspect like housing, transportation, infrastructure, land use etc to achieve the vision.

5.6 Evaluation of the Second Master Plan of Chennai Based on Smart Growth Principles.

5.6.1 Introduction

The evaluation of Second Master Plan of Chennai based on smart growth principles is done to know to what extent the master plan has incorporated smart growth approach to development.

5.6.2 Methodology

The evaluation is carried out by literature review of the master plan. The matrix for evaluation is prepared by referring smart growth audit [27] and municipal plan assessment [28]. The parameters for evaluation are based on the ten smart growth principles and are evaluated as 'excellent' with score 5 , 'To a great extent' with score 4, 'To a good extent' with score 3 , 'Satisfactory' with score 2 , 'Negligible extent' with score 1 and 'No mention at all' with score 0. The total score for evaluation is 200 and if the range of evaluated score is between 150 to 200 then the master plan has smart growth approach to development, if the evaluated score is between 100 to 150 then the master plan has some aspects of smart growth development and if the evaluated score is between 0-100 then it is not focussed on smart growth approach to development. The overall level of adherence is evaluated on the following basis.

Up to 40 – Negligible

Up to 80 – Marginal

Up to 120 - Good

Up to 160- Very Good

180 and above – Excellent

5.6.3 Evaluation Based On Smart Growth Principles

Principle 1: Create a range of housing opportunities and choice

The Chennai master plan evaluates the current gap between the households and housing units in the city and the houseless population, slums and pavement dwellers. The master plan also evaluates the structural characteristics of the existing housing stock. Chennai being a

coastal city the existing housing of fishermen in various parts of the city is discussed. Earlier the TNHB carried out land development and housing construction for higher income and middle income group but with the changing trends in the construction market and real estate the master plan lays emphasis on the provision of adequate land at affordable cost through public sector to EWS. The private sector is involved only in the provision of housing for high income and middle income group. The major stakeholders for providing housing to the EWS are the TNHB and TNSCB in public sector and in private sector are the builders and the individuals. The housing demand has been projected for various income groups till 2026. The Special requirement of housing for fishermen has also been projected till 2025.

The policies and strategies of housing in the master plan lay emphasis on the provision of built dwelling units or affordable serviced sites for LIG and EWS by public or private sector. In case of apartment blocks or neighbourhood development of area covering more than 1 hectare 10 % of the land area has to be reserved for the development of LIG /EWS housing with in the site or in the site with in 2 km from the existing site. The policies and strategies stress on provision of housing in proximity to employment centres and the shelter program to integrate with infrastructure facilities, health, education, livelihood opportunity ,skill training and micro finance.

The other housing strategies suggest the housing action plan to include the demands for various target group of housing like working women's hostel student hostels, employees housing by employers, single person dwellings and night shelters. Incentives are provided for the development of self contained townships with all infrastructural facilities. The Area Development Strategies does not encourage the development on agricultural land and environmentally unsuitable land.

From the master plan it is clear that the need for developing housing for EWS and LIG needs more priority when compared to other income group. Though the higher income and middle income housing are catered by private developers the rate per square feet is very high thus making it unaffordable. The master plan lacks policy regarding the mix of housing types and housing prices. The master plan also lacks policy for the provision of affordable housing. No incentives are provided for private developers for developing low income and affordable housing instead if a residential development exceeds 1 hectares area than 10 percent of the sites are should be reserved for lower income group or a site with in 2km radius should be provided.

Principle 2: Create a walkable neighbourhood

The master plan emphasises on the creation of foot paths in residential and commercial area. There is no emphasis on the development of pedestrian amenities. The residential area to have minimum of 1.5 m foot path and commercial area to have 3m footpath. There are legal ordinance for evicting encroachments. One of the strategies is to redeem the encroached foot paths. Providing exclusive stretches for pedestrians and cyclist. Though there is no policy for retrofitting of side walks in the Master plan. The master plan has no mention for the provision of incentives for creating a development which is walkable. The master plan also doesn't illustrate any model for walkable neighbourhood. The master plan mentions to encourage new industrial development to provide housing with in the premises, the list of projects has a mention for the provision of escalators and elevated walkways.

Principle 3: Encourage community and stakeholders collaboration

The master plan proposes to evolve its own set of indicators so that the stakeholders can assemble information and make it available to all so as to improve the public awareness in the city development and improvement. After the draft master plan was prepared public consultation was done to get suggestion on the draft master plan from the public. This was notified through newspapers. The master plan does not mention how community has been involved during planning process and it has no provision describing the collaboration of stakeholders and community

Principle 4: Foster distinctive, attractive communities with a strong sense of place

The master plan does not emphasise on the architectural style of the area but the DCR mentions that the architectural features of the building must be in conformity with the permission granted by the authority. The DCR provides guide lines for preservation and conservation of heritage building. The development regulations have provision for reservation of land for recreational purpose in any new development for a development of above 10,000 m^2 it is obligatory to provide 10 percent of the area for development excluding recreational uses. In the layouts, which are more than 10000 m^2 10 per cent of layout area excluding roads, additionally, shall be reserved for Public Purpose.

Principle 5: Make development decisions predictable, fair and cost- effective

The master plan mentions the various agencies involved in the development but doesn't give any policies or guidelines for the coordination of these agencies. The development

regulations and byelaws are made available in the form of booklet and is also available in the website of the development authority. The master plans give the financial detail for the projects to be implemented. It gives the investment plan for various utilities lie water supply, sewerage, stromwater drain, solid waste management and transport. It gives investment plan for annual plan, medium term plan and long term plan

Principle 6: Mix land use

The master plan has various land use zones out of which mixed residential use zone is one. The DCR provides for permissible uses and permissible use with special sanctions in the mixed residential zone. The mixed residential use zone can have residences, commercial establishment, institutional and industrial uses as mentioned in the regulations. The master plan mentions the MRTS influence area and specifies the regulation of allowable FSI of 2 for non residential multi-storeyed buildings. In primary residential use zone if special building of residential development exceeding 100 dwelling units is done than commercial and institutional uses not exceeding 10 per cent of the floor area of the building at lower habitable floor levels is permitted.

Principle 7: Preserve open space, farmland, natural beauty and critical environmental areas

The master plan contains map for ecologically sensitive area but not for farm lands. It also has map showing the water bodies in CMA. The master plan identifies the environmentally sensitive area for conservation and protection. The plan mentions development of greenery, planting of trees and protecting the existing green resource. The plan provides to strengthen the community based environment improvement project with in the local body area. The plan has regulations for the development in coastal zone. There are regulations for development in aquifers recharge area. The policies do not provide incentives for developers who preserve more open space during development.

Principle 8: Provide variety of transportation

The master plan discusses about the existing conditions and characteristics of the road network and railway network of the city. The master plan evaluates the growth of vehicle population on the road and the existing modal preferences by the commuters. The travel characteristic has been studied and it has been observed that there has been a decline in use of public transport, cycle and IPT. The traffic characteristic has been evaluated. The issue of goods

transport has also been discussed. The master plan has projections for travel demand. The projection has been worked out in such a way that the modal share of public transport has been increased and the rail transport share has been increased thus giving importance to public transport and fast and comfortable mode of transport. The master plan strategies emphasise on greater accessibility and mobility to the commuters. The master plan has strategies for integrating land use and transportation .One of the strategy is to densify development along the transit corridor but it does not mention what type of development and what type of densities has to be adopted.

The master plan recognises the modal share of pedestrians and bicyclist and there is a mention for provision of 1.5m foot path in residential area and 3m foot path in commercial area. The strategies emphasise on developing subways for safe passage of pedestrians and cyclist. Though there is no policy for retrofitting of side walks in the Master plan. The List of Medium – Term Transportation Schemes mentions the development of foot path on the three major roads Arcot Salai, Poonamalle road and Kundrathur road. The master plan has strategies for optimising the road and rail network to increase the accessibility and mobility. The issue of parking has been discussed with the demand and supply of parking in commercial area but it doesn't give a detail overview for Chennai city.

Strategies have been evolved in the master plan for developing parking control to reduce congestion on road. The strategies emphasise on off street parking norms, park and ride facilities, multilevel parking , enforcing accommodation of visitors vehicles with in the flats and provision of parking by commercial establishment so that they don't occupy the road for parking , and introduction of the concept of community parking. The master plan emphasis on the role of para transit. The master plan emphasises on the travel demand management like staggering of school and office opening timings, encourage car and van pooling , encourage new industrial development to provide housing with in the premises, encourage tele-shopping , deploying of congestion charges etc.

Principle 9: Strengthen and direct development towards existing communities

The master plan has no strategies to direct development towards existing communities. There are no provisions in the master plan to promote redevelopment of brown field and grey field or to promote infill developments. There is a provision of premium FSI in which FSI is allowed above the normal FSI for which the developer has to pay extra charges to the authority.

Principle 10: Take advantage of compact building design

The development regulation promotes more of sprawl development. It permits development with low FSI. The DCR has special regulations for developing multi-storey development. The planning parameters show that they encourage medium to low rise development.

- Planning parameters for Ordinary Residential Buildings and other small developments allow for only G+1 floor development or stilt +2 floor subject to a height of 9 m ,the maximum FSI Permitted is 1.5 and ground coverage of 75% and 70% respectively. Planning parameters for Ordinary Commercial Buildings and other small developments is the same as above except the ground coverage in CMA is 65%. Planning parameters for Cottage industries, Green industries and Orange industries upto 30 H.P allows for a Maximum FSI of 1.00 in Continuous Building Area any where within CMA, 1.25 Chennai city, Municipal & Town Panchayat area and 1.5 in Rest of CMA .Maximum Plot Coverage of 75% is permitted.

- Planning parameters for Green industries, and Orange industries (other than Special and Hazardous industries) up to 200 HP permissible in industrial use zone allows for a Maximum FSI of 1.00 in Continuous Building Area any where within CMA, 1.25 Chennai city, Municipal & Town Panchayat area and 1.25 (if the road width is more than 9.0m, FSI upto 1.50 can be permitted) in Rest of CMA. Maximum Plot Coverage of 75% is permitted. Planning parameters for Industries exceeding 200 H.P. (other than the industries listed under Special and Hazardous Industries) allows for a Maximum FSI of 1.25 in Chennai city, Municipal & Town Panchayat area and Rest of CMA. Maximum Plot coverage of 75% is permitted.
- Planning parameters for Special and Hazardous Industries (Red Industries) allows for a Maximum FSI of 1 in both Chennai city, Municipal & in Town Panchayat area and 1.25 Rest of CMA. Maximum Plot coverage of 75% is permitted.

- Planning parameters for Institutional buildings allows for Maximum FSI of 1.5 in Continuous Building Area any where within CMA, Chennai city, Municipal & Town Panchayat area and Rest of CMA .Maximum and Plot Coverage is 50%, 40% and 33% is permitted respectively.

- Planning parameters for Religious buildings with floor area less than 300 sq.m. and height not exceeding G+1 floors allows for a maximum FSI of 0.75 and ground coverage 75 % is permitted in all the areas.

- Planning parameters for Transport Terminals such as Bus Terminals, Bus stands, Railway stations, Truck terminals, and container terminals allows for a maximum FSI of 1 and ground coverage 75 % is permitted in all the areas.

- Planning parameters for special building with height of G+2 or Stilt+3 subject to a max. of 12m or G+1 or Stilt+2 subject to a max. of 9m G+2 or Stilt+3 subject to a max. of 12m or G+3 or Stilt+4 subject to a max. of 15.25m allows for a FSI of 1.5

- Planning parameters for multi-storey building permit for FSI of 1.5 to 2.5 and ground coverage from 30% to 50%.

5.6.4 Matrix for Evaluation of Chennai Master Plan

The evaluation of Second Master Plan of Chennai based on smart growth principles is done in the matrix below. (Refer Table 5.5)

Table 5.5: Matrix for Evaluation of Chennai Master Plan

Parameter for Evaluation	Evaluation					
	Excellent (5)	To a great extent (4)	To a good extent (3)	Satisfactory (2)	Negligible extent (1)	No mention at all (0)
Principle 1 : Create a range of housing opportunities and choices						
1. Does the master plan assess the existing housing needs and demands of all income groups?	✓					
2. Does the master plan have future projection of housing needs of all income groups?	✓					
3. Does the master plan include plans for meeting the future housing needs of all income groups?				✓		
4. Does the master plan discuss the issues of housing affordability?				✓		
5. Does the master plan support policy for a mix of housing types and housing prices?						✓

6. Does the master plan have provision for providing incentives for the development which contain housing for EWS?						✓
Score out of 30	14					
Principle 2: Create a walkable neighbourhood						
1. Does the master plan emphasize on creation of pedestrian pathways and pedestrian amenities?		✓				
2. Does the master plan emphasise on "Walk to Live Work and Play" model of development?				✓		
3. Is there some provision for providing incentives for the development of walkable neighbourhood?						✓
4. Does the master plan illustrate any model for walkable neighbourhood?						✓
5. Does the master plan emphasize on the provision of schools and other social						

amenities with in walkable distance?						✓
Score out of 25	6					
Principle 3: Encourage community and stakeholders collaboration						
1. Does the master plan mention how community has been involved during planning process?						✓
2. Does the master plan have any provision describing the collaboration of stakeholders and community?						✓
Score out of 10	0					
Principle 4: Foster distinctive ,attractive communities with a strong sense of place						
1. Does the master plan encourage the promotion of particular architectural style in an area?						✓

2. Does the master plan support the preservation conservation of historic buildings and area?		✓				
3. Does it have regulations to prevent the unaesthetic development in specific area?						✓
4. Do the policies in the master plan encourage the development of public spaces in the new development?			✓			
Score out of 20	7					
Principle 5: Make development decisions predictable ,fair and cost- effective						
1. Does the master plan provide policies and guidelines for development authority to coordinate with other agencies which provide utility?						✓
2. Are the development regulations and bylaws made available to developers and the public?	✓					

3. Does the master plan provide financial details for the provision of utility?		✓				
Score out of 15	9					
Principle 6: Mix land use						
1. Does the master plan permit mix landuse?		✓				
2. Does the master plan have a appropriate regulation for mix landuse?	✓					
3. Does the master plan favour TOD?				✓		
Score out of 15	10					
Principle 7: Preserve open space, farmland, natural beauty and critical environmental Areas						
1. Does the plan include maps containing ecologically sensitive area and farmlands?		✓				

2. Does the plan provide policies for preserving ecologically sensitive area and farmlands?		✓				
3. Does the plan have policies for providing incentives for developers who preserve more open space during development?						✓
4. Does the plan contain strict measures to prevent development near water bodies and wetland?				✓		
5. Does the by laws provide for adequate buffer around wetlands, ecologically sensitive area and farmlands?						✓
Score out of 25	10					
Principle 8: Provide variety of transportation						
1. Does the master plan evaluate the present and travel demand for various modes of transport?		✓				

2. Does the policy in master plan encourage multimodal transportation system?	✓					
3. Does the master plan provide strategies for development of public transportation system?	✓					
4. Does the master plan support policies for compulsory development of sidewalks and bicycle paths in new development?			✓			
5. Does the master plan talk about the hierarchy of street network with respect to development?						✓
6. Does the master plan support policies for retrofitting sidewalks in existing development?						✓
Score out of 30	17					
Principle 9: Strengthen and direct development towards existing communities						
1. Does the master plan promote infill development?						✓

2. Does the master plan promote redevelopment of brown field and grey fields?						✓
3. Is there provision for increasing the existing densities?				✓		
4. Does the master plan indicate priority development area?						✓
Score out of 20	2					
Principle 10: Take advantage of compact building design						
1. Does the master plan promote high rise development?				✓		
2. Are some incentives provided for developing compact development?						✓
Score out of 10	2					
Total Score out of 200	**77**					
The over all level of adherence	**Marginal**					

From the above evaluation the score comes to about 77 out of 200, thus it is clear that the master plan is not focussed on smart growth approach to development.

5.7 Development of Private Township in Chennai

5.7.1 Introduction

The study has been made on four private townships and one residential development in Chennai out of which two township development are integrated town ship with SEZ. The location of the township is shown in the map (Refer Map 5.7). Analysis of each township is made on the parameters like accessibility, density housing range and choices, pedestrian environment, walkability, recreational and green spaces and amenities. Then a comparative analysis is made for all township based on the smart growth principle. The township taken for study are Estancia integrated township, Mahindra world city, DLF garden city, Chennai Pattinam and Metropolis residential development.

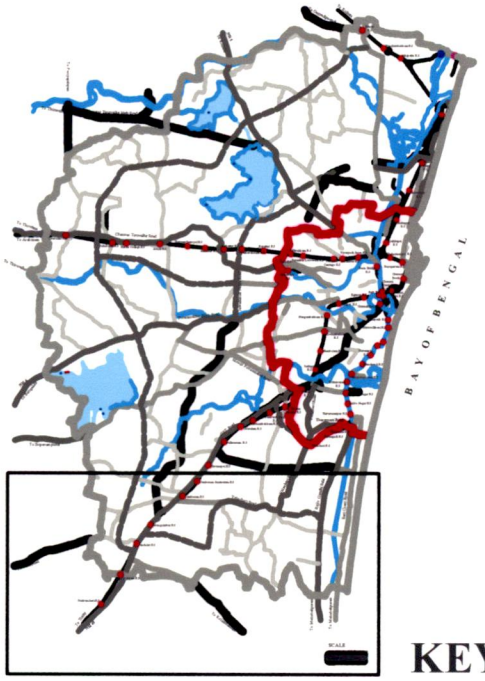
Estancia integrated township with SEZ provides for walk to live, work, play and shop kind of development. There is not much range of housing choices and they do not cater to all income group. The housing is apartment type housing. In terms of affordability the housing units are not affordable to any other income group except high income group. The pedestrian amenities will be well developed. It has good accessibility to the city by public transportation.

Mahindra world city is also a township with SEZ. The SEZ consists of IT, apparel and automotive units. Here to all the amenities are located with in the site. It has good accessibility with in as well as outside the site. Accessibility by public transportation is encouraged by the Railway station located near by. The land uses are planned in such a way that the residential, commercial, recreational and institutional use are in proximity .Housing variety is provided with different type of housing units like individual bungalows, semidetached housing units and apartment blocks.

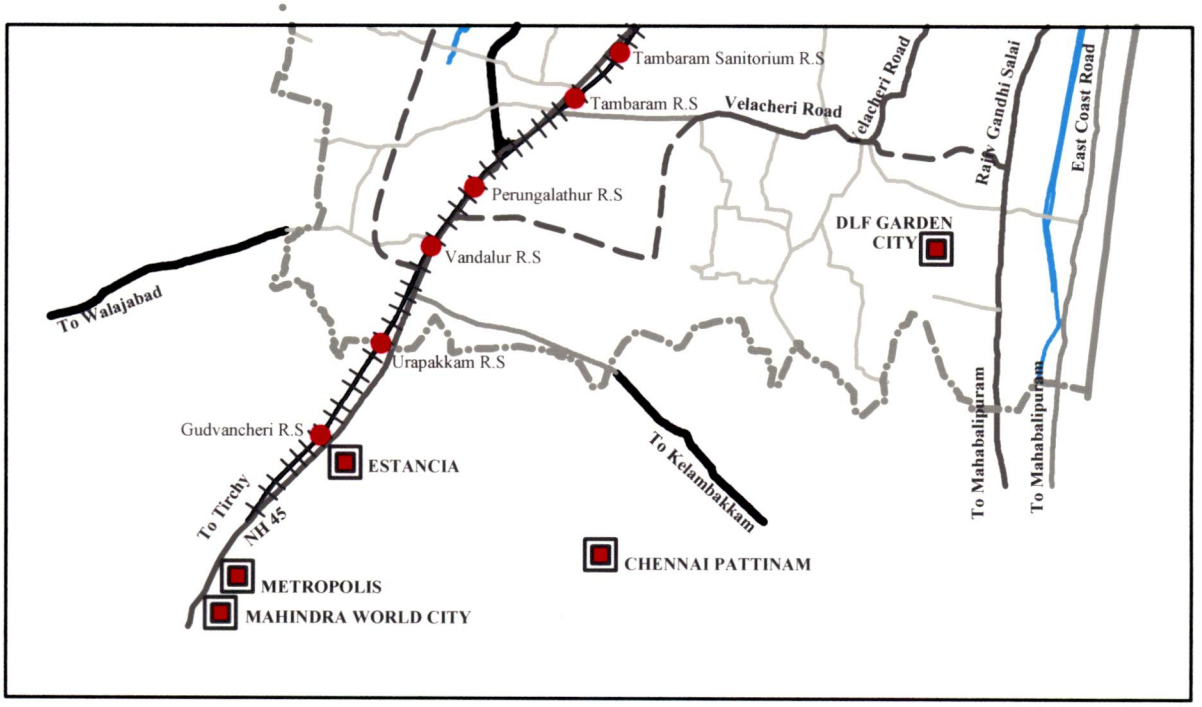
DLF garden city is more a residential township with other amenities. In this project the mix of use can be seen with in a building. The housing variety and choice is limited and the choice is only in the size of the unit. Good pedestrian amenities will be developed and segregation of vehicular and pedestrian movement is done by provision of pedestrian path way connecting the buildings. In terms of accessibility by public transportation is difficult to the site. For work people need to commute outside the township. All other amenities like shopping malls, health care facilities and schools are provided with in the site.

Chennai Pattinam is a residential township with school and other amenities. Compared to the other projects the cost of the housing units are less and ranges from Rs.23, 11,250 to Rs.48, 37,500. The range of housing choices is limited only to the housing choices and not the type of housing. The accessibility to the site by public transportation at present is difficult. The township will have shuttle bus services. Recreation and other amenities are taken care off and the school is with in walkable distance.

Metropolis is a complete residential development. The accessibility to the site is good. People have to commute out for work. The housing cost ranges up to Rs. 80, 00,000. The range of housing choice is limited only to the size and not to the housing type. The housing units are not affordable to all income groups of people. For school and health care facilities people have to travel out.



KEY PLAN



MAP SHOWING LOCATION OF TOWNSHIPS

MAP NO: 5.7

SCALE 1.0 0 1.0 2.0 Km

Source: Drawn By Author

5.7.2 Study of Townships

Project name	Location	Type	Total land area	FSI	No. of floors	No. of Housing unit	No. of blocks	Rate per sq.ft.
ESTANCIA	Along GST Road (NH45)	IT SEZ Integrated township	82 acres	1.5	17	2000	17	3,950 to 4450

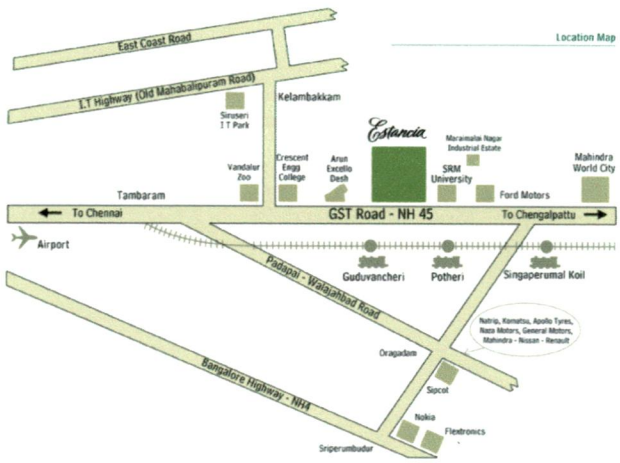


Fig 5.33: Location of Estancia

Source: http://www.arunexcello.com/estancia_location.html

Fig 5.34: Master Plan of Estancia Township

Source : http://www.arunexcello.com/estancia_siteplan.html

Other Details, Analysis and Remark

- Developers and consultants

  Promoters: Larsen & Toubro Limited and Arun Excello Infrastructure Pvt Ltd.

  Architects and planners : RMJM of UK

  Landscape : Strata

- Elements of township (Refer Fig 5.34)

  1. Residential
  2. School
  3. IT SEZ
  4. Club house
  5. Retail mall
  6. Serviced apartment
  7. Hotel

Landuse	Area (acres)
IT Special Economic Zone (SEZ)	29
Residential	37
Commercial	11
School	3
Others	2

The IT SEZ will consist of 3.04 M sq.ft of office space. The total built up area will be spread over eight blocks, each ranging from 2,83,000 sq.ft to 4,68,000 sq.ft. The residential area will consist of Residential Gated Township with over 2000 apartments. The commercial use will consist of Commercial and retail development with a Hotel Service apartment and a Mall cum Multiplex. The school will be run by Vidya Mandir and is located with in walking distance. Estancia would house the largest retail complex in the city with 50 nos. of life style, branded shops and 60 nos. of day to day need shops. The shopping mall will consist of 4 multiplex with 150 seating It would house business class hotel with 200 rooms by Holiday Inn and service apartments with 75 units to serve the requirements of IT SEZ. [30] The figures below illustrate the views of the township and its elements as they will be developed. (Refer Fig 5.35 to Fig 5.38)

Fig 5.35: Aerial View of the Estancia Township

Source: http://www.arunexcello.com/elevation3.html

Fig 5.36: View of IT SEZ.

Source: http://www.arunexcello.com/elevation3.html

Fig 5.37: View of School.

Source: http://www.arunexcello.com/elevation13.html

Fig 5.38: View of Club House.

Source: http://www.arunexcello.com/elevation14.html

Other Details, Analysis and Remark

- Accessibility to the site

  The site is abutting NH -45. The railway line is parallel to the NH-45. (Refer Fig 5.33) There is Suburban train and frequent bus service. The nearest railway station for suburban train is 1.5 km Tambaram railway station and bus terminus is located at a distance of 18 km. The airport is located at a distance of 25km .It is located in the fastest growing suburb of Chennai .The Maraimalai nagar industrial township, Ford motors and Mahindra world city is located near by.

- Density

  Population to be accommodated 50,000. The density is 610 per acre.

- Housing range and choices

  The housing doesn't cater to all income group of people. Even the middle class families cannot afford to buy the housing units. The housing is developed for the professionals working in the IT SEZ. The range of housing choice is limited to flats of various sizes.

- Pedestrian friendly environment and walkability with in site

  The site is well landscaped and pedestrian amenities are created. The landuse like school recreational area and work place are provided within walkable distance. The township has been developed on the basis of walk to live work and play model. The residential, recreational school and offices are all interconnected by good landscape. There are informal places for socialising. Provision for bicycle path way are also provided.

- Recreational and green spaces

  70 % of the area is reserved for greenery .The building foot print will be only 30%. The site is surrounded by lakes and hills. The site will be completely landscaped. Vandalur zoo is located at a distance of 7 .km from the site .Jogging tracks are present. Dance school, gym and club house facility are present with in the site and are located at a walkable distance.

Other Details, Analysis and Remark

- Amenities

The township provides for employment, residence ,education with in the site thus the need for commuting to work education and home is completely eliminated. SRM university is located at a distance of 1Km and Cresent Enginnering College is located 6.5 km from the township thus providing opportunity for higher studies near by. This town ship is a self contained township thus reducing the need for travel for work, education, recreation and shopping.

Remarks

The town ship is located in a favourable site with access to public transportation system. The housing units are sold to outsiders also ie to people not working in the SEZ. This will lead to commuting of people from the township to the work place thus increasing the traffic on road. The township does not cater to the housing requirement of all income group. The township doesn't address the issue of housing shortage instead they are investor oriented. The approach of town ship development is not focussed on smart growth approach to development. Only very few aspects of smart growth approach to development can be seen in this development.

Project name	Location	Type	Total land area	FSI	No. of floors	No. of Housing unit	No. of blocks	Rate per sq.ft.
MAHINDRA WORLD CITY [31]	Along GST Road (NH45)	Integrated business city	1400 acres	1.5	(details not available)			3350

Fig 5.39: Location of Mahindra City

Source : http://www.mahindraworldcity.com/doc/Mwc_Brochure_Prepress_19_DEC_2007.pdf

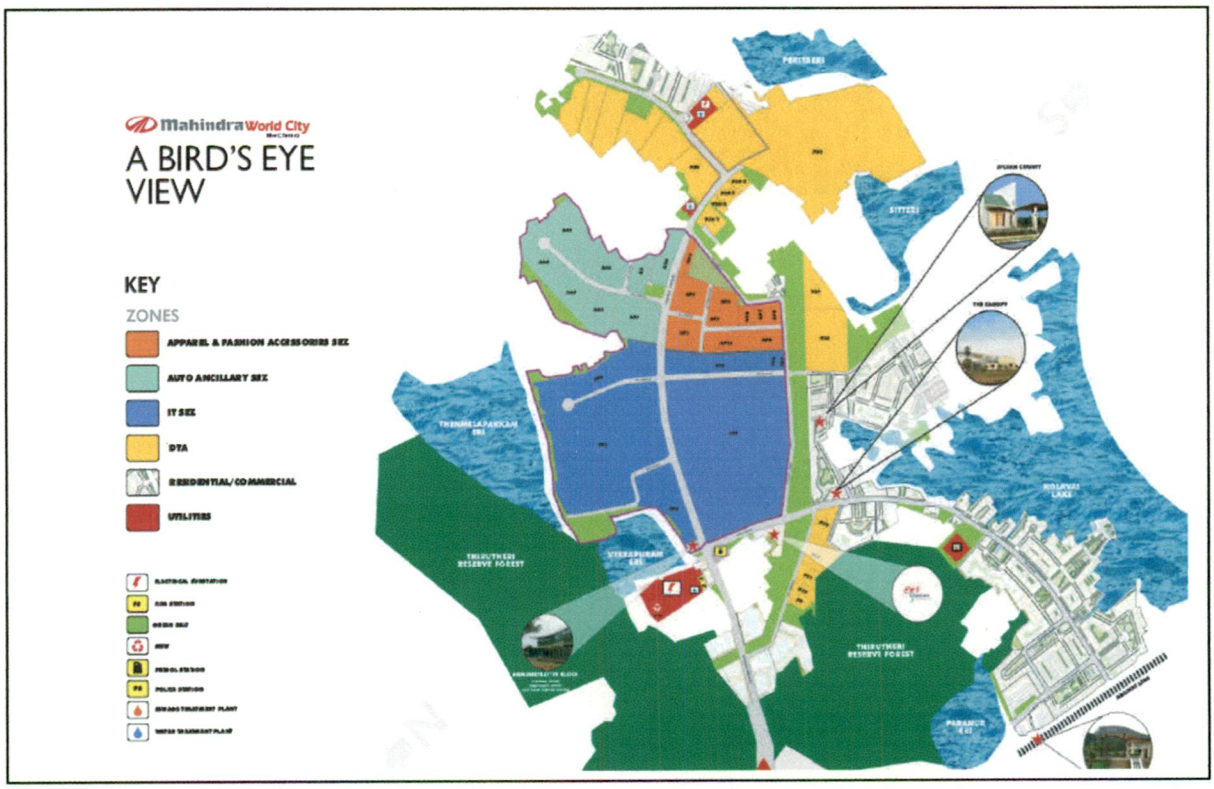


Fig 5.40: Master Plan of Estancia Township

Source : http://www.mahindraworldcity.com/doc/Mwc_Brochure_Prepress_19_DEC_2007.pdf

Other Details, Analysis and Remark

- Developers and Promoters

  Jointly promoted by Mahindra group and TIDCO. It is done by public private Partnership.

  Master Planner : Jurong Consultants

  Landscape consultant : Belt Collins

- Elements of township

  1. Buisiness Zone
  2. Life style Zone

The Business Zone is divided into a Domestic Tariff Area (DTA) and three sector specific Special Economic Zones for IT (Services & Manufacturing), Auto Ancillaries and Apparel and Fashion Accessories. The life style zone consists of sylvan county, the canopy and the school. (Refer Fig 5.40)

- Accessibility to the site

The site is abutting NH -45. The railway line is parallel to the NH-45. (Refer Fig 5.39) The site has its own railway station. (Refer Fig 5.44)Tambaram railway station and bus terminus is located at a distance of 22km . The airport can be reached with in 30 minutes. It is located in the fastest growing suburb of Chennai .The Maraimalai nagar industrial town ship, Ford motors located near by.

- Density (details not available)

- Housing range and choices

  The sylvan county is spread over an area of 22 acres. It offers a range of low density options. (Refer Fig 5.41 and Fig 5.42). Independent bungalows, semidetached houses and a available. (Refer Fig 5.45 and Fig 5.46).The housing does not cater to all income group people. It bungalow type house cover an area of 2.25 ground and the house size ranges from 3733 sq.ft. (4 bedroom) to 2795 sq.ft. (3- bedroom). The semidetached houses are built on 1.32 ground of land with an area built up are of 2,374 sq.ft. The apartment buildings are low rise apartment complex of four storey height.

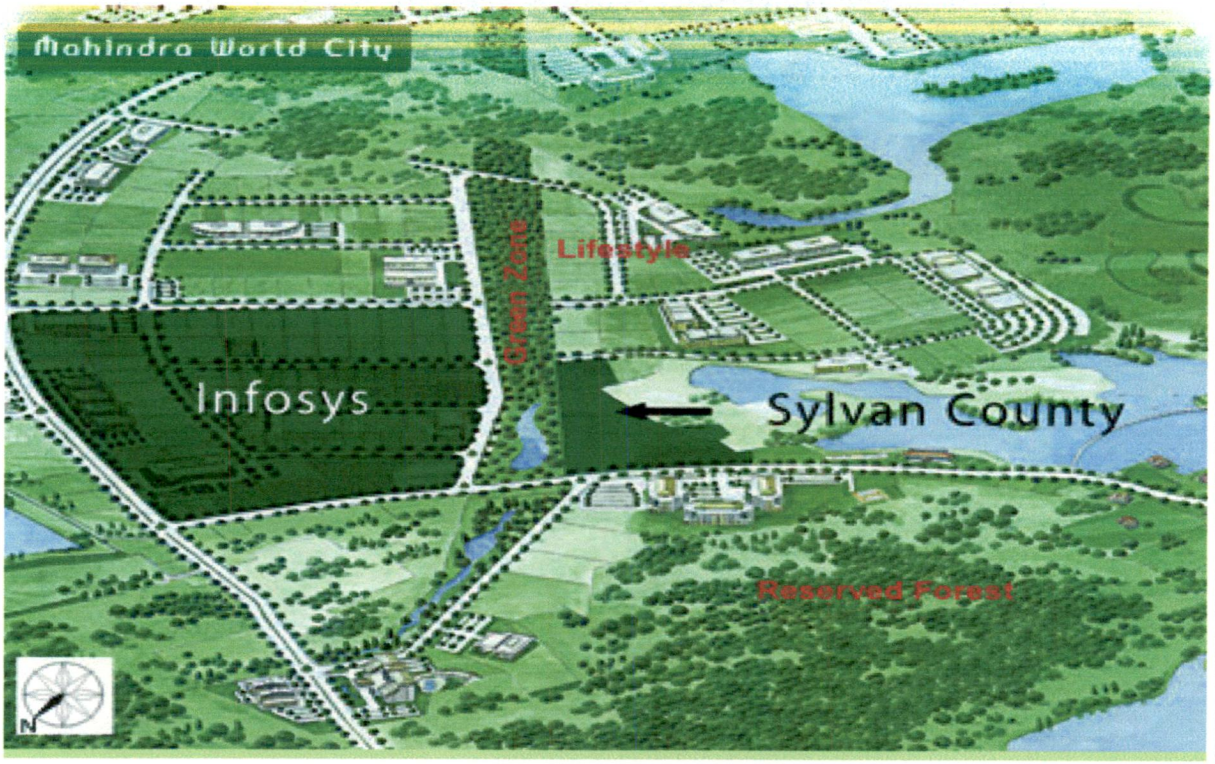


Fig 5.41: Location of Sylvan County and Infosys Complex

Source: http://www.arunexcello.com/elevation3.html

Fig 5.42: Sylvan County

Source: http://www.arunexcello.com/elevation3.html

Fig 5.43: Central Avenue

Source: http://www.mahindraworldcity.com/image display.aspx?ID=6

Fig 5.44: Paranur Railway Station

Source: http://www.mahindraworldcity.com/imagedisplay.aspx?ID=12

Fig 5.45: Sylvan County

Source: http://www.mahindraworldcity.com/imagedisplay.aspx?ID=16

Fig 5.46: Semi Independent Houses

Source: http://www.mahindraworldcity.com/imagedisplay.aspx?ID=17

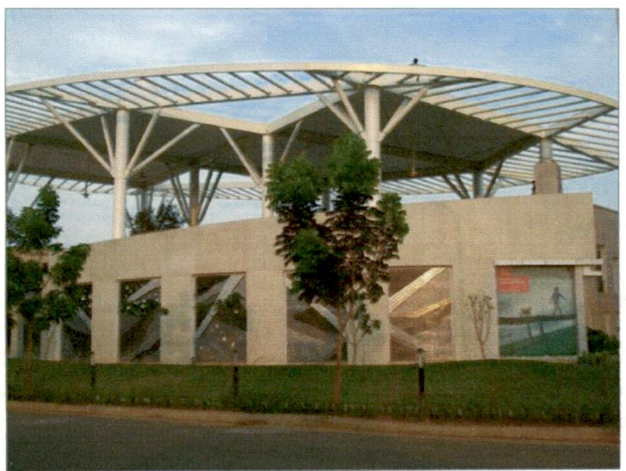


Fig 5.47: Canopy

Source: http://www.mahindraworldcity.com/imagedisplay.aspx?ID=19

Fig 5.48: Infosys

Source:http://www.mahindraworldcity.com/imagedisplay.aspx?ID=7

Other Details, Analysis and Remark

The apartment buildings are low rise apartment complex of four storey height. 300 plus acre is allocated for residential use. Low density development with 6000 plus families will be accommodated. The land cost per ground is about Rs. 18, 00,000. the total cost of housing units ranges from 1.4 crores to 1.7 crores including land and amenities

- Pedestrian friendly environment and walkability with in the site .The site is well landscaped and pedestrian amenities are created. (Refer Fig 5.43). The landuse like school area, commercial complex, railway station, bank, medical centre, departmental store are provided within walkable distance. The residential and other uses are all interconnected by good landscape. There are informal places for socialising. The town ship is developed with work, live, learn and play environment.
- Recreational and green spaces

  The site is surrounded by hills, lakes and reserve forest. The site is landscaped with avenue of trees.
- Amenities

The township provides for employment, residence ,education with in the site thus the need for commuting to work education and home is completely eliminated. Mahindra world school is spread over 5 acre of land with a built up of 1,00,000 sq.ft. the canopy (Refer Fig 5.47) is the commercial complex spread across an area of 60,000 sq.ft. It has health centres, hospitals, banks, super markets, recreational spaces etc. There will also be business hotels with 200 rooms by Mahindra holiday inn and resort. SRM university is located near by the township thus providing opportunity for higher studies near by.
This town ship is a self contained township thus reducing the need for travel for work, education, recreation and shop.

Remarks

The town ship is located in a favourable site with access to public transportation system. This township also doesn't address the issue of housing shortage instead they are investor oriented. The development is a low density development. Only very few aspects of smart growth approach to development is addressed in this development.

Other Details, Analysis and Remark

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Remarks

The town ship is located in a favourable site with access to public transportation system. This township also doesn't address the issue of housing shortage instead they are investor oriented. The development is a low density development. Only very few aspects of smart growth approach to development is addressed in this development.

Project name	Location	Type	Total land area	FSI	No. of floors	No. of Housing unit	No. of blocks	Rate per sq.ft.
DLF GARDEN CITY [32]	OMR	Residential town ship	53.5 acres	2.5	Stilt + 19	3493	6	3200

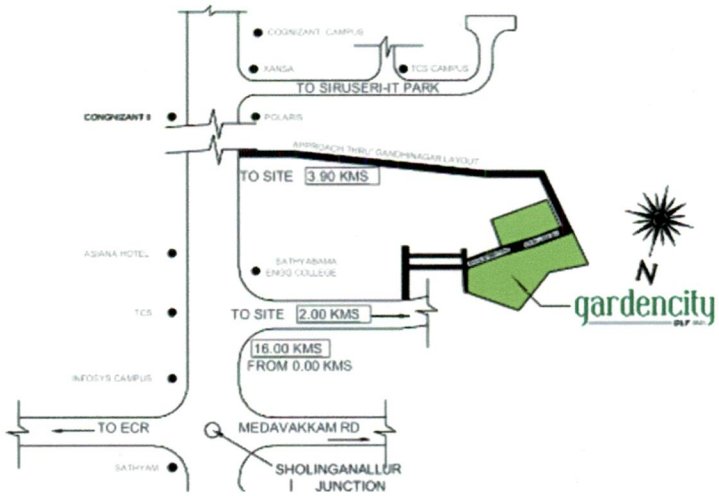

Fig 5.49: Location of DLF Garden City

Source: http://www.dlf.in/dlf/wcm/connect/da2a5b804c5941d39896fa550cdb51fe/dlf_chennai_location_map_big.jpg?MOD=AJPERES

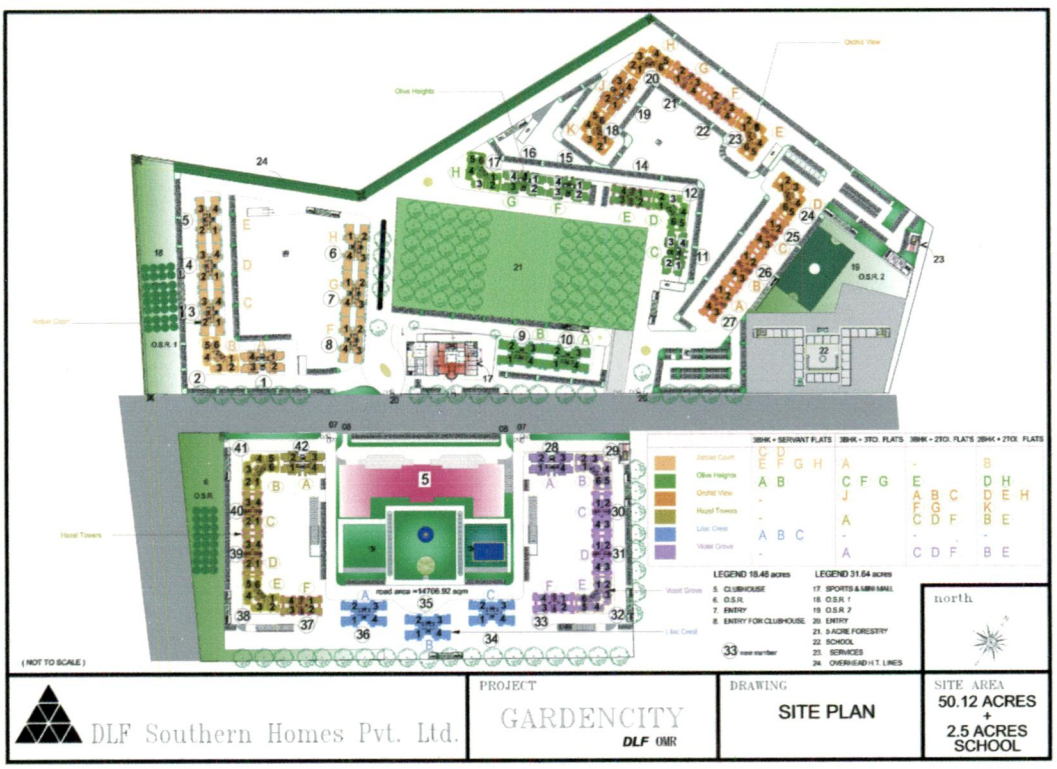

Fig 5.50: Site Plan

Source: http://www.dlf.in/dlf/wcm/connect/71aaa1004c59420a98b9fa550cdb51fe/dlf_chennai_sp_big_new.jpg?MOD=AJPERES

Other Details, Analysis and Remark

- Developers

  DLF

- Elements of township (Refer Fig 5.50).

  1. Residential
  2. School
  3. Club house
  4. Retail mall
  5. Hotel

The figure illustrates aerial view of the township. (Refer Fig 5.51).

- Accessibility to the site

The site is abuting the OMR road. (Refer Fig 5.49) The site is 8 km from MRTS station,20 km Airport, 30 kms from Egmore Railway Station and 35 kms from Chennai Central Bus Stand. It is located 15 kms from Tidel Park and 2 kms from Satyabhama University

- Density

  Population to be accommodated 16,000. The density is 299 per acre.

- Housing range and choices

  The housing doesn't cater to all income group of people. The building has mix use. Each tower will house from ground to third floor shopping centre and fourth and fifth floor Health care centre. The rest will be residential with 2BHK to 3BHK flats size ranging from 1170 to 2012 sq.ft.

- Pedestrian friendly environment and walkability with in site the site is well landscaped with pedestrian foot paths and gardens. (Refer Fig 5.52).The school and other amenities are located with in walkable distance. The shopping centre and health centre are located with in the building. Informal gathering spaces are located with in the site. All the blocks are connected by pedestrian path ways.

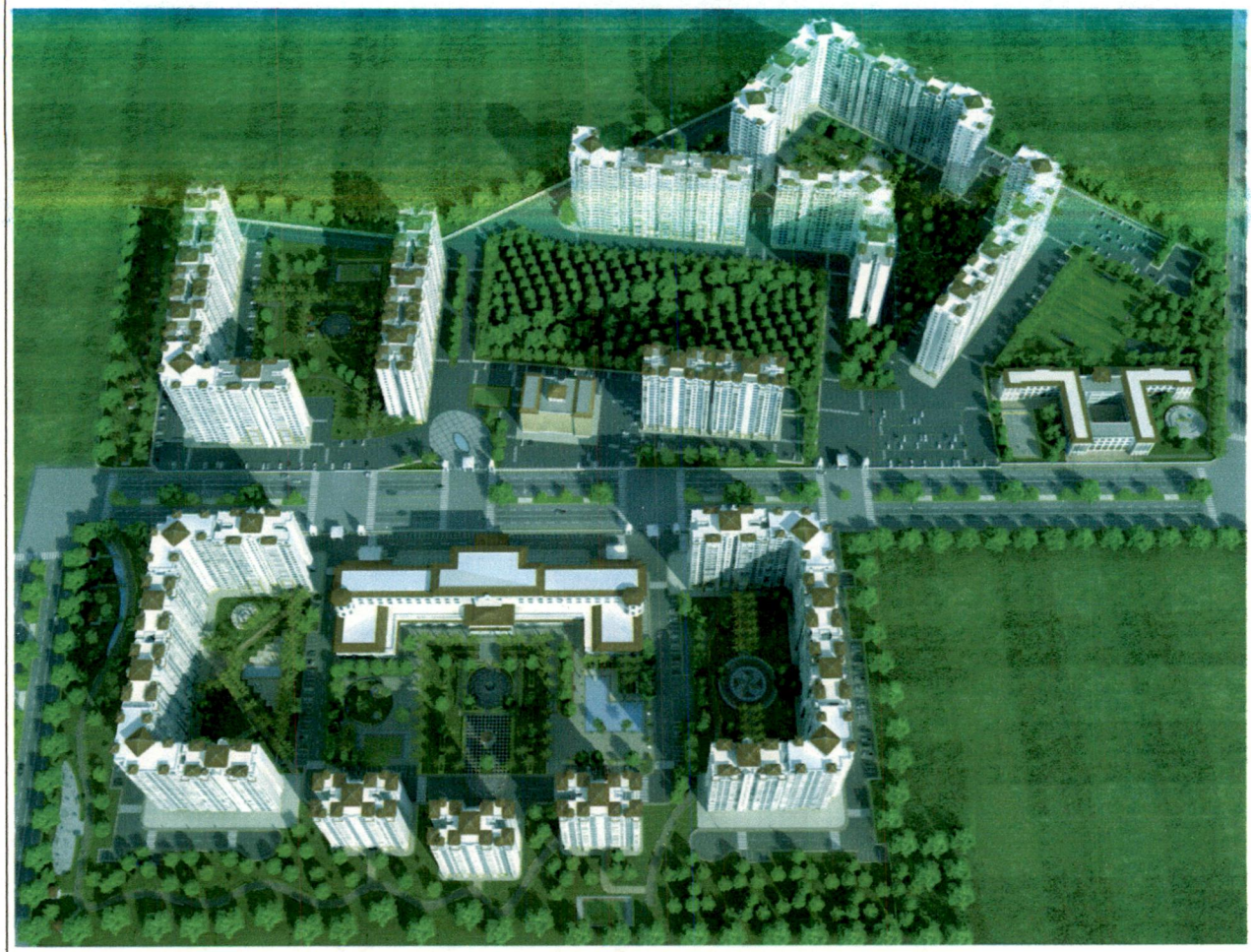

Fig 5.51: Aerial View of Garden City Township

Source:

http://www.dlf.in/dlf/wcm/connect/d18953804c5941da989afa550cdb51fe/dlf_chennai_mp_big.jpg?MOD=AJPERES

Fig 5.52: Pedestrian path in the township

Source:

http://www.dlf.in/dlf/wcm/connect/761f6e804c5940d19626f6550cdb51fe/dlf_chennai_ev2_big.jpg?MOD=AJPERES

Fig 5.53 : Club House

Source: http://www.dlf.in/dlf/wcm/connect/7ead80004c5940a495bff7550cdb51fe/dlf_chennai_ev4_big.jpg?MOD=AJPERES

Other Details, Analysis and Remark

Separate place for parking is provided and pedestrian movement is facilitated in all parts of the township.

- Recreational and green spaces

  The site will be fully landscaped. Jogging tracks will be provided. Landscaped gardens with seating area. 5 acres of land is allocated for forestry.

- Amenities

The town ship has amenities like school, shopping and recreation with in the township. The PSBB Millennium School is located with in the township. Club house at Garden city Club in an area of 1,92,000 sq. ft. (Refer Fig 5.50). The shopping and health care facilities will be spread over 5 floors and 78000 sq. ft. Shopping Centre with ATM, Laundromat, Cafeteria, fast food outlet, Departmental Store, Retail outlets, Beauty salon and Fast Food outlet will be provided.

Remarks

In this township the accessibility to the site is not good by public transportation mode. Though some aspects of smart growth is incorporated in the development like walkability with in the site, mix use, compact development ,open spaces etc. The mix of residential use and commercial activity with in the building is there but this has to be designed well as the commercial activities will attract people from outside. Security , parking and many other aspects have to be taken care off while development. This project is also investment oriented project.

Project name	Location	Type	Total land area	FSI	No. of floors	No. of Housing unit	No. of blocks	Rate per sq.ft.
CHENNAI PATTINAM [33]	Off OMR Thiruporur	Township	52 acre	1.5	Stilt + 4	2608	70	Rs. 2150

Fig 5.55: Layout of Township

Source : http://www.ceedeeyes.com/location_01.html

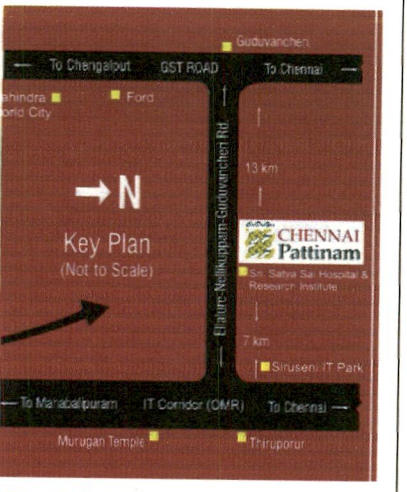

Fig 5.54: Location

Source: http://www.ceedeeyes.com/location_02.html

Fig 5.56: Rendered View of Residential Block

Source: http://www.ceedeeyes.com/screen_01.html

Fig 5.57: Rendered View of Club House

Source: http://www.ceedeeyes.com/screen_02.html

Other Details, Analysis and Remark

- Developers and consultants

  CeeDeeYes Infrastructure Development Pvt. Ltd.

- Elements of township (Refer Fig 5.55)

  1. Residential
  2. School
  3. Creche
  4. Club house
  5. Shopping mall
  6. Recreational

It is a suburban township within 10 minutes of the Chennai IT corridor. The township will house all the infrastructure like school, shopping mall and recreational amenities.

- Accessibility to the site

  The site is off the IT corridor. Accessible through GST road also. (Refer Fig 5.54)

  The township has the provision of shuttle bus service. The frequency of bus service is less.

- Density

  Population to be accommodated is about 13,000. The density is 250 per acre.

- Housing range and choices

  The housing is developed for the professionals working in the IT SEZ. The range of housing choice is limited to flat sizes :1075-1150 sq.ft – 2 BHK 1190- 2250 sq.ft – 3 BHK. All the housing units are Flats. There is no variety in the type of housing units except the sizes and number of room vary. Two bed room Type A consists of 26 blocks with housing unit of size 1100 sq.ft. Three bed room Type B consists of 35 blocks with housing unit of size 1600 sq.ft. Three bed room Type C consists of 9 blocks with housing unit of size 2250 sq.ft. The Residential block is illustrated in the figure above (Refer Fig 5.56).

Other Details, Analysis and Remark

- Pedestrian friendly environment and walkability with in site .The site will be landscaped and pedestrian amenities will be created. The landuse like school ,recreational area are provided within walkable distance from the residences. The residential, recreational and school are all interconnected by good landscape. The landscape also includes informal seating.

- Recreational and green spaces

  60 % of the area is reserved for greenery. The site is surrounded by hillocks and Lakes.

- Amenities

The township provides for, residence ,education, shopping and recreation with in the site. There is need for commuting to work. IT corridor located near by provides good job opportunity This town ship is a self contained township with respect to all aspects except job. The other amenities with in the site are club house, Shopping Mall, 3 screen Multiplex, Children's Play Area, Tennis Court,Swimming Pool, Day Care Center and DAV Public School within campus. The illustration of club house is given above (Refer Fig 5.57)

Remarks

This township is not focussed on smart growth approach to development. Though the walkability with in the site is taken care off the access to the township is difficult and will force people to have their individual vehicles. The layout seems to be too congested instead of spreading the township horizontally, vertical development should have been preferred. This project is also investment oriented project.

Project name	Location	Type	Total land area	FSI	No. of floors	No.of Housing unit	No.of blocks	Rate per sq.ft.
METROPOLIS [34]	G.S.T Road, Thirukachur Village, Maraimalainagar Chennai	Residential development	10.36	1.5	10	436	11	4450 to 5000

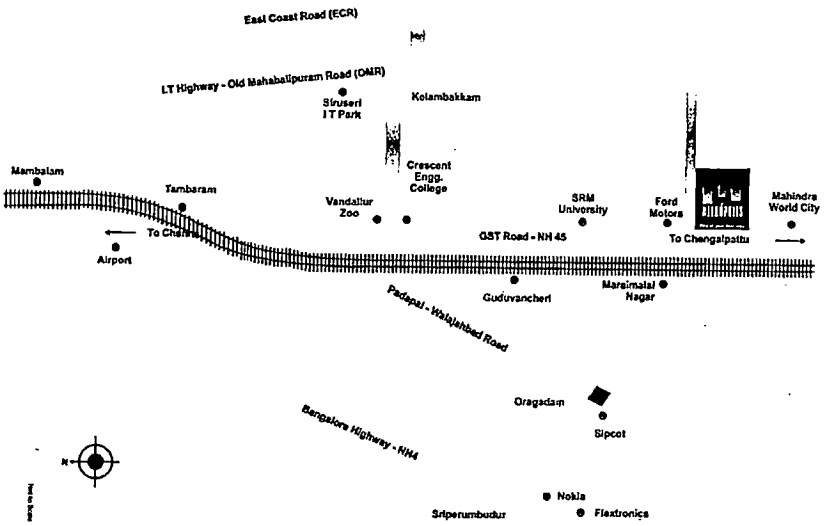

Fig 5.58: Location Map of Metropolis

Source: http://www.akshayahomes.com/location.asp?prjid=00025

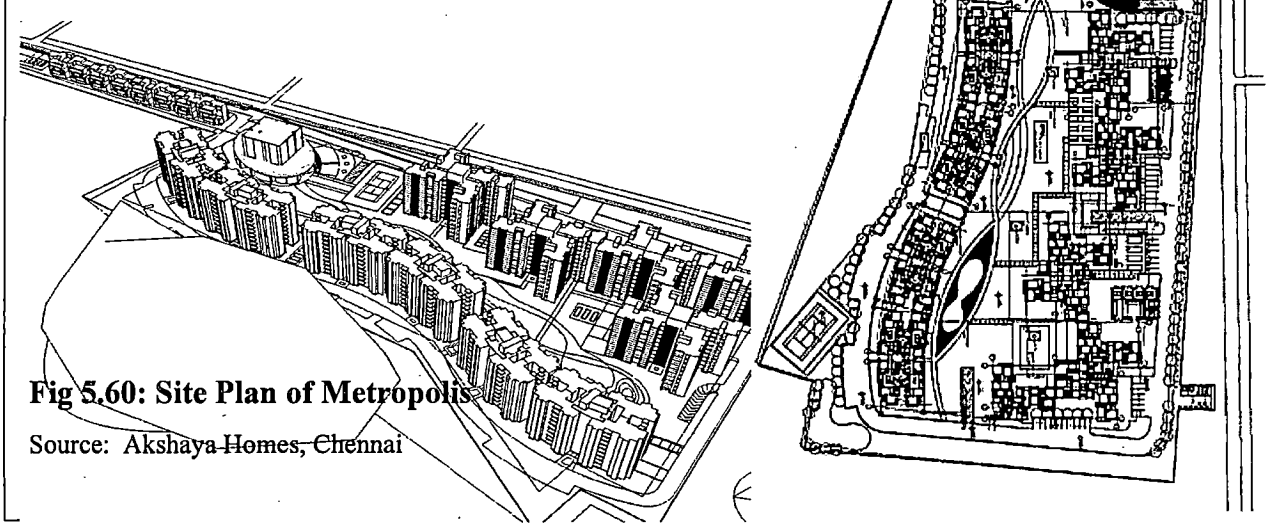

Fig 5.60: Site Plan of Metropolis

Source: Akshaya Homes, Chennai

Other Details, Analysis and Remark

- Developers

  Akshaya Pvt.ltd.

- Elements of development (Refer Fig 5.60)

  1. Residential
  2. Club house
  3. Convenient shop

Metropolis is a residential development on 10.36 acres of land. The ground coverage is about 45%. It is located in the fastest growing suburb of Chennai city known as New Chennai

- Accessibility to the site

The site is abutting NH -45. The railway line is parallel to the NH-45 (Refer Fig 5.58). There is suburban train and frequent bus service. The nearest railway station for suburban train is Maraimalainagar. Tambaram railway station and bus terminus is located at a distance of 15 km. The airport is located at a distance of 22 km .The Maraimalai nagar industrial township, Ford motors and Mahindra world city is located near by.

- Density

  Population to be accommodated is about 2180. The density is 210 per acre.

- Housing range and choices

  The housing doesn't cater to all income group of people. Even the middle class families cannot afford to buy the housing units. The range of housing choice is limited to 2/3 bedroom villa apartments of size ranging from 1400-1950sf.ft. The present stage of construction is shown in the figure. (Refer Fig 5.62 and Fig. 5.63).

- Pedestrian friendly environment and walkability with in site

  The site is well landscaped and pedestrian amenities are created. There are informal places for socialising . This is not a township development and thus the residents have to go out for schooling and other facilities. The parking of vehicle is restricted to

Other Details, Analysis and Remark

- Developers

  Akshaya Pvt.ltd.

- Elements of development (Refer Fig 5.60)

  1. Residential
  2. Club house
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- Pedestrian friendly environment and walkability with in site

  The site is well landscaped and pedestrian amenities are created. There are informal places for socialising . This is not a township development and thus the residents have to go out for schooling and other facilities. The parking of vehicle is restricted to

basement floors

Fig 5.61: Rendered View of Metropolis

Source: http://www.akshayahomes.com/prjDesc.asp?prjid=00025

Fig 5.62: Construction Work on Site

Source: http://www.akshayahomes.com/status.asp?prjid=00025

Fig 5.63: Construction Work on Site

Source: http://www.akshayahomes.com/status.asp?prjid=00025

Other Details, Analysis and Remark

- Recreational and green spaces

  65 % of the area is reserved for greenery .The building foot print will be only 35%. Bicycle pathways will be provided.

- Amenities

  The other amenities provided with in the site is the Club House and Convenient shops.

Remarks

This residential development is also not focussed on smart growth approach to development. It caters to the housing for high income group. This project is also investment oriented project.

5.7.3 Evaluation of the Private Townships

The evaluation of the selected private township is done based on the ten principles of Smart growth. For the evaluation five new developments are taken up. The studyof the township on various aspects like housing choices, affordability, walkability with in the site, accessibility to the site, and presence of school with in the township, mix landuse, preservation of open space etc is done. The study shows that none of the new development caters to the housing shortage issue instead they all are investor oriented development. The housing choices and range in terms of affordability is limited to high income group only. The development doesn't encourage the development of vibrant community. In the new township all uses are present and thought has been given for developing walkable environment. Presence of school with in the township is one aspect seen in the township. The townships are developed with basic amenities. Some aspect of smart growth development is incorporated in these developments. The evaluation is done based on smart growth principles (Refer Table 5.6)

Table 5.6: Evaluation of the Townships

Parameters	Townships									
	Estancia		Mahindra World City		DLF Garden City		Chennai Pattinam		Metropolis	
	Y	N	Y	N	Y	N	Y	N	Y	N
1. Create a range of housing opportunities and choices										
Does the township development provide a variety in housing type?		✓	✓			✓		✓		✓
Does the township development provide a variety in housing size?		✓		✓	✓		✓			✓
Are the housing units affordable to all income groups?		✓		✓		✓		✓		✓
Does the project allocate certain percentage of housing units for Low income or EWS?		✓		✓		✓		✓		✓
2. Create a walkable neighbourhood										
Does the township emphasise on "Walk to Live Work and Play" model of development?	✓		✓			✓		✓		✓
Is there a school with in the township?	✓		✓		✓		✓			✓

Are the other basic amenities like convenient shopping and recreation provided within the township?	✓		✓		✓		✓			✓
Parameters	**Townships**									
	Estancia		**Mahindra World City**		**DLF Garden City**		**Chennai Pattinam**		**Metropolis**	
	Y	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
3. Encourage community and stakeholders collaboration										
Does the township development involve the public also in the development process		✓		✓		✓		✓		✓
4. Foster distinctive ,attractive communities with a strong sense of place										
Are there public parks to recreate with in the township?	✓		✓		✓		✓		✓	
Does the township development follow any local architectural style		✓		✓		✓		✓		✓
5. Make development decisions predictable ,fair and cost-effective										
Is the financial detail of the development of the project as a whole and development of infrastructure made available to the people?		✓		✓		✓		✓		✓

Parameters	Townships									
	Estancia		Mahindra World City		DLF Garden City		Chennai Pattinam		Metropolis	
	Y	N	Y	N	Y	N	Y	N	Y	N
6. Mix land use										
Does the township have a mix of landuse?	✓		✓		✓		✓		✓	
Does the township include a school?	✓		✓		✓		✓			✓
Does the township include workplace?	✓		✓			✓		✓		✓
Is the mix of landuse with in the building?		✓		✓	✓			✓		✓
7.Preserve open space, farmland, natural beauty and critical environmental areas										
Are there planned open space?	✓		✓		✓		✓		✓	
Does the project take up or mention any measure to Preserve open space, farmland, natural beauty and critical environmental areas in its surrounding and to include it while planning the development?		✓		✓		✓		✓		✓

Does the project clean up a brownfield site?		✓		✓		✓		✓		✓
Parameters	**Townships**									
	Estancia		**Mahindra World City**		**DLF Garden City**		**Chennai Pattinam**		**Metropolis**	
	Y	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
8. Provide variety of transportation										
Is the development with in walking distance of public mode of transport?	✓		✓			✓		✓		✓
Is the development accessible by both rail and road?	✓		✓			✓		✓	✓	
Is the development accessible by road only?		✓		✓	✓		✓			✓
Is the accessibility to the development by public transportation good?	✓		✓			✓		✓	✓	
9. Strengthen and direct development towards existing communities										
Is the project with in the Chennai Metropolitan Area?		✓		✓	✓		✓			✓
Is the area surrounding the development well developed?		✓		✓		✓		✓		✓

Is the project a part of redevelopment of the existing area?		✓		✓		✓		✓		✓
10. Take advantage of compact building design										
Is the development compact?	✓			✓	✓			✓	✓	

5.7.4 Inferences

The integrated township should be developed with live, work, learn, play and shop with in the site kind of development so that the number of commuting trips to work and educational purpose is reduced. The location of new developments should be sited in location where public transportation facilities are available so that the dependence on the private mode of transport is reduced. In case the development is far from the public transportation terminal or station in that case shuttle service from the town ship to the nearest transit station or terminal should be provided as in Chennai Pattinam Township. The townships development must cater to the housing shortage. The housing type in any township development should not only have variety in the size of the dwelling unit but also in the type of dwelling units like apartments, villa type houses, semidetached houses etc. The housing development should also cater to various income groups of people. The mix of uses should not only limited with in the site it can be extended to the buildings also. Pedestrian and bicycle friendly environment should be created with in the site so that people access the various amenities with in the site by walking or by bicycling, the least polluting mode of transport. Above all the maintenance of the township is highly essential in terms of solid waste management and regular cleaning and maintenance of landscape to create a healthy environment. Lively recreational spaces should be created with in the township.

5.8 Conclusions

The evaluation of master plan and the study of townships show that there is no focus on smart growth approach to development. The current trends of development in Chennai shows development concentrated in particular corridor. There is no mix of land use and there is a leap frog development. Though the development of townships is inline with few aspects of smart growth, they don't cover many principles. To induce smart growth development, planning

development with accessibility to public transportation must be attempted. The integration of land use and transportation smartly will solve the problem of urban sprawl and the related issues. The smart growth approach to development has to be taken up to create a livable environment in Chennai and other cities of India.

CHAPTER 6 DEVELOPMENT PLAN OF MARAIMALAI NAGAR

6.1 Introduction

6.2 Brief History on the Development of New Towns in Chennai

6.3 Development of New Town Maraimalai Nagar

6.3.1 Introduction

6.3.2 Location and Site Area

6.3.3 Administrative Division

6.3.4 Objectives of Maraimalai Nagar Development

6.4 Planning of Maraimalai Nagar

6.4.1 The Site before Development of Township

6.4.2 Development Plan

6.4.4 Planning Standards

6.4.5 Development Policies

6.5 Evaluation of Development Plan of Maraimalai Nagar

6.5.1 Objective of the Evaluation

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6.5.3 Evaluation of Development Plan of Maraimalai Nagar

6.6 Existing Development in Maraimalainagar

6.6.1 Introduction

6.6.2 Demography

CHAPTER 6

EVALUATION OF DEVELOPMENT PLAN OF MARAIMALAI NAGAR

6.1 Introduction

The selected area of Chennai metropolis for study is Maraimalai Nagar. It is a new town development incorporated in the first master plan of Chennai. It was approved for establishment in 1972.[35] The work on new town project Maraimalai Nagar, commenced in 1976 by the MM DA now known as CMDA. .[35] A detail study has been carried out on various aspects of Maraimalai Nagar and the application potential of smart growth oriented development has been assessed in this chapter.

6.2 Brief History on the Development of New Towns in Chennai

The Development of new town was envisioned in the Madras Metropolitan Plan in 1971-1991. A three tiered development strategy was evolved in which the third tier consisted of developing three new towns Maraimalai Nagar, Tiruvallur and Gummudipoondi each with a population of 1, 00,000. [36] These three new towns were located at a favourable distance from the city so that they can take the advantage of the city as well as have their own identity. The Madras Metropolitan Plan 1971-1991 proposed the development of six urban nodes and three new towns.

Further in Master Plan-2001 in view of improving the economy of the metropolis, to improve the employment generation level and to improve the financial and industrial strength certain actions were recommend in which to create additional potential for large scale industrial units in the satellite town was envisioned. Steps were taken to attract petro chemical units in Gummidipoondi, Export related units in Maraimalai nagar and engineering and auto mobile centre in Thiruvallur. Maraimalai Nagar satellite town was already developed with adequate industrial infrastructure and was attractive for setting up of large and medium scale industries the madras export processing zone is close to Maraimalai nagar thus a part of Maraimalai Nagar was envisaged to be develop us export city to attract labour intensive export industries. [37]

Among the three satellite towns and six urban centers only work on Maraimalai Nagar and Manali was commenced. Both could not achieve the expected development. The location of three satellite towns is shown in the map. (Refer Map 6.1)

6.3 Development of New Town Maraimalai Nagar

6.3.1 Introduction

Out of the three satellite towns mentioned in the master plan only Maraimalai Nagar development was commenced and the development of it was entrusted to Madras Metropolitan Development Authority. The idea of this satellite town was first proposed by former President R.Venkatraman in the 1960s when he was a Minister in the Tamil Nadu government.[41] The Maraimalai Nagar new town was developed owing to the pressure on the cities infrastructure due to increase in population mainly by migrants. The number of migrants in the city in 1961 constituted as much as 38% of the total population 33% of the total immigrants were from Chengalpattu district. [36] The major objective to create a self contained town to attract the potential migrant. Thus Maraimalai Nagar was developed on the corridor connecting Chennai and Chengalpattu. The development of Maraimalai Nagar was entrusted the Madras Metropolitan Development Authority. The town does not have any heritage background and is named in remembrance of Maraimalai Adigalar an eminent tamil scholar as Maraimalai Nagar Town.

6.3.2 Location and Site Area

Location: Located in South direction at a distance of 81 km from Chennai city.

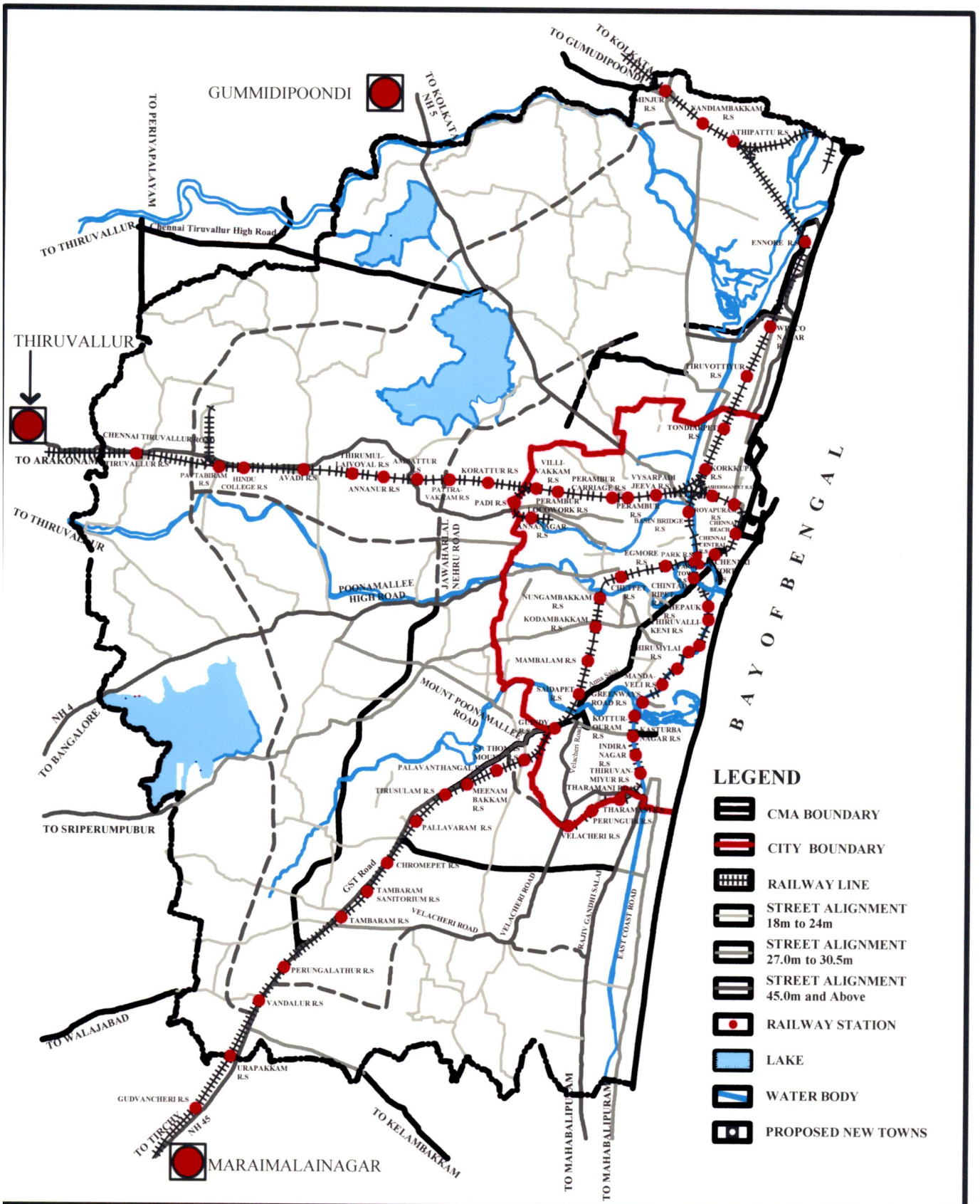
Latitude: 12° 41' 30'

Longitude: 74° 58' 00'

Elevation: 28m from M.S.L.

Extent of Municipal Area: 58.08 km^2

The notified area for development at present for Maraimalai Nagar Township is about 1214 ha with in the municipal area. The site abuts the Grand Southern Trunk Road NH 45 and the railways line and lies in between Chennai and Chengalpattu (Refer Map 6.2).

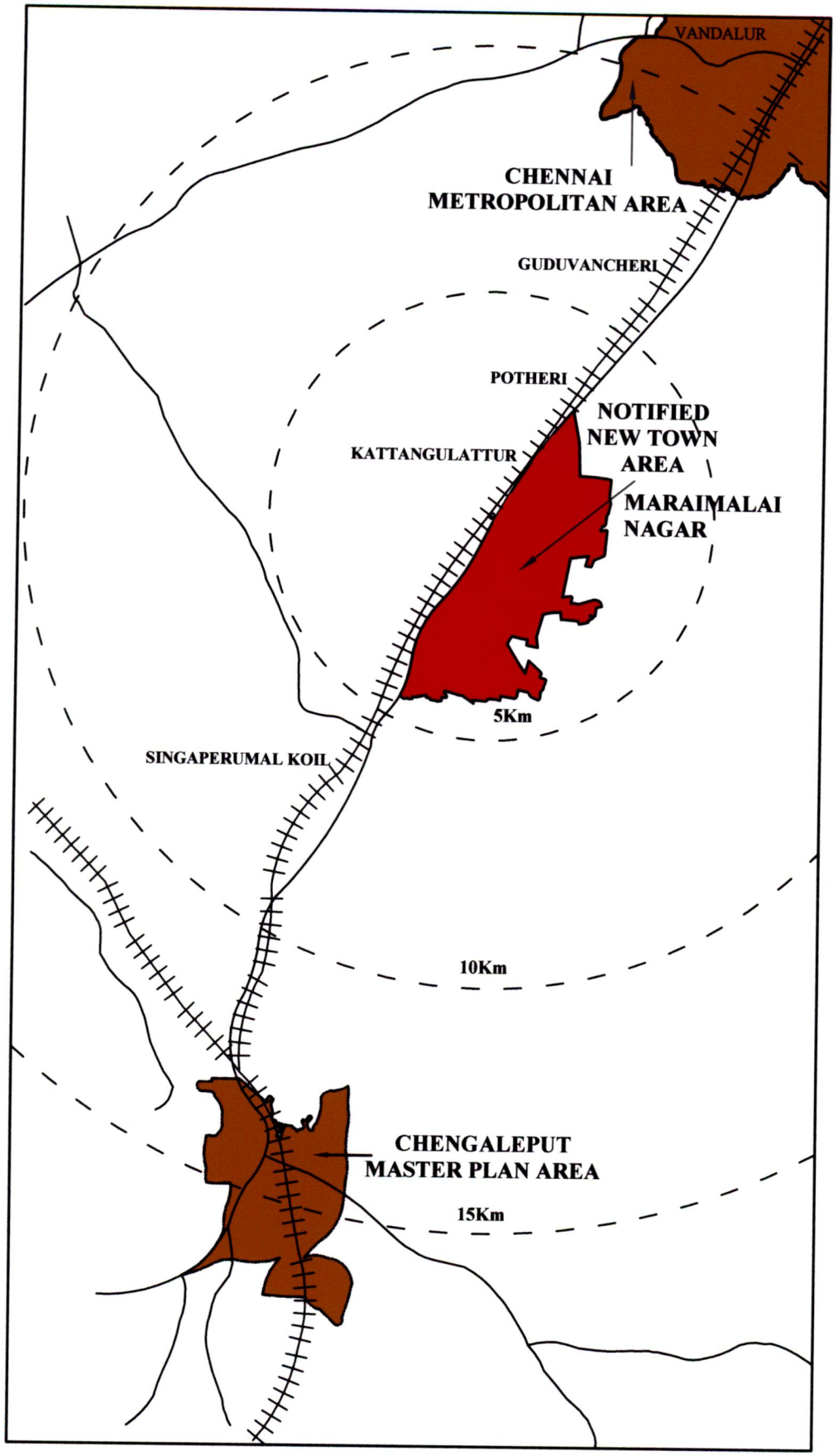


LOCATION OF NEW TOWNS

MAP NO: 6.1

SCALE 1.0 0 1.0 2.0 Km

Source: Redrawn By Author



LOCATION OF MARAIMALAI NAGAR

N

MAP NO:6.2

SCALE

1.0 0 1.0 2.0

Km

Source: Redrawn By Author

6.3.3 Administrative Division

Maraimalai Nagar is the head quarters town of Maraimalai Nagar taluk in Kancheepuram district. It is third Grade Municipality. The town is divided in to 21 wards. The Maraimalai nagar municipality comprises of 8 village panchayats and 16 revenue village. [36] The Maraimalai Nagar municipality with its ward is shown in the map. (Refer Map 6.3)

6.3.4 Objectives of Maraimalai Nagar Development

The main objective of Maraimalai Nagar development was to create a self contained township. The aim of creating Maraimalai Nagar satellite township was to decongest the city and to attract the potential migrants thus reducing the pressure on Chennai city. The notified area of development was 1318.35 ha and a population of 1,00,000 to be achieved with in 20 years the ulrimate population being 3,00,000.

6.4 Planning of Maraimalai Nagar

6.4.1 The Site before Development of Township

The site before development was rural in character and part of it was cultivated and the rest was classified as forest land. There were very few industries in this area. The nine villages constituted the new town area Potheri, Ninnakarai, Kattangulathur, Thirukatchur, Peramanur, Keelkaranai, Chitamanur, Gudalur and Sengundram. They constituted a land area of about 4279 ha out of which the urbanisable area was about 1318.35 ha. There were only few industrial establishments in the area and the main occupation in the village settlements consisted of agriculture. The population in 1971 was 11,722 and the over all density of population in the villages was 45 persons per km^2 and in the settlements 183/p.ha. During the inception of the project the institutions that were present are Silviculturist Research Centre, Veterinary Research Farm, Tamil Nadu Poultry Farm, Sivananda Ashram and Cashew and Euclytus oil Farm. [36]

6.4.2 Development Plan

According to the development plan 1991 the new town would cover an area of 4,300 hectares of these 1300 hectares will form the urbanisable area and would be acquired and developed by the authority and the rest area will form the green belt around the town. According the original plan the town was initially be planned and built for 1, 00,000 population to be

reached with in twenty years and could be expanded to house ultimately a population of 3, 00,000 persons. It was envisaged to create a strong economic base with non polluting and labour intensive industries and to develop the town for appropriate research and training centre and public institutions and offices. The permissible industries in Maraimalai Nagar are given in Annexure I. The land use for Maraimalainagar New Town as mentioned in the development plan is given in the table below. (Refer Table 6.1) [36] The development plan 1991 is illustrated in the Map (Refer Map 6.4)

Table 6.1: Maraimalai Nagar New Town Land Use 1991

S.No.	Urbanisable Area	Area in hectare	Percentage
1.	Industrial Area	161.02	12.2
2.	Residential Neighbourhood	542.50	41.1
3.	Institutional	103.20	7.8
4.	Town Centre	48.77	3.7
5.	Recreational and Open spaces	58.47	4.3
6.	Transportation	141.10	10.7
7.	Railways	6.47	0.5
8.	Deferred	184.58	14.2
9.	Water bodies	68.98	5.2
10.	Settlements	3.26	0.3
	Total	1318.35	100

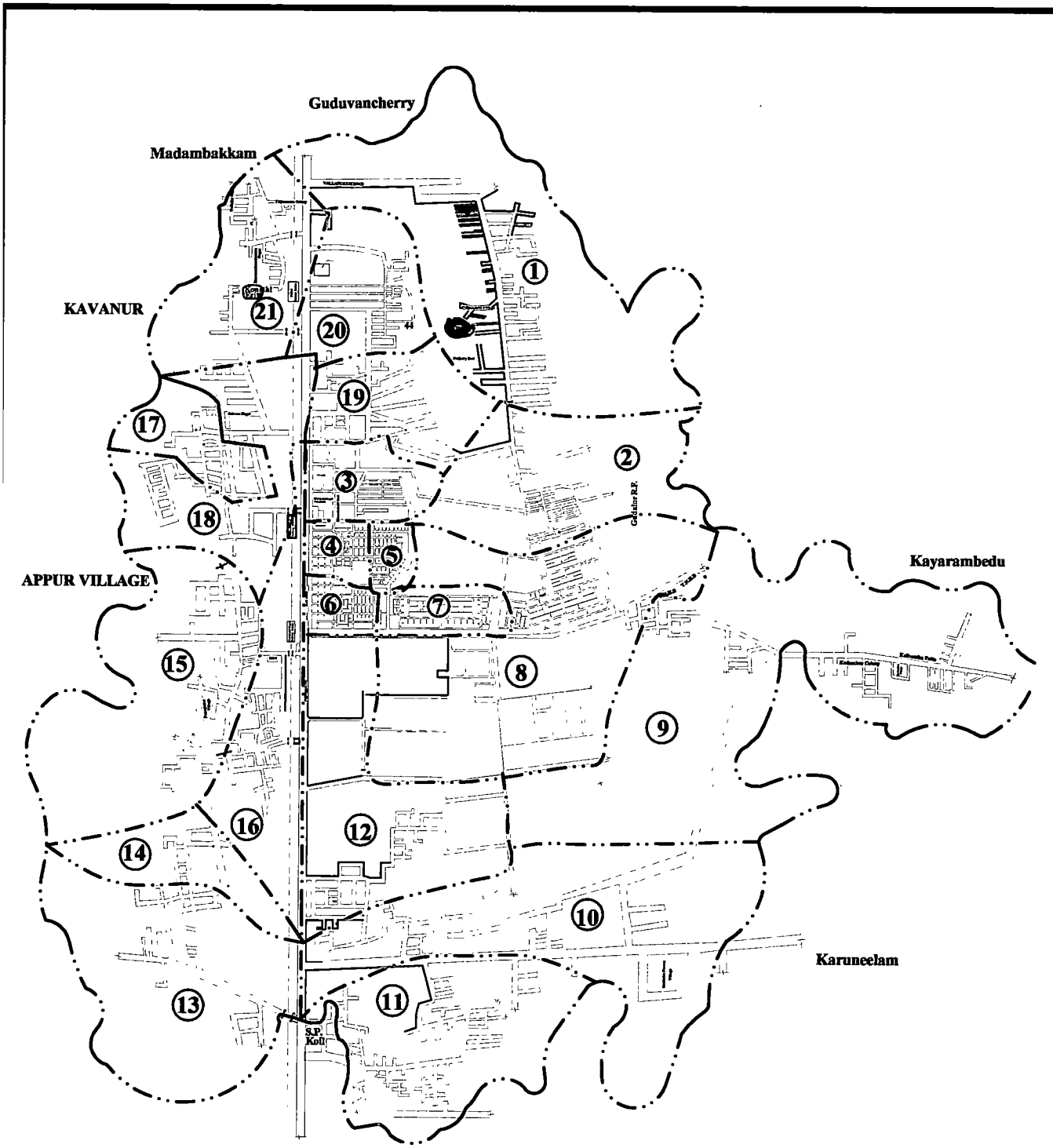
Source: Development Plan for Maraimalai Nagar 1991

Industrial Area: A total of 161 hectare is for Industrial Area. It is 2km from town centre. 131 ha is allocated for medium scale industries and 30ha for small scale industries .Only clean industries are permitted with in the industrial area.

Residential Neighbourhoods: Neighbourhoods with a population of 10,000 were planned a total of 11 residential neighbourhoods were planned.

Institutional area: 103ha is under institutional area for accommodating, colleges, higher education centres and vetenary research, cattle research station and poultry farm are present. The cattle research station is on the west of railway line.

Town centre: The town centre as mentioned in the development plan is not completely developed. The facilities like head post office, fire station, telephone exchange etc are present. The town centre occupies a land area of 49 ha.



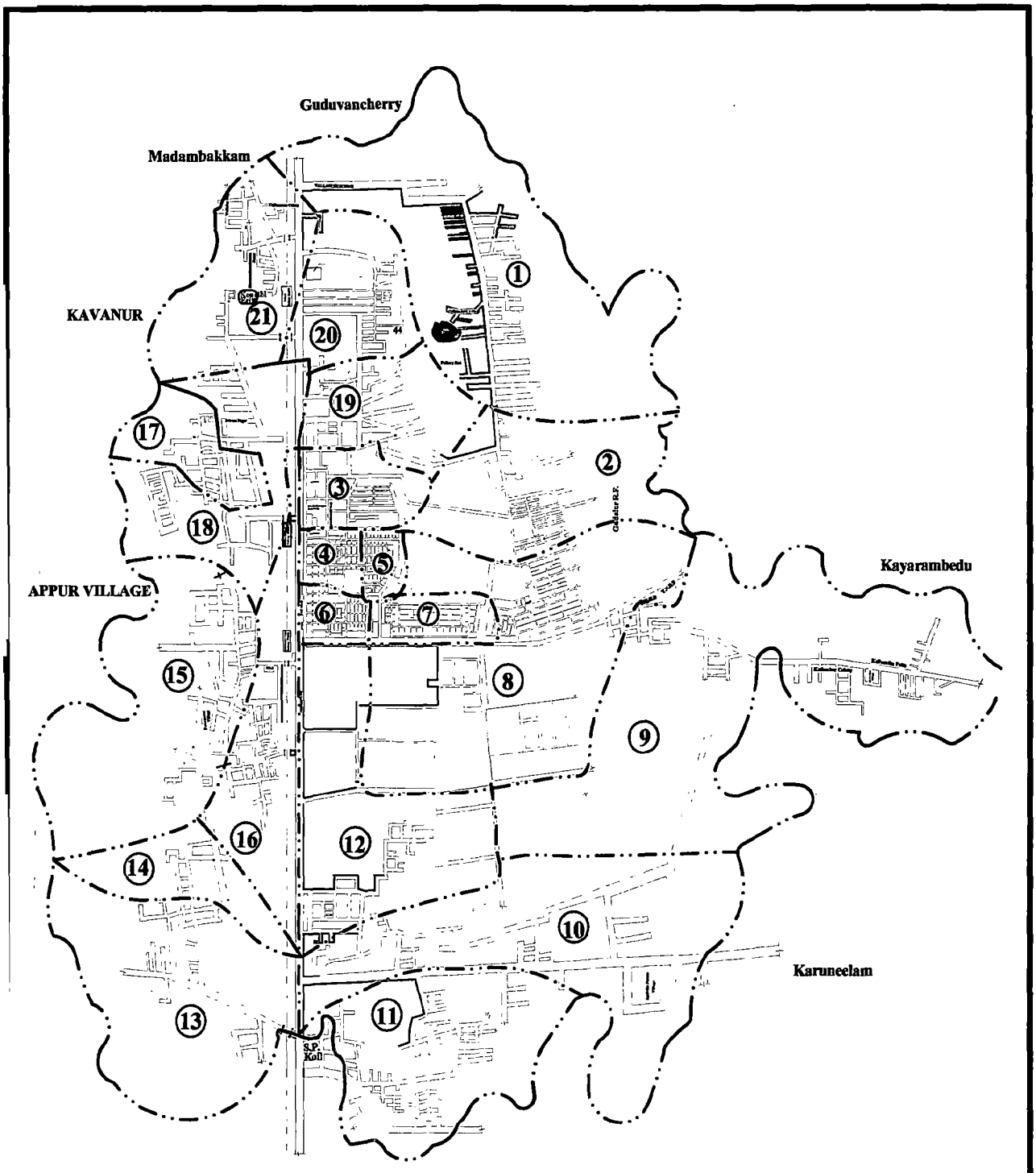
WARD MAP OF MARAIMALAI NAGAR

MAP NO: 6.3

SCALE

NOT TO SCALE

Source: Redrawn By Author



WARD MAP OF MARAIMALAI NAGAR

MAP NO: 6.3

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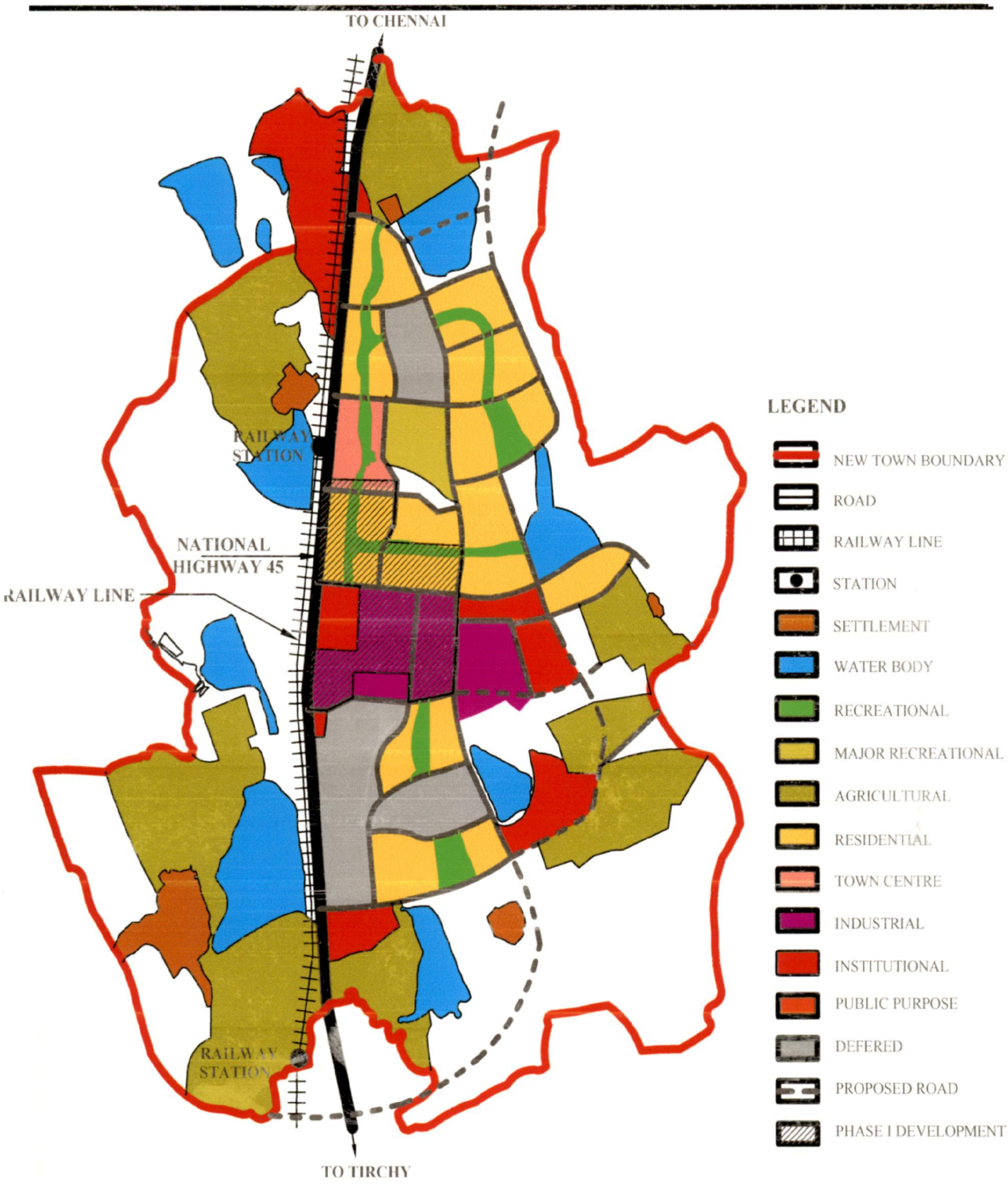

MARAIMALAI NAGAR NEW TOWN DEVELOPMENT PLAN 1991

MAP NO: 6.4

SCALE

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Source: Redrawn By Author

Recreational area: The total town level open space is 58ha. There are neighbourhood level parks there are a total of 5 parks.

As the new town aimed at industrial development the development plan also gives the projected number of workers and their disposition in new town. (Refer Table 6.2)

Table 6.2: The Projected Number of Workers and Their Disposition

Town	Population	Workers	%	Distribution of workers		
				Primary	Secondary	Tertiary
Maraimalai Nagar	100000	25000	25%	10%	30%	60%

Source: Development Plan for Maraimalai nagar 1991

The original development plan laid emphasis on the development of compact and walkable township. The emphasis was on designing for pedestrians and cyclists and use of public transportation rather than individual vehicles. The development of town centre as major focal point with access by public transportation and restricted vehicular entry and development of major recreational area and parks along the periphery and development of green ribbons & wedges in the neighbourhood was envisaged. The Development plan lays emphasis on the internal circulation and linkages with outside town the hierarchy of street system is suggested. Emphasis on development of pedestrian path and cycle tracks and subways for comfort & safety of pedestrians & cyclist was given.

The second master plan for Chennai 2026 provides the illustration of development plan of Maraimalai nagar. The notified area of development is 1214 ha. The development plan as modified is shown in the map (Refer Map 6.5)

6.4.3 The Conceptual Plan

Town unit of population 1 lakh was envisaged. The Town unit consisted of 8 to 12 neighbourhood with a population of 8 to 12 thousand per neighbourhood and a town centre with all socio-economic facilities. The town units were not allowed to provide any work area the employment had to be provided in industrial area and linked with mass rapid transit routes. The new town area was designed for an over all density of 100 persons/ha.

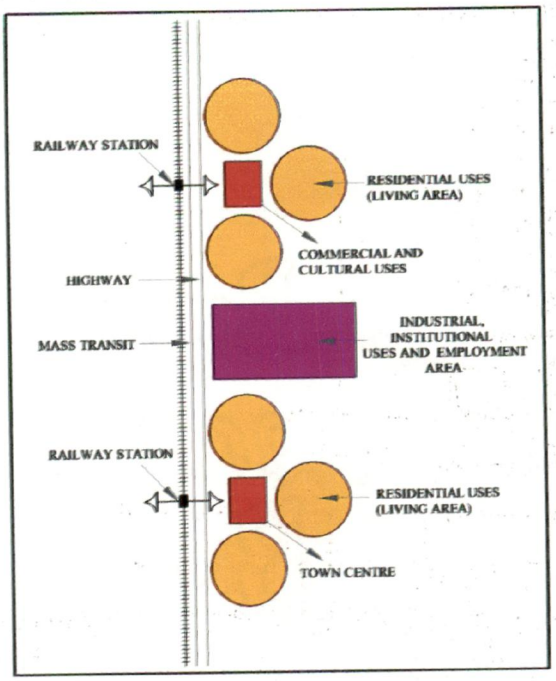


Fig 6.1: Conceptual Plan of Maraimalainagar

Source: Redrawn by author

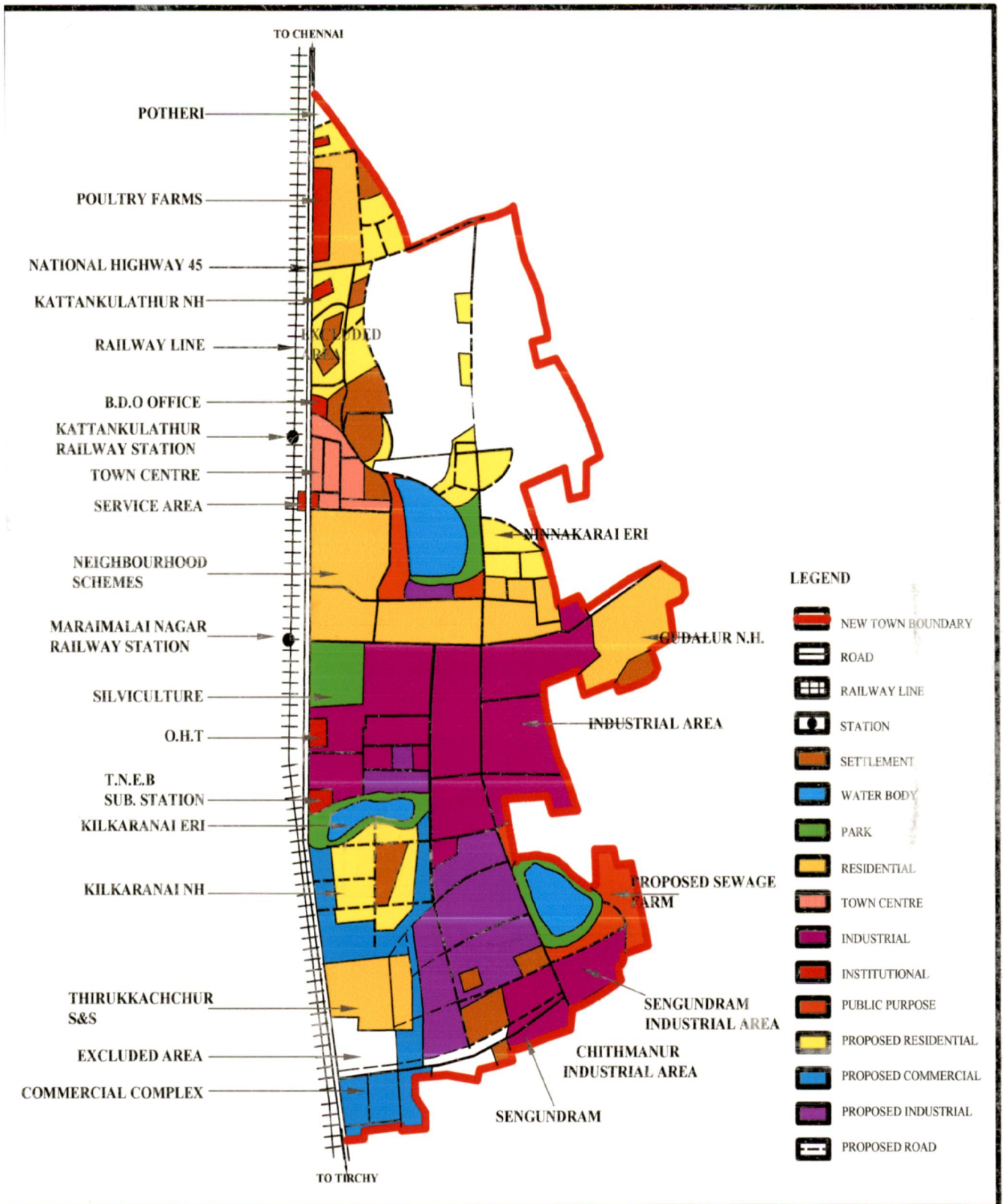
The conceptual plan emphasised on the accessibility to work and residential area. The accessibility to the transit stations was also considered. (Refer Fig.6.1)

6.4.4 Planning Standards

The planning standards adopted for the development of township as mentioned in the development plan are given in the table below. (Refer Table 6.3)

Table 6.3: Planning Standards Adopted

1.	Over all density	40 persons/Acre
2.	Gross residential density in neighbourhood	80 persons/acre
3.	Size of residential	8 to 12 thousand population
4.	Residential area/1000 pop.	12 acres
5.	Town Centre area/1000pop.	1 acres



OVERALL DEVELOPMENT PLAN
MARAIMALAI NAGAR NEW TOWN-
SECOND MASTER PLAN OF CHENNAI 2026

MAP NO: 6.5

SCALE

NOT TO SCALE

Source: Redrawn By Author

6.	Industrial area/1000 pop.	4acres
7.	Institutional area/1000 pop.	2 acres
8.	Recreational area/1000 pop.	1 acres

Source: Development Plan for Maraimalai nagar 1991

6.4.5 Development Policies

In the development plan the development policies for land acquisition, land development, land disposal, housing and administrative policy are provided to carry out the development. The policies mentioned in the development for Maraimalai Nagar 1991 are as follows

Land acquisition policy: The land was to be acquired in bulk to avoid escalation cost and to prevent disorderly development.

Land development policy: The land development had to be carried out in phased manner. The land development will be carried out by Madras Metropolitan Development Authority. The construction of units for housing industry and commercial unit will be carried out by private individual, Co-operative society and other quasi government agencies & by Chennai Metropolitan development Authority.

Land Disposal Policy: Disposal of land for residential use & industrial area are be free hold. Industrial units in the Industrial Estates are on leasehold basis.

The order of allotment of plots will be as follows:

1. Local people displaced by the development of New Town
2. Locally employed
3. Others

The Lease-hold disposal is suggested for the land which do not requires immediate development and is for non-residential use. These lands may be leased out for a short period of 5 to 10 years subject to terms and conditions of Madras Metropolitan Development Authority. The development of the site should be commenced with in a period of three years from the date of purchase

Housing Policy: Mixture of plots and flats are be permitted for housing development. The layout has to been so conceived that a maximum plot size of 2 grounds will face the roads while

sub-division up to a Minimum extent of half ground could be done by providing access ways. Both income and family composition was taken into account for determining the area requirement. (Refer Table 6.4)

Table 6.4: Area Requirements for Different Income Groups with Different Family Composition.

Income group and family	Floor Area (m^2)
H1	100
H2 & M1	80-100
H3 & M2 & L1	60-80
M3 & L2 & P1	40-60
L3 & P2 & P3	25-40

Code	Income group
H	High Income group
M	Middle Income group
L	Low Income group
P	Poor class

Code	Family size
1	8 and above
2	5 to 7 members
3	2 to 4 members
4	Single person

Source: Development Plan for Maraimalai nagar 1991

Types of proposed housing development

1. Proposed housing development is a mixture of plots. The ratio of plots flats of 1:1 are be adopted for the entire area.
2. In a residential plot more than one dwelling may be allowed so that the maximum site is utilized.
3. Housing for single person is also to be taken care of.

The following agencies are involved in the construction work. Tamil Nadu State Housing Board, Cooperatives, purchasers of plots and slum clearance Board. The maintenance of housing development is done by MMDA and later by the local authority. MMDA will be the financing Agency for public Housing.

Policy on social and community facility: The land at subsidized rates is available for social facilities like schools, colleges, hospitals etc.

Administrative policy: The planning development of the New town is looked after by the Chennai Metropolitan Development Authority and Development Control of Chennai will be followed.

6.5 Evaluation of Development Plan of Maraimalai Nagar

6.5.1 Objective of the Evaluation

To access whether the development plan was successful or not to evaluate the development plan in the context of smart growth to give proposals based on the assessment and to use smart growth principles as tools to improve the quality of life for the selected site.

6.5.2 Methodology

The evaluation is carried out by literature review of the development plan. The matrix for evaluation is prepared by referring smart growth audit and municipal plan assessment. The parameters for evaluation are based on the ten smart growth principles and are evaluated as 'excellent' with score 5 , 'To a great extent' with score 4, 'To a good extent' with score 3 , 'Satisfactory' with score 2 , 'Negligible extent' with score 1 and 'No mention at all' with score 0. The total score for evaluation is 200 and if the range of evaluated score is between 150 to 200 then the development plan has smart growth approach to development, if the evaluated score is between 100 to 150 then the development plan has some aspects of smart growth development and if the evaluated score is between 0-100 then it is not focussed on smart growth approach to development. The overall level of adherence is evaluated on the following basis.

Up to 40 – Negligible

Up to 80 – Marginal

Up to 120 - Good

Up to 160- Very Good

180 and above – Excellent

For the evaluation of development plan of Maraimalai Nagar

1. The first stage is to conduct a literature review of the development plan and compare it with smart growth principles and evaluate it.
2. The second stage consists of site visit and evaluation of how much in the development plan has been translated on the ground and evaluating the existing condition with smart growth principles.
3. Interview with the residents and key stakeholders.

6.5.3 Evaluation of Development Plan of Maraimalai Nagar

Principle 1: Create a range of housing opportunities and choices

In the development plan there is no assessment made for housing needs and demands and future projection of housing needs for all income groups. The development plan does not include plans for meeting the future housing needs of all income groups. The housing policy of the development plan adopts a system in which the economic paying capacity and the family composition is taken in to consideration for determining the area requirement for different income group thus addressing the issue of affordability ,a mix of housing types and housing prices. There is no provision in the development plan for providing incentives for the development which contain housing for EWS. Initially while developing the township the residential area was developed but it could not attract much population as there was no economic base.

The development plan also doesn't have policy to make it mandatory for the industrial units to provide housing for its employers with in the township. Though the housing policy states the preferences for allotment of housing for the locally employed it couldn't be effectively achieved.

Principle 2: Create a walkable neighbourhood

The development plan emphasize on creation of pedestrian pathways and pedestrian amenities but it ground reality this has not been achieved. The development plan emphasise on "Walk to Live Work and Play" model of development. The development plan emphasize on the provision of schools and other social amenities with in walkable distance. There is a town centre with all amenities like school, hospital, government offices, hotels etc. The township is planned in such a way that the industrial area and the residential areas are within 2km from the town

centre but pedestrian amenities have not been developed. The development plan does not provide any incentives for developing a walkable neighbourhood nor does the development plan illustrate any model for development of walkable neighbourhood

Principle 3: Encourage community and stakeholders collaboration

There is no mention of community participation in planning process in the development plan. The development plan mentions the stakeholder who will be involved in the development that is Chennai Metropolitan Development Authority but doesn't mention in detail the other stakeholders who will be involved in the development of the township.

Principle 4: Foster distinctive, attractive communities with a strong sense of place

The development of Maraimalai nagar doesn't have any historical background or heritage association. The development plan also doesn't encourage any particular architectural style or façade control in the area. Maraimalai nagar doesn't have any historical buildings and thus there is no mention of preservation or conservation of historic building in the development plan. There are development control rules to prevent haphazard development. The development plan encourages the development of public spaces and there was a plan of the town centre with shopping centre, theatre, office complex stadium, art gallery, youth centre, hotel, wholesale etc. at present only some of the facilities are available in the town.

Principle 5: Make development decisions predictable, fair and cost- effective

Detail policies and guidelines for development authority to coordinate with other agencies which provide utility is not mentioned in the development plan only broadly it has been mentioned who will be involved in the development of township. The development regulations of CMA are applicable to Maraimalainagar and the DCR is available to developers and the public. The development plan does not provide financial details for the provision of utility.

Principle 6: Mix land use

The development plan has zoning of the area in to residential, industrial institutional, commercial. Some amount of mix land use is permitted as per the DCR. The DCR gives appropriate regulation for mix landuse and the kind of activity and area permitted with in a particular zone. But it doesn't encourage high density mix land use. The development plan is in favour of transit oriented development the railway line provides for mass rapid transit and the national highway for road transport. The development plan aims at reducing the dependence on individual private vehicles.

Principle 7: Preserve open space, farmland, natural beauty and critical environmental areas

The development plan contains maps for ecologically sensitive area and farmlands but there are no policies for preserving ecologically sensitive area and farmland. The reserve forest area was used for developing residential area initially. Huge tract of reserve forest land still exist with in the site. There are no incentives provided for the developer who preserve more open space during development. No special laws have been formulated for preserving the ecologically sensitive area and wetlands the regulations mentioned in the DCR for ecologically sensitive area is applicable to Maraimalainagar also.

Principle 8: Provide variety of transportation

The development plan doesn't evaluate the present travel demand for various modes of transport. The development plan encourages multimodal transportation system and lays emphasis on the use of public transportation system rather than individual mode of transport. The development plan has policies for development of sidewalks and bicycle paths but in reality it has not been achieved. The development plan mentions the right of way and street hierarchy with respect to development. Different right of way is proposed for residential area, industrial area, town centre etc. there are no policies for retrofitting of sidewalks in existing development.

Principle 9: Strengthen and direct development towards existing communities

There are no policies in the development plan for directing development towards the existing community. The development plan has no provision to promote infill development, redevelopment of brown field and grey fields and to increase existing densities. The development plan also doesn't specify priority development area.

Principle 10: Take advantage of compact building design

The development plan doesn't promote high rise development. The FSI allowed in this area is about 1.5 which is permits for low rise development. The existing buildings are G or G+1 only few buildings along main road are G+2. There are no incentives provided to the developer for creating a compact development.

The evaluation is presented in a matrix format. (Refer Table 6.5)

Table 6.5: Matrix for Evaluation of Development Plan of Maraimalai Nagar

Parameter for Evaluation	Evaluation					
	Excellent (5)	To a great extent (4)	To a good extent (3)	Satisfactory (2)	Negligible extent (1)	No mention at all (0)
rinciple 1 : Create a range of ousing opportunities and hoices						
1. Does the development plan assess the existing housing needs and demands of all income groups?						
2. Does the development plan have future projection of housing needs of all income groups?						✓
3. Does the development plan include plans for meeting the future						✓

housing needs of all income groups?						
4. Does the development plan discuss the issues of housing affordability?			✓			
5. Does the development plan support policy for a mix of housing types and housing prices?		✓				
6. Does the development plan have provision for providing incentives for the development which contain housing for EWS?						✓
Score out of 30	7					
Principle 2: Create a walkable neighbourhood						
1. Does the development plan emphasize on creation of pedestrian pathways and pedestrian amenities?	✓					
2. Does the development plan emphasise on "Walk to Live Work and Play" model of development?	✓					
3. Is there some provision for providing incentives for the development of						✓

walkable neighbourhood?						
4. Does the development plan illustrate any model for walkable neighbourhood?						✓
5. Does the development plan emphasize on the provision of schools and other social amenities with in walkable distance?	✓					
Score out of 25	15					
Principle 3: Encourage community and stakeholders collaboration						
1. Does the development plan mention how community has been involved during planning process?						✓
2. Does the development plan have any provision describing the collaboration of stakeholders and community?						✓
Score out of 10	0					

Principle 4: Foster distinctive ,attractive communities with a strong sense of place						
1. Does the development plan encourage the promotion of particular architectural style in an area?						✓
2. Does the development plan support the preservation conservation of historic buildings and area?						✓
3. Does it have regulations to prevent the unaesthetic development in specific area?				✓		
4. Do the policies in the development plan encourage the development of public spaces in the new development?			✓			
Score out of 20	5					
Principle 5: Make development decisions predictable ,fair and cost- effective						
1. Does the development plan provide policies and				✓		

guidelines for development authority to coordinate with other agencies which provide utility?						
2. Are the development regulations and bylaws made available to developers and the public?	✓					
3. Does the development plan provide financial details for the provision of utility?						✓
Score out of 15	7					
Principle 6: Mix land use						
1. Does the development plan permit mix landuse?				✓		
2. Does the development plan have an appropriate regulation for mix landuse?	✓					
3. Does the development plan favour TOD?	✓					
Score out of 15	12					

Principle 7: Preserve open space, farmland, natural beauty and critical environmental areas						
1. Does the plan include maps containing ecologically sensitive area and farmlands?	✓					
2. Does the plan provide policies for preserving ecologically sensitive area and farmlands?						✓
3. Does the plan have policies for providing incentives for developers who preserve more open space during development?						✓
4. Does the plan contain strict measures to prevent development near water bodies and wetland?						✓
5. Does the by laws provide for adequate buffer around wetlands, ecologically sensitive area and farmlands?			✓			
Score out of 25	8					

Principle 8: Provide variety of transportation						
1. Does the development plan evaluate the present travel demand for various modes of transport?						✓
2. Does the policy in development plan encourage multimodal transportation system?		✓				
3. Does the development plan provide strategies for development of public transportation system?	✓					
4. Does the development plan support policies for compulsory development of sidewalks and bicycle paths in new development?	✓					
5. Does the development plan talk about the hierarchy of street network with respect to development?	✓					
6. Does the development plan support policies for retrofitting sidewalks in existing development?						✓
Score out of 30	19					

Principle 9: Strengthen and direct development towards existing communities						
1. Does the development plan promote infill development?						✓
2. Does the development plan promote redevelopment of brown field and grey fields?						✓
3. Is there provision for increasing the existing densities?						✓
4. Does the development plan indicate priority development area?						✓
Score out of 20	0					
Principle 10: Take advantage of compact building design						
1. Does the development plan promote high rise development?						✓
2. Are some incentives provided for developing compact development?						✓
Score out of 10	0					
Total Score out of 200	73					

The evaluation attempts to measure how much is the development plan of Maraimalai Nagar consistent with the smart growth principle. From the evaluation the score out of 200 is 73. The score shows that there is no focus on Smart growth approach to development. From the above evaluation it is clear that the development plan lacks smart growth approach to development and there is lot of scope for application of smart growth principle in Maraimalai Nagar. From the evaluation of development plan it is clear that it lays emphasise on the principle like creating a walkable environment, creating variety of transportation options and promoting mix landuse, to see how of these aspects mentioned in the development plan are translated on ground a field study was done and the current trends of development in Maraimalai Nagar is studied.

6.6 Existing Development in Maraimalainagar

6.6.1 Introduction

Residential and industrial layout has been developed by CMDA in about 1200 acres. The government had notified 3000 Ac of lands for development including patta lands, Government poramboke land about 1150Ac of patta lands have been acquired and 693 Ac. of reserved forest land had been taken up for development. [39] The original plan envisaged for the development of 10 residential neighbourhoods with industrial area but later the development plan was modified to provide for more Industrial area. Only three neighbourhoods were developed. To attract industries and to provide economic base for the township in 1996, 270 acres of land was handed over to MFIL and a MOU was signed with Mahindra Ford India Ltd., for establishing an Automobile Industry. [39] The establishment of Ford industry acted as a catalyst for attracting population to Maraimalai Nagar.

6.6.2 Demography

According to 2001 India census population of Maraimalai Nagar was 48,463. [40] The male constitute 52% of the total population and the female constitute 48% of the total population. The table below gives the detail of the population of Maraimalai Nagar. (Refer Table 6.6)

Table 6.6: Population in Maraimalainagar

Population	Male	Female
48463	25309	23154

Source: http://municipality.tn.gov.in/Maraimalainagar/salient_population.html

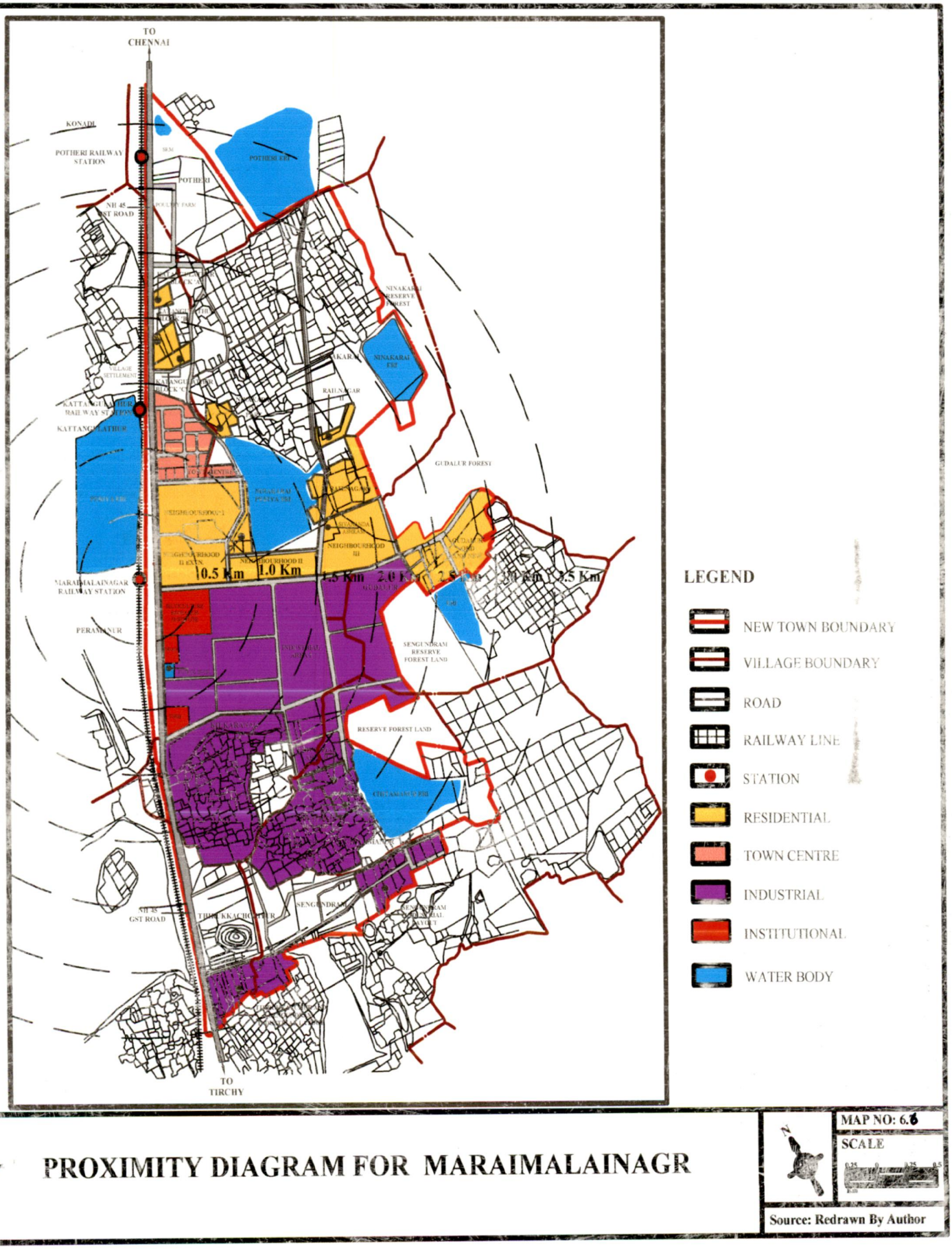
6.6.3 Landuse Development

The neighbourhood I and the town centre are located exactly opposite to the Maraimalai Nagar railway station. The industrial site is located on the south abutting the railways and highways the institutional area is located east of industrial area the Residential area is located such that 90% of the residential area is with in 2 km of town centre. The highway and the railway provide fast and convenient access and there is a service road running parallel to national highway which provides access to the town. The proximity map showing the distances and the development in Maraimalai Nagar is illustrated. (Refer Map 6.6)

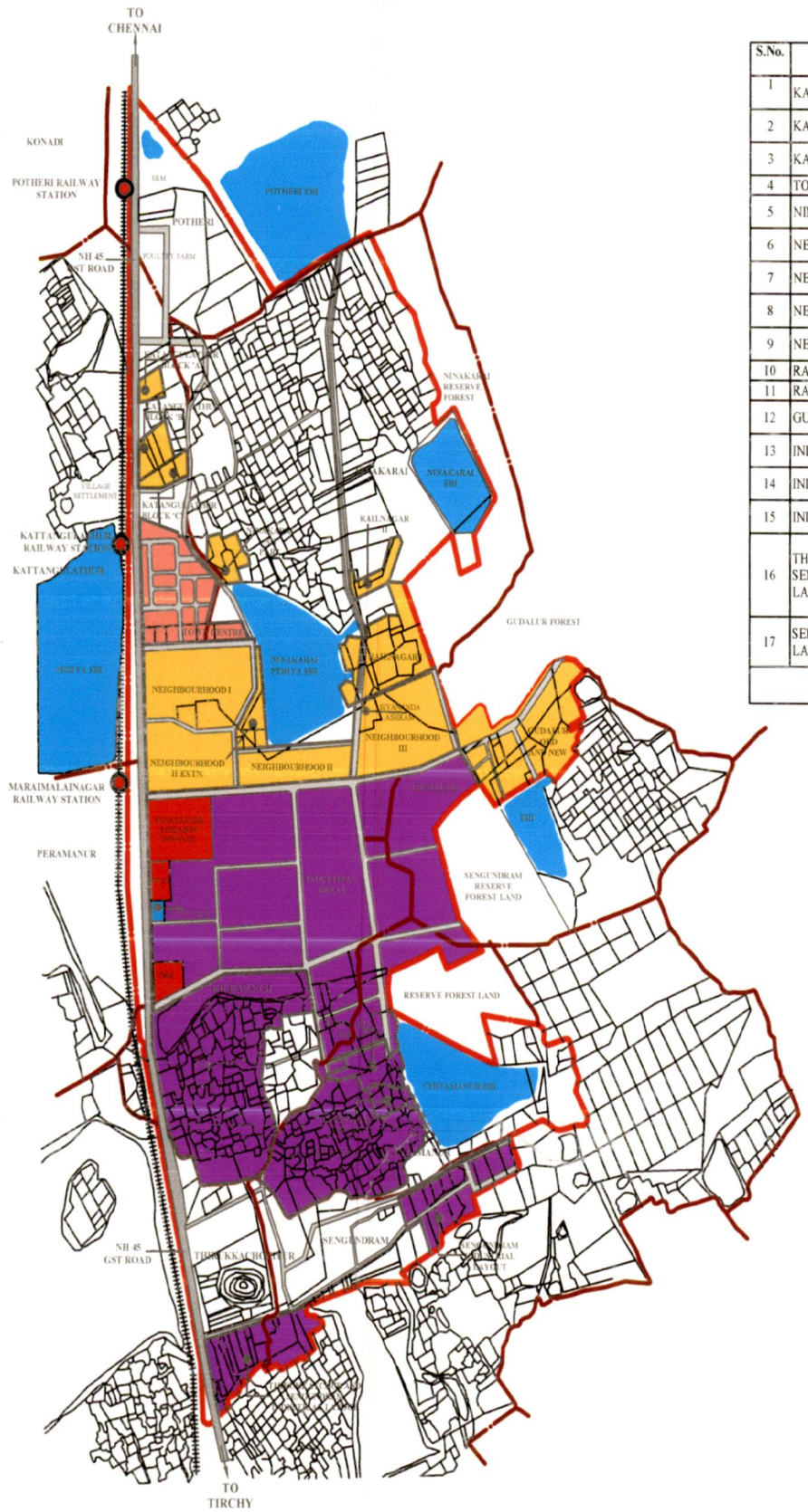
The table below (Refer Table 6.7) gives an overview on the development of Maraimalai Nagar. The map illustrates the present development in Maraimalai Nagar. (Refer Map 6.7) It shows the proposed development in the plan period and what is actually achieved. The table gives an overview of the landuse development which has occurred till now. The detailed development plan was prepared for a period till 1991 no detailed development plan was prepared for the development. The second master plan mentions reduction in the notified area and details on the area of proposed land use are not available. The table shows the slow pace of development in Maraimalai Nagar.

Table 6.7: Development of Maraimalainagar at a Glance

Sl. No.	Plan Features	Development Plan 1991 (1971-1991)	Present Development	Remarks
1.	Notified area in development plan	1318.35 ha	1214 ha	The notified area for development was reduced due the problem of acquisition of land for development.



PROXIMITY DIAGRAM FOR MARAIMALAINAGR



S.No.	NAME OF LAYOUT	AREA DEVELOPED IN Ha
1	KATTANKULATHUR BLOCK 'A'	24.28
2	KATTANGULATHUR BLOCK 'B'	
3	KATTANGULATHUR BLOCK 'C'	
4	TOWN CENTRE	29.95
5	NINAKARAI NH PART	5
6	NEIGHBOURHOOD I	53.82
7	NEIGHBOURHOOD II	23.47
8	NEIGHBOURHOOD II EXT	5.26
9	NEIGHBOURHOOD III	35.61
10	RAILNAGAR I	14.97
11	RAILNAGAR II	2.25
12	GUDALUR OLD AND NEW	28.73
13	INDUSTRIAL AREA I	364.22
14	INDUSTRIAL AREA II	
15	INDUSTRIAL AREA III	
16	THIRUKKATCHUR AND SENGUNDRAM INDUSTRIAL LAYOUT	44.56
17	SENGUNDRAM INDUSTRIAL LAYOUT	8.90
	TOTAL	641.02

LEGEND

- NEW TOWN BOUNDARY
- VILLAGE BOUNDARY
- ROAD
- RAILWAY LINE
- STATION
- RESIDENTIAL
- TOWN CENTRE
- INDUSTRIAL
- INSTITUTIONAL
- WATER BODY

PRESENT DEVELOPMENT IN MARAIMALAINAGR

MAP NO: 6.7

SCALE

0.25 0 0.25 0.5 KM

Source: Redrawn By Author

2.	No. of phases of development.	-	-	The development plan does not mention the phases of development except the first phase of development and the period of first phase of development is not mentioned
3.	Area to be developed in development plan period	1318.35 ha (Urbanisable area)	1214 ha	-
4.	Area actually developed	435 ha (1995)	645.02 ha (2009)	The target set in the plan period is not achieved.
5.	Percentage of actually developed area to the area to be developed in the development plan period.	33%	53.13%	The percentage figure indicates slow pace of development.
6.	Designated population for the plan period. (20 years)	1,00,000	-	The Ultimate population to be achieved is 3,00,000
7.	Actual population achieved during the plan period.	33,000[41] (1991 Census)	48463 (2001Census) 72,000 (Present population 2009)	The population of 1, 00,000 could not be achieved after more than 30 years of development of the township.
8.	Percentage of the actual population to the designated population.	33%	-	The township development could not attract much population.
9.	Land use development			
	• Residential			
	Proposed	542.50 ha	-	Initially 10 residential

	Actually developed	170 ha (1995) [41]	193.39 ha	neighbourhoods were planned but only three were executed. The residential development initially could not attract the population and as the residential plots were sold on no-profit/no-loss basis the necessary fund for development could not be generated thus the residential landuse was reduced.
	Percentage	31.34%	-	
	• Industrial			
	Proposed	161.02 ha	-	The percentage of industrial use was increased during the plan period to generate revolving fund for development.
	Actually developed	240 ha (1995) [41]	421.68 ha	
	Percentage	149%	-	
	• Institutional			
	Proposed	103.20 ha	-	Only the already existing institutions during the inception of the project were present and no new institutional development took place during the plan period. At present schools, hospitals, post-office etc are developed with in the neighbourhood.
	Actually developed	0 ha (1995) [41]	-	
	Percentage	0%	-	
	• Recreational			

	Proposed	58.47 ha	-	No exclusive recreational spaces have been developed. Parks in the neighbourhood are the only recreational open space available at present.
	Actually developed	0 ha (1995) [41]	-	
	Percentage	0%	-	
	• Town centre			
	Proposed	48.77 ha	-	The town centre was not developed as in the development plan. Now even residential developments are included in the development plan.
	Actually developed	25 ha (1995) [41]	29.95 ha	
	Percentage	51.26%	-	

Source: By Author

6.6.4 Infrastructure and Other Facility Development

The study of the infrastructure facilities is carried out to see how far the development in Maraimalai Nagar fulfils the smart growth principle.

Road

There is a service road along the NH and the service road is interconnected in the east-west direction approximately at 1km distance.

Fig 6.2: Road Abutting Neighbourhood

Photo credit: Author

Fig 6.3: Road in Industrial Area

Photo credit: Author

The right of way of the spinal road is 36.75m and the east west road is 31m. The peripheral roads of the neighbourhood are 24.5m. The road abutting the neighbourhood has huge trees on both side of the road. (Refer Fig 6.2) The town centre and industrial area are flanked by 31m roads. (Refer Fig 6.3) The total number of streets is about 1402 and length of streets 160.2km

Water supply

Piped water supply is provided to the housing units and water supply by hand pumps and water tanks are provided. (Refer Fig.6.4 and Fig 6.5) Maraimalai Nagar has its own water purification plant. (Refer Fig.6.6 and Fig 6.7) Number of water supply service connections is about 3525 and number of public fountains is about 1255. The per capita supply of water is about 76Lpcd. Maraimalai Nagar is divided into four distribution zones. There are about 26

Fig 6.4: Water Supply by Tanks Located At Various Places With in the Neighbourhood

Photo credit: Author

Fig 6.5: Water Supply by Hand Pumps

Photo credit: Author

Fig 6.6: Water Treatment Plant

Fig 6.7: Water Treatment Plant

Photo credit: Author

Photo credit: Author

OHT and one under ground sump with a total capacity of 5 lakh litres. The number of streets covered with piped water supply is 1402 streets. The population covered by public fountains is 28463 and the quantity of water supplied through public fountains is 13.4 lakhs litres. For piped water supply Rs.20 is charged per month from each housing unit by the municipality.

Sewerage

The under ground sewerage system for domestic sewage is it being installed by Tamilnadu Water supply and Drainage board. Some wards have underground sewage system. The town centre ward 4, 5, 6, 7, 8 and part of ward 3 are served by underground sewage system and the sewage is treated in sewage treatment unit and there is an oxidation pond and pumping station for the treatment of domestic sewage. (Refer Fig.6.8 and Fig.6.9)

Fig 6.8: Pumping Station

Photo credit: Author

Fig 6.9: Pumping Station and Oxidation Pond

Photo credit: Author

Solid Waste Management

Door to door collection is carried out in the residential area regularly and the streets are cleaned daily by the workers, but the township lacks in the provision of dustbins and thus the

Fig 6.10: Garbage Collecting Vehicle

Photo credit: Author

garbage is thrown on the road side creating an unpleasant environment. The figure shows the garbage collecting vehicle. (Refer Fig 6.10)

Electric power

The electric power to the town is made available from the state grid. Both H.T and L.T Power is made available for industries.

Housing

The table below (Refer Table 6.8) gives an overview of residential development of Maraimalai Nagar. The data of the number of housing units and the land area was obtained from CMDA. From the table it is clear that more than 50% was allocated for low income group. The figure below shows the housing units developed. (Refer Figure 6.11 and Figure 6.12)

Table 6.8: Overview of Residential Development in Maraimalainagar

NEIGHBOURHOOD	LAND AREA IN ha	Housing units per ha	HIG		MIG		LIG		EWS		TOTAL	%
			ODP	RBH	ODP	RBH	ODP	RBH	ODP	RBH		
1. NH I	53.82	37.4	98	0	343	0	942	358	272	0	2013	36.7
			(4.9%)	(0%)	(17%)	(0%)	(46.8%)	(17.8%)	(13.5%)	(0%)		
			(4.9%)		(17%)		(64.6%)		(13.5%)			
2. NH II	23.47	28.24	0	0	147	30	234	252	0	0	663	12.1
			(0%)	(0%)	(22.2%)	(4.5%)	(35.3%)	(38%)	(0%)	(0%)		
			(0%)		(26.7%)		(73.3%)		(0%)			
3. NH III	35.61	30.8	98	0	223	0	255	252	269	0	1097	20
			(8.9%)	(0%)	(20.3%)	(0%)	(23.3%)	(23%)	(24.5%)	(0%)		
			(8.9%)		(20.3%)		(46.3%)		(24.5%)			
4. BLOCK A			24	0	28	0	32	0	0	0	84	1.5
			(28.6%)	(0%)	(33.3%)	(0%)	(38.1%)	(0%)	(0%)	(0%)		
			(28.6%)		(33.3%)		(38.1%)		(0%)			
5. BLOCK B	24.28	14.45	0	0	13	0	154	0	0	0	167	3
			(0%)	(0%)	(7.8%)	(0%)	(92.2%)	(0%)	(0%)	(0%)		
			(0%)		(7.8%)		(92.2%)		(0%)			
6. BLOCK C			0	0	30	0	70	0	0	0	100	1.8
			(0%)	(0%)	(30%)	(0%)	(70%)	(0%)	(0%)	(0%)		
			(0%)		(30%)		(70%)		(0%)			
7. RAIL NAGAR I	14.97	22.57	54	0	196	0	88	0	0	0	338	6.2
			(16%)	(0%)	(58%)	(0%)	(26%)	(0%)	(0%)	(0%)		
			(16%)		(58%)		(26%)		(0%)			

8. RAIL NAGAR II	2.25	23.55	0	0	0	0	53	0	0	0	53	1
			(0%)	(0%)	(0%)	(0%)	(100%)	(0%)	(0%)	(0%)		
			(0%)		(0%)		(100%)		(0%)			
9. NINNAKARAI I	4.97	26.36	0	0	68	0	63	0	0	0	131	2.4
			(0%)	(0%)	(52%)	(0%)	(48%)	(0%)	(0%)	(0%)		
			(0%)		(52%)		(42%)		(0%)			
10. GUDALUR I	28.73	15.66	41	0	153	0	194	0	62	0	450	8.1
			(9.1%)	(0%)	(34%)	(0%)	(43.1%)	(0%)	(13.8%)	(0%)		
			(9.1%)		(34%)		(43.1%)		(13.8%)			
11. GUDALUR II	364.2	-	0	0	0	0	0	0	303	0	303	5.5
			(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(100%)	(0%)		
			(0%)		(0%)		(0%)		(100%)			
12. TOWN CENTRE	29.95	-	39	0	52	0	0	0	0	0	91	1.7
			(42.9%)	(0%)	(57.1%)	(0%)	(0%)	(0%)	(0%)	(0%)		
			(42.9%)		(57.1%)		(0%)		(0%)			
TOTAL			**354**	0	**1253**	**30**	**2085**	**862**	**906**	0	**5490**	100
PERCENTAGE			6.5 %	0%	22.8 %	0.5 %	38%	15.7 %	16.5 %	0%		
TOTAL PERCENTAGE OF HOUSING IN EACH CATEGORY			6.5%		23.3%		53.7%		16.5%			

Note: **ODP** - Open Developed Plot; **RBH** - Ready Built House

Source: By Author

Fig 6.11: Ready Built Houses by TNHB

Photo credit: Author

Fig 6.12: Housing Developed by Owner of the Plot

Photo credit: Author

The table below (Refer Table 6.9) gives the list of infrastructure and facilities present in Maraimalai Nagar. The study of the facilities and infrastructure provides as with the information of the available infrastructure and what needs to be developed for the improvement of Maraimalai Nagar.

Table 6.9 Existing Infrastructure and Facilities in Maraimalai Nagar

Use /Facilities	No.	Present/ Available	Not present/not Available	Remarks
Housing				
1. Plotted				
• EWS	906	✓		The plots were disposed at no –profit no-loss basis. The plot sizes varied from 55m^2 to 370m^2. The construction of the houses was carried out by the individual who had purchased the plots.
• LIG	2085	✓		
• MIG	1253	✓		
• HIG	354	✓		
2. Ready built house				
• EWS	0		✓	Ready built housing scheme was not for EWS group.
• LIG	862	✓		The ready built houses were constructed by the Tamil Nadu Housing Board. Low rise buildings were constructed. The housing units were G+1 in height.
• MIG	30	✓		

Category - Height				
• Low rise		✓		The height of the buildings range from ground floor to G+2.
• Medium rise			✓	With in the town area there are no medium rise buildings.
• High rise			✓	There is no high rise building in the whole of the town area.
Mode of Housing Development				
1. Housing board or development authority developed housing		✓		The housing in Maraimalainagar is developed by CMDA and a housing scheme was done by TNHB.
2. Privately developed		✓		The individuals who have purchased the plot have constructed their housing units.
3. Cooperative housing		✓		The housing is also developed by cooperative housing society.
4. Institutional group housing			✓	There are no housing provided by the institutions in the municipal area.
5. Industries group housing			✓	The industries do not provide housing for the employees.

Rental				
1. Housing on rent		✓		Housing is available on rent. There is no governmental organisation running the rental housing scheme. The houses are rented by the private individuals (Owner of the house).
2. Women hostel	1	✓		One women hostel is located with in the town area. It is privately run.
3. Men hostel			✓	There are hostel facilities for men.
4. Institutional hostel for school	1	✓		The government school in Maraimalainagar provides hostel facilities for the SC/ST students only.
5. Institutional hostel for college/ university/ research centres			✓	There are no hostels for the institutions present near the town area. SRM university has its own hostel facility with in it's campus.
6. Hostels developed by industries			✓	There are no hostels developed by the industries for their workers.
Shopping				

1. Convenient shopping		✓		Convenient shops are located with in the neighbourhood. The shops range from small to medium size stores. Even petty shops are present in some location.
2. Neighbourhood level shopping area			✓	There is a proposal for neighbourhood level shopping centre.
3. Weekly markets			✓	There are no designated spaces for weekly market with in the town area.
4. Informal markets			✓	There are no designated spaces for informal market with in the town area. Encroachment by small shops on road side can be seen.
5. Wholesale market			✓	There is no wholesale market with in the municipal area.
Recreational				
1. Hotel	5	✓		There are five hotels and they have boarding and lodging facilities.
2. Cinema	1	✓		Sangeetha theatre is located in Katangulathur street.
3. Sports complex			✓	There is no developed sports complex with in the town area. People

				have to commute to the city to avail the facility.
4. Community centre /Marriage Hall.	2	✓		DVVP Thirumana Mandapam, Balaji Thirumana Mandapam. Located in Ward 3 and Ward 6 of Maraimalainagar.
5. Religious buildings				The religious buildings are located in the town area as well as in the municipal area.
• Temples	4	✓		
• Mosque	1	✓		
• Churches	6	✓		
6. Parks	3	✓		There are three parks located with in the neighbourhood. Periyar park, Indira Nagar park, Ilavazhaganar street Park. The parks have facility for children play. The maintenance of the park has to be improved.
7. Play grounds			✓	There is no well developed play ground in the town area. The vacant land in the town centre is used for playing cricket and other sports.
Educational				

1. Schools	8	✓		There are about eight schools located with in Maraimalainagar municipality. The schools range from nursery to higher secondary school. There are both government run as well as private schools.
2. Educational institutions	2	✓		SRM university is located in Potheri and offers education in arts, hotel management engineering and medicine . State Institute of Rural Development
3. Research and training centres		✓		• Silviculturist Research Centre • Veterinary Research Farm • Tamil Nadu Poultry Farm • Sivananda Ashram • Cashew and Euclytus oil Farm
Other facilities				
1. Post office	2	✓		Out of the two post offices one is located in

				NH I and the Kattangulathur post office is located in Potheri.
2. Bank	6	✓		State Bank of India, Indian bank, Syndicate Bank, Indian Overseas bank, Central Bank of India, and Thenmelpakkam Co-operative Bank is located in Maraimalai nagar. The Banks have ATM centres also.
3. Hospitals	5	✓		Government hospital, Surya hospital, J.S. Hospital, Rotary Hospital, S.R.M. Hospital are the hospitals located with in the neighbourhood and the municipality. S.R.M. Hospital is located in Potheri at a distance of 4.2 km from the Maraimalainagar neighbourhood I.
4. Fire station	1	✓		One fire station is located with in the town area in the industrial area of the town.
5. Police station	1	✓		One police station is located with in the town

				area in the industrial area of the town.
6. Petrol bunk	4	✓		There are two petrol bunks with in the town area and the rest is located outside. In total there are four petrol bunks with in the municipal limit.
Transportation				
1. Bus terminal	0		✓	There is no bus terminal with in the municipal limit.
2. Bus stops	11	✓		There are about ten bus stops in the municipal area on the main road and one bus stop in the town area. There are seven buses serving the town area and the number of trip is not adequate. The location of the bus stands must be re-planned.
3. Parking near bus stops			✓	There is no parking facility available for the bus stop.
4. Train station	3	✓		There are three stations located with in the municipality. They are located in Potheri,

				Katangulathur and Maraimalai Nagar the distance between them being 1.3 km from Maraimalai nagar to Katangulathur and 2 km from Katangulathur to Potheri. Thus the total distance from Potheri to Maraimalainagar being 3.3 km.
5. Parking near station		✓		There are parking facilities for two wheeler and cycle adjacent to the station.
6. Auto stand		✓		The auto stands are located at various locations. The auto are run privately and the auto stands don't have designated area and are located on the road side.
7. Pre paid Auto stand	0		✓	There are no prepaid auto stands in the whole of the municipal area.
8. Taxi stand		✓		There are few taxi stands located on the road side. The taxis are operated by private operators.

Source: By Author

The housing development in Maraimalai Nagar is a low rise development. Majority of the development is plotted development. The FAR of 1.5 is not fully utilised in many areas. The development of apartment is not seen much. Only in recent years some apartment housing development can be seen. The authorities involved in the housing development were the TNHB and CMDA. Some of the housing development was done by the cooperative society. The construction of the houses on the plot is done by the individuals who have purchased the plot and some ready built houses were constructed by the TNHB. No housing was constructed by the government for rental housing scheme. The township lacks hostel facilities.

There is no shopping centre for the township nor there a whole sale market or informal market. There is a proposal for development of shopping centre. People have to commute to city for purchasing some goods. The daily needs are meet by the convenient shops and stores present in the township. The development of organised informal market and shopping centre is essential. A recreational facility like theatres needs to be developed for the area. The facility for sports needs to be provided. The maintenance of the parks needs to be improved and more amount of space must be allocated for parks and play ground. The bus depot must be improved and the location of the bus stop on the main road must be relocated to improve the accessibility. Authorised location of auto stands and taxi stands must be provided.

6.7 Assessment of Development Plan through Observation of Design Aspects and Their Implementation

6.7.1 The Town

The township area is planned with grid iron street network. There is no historical background for the development of the town. The town was developed to decongest the city. The town is surrounded by agricultural land and reserve forest area. There is no development on the other side of the railway track. Only some unauthorised structures are present near the railway station. The development of some neighbourhood has been done beyond the town area like Gudalur, Katangulathur block A, B, C and Railnagar. Gudalur and Katangulathur still retain the rural character and though the plots are allotted most of it is not developed by the private individual and the plots are left vacant. The connecting

on private vehicle. The roads in the town area are well maintained. The low density of development is illustrated in the map using photographs. The map shows the low density pattern of development in Maraimalai Nagar. (Refer Map 6.8)

6.7.2 Buildings and Structures

There is no particular vernacular style of construction in this area. The development was done on a virgin land thus there is no building of architectural or historical importance in this site. The age of the buildings and structures in this area ranges from 0 to 30 years. No distinctive type of building front is seen in this area there is no type of common façade treatment except in some ready built housing units (Refer Fig 6.13). No distinctive colour and texture is found in the building and its surface. Each building has different colour and texture as there is no regulation for façade treatment. There is no regularity and order in the development of the streetscape some housing units and shops have occupied the right of way of the street (Refer Fig 6.14). As there is no proper space for parking the some street space is occupied by vehicles (Refer Fig 6.15). The most of the buildings are low rise buildings (Refer Fig 6.16). FSI of 1.5 is permitted in this area. The housing for LIG and EWS do not have side setbacks the building lines is continuous. The housing for HIG and MIG are supposed to provide set backs many of the housing units do not follow the regulation. Along the main road active street frontage is provided with shops on the ground floor. The frontage of the houses in residential area faces the road.

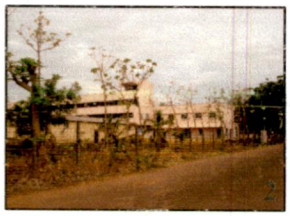
Fig 6.13: The Façade Treatment Varies from Building to Building

Photo credit: Author

Fig 6.14: The Development of the Building Does Not Follow a Single Line there is Irregularity

Photo credit: Author

tial development in Kattangulathur



A school building in the Town centre

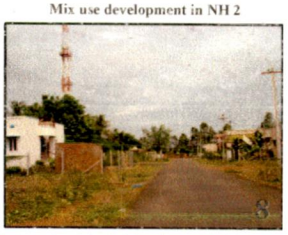
Low rise residential development in NH1

View of the Ninakarai Periya Lake

Mix use development in NH 2

Bus depot abutting NHII and NH III

Low rise residential development in NH III



Scattered residential development(Rail Naga

Development in Gudalur has rural charachter

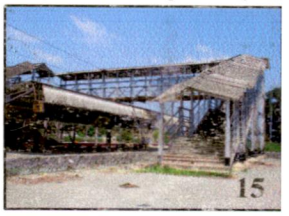
Development in Industrial area

Automobile company in Maraimalai Nagar

Maraimalainagar Railway station

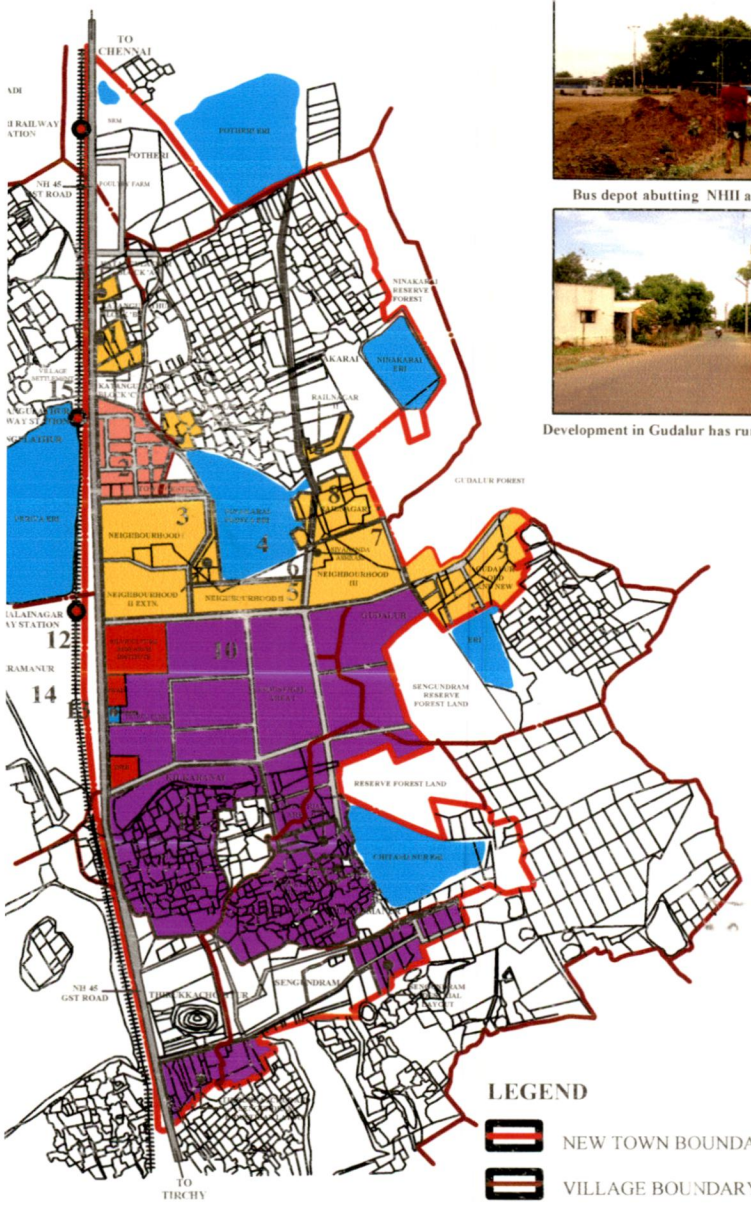
Development of slum along the railway trac

Area surrounding the railway station has no development



Kattangulathur railway station

The photos show the pattern of development in Maraimalai Nagar. Low rise low to medium density development is predominant.



LEGEND

- NEW TOWN BOUNDARY
- VILLAGE BOUNDARY
- ROAD
- INSTITUTIONAL
- RAILWAY LINE
- STATION
- RESIDENTIAL
- TOWN CENTRE
- INDUSTRIAL
- WATER BODY

ATTERN OF DEVELOPMENT IN MARAIMALAINAGR

MAP NO: 6.8

SCALE

0.25 0 0.25 KM

Source: Redrawn By Author

Fig 6.15: View of Residential Street Showing Lack of Parking Amenities

Photo credit: Author

Fig 6.16: View of Residential Street with Low Rise Buildings

Photo credit: Author

6.7.3 The Public Realm

The quality of the public realm is judged by its attractiveness, the variety of facilities available, liveliness it creates, the landscaping, the streetscape, open and green spaces safety security and maintenance of public space. There are no good mixture of uses and potential vibrant spaces. Activity can be seen in few pockets where there is mixed use with shops on ground floor and residents on first floor. The residential neighbourhoods are calm and activities are prevalent on the main streets due to its commercial character. There is no organised informal market sector.

The streetscape development is required. The streets do not have pedestrian paths and in places where they are present they are not continuous and in some streets the pedestrian paths are missing (Refer Fig 6.17 and Fig.6.18). The quality of workmanship is bad and the paving blocks are displaced and the pedestrian paths do not have universal accessibility. The planting of trees on the streets is done. More landscaping and planting is required. There are no street furniture's like seating, tree grilles, railings etc. there are no pedestrian bridges or subways to cross the main road.

Fig 6.17: View of the Street Connecting the Town to the National Highway

Photo credit: Author

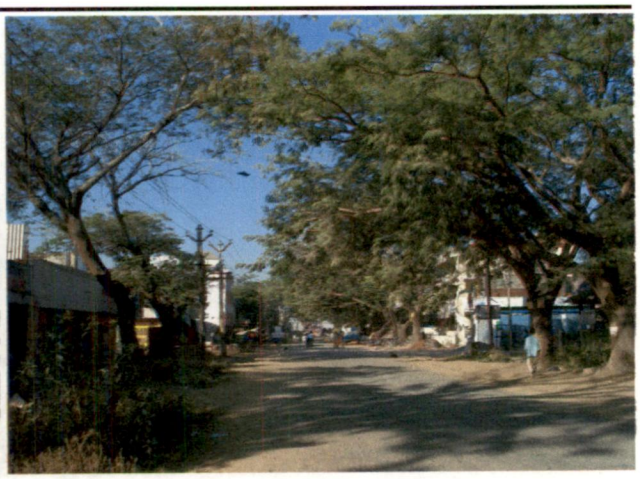


Fig 6.18: View of a Residential Street

Photo credit: Author

The public spaces are the neighbourhood parks and the open space in the town centre used as play ground. The neighbourhood parks are small and are not maintained well they are less used by the residents and the children's use it for playing (Refer Fig 6.19 and Fig.6.20).

Fig 6.19: View of Dr. Ambedkar Park

Photo credit: Author

Fig 6.20: View of Kamarajar Park

Photo credit: Author

The area around railway station and bus terminus too doesn't have much of commercial activity and are abandoned once the train or bus leaves. The existing public spaces are not pleasant and do not foster community pride or community cohesion.The maintenance of the open space and natural environment is not proper. There are many lakes with in the township area. They are not maintained and some of the lakes are being converted in to dump yards (Refer Fig 6.21 and Fig.6.22). The edges of the lake don't provide attractiveness to stroll around. The natural beauty of the place has to be maintained and some development can be made so that the residents can use the edge as public space for walking, jogging or cycling, sitting etc.

Fig 6.21: View of Lake

Photo credit: Author

Fig 6.22: Area Around Lake Converted As Dump Yard

Photo credit: Author

6.7.4 Ease of Movement

Public transport

Public transportation system is available. The Maraimalainagar Township is a perfect location in terms of public transport. With in the municipal limits there are three railway stations with in a stretch of 3.3 Km. The railway station is located at Potheri, Katangulathur and Maraimalainagar with in municipal limit. One station is located just outside the municipal limit. The stations are located at an approximate distance of Maraimalainagar to Katangulathur 1.3 km and from Katangulathur to Potheri 2 km. The railway line provides transport to both inter and intra city transport. (Refer Fig 6.23). The Potheri railway station is located near SRM institute and Maraimalainagar railway station is located near the town centre thus providing easy access to the township. Frequent bus service is also available towards Chennai city and Chengalpat and intercity bus service is also available. The bus stops are located on the service lanes of NH- 45. The view of the bus stop is shown in the figure below (Refer Fig 6.24).

Accessibility

The present and potential means of getting around the site are private vehicles like bikes cars, cycles, autos and bus service is provided but their frequency is very less. There is access to all level of mobility with in the township i.e. by cars, walk, and bicycle but not in a planned manner. The roads are not pleasant to pedestrians, bicyclist, motorist or the car users. There is accessibility to various parts of township but the design of the streets has to be improved. The access from the railway station to the township has to be improved.

Fig 6.23: Railway Line Parallel to National Highway

Photo credit: Author

Fig 6.24: Bus Stop

Photo credit: Author

Accessibility to railway stations and bus stand is not pedestrian friendly. The railway station is located on the opposite side of the road. The pedestrian amenities are not well developed. People have to wait for a long time to cross the road. There are no pedestrian subways, sidewalks or traffic signals to ensure safety of the pedestrian. The location of the bus stand is far from the railway station and no feeder bus service to the township from the railway station is available. The bus stand on the national highway is located far from the township. The number of bus stand must be increased and at located at favourable location and must be in easy access to the residential neighbourhood and the industrial area.

Safety, comfort, maintenance and frequency of public transportation

The train offers quick, comfortable and pollution free transportation mode. In a day there are about 33 services towards Tambaram and 34 services towards Chengalpat. The train service begins at 4:21 am to 12pm. The service during peak hour is more with a frequency of 15 to 20 minutes and during lean hours it varies from 30 minutes to 60 minutes. The bus services are more frequent when compared to train. The buses are overloaded during peak hours. The area surrounding the railway station is not maintained well and the access way to the railway station are not clean and tidy (Refer Fig 6.25 and Fig.6.26). There are not much activity surrounding the railway station and thus they do not provide a safe environment. The platform lacks amenities of drinking water fountains, dust bins etc. (Refer Fig 6.27). Slums have developed in the area surrounding the railway station (Refer Fig 6.28).

Fig 6.25: Access way to the Railway Station From the Main Road.

Photo credit: Author

Fig 6.26: Unpleasant Entry to the Railway Station.

Photo credit: Author

Fig 6.27: Railway Station Platforms Lacking Amenities.

Photo credit: Author

Fig 6.28: Development of Slums Near the Railway Station

Photo credit: Author

Sidewalks

The side walks are not there only few areas have side walks and that to not maintained or encroached upon by vendors or interrupted by electric poles and trees or encroachments by house owners. The pedestrian and vehicular movement is not segregated and sidewalks exist only in few places. There is good permeability to the site but the area is not connected within and to the surrounding by pedestrian network. The pedestrian amenities have to be improved with proper street trees, street furniture, street lights and side walks. Universal accessibility should be provided. The hard landscaping must be planned and the quality of workmanship and materials used for paving and kerbs must be checked and ramps must be provided in the side

walk at appropriate location for easy accessibility for all. The conditions of the sidewalk are shown in the figure below (Refer Fig 6.29 to Fig 6.34).

Fig 6.29: Encroached Sidewalks
Photo credit: Author

Fig 6.30: Discontinuous Sidewalks
Photo credit: Author

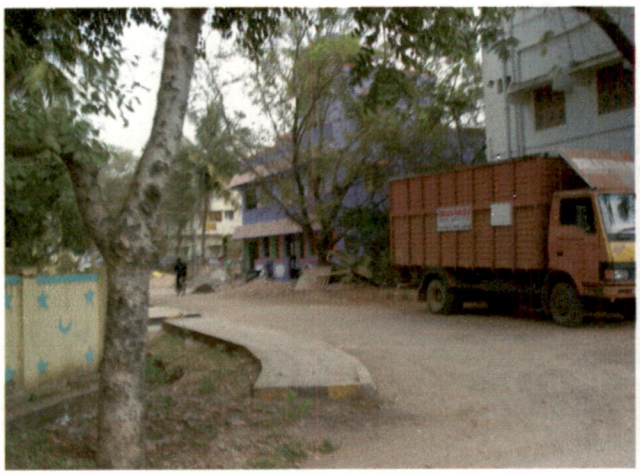


Fig 6.31: Discontinuous Sidewalks
Photo credit: Author

Fig 6.32: Sidewalks Not Maintained
Photo credit: Author

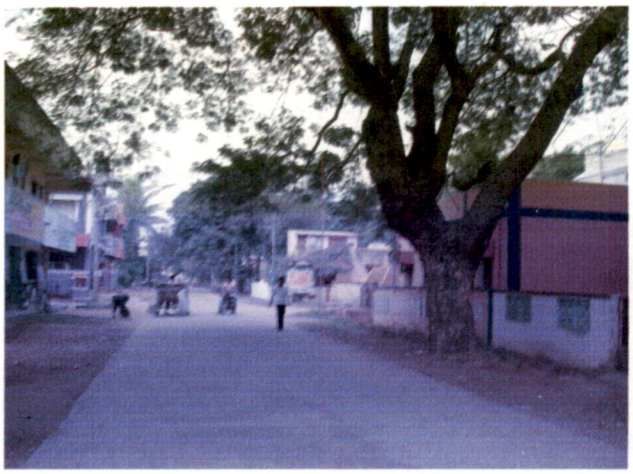


Fig 6.33: No Sidewalks in the Neighbourhood
Photo credit: Author

Fig 6.34: No Sidewalks in the Road Connecting the Residential Area
Photo credit: Author

Bicycle paths

There are no separate bicycle pathways or bicycle lanes on the road. There is no cycling facility with in the township. The school going children, the industrial labour and other bicycle users have to move with other vehicles on the road. The figure below shows the plight of the bicycle users. (Refer Fig 6.35 and Fig 6.36)

Fig 6.35: Conflict of Vehicular, Cyclist and Pedestrian Traffic

Photo credit: Author

Fig 6.36: Conflict of Vehicular, Cyclist and Pedestrian Traffic

Photo credit: Author

Road surface

The road surfaces are not maintained and have many potholes (Refer Fig 6.37). Some of the roads are being relayed (Refer Fig 6.38). The roads have been dug up for laying sewer lines.

Fig 6.37: Bad Road Surface

Photo credit: Author

Fig 6.38: Road under Construction

Photo credit: Author

Parking

The need for parking is there as the houses do not have their own parking area and they park on the roads thus occupying road space and creating congestion on the road. The railway station provide parking space for vehicles which is charged (Refer Fig 6.39). The bus terminus with in the township do not have adequate parking space and the vehicles are parked haphazardly (Refer Fig 6.40).

Fig 6.39: Parking Near Railway Station

Photo credit: Author

Fig 6.40: Parking Space Near Bus Stand.

Photo credit: Author

6.7.5 Legibility

There are no landmarks with in the township. The township does not have much aesthetic quality. There is no skyline developed as there are low rise buildings. There are no planned activity nodes with in the township. The building regulation doesn't provide much opportunity for diversity and mix of landuse. The street names are mentioned on sign boards but are there only in Tamil language. The town map should be located at strategic points so that a new comer can easily locate himself. The streets must be provided with traffic signage's also.

6.7.6 Conclusions

The assessment has helped in identifying the needs and requirements for the improvement of the township. The improvement for pedestrian facility and better accessibility must be provided. The regulation for building control must be implemented strictly. The façade

control measure must also be incorporated in the township. The public realm has to be improved. The legibility of the township must be enhanced.

6.8 Assessment by Informal Interview

An informal interview was conducted during the field survey. The respondents include the residents, shopkeepers and workers in the industries etc. The questionnaire for informal interview is given in annexure (Refer Annexure II). Most of the respondents rated the quality of life in the township as fair. Some of the residents work in the near by industrial area and the others commute to the city or Chengalpattu for work. Good schooling facility is available in Maraimalai Nagar. For higher studies people need to commute to the city or the near by S.R.M university. The respondents said that there is lack of facility of open green spaces, parks and playgrounds. The township also lacks shopping facilitates. The respondents emphasized on the development of public transportation and development of recreational facilities. The respondents were not sure of what type of growth would they prefer in and near by their township and some responded to have mix use medium rise development. There is increase in vehicular movement as there is lack of public transportation facility with in the neighbourhood. The respondents prefer using public transportation facilities if it is provided. The respondents especially the workers preferred the provision of range of housing choices as essential mainly single room accommodation or hostel facilities were their choices. The respondents said that public participation in the planning process would help to put forth their views and object to some development which they think is not required. The informal interview with the planner and other officials about the development provided necessary details required for the study and gave a perspective of how the development took place.

6.9 Problems in Development of Township

The Maraimalainagar development could not attract much population as planned and the land acquisition process was not successful for the development. The seed capital was given by the government and it was planned to simultaneously utilize the forest land for residential purpose and acquire land for industrial activity and allot the land and thus forming revolving fund which will be utilized for further development. These could be realized only partially as the forest land developed for residential activity could not attract much people without economic activity and thus the industrial area was developed first. There was problem of water supply

also. When the industrial areas developed the industrialists expected housing and other services. Thus internal funds could not be generated. The land acquisition procedure was also a failure due to the compensation policies adopted. Thus the pace of development was slow. The housing policies do not suggest compulsory housing for industrial workers with in the township. It was only after 1996 when Mahindra ford automobile industry was established some population was attracted to the town. At present the population is about 72,000 and per day floating population are about 20,000.

The land for residential purpose was sold on a freehold basis and they were sold at no-profit/ no-loss basis. The land pricing policy was not effective to create funds. There development plan does not mention the phasing of the project except the first phase of development. No development plan is made for the development of the town after the first development plan. The second master plan of Chennai mentions the development plan for Maraimalai Nagar but the description is not in detail. The landuse details are not available.

6.10 Conclusions

The site has huge potential of development by application of smart growth principles. The site already has neighbourhoods and town centre and excellent mass transit accessibility. It is essential to revitalise and redevelop the area into compact, mixed use neighbourhood with strong industrial and residential components. The Maraimalai nagar town has to be served by proper sanitary sewers and improved pedestrian friendly streets. These municipal improvements should be compatible to the land use and must be an attractive addition to town. The area around the railway station has to be improved and redeveloped and must be provided with pedestrian subways to ensure safe connection for the pedestrians to the railway station with the township. The public amenities like pathways, the streetscape and public open space needs to be enhanced in the neighbourhood. Maraimalai nagar requires landscaping enhancements and regulations for parking. The major concern is to improve the quality of life and to induce development in Maraimalainagar.

CHAPTER 7 DEVELOPMENT PROPOSALS FOR CHENNAI BASED ON SMART GROWTH

7.1 Introduction

7.2 Proposal for Chennai City and Metropolitan Area

7.2.1 Introduction

7.2.2 Demography and Density

7.2.3 Land Use Development

7.2.4 Transportation

7.3 Proposal for Chennai City

7.3.1 Introduction

7.3.2 Methodology

7.3.3 Findings from Analysis.

7.3.4 Proposals

7.3.5 Guidelines for Development of Chennai City and Metropolitan Area

7.3.6 Conclusions

7.4 Proposals for Maraimalai Nagar Township

7.4.1 Introduction

7.4.2 Requirements for Maraimalai Nagar Township

7.4.3 Strategies for Development

7.4.4 Proposals and Guidelines for High Density Predominantly Residential Development with Mix Land Use

7.4.5 Proposals for the Redevelopment of Existing Urban Area

7.4.6 Guidelines for Development of the Land Which Could Not Be Acquired By the Government

7.5 Conclusions

CHAPTER 7
DEVELOPMENT PROPOSALS FOR CHENNAI BASED ON SMART GROWTH

7.1 Introduction

The proposals for 'smart-growth-oriented-development' for Chennai city and Maraimalai Nagar Township are presented in this chapter. The proposals are based on the study made on Chennai city and Maraimalai Nagar Township. A re-planning has been attempted for Chennai city based on the accessibility to transportation corridor and density of population. For Maraimalai Nagar a plan strategy is prepared for smart-growth-oriented-development. Necessary modifications in the existing planning norms and developmental mechanisms for the application of smart growth principles in Chennai city and Maraimalai Nagar are provided.

7.2 Proposal for Chennai City and Metropolitan Area

7.2.1 Introduction

As observed from the study conducted on Chennai city it is clear that the new developments are occurring in the suburb and beyond due to cheap and ready availability of land. The development corridors of Old Mahabalipuram Road (OMR) and Grand Southern Trunk road (GST) are not concentrated and are spread over more than 20 Km. Leap frog development pattern is observed in these corridors. The public transportation has to be developed for OMR corridor and, along GST road it needs to be strengthened. The issue of affordable housing needs to be addressed. Solution to achieve compact development should be worked out as spreading of the development is not beneficial for the government as well as the people. The sprawl development puts strain on the resources and makes the development uneconomical. Certain supporting densities are required for provision of the infrastructure facilities and its viability. The sprawl development and lack of public transportation forces the people to use their own private mode of transport causing congestion, pollution and other problems. Sprawl development leads to haphazard development with little or no infrastructure facilities causing problem to the people living in such kind of development. A re-planning for

the cities has to attempted based on the integration of density (of population), landuse and transportation to solve the problem of sprawl and to create compact liveable environment.

7.2.2 Demography and Density

The existing and proposed population and densities are presented in Tables below. (Refer Table 7.1 and Table 7.2).The existing and proposed population of Chennai city and CMA are 43.43 lakhs and 70.41 lakhs; 58.56 lakhs and 125.82 lakhs respectively. As per 2001 census, the gross population density of Chennai city, with in the city corporation limits, varies from 180 persons per ha. in Saidapet and Mylapore zones to 368 persons per ha. in Kodambakkam zone. The gross average density for Chennai City is of the order of 247 persons per ha. As per the projected population demand the density of the City is anticipated to go up to 333 persons per ha. by 2026. [42] The ward wise gross density map for Chennai city is shown in the Map 7.1

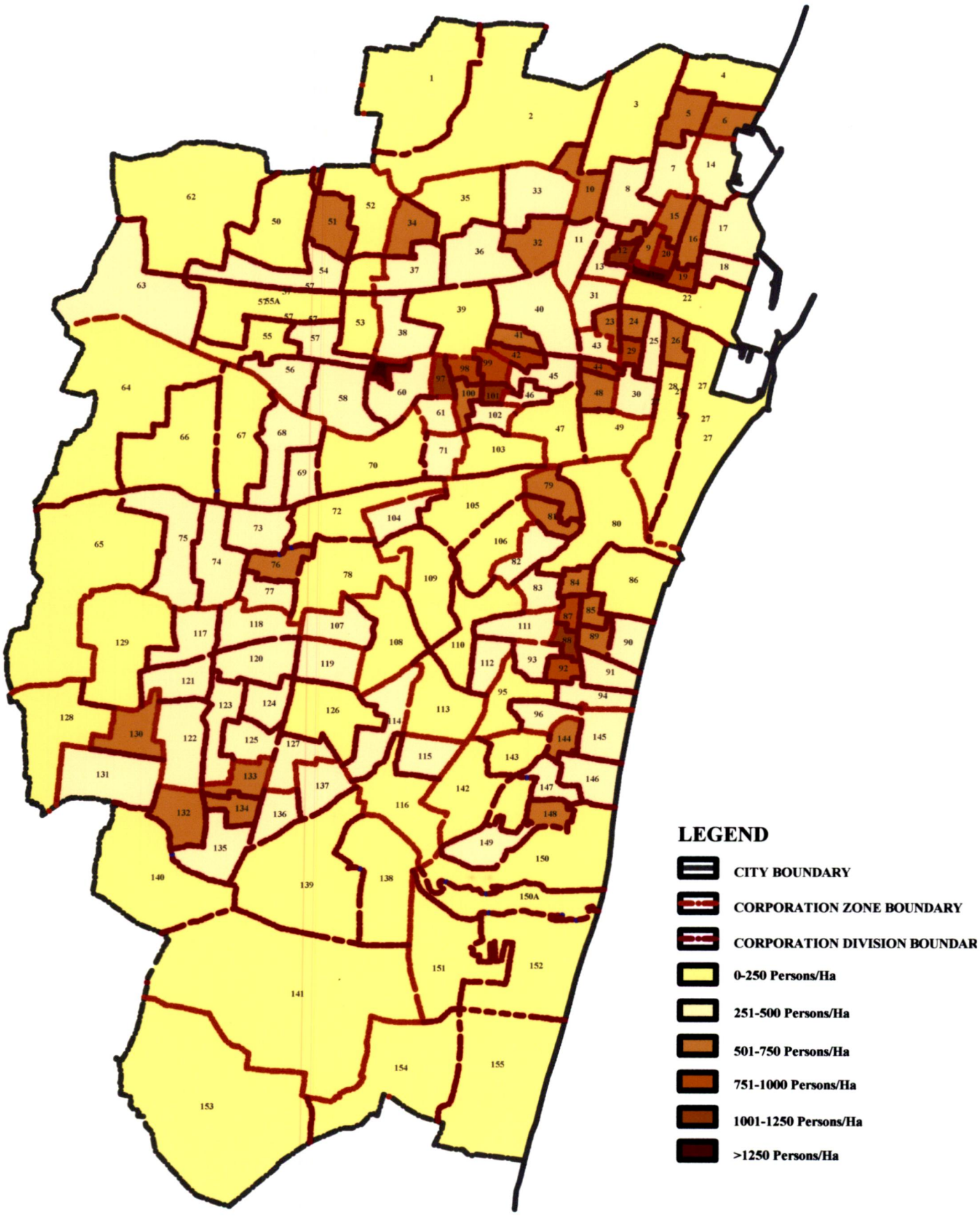
Table 7.1 Existing Population Densities as of 2001

Sl, No.	Description	Population in Lakhs	Area in ha	Gross Density Persons per ha
1.	**Chennai City**	43.43	17600	247
2.	**Densities In Outlying Areas**			
	• Municipal Towns	15.81	24000	66
	• Town Panchayats	3.86	15600	25
	• Rest of Panchayat Union Areas	7.31	61700	12
3.	**CMA Total**	70.41	118900	59

Source: Second Master Plan for Chennai Metropolitan Area, 2026

Table 7.2 Projected Population Densities for 2026

Sl No.	Description	Population in Lakhs	Area in ha	Gross Density Persons per ha
1.	**Chennai City**	58.56	17600	333



WARD WISE GROSS DENSITY OF POPULATION IN CHENNAI CITY- 2001

2.	**Densities In Outlying Areas**			
	• Municipal Towns	35.69	24000	149
	• Town Panchayats	12.22	15600	78
	• Rest of Panchayat Union Areas	19.88	61700	32
3.	**CMA Total**	125.82	118900	105

Source: Second Master Plan for Chennai Metropolitan Area, 2026

7.2.3 Land Use Development

Land is a vital and limited resource for the development of the city. Its economic and wise use is highly essential. The existing land use- 2006 and the proposed landuse for 2026 for Chennai Metropolitan Area are shown in two maps (Refer Fig.7.1 and Refer Fig.7.2 respectively).As seen from Fig.7.1 it is clear that the urban form has developed in the shape of a half star with interspersed green wedges, more like a open palm and webbed fingers. Beyond the city limit as seen from the map there are vacant lands. With the development of transportation infrastructure there is scope for development of these lands. The proposed land use shows that maximum of the vacant land being developed mainly for residential purpose. And the half star urban form will be developed as concentric half circles. The master plan mentions that the urban structure beyond the City limits is also expected to shift from a predominantly low-density low-rise development to medium density developments interspersed with high-rise buildings.

Though the master plan mentions the development of MRTS and other transportation network there is a mismatch in the land use development and many areas beyond the city limit will not be benefited by the current transportation proposals. The strategies in the master plan to achieve the objective of optimum utilisation of land, provision of efficient transportation system, decentralization of employment centres, preservation and conservation of ecologically sensitive areas and natural and built heritage are not satisfactory. The strategies suggest expansion of the city by encouraging growth outside the city and along the outer ring road. This type of development by expanding the city will increase the cost of development as well as maintenance of the city and will create accessibility, transportation and infrastructure related problems. Thus, it will be difficult to accomplish the vision 2026 of making Chennai a prime metropolis which

will become more livable, economically vibrant, and environmentally sustainable and with better assets for the future generations.

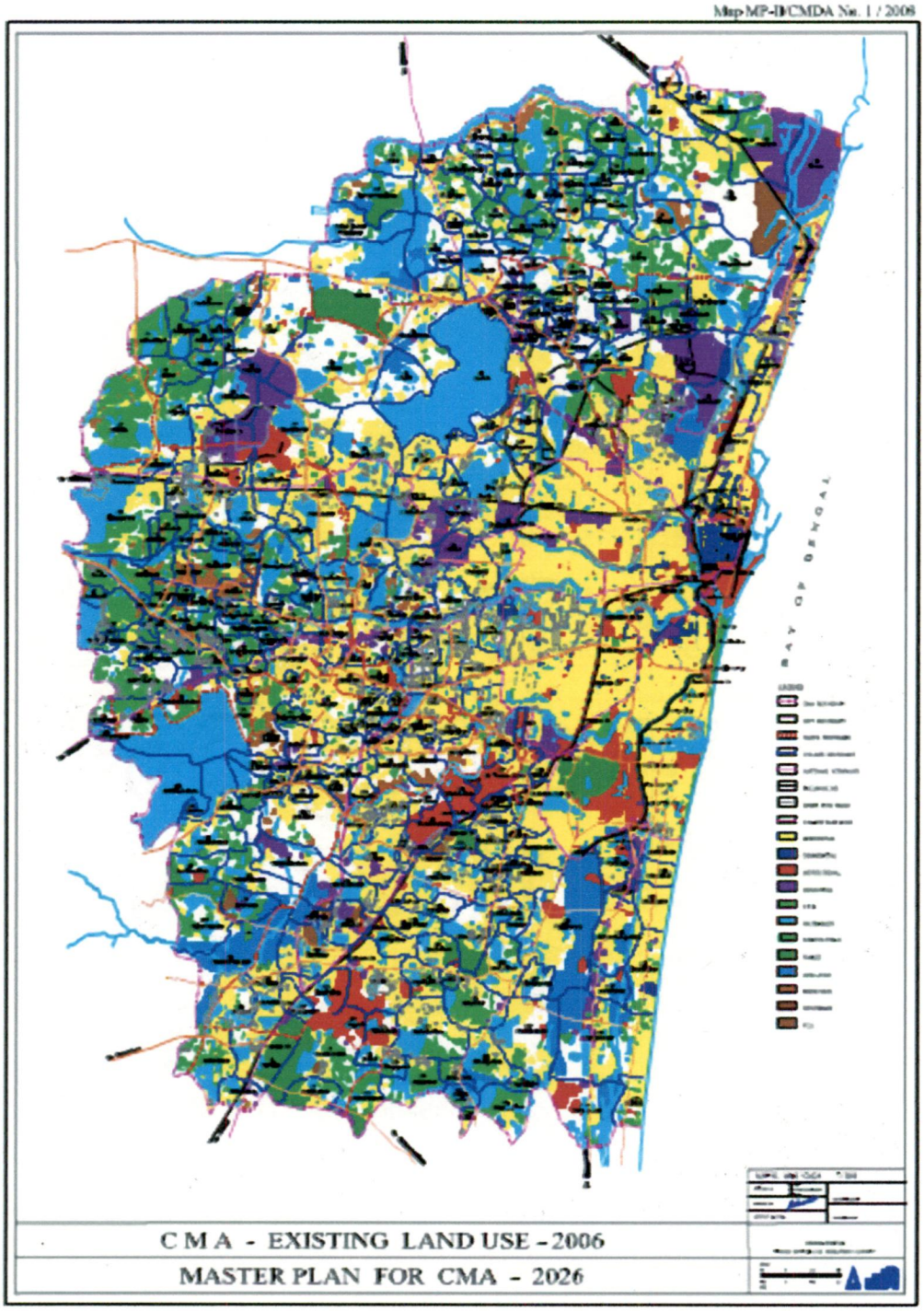


Fig 7.1: Existing Landuse of CMA 2026

Source: Second Master Plan for Chennai Metropolitan Area, 2026

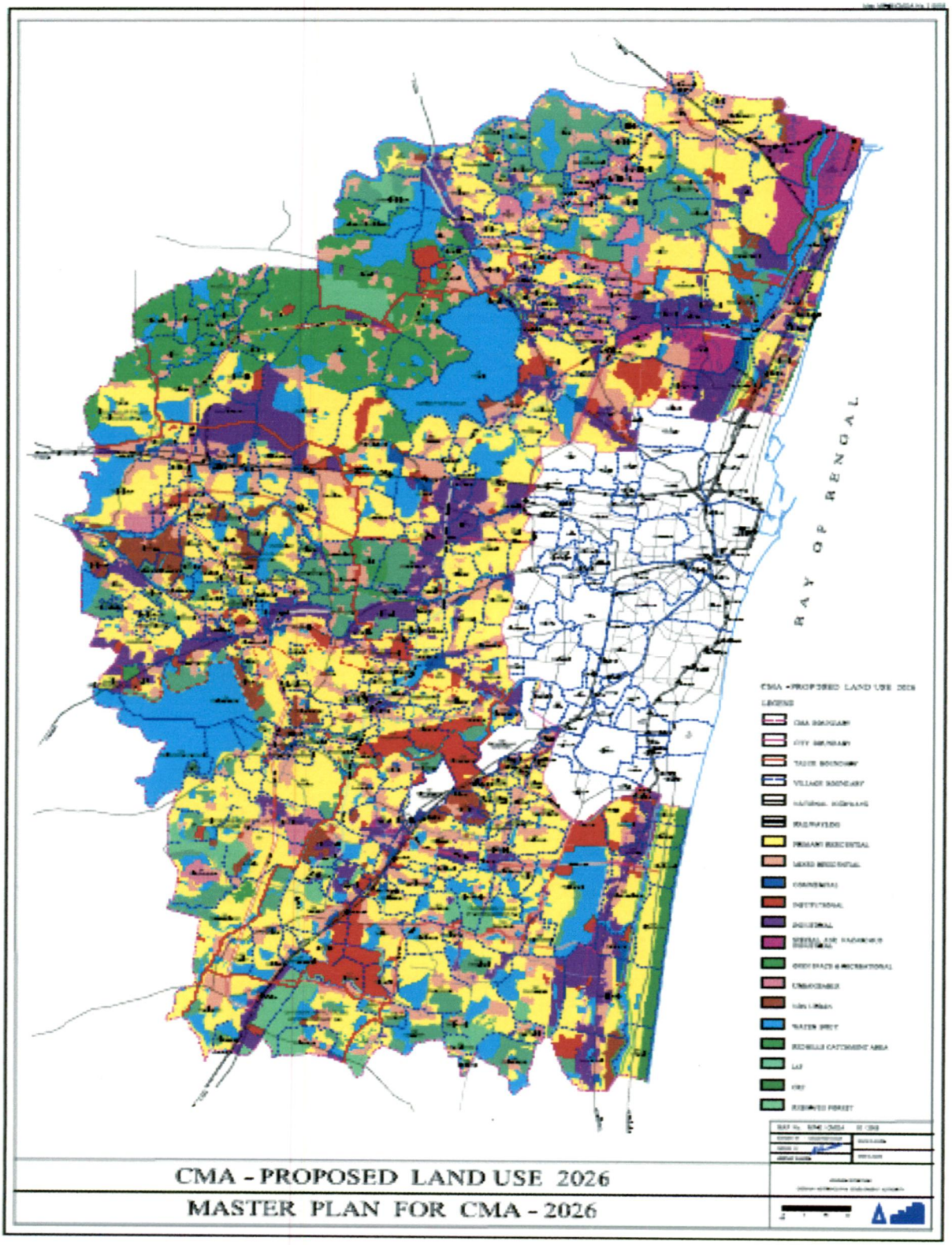


Fig 7.2: Proposed Landuse of CMA 2026

Source: Second Master Plan for Chennai Metropolitan Area, 2026

7.2.4 Transportation

The existing transportation network in Chennai city is discussed in chapter 5 in section 5.2.7. The existing transportation network is shown in the Map 7.2. The city is served by both road and rail network. The public transportation is mainly by bus and the suburban railway. MRTS corridors are also present and there are proposals for the development of new MRTS corridors. The master plan aims at increasing the modal share of the public transport and increasing the share of rail transport within the public transportation mode. The master plan aims at achieving a modal split between public and private transport from 28:72 in 2005 to 70:30 in 2026 and the sub modal split between bus and rail to change from 91:9 in 2005 to 60:40 in 2026. The policies and strategies to achieve the targets have been formulated in the master plan. The medium and long term schemes have been developed which include improving the urban rail transit system, improving the urban bus transit system, development of road network, improving pedestrian facilities, construction of multilevel car parking etc.

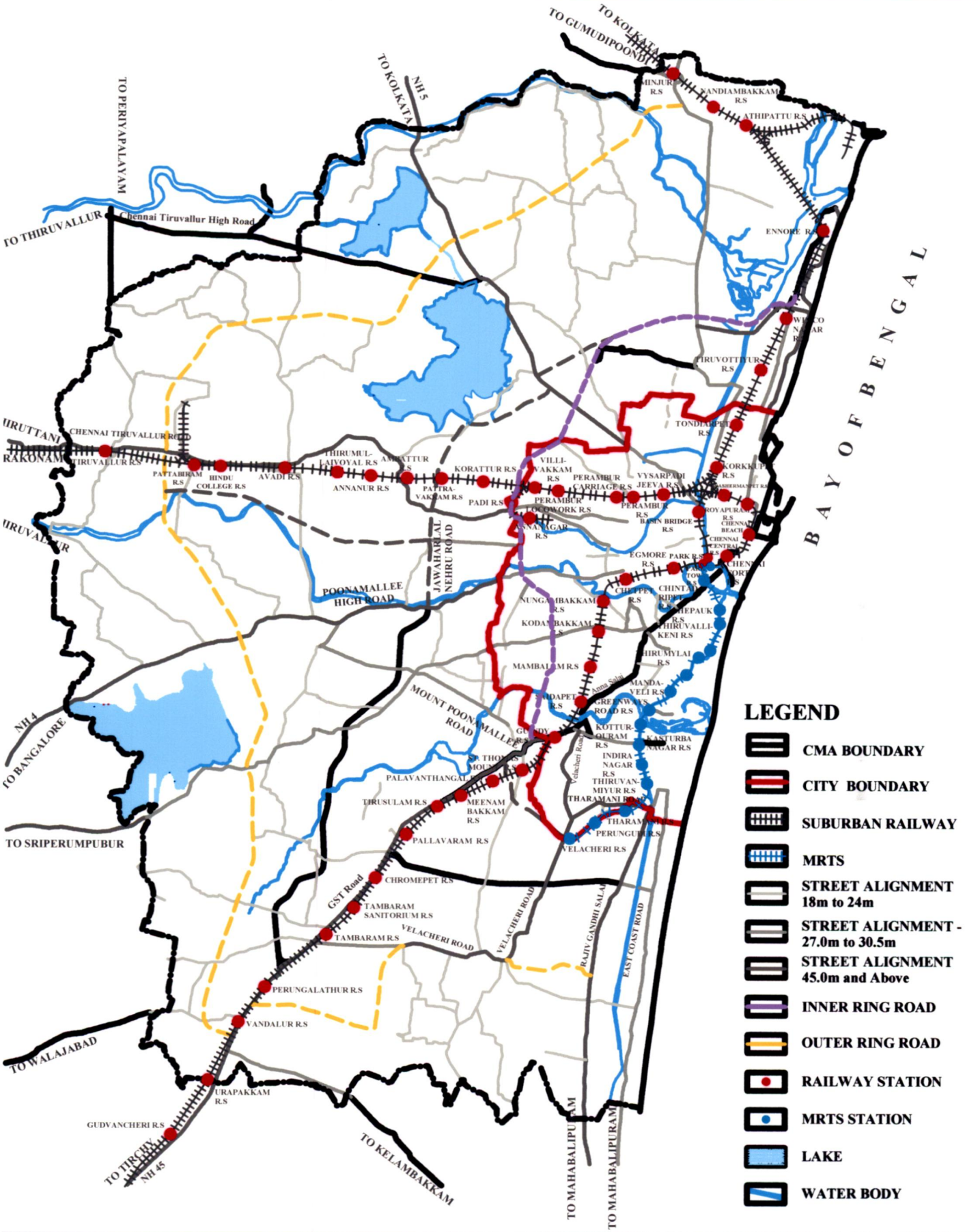
The proposal for MRTS corridors as mentioned in the detailed project Report Chennai Metro Rail Project are as follows [43] UG represents underground land EL represents elevated line.

Corridor -1: Washermanpet – Chennai Central –Airport

Washermanpet (UG) – Mannadi (UG) - Chennai Fort (UG) – Chennai Central (UG) – Egmore (UG) - LIC Building (UG) - Thousand Lights (UG) - Gemini (UG) – Teynampet (UG) – Chamiers Road (UG) – Saidapet (EL) - Velacheri Road (EL) – Guindy (EL) – Alandur (EL) - Officers Training Institute (EL) - Indian Airlines Colony (EL) – Meenambakkam Chennai Airport (EL).

Corridor -2: Chennai Fort – Anna Nagar – St Thomas Mount

Chennai Fort (EL) – Chennai Central (EL) – Vepery (EL) – Shastri Nagar (EL) – Kilpauk Medical College (EL) – Aminjikarai (EL) - Shenoy Nagar (EL) - Anna Nagar East (EL) - Anna Nagar Tower (EL) – Tirumangalam (EL) – Koyambedu (EL) – Chennai Mofussil Bus Terminal (EL) – Arumbakkam (EL) – Vadapalani (EL) - Ashok Nagar (EL) – KK Nagar (EL) - Sidco Industrial Estate (EL) - Alandur (EL) – St Thomas Mount (EL)



LEGEND

- CMA BOUNDARY
- CITY BOUNDARY
- SUBURBAN RAILWAY
- MRTS
- STREET ALIGNMENT 18m to 24m
- STREET ALIGNMENT - 27.0m to 30.5m
- STREET ALIGNMENT 45.0m and Above
- INNER RING ROAD
- OUTER RING ROAD
- RAILWAY STATION
- MRTS STATION
- LAKE
- WATER BODY

ROAD AND RAIL NETWORK IN CHENNAI METROPOLITAN AREA

MAP NO: 7.2

SCALE 1.0 0 1.0 2.0 Km

Source: Redrawn By Author

The table below (Refer Table 7.3) gives the detail of route length and number of stations in corridor – 1 and corridor -2.

Table 7.3 Route Length and Number of Stations for Proposed MRTS

Description	Length		Number of stations		Total	
	Underground	Elevated	Underground	Elevated	Length	Stations
Corridor - 1	14.250	8.805	11	7	23.055	18
Corridor - 2	00.00	23.449	00	19	23.449	19
					46.504	37

Source: Detailed project Report Chennai Metro Rail Project

The proposed MRTS corridor along with the existing transportation network is illustrated in Map 7.3

7.3 Proposal for Chennai City

7.3.1 Introduction

The city development activities should enhance the quality of life of the city rather than deplete it. The transportation networks are the most important urban component connecting various parts of the city and activities. The transportation system must be efficient system and sustainable. While planning the transportation network the landuse and population density must be considered without which it becomes incapable and unsuitable.

7.3.2 Methodology

First area with population density is marked out and gross population density map is prepared. The gross density map, the existing transportation network map and the proposed MRTS corridor map for Chennai city are overlapped. The combined map is then analysed for potential for development. A proposal based on the objective of enabling maximum percentage of population to live and with in the walking distance of the transit station and to create a compact development is prepared. Proposal for additional MRTS corridors which are not present in the proposed plan is made. A re-planning has been attempted based on the density of population and accessibility to the transit station. A proposal plan map based on the residential

density and the transportation corridor is prepared and guidelines for development have been provided.

7.3.3 Findings from Analysis.

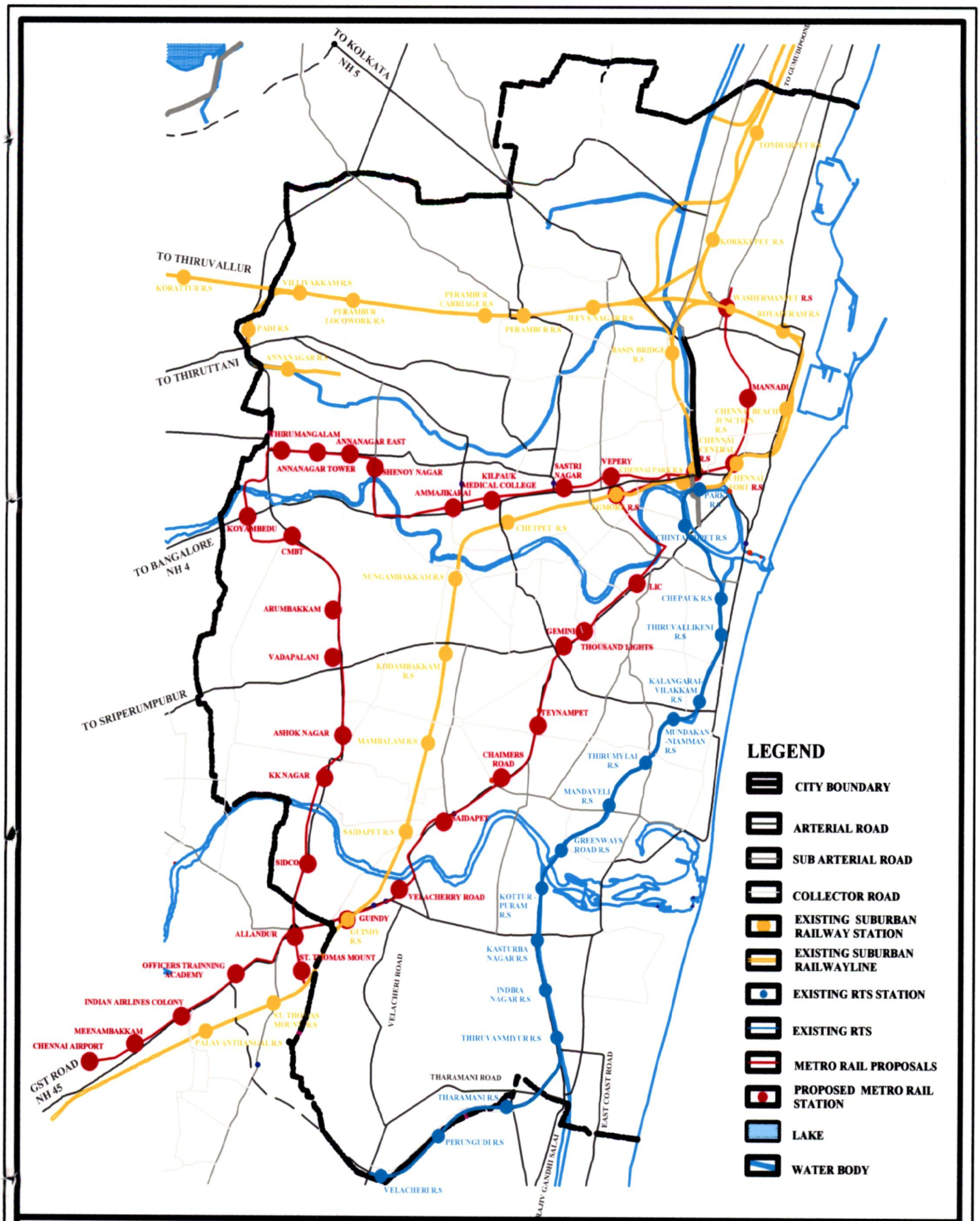
By over lapping the existing transportation network, proposed MRTS corridor and population density maps (Refer Map 7.4) the following observation are made.

1. The existing as well as the proposed rail transportation corridor does not run through high density residential area. In proposal for both corridor I and corridor II development of MRTS the MRTS passes mainly through medium and low population density wards.
2. The proposal of MRTS doesn't serve the northern part of the city.
3. The connectivity between the MRTS stations can be improved by connecting the lines by providing interchange where the corridors overlap.
4. From the point of view of the objective of enabling maximum percentage of population with in the walking distance of the transit station the existing proposal needs modification.

To meet the above objective we have to make changes in the master plan, mainly the landuse development. The proposal in the master plan does not show an integrated map with landuse, transportation network and residential density. An integrated map needs to be prepared. A map showing the development regulations including zoning and FAR based on the proposed residential and landuse density must be prepared.

7.3.4 Proposals

1. After studying the existing and proposed transportation corridors the proposal for addition of two more corridors is made so that the whole city is connected by MRTS corridors. The already existing MRTS corridor ends at Velacherry and the new MRTS corridor 1 extend up to Chennai airport. From Velachery the line can be connected to the corridor -1 so that it forms a ring. Another corridor connecting Tondiarpet and other medium density areas with Villivakkam, Annanagar and corridor II at Tirumangalam can be proposed. The additional corridors are represented by green line in the map. (Refer Map 7.5) The corridor lengths for the proposed additional corridor are 15.44 Km from



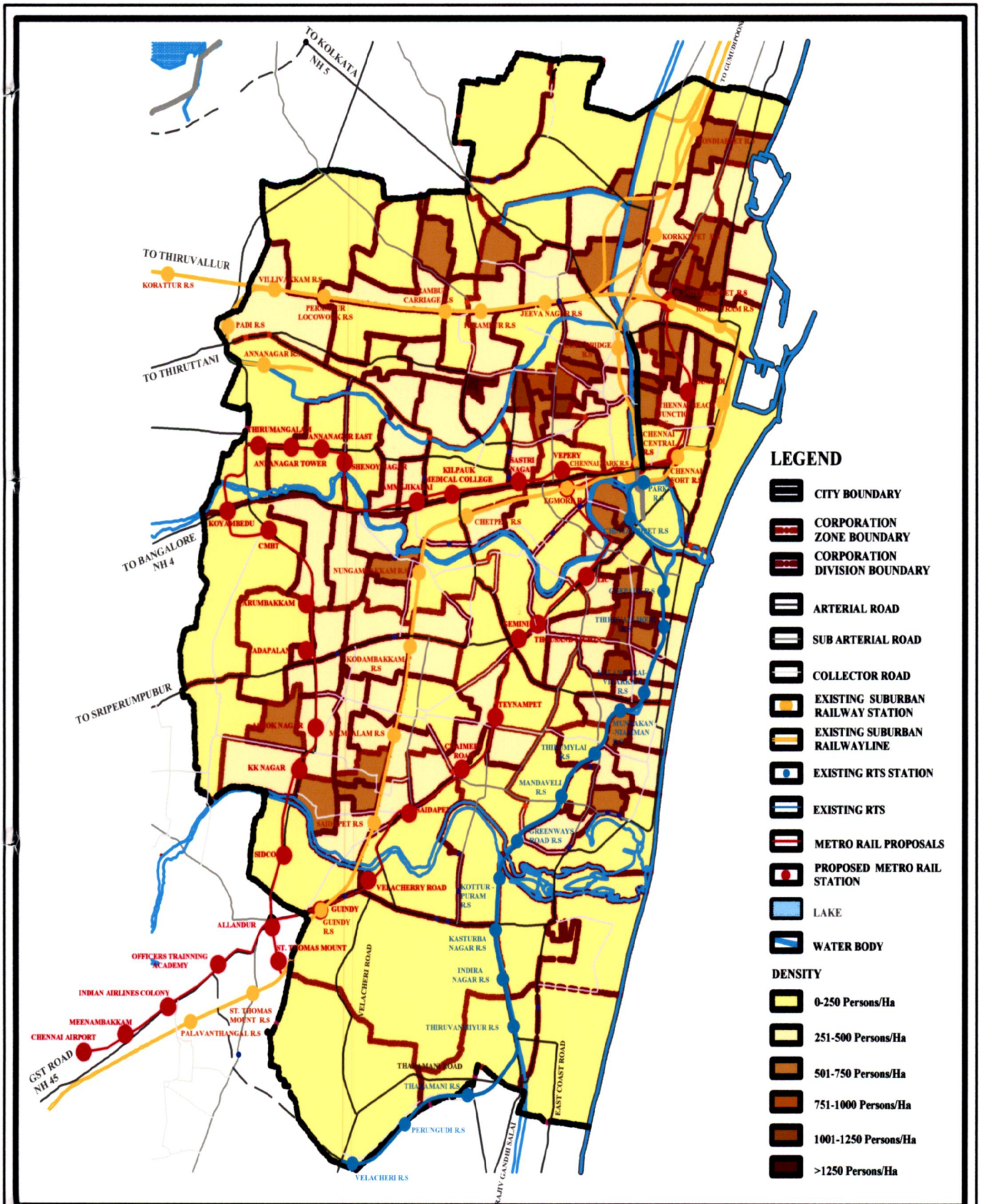
EXISTING AND PROPOSED TRANSPORTATION NETWORK IN CHENNAI CITY

N

MAP NO: 7.3

SCALE

Source: Redrawn By Author



MAP SHOWING OVERLAP OF RESIDENTIAL DENSITY, EXISTING AND PROPOSED TRANSPORTATION NETWORK IN CHENNAI CITY

N

MAP NO: 7.4

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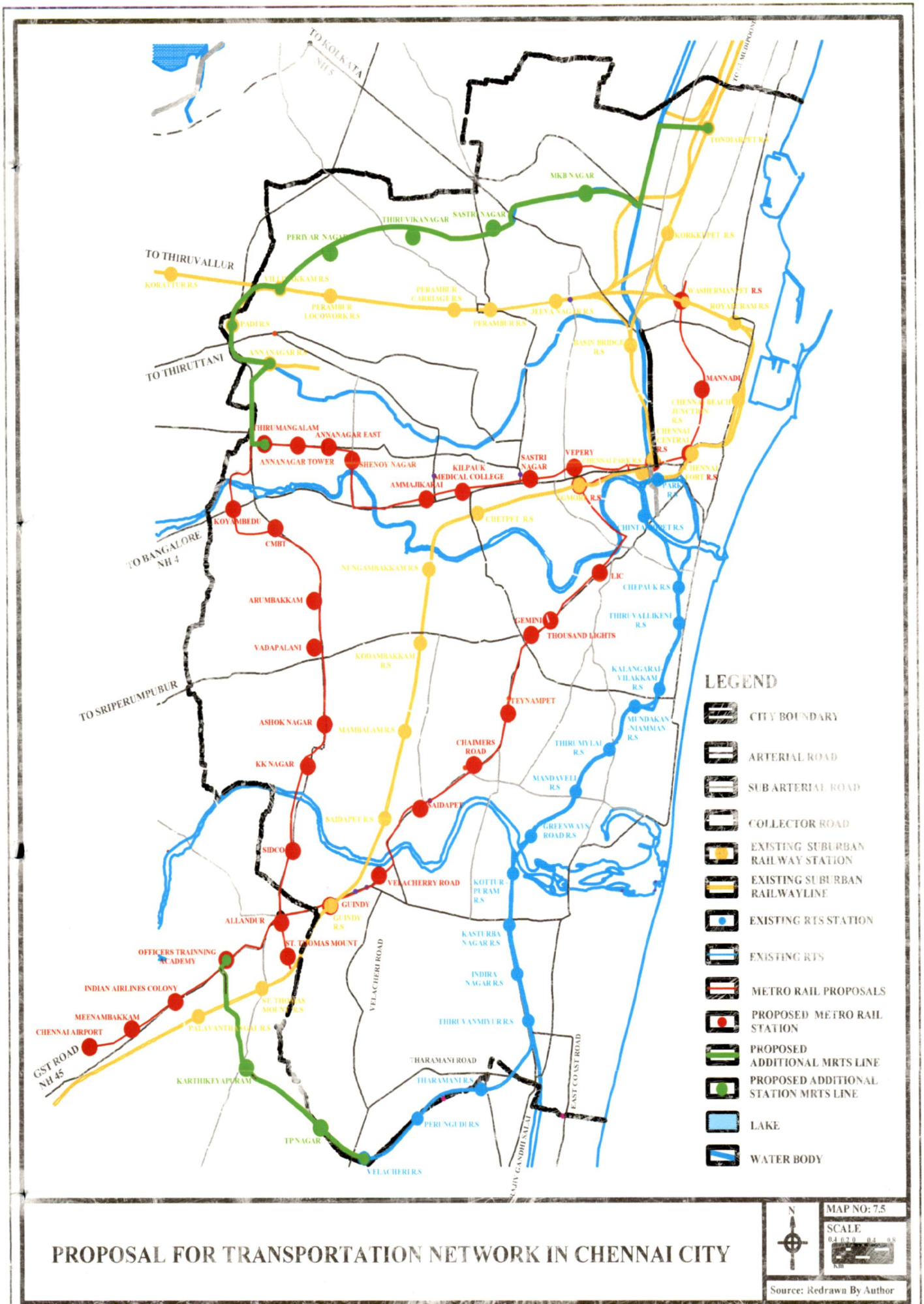
Source: Redrawn By Author



PROPOSAL FOR TRANSPORTATION NETWORK IN CHENNAI CITY

Tondiarpet to Thirumangalam and 5.19 km from Velacherry to Officers Training Academy. There will be 9 station in Tondiarpet to Thirumangalam corridor and 4 stations from Velacherry to Officers Training Academy. The additional corridor proposed for the city will connect the whole city by Mass Rapid Transit System. The transportation network and density map (Refer Map 7.6)

2. **Goal**

The main goal is to make efficient use of the transportation corridor to enable maximum population to live and work with in the accessibility of the transit station.

Strategies

The strategies adopted to achieve the goal are as follows

- Density standards
- Enhanced FSI
- Development along transit corridor

Plan

Keeping the main criteria as accessibility to the transit station a re-planning has been attempted. A revised proposal is made to show how exactly the residential and other development will occur along the transportation corridor and transit station. The re-planning will bring sizeable urban area with in walking distance from the proposed transit stations this will have impact on the existing structure of the city and it will lead to high density and medium development. This will ensure optimum utilization of the land along the transit corridor. The population density will increase towards the transportation corridor and towards transit station and will decrease as we move away from the transit station. The figure below illustrates the conceptual sketch of how the development should occur. (Refer Fig 7.3 and Fig 7.4). Along with MRTS corridor, BRTS and LRTS corridor should be integrated thus providing a range of transportation choice including walking due to the criteria of accessibility. The integration of various modes of transport must not only be limited to the fare structure, the timing, frequency of various modes of transport must be coordinated. The MRTS stations must not be located very close to each other as it reduces the efficiency of the transportation mode.

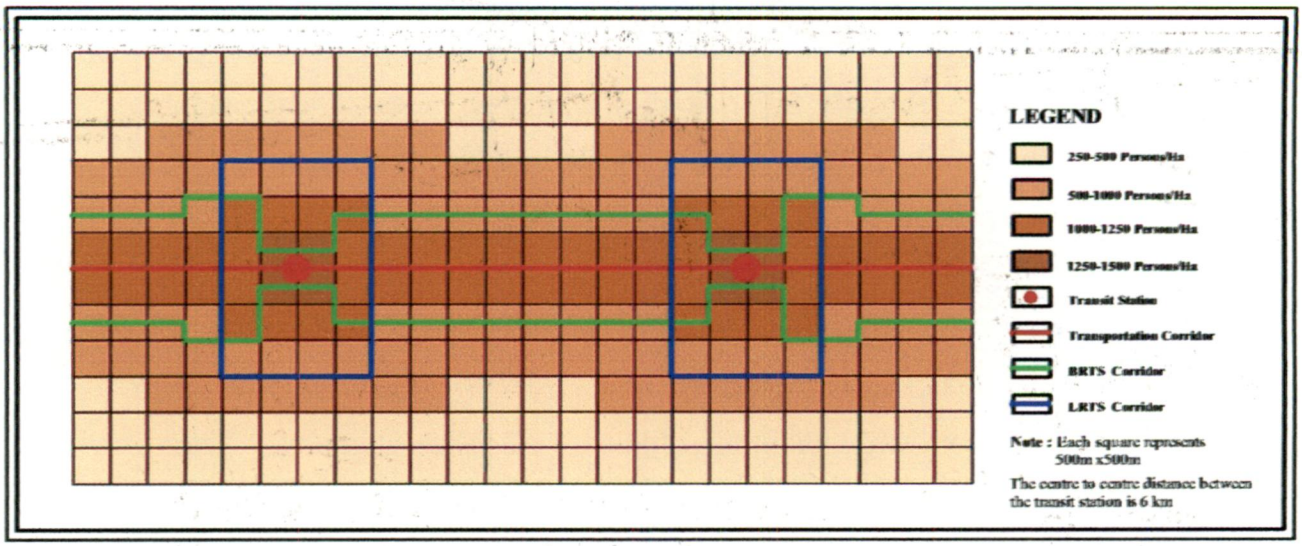


Fig 7.3: Conceptual Sketch Showing the Suggested Residential Density Along the MRTS /BRTS/LRTS Transportation Corridor and Transit Station. The Transit Station Being Located At a Distance of 6 Km Centre To Centre

Source: Drawn By Author

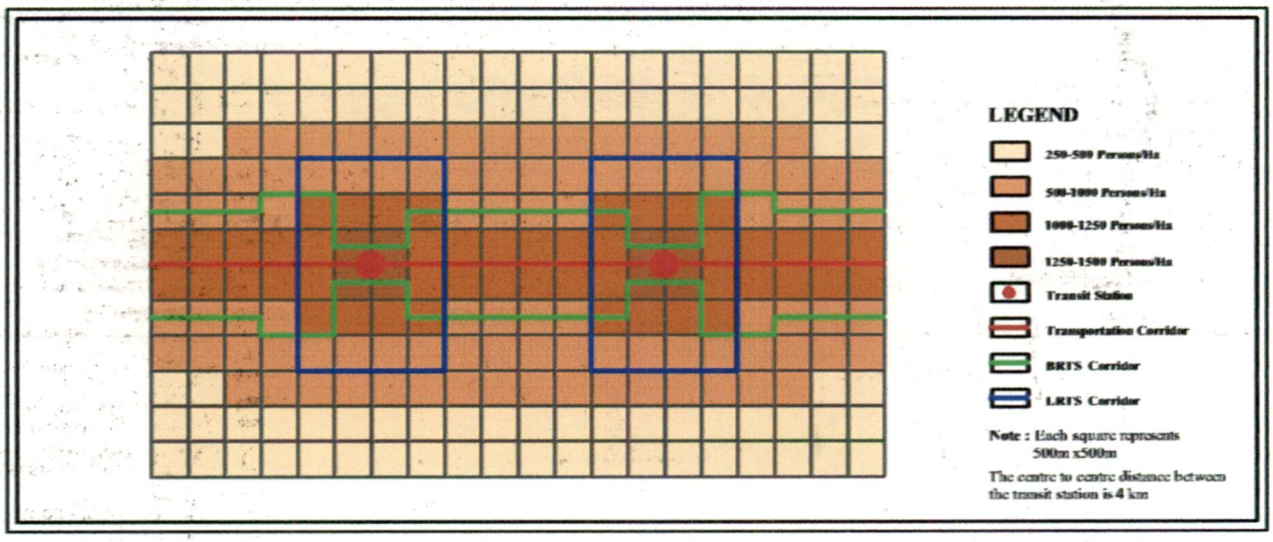
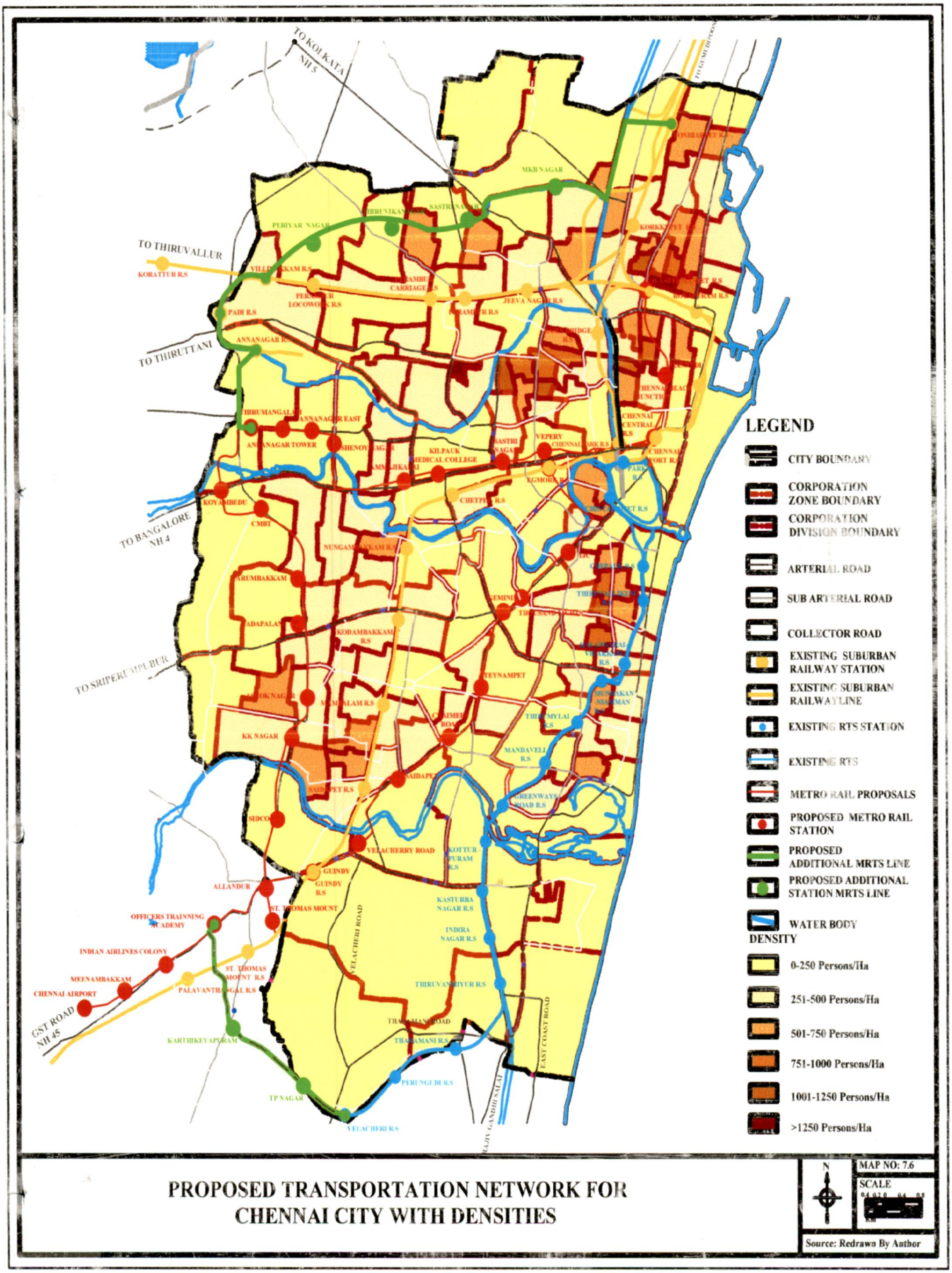


Fig 7.4: Conceptual Sketch Showing the Suggested Residential Density Along the MRTS /BRTS/LRTS Transportation Corridor and Transit Station. The Transit Station Being Located At a Distance of 4 Km Centre To Centre

Source: Drawn By Author

The table below gives the density of population to be located with in the distance range from the transit station (Refer Table 7.4) and transportation corridor (Refer Table 7.5)



PROPOSED TRANSPORTATION NETWORK FOR CHENNAI CITY WITH DENSITIES

Table 7.4 Distances from the Transit Station and Density

SL. No.	Distance (Km)	Density (persons per ha)
1.	Up to 0.5	1250- 1500
2.	0.5-1.0	1000- 1250
3.	1 to 2	500-1000
4.	Beyond 2	250-500

Source: By Author

Table 7.5 Distances from the Transportation Corridor and Density

SL. No.	Distance (Km)	Density (persons per ha)
1.	Up to 0.5	1000- 1250
2.	0.5-1.5	750-1000
3.	1.5 to 2	250-750
4.	Beyond 2	Up to 250

Source: By Author

Based on the density criteria the re-planning has been done. The map shows the re-planned densities around the transit station and along the transportation corridor. (Refer Map 7.6) The re- planned densities around the transit station and along the transportation corridor will lead to increase in the population holding capacity in the area around the transit station and transportation corridor thus increasing the population holding capacity of the city. The re-planning will help to contain the growth of the city. The population holding capacity can be enhanced through a redevelopment strategy and modified development norm. The guidelines for development are discussed in the section below.

7.3.5 Guidelines for Development of Chennai City and Metropolitan Area

The modified development regulations are provided for density and FSI.

FSI and Density

The existing development regulation suggests low FSI for development in Chennai, generally an FSI of 1.5 is allowed and FSI of 2.75 or 3 is permitted for multi-storeyed building construction. The FSI suggested for development of various land uses is given in the table below

(Refer Table 7.6). The density for development is suggested in the tables above. (Refer Table 7.4 and Table 7.5). The concentration of population should be more near the transit station and along the transportation corridor.

Table 7.6 Suggested Changes in FSI for Various Land Uses

Categories	Proposed FSI	Existing FSI
Predominantly Residential Area	**3-5**	**Ordinary residential buildings**
Predominantly residential within the city area	4-5	**1.5**
Predominantly residential outside the city area except rural area	3-4	
Predominantly Commercial Area	**4-6**	**Ordinary commercial**
Predominantly residential within the city area	5-6	**1.5**
Predominantly residential outside the city area with in metropolitan limit except rural area	4	
Predominantly Institutional Area	**1.5-3**	**Institutional buildings**
Predominantly Institutional within the city area	2-3	**1.5**
Predominantly Institutional outside the city area with in metropolitan limit except rural area	2-2.5	
In rural area	1.5-2	

Source: By Author

Landuse

The aim is to promote mixed landuse development. Integration of landuse and transportation is highly essential for sustainable infrastructure and urban development. The mix landuse should have compatible uses. The arterial roads, city centre and sub city centre should have mix of landuse. Optimum utilisation of the land must be done along the transportation corridor. The open spaces and ecologically sensitive areas must be preserved. Infill development for under utilised site must be done. The new urban extensions must be planned with mix landuse. Large communities must be developed as self-contained entities along the transportation corridor.

Housing

The development of low rise and low density plotted residential development should be restricted to special situations. The housing development should be predominantly group housing. The residential development must be medium to high rise development with varying residential densities. No plotted development should be permitted with in the proximity of transportation corridor. The row housing should be in the form of walk up apartments. A range of housing choices should be provided in any new development. The range of housing choices must not only be based on income or sizes it should also include other categories like working men /women hostel, institutional hostels, rental housing etc. In case of any new large scale industrial development the housing for certain percentage of workers and employees should be made mandatory. Affordable housing options should be provided. In case of mix use development the upper floors should be occupied for residential purposes and the lower floors can be used for commercial purposes. The access to residential area must be segregated from that of commercial area in case of mix use development in a single building. High rise residential development with no height restrictions must be permitted with a ground coverage of 15% to 25% .In developing land for residential development low ground coverage should be permitted so that land is available for community park, other common facilities, water recharge, energy plantation etc.

Transportation

The use of public transportation must be promoted by concentrating development along the transportation corridors. The new developments should compulsorily have good pedestrian facilities. All the existing roads should be redesigned and redeveloped to make it walkable for pedestrian development as per international standards. Grade separation at appropriate location

Fig 7.5: Ramp for Universal Accessibility In Salem, Oregon

Source: PBIC, www.pedbikeimages.org

Fig 7.6: Pedestrian Sidewalk Providing a Healthy Environment with Planters in New Center, Michigan

Source: PBIC, www.pedbikeimages.org

should be provided. Smaller and larger pedestrian precincts must be created in the inner core as well as outer area of the city. The figures above illustrate examples from western countries for creating a pedestrian environment. Introduction of bicycle tracks in some stretches of the road and later developing it to the other roads. There should be good integration between different transportation modes. Disincentives for car ownership by charging congestion charges strict legislation for parking, etc. must be done. The main criteria for new development must be accessibility to the transportation corridor.

Public realm

The public realm should be improved. Provision of green spaces like parks must be mandatory in any new development. The design of streetscape must be made mandatory. The design of streetscape must have provision for pedestrians and cyclists. Active street frontage must be created in the neighbourhood. Urban design guidelines must be prepared for design development and use of public realm.

7.3.6 Conclusions

The proposals for accommodating growth of Chennai on the principle of public transport accessibility and other smart growth principles like providing a range of housing opportunities and choices; creating a walkable neighbourhood; encourage community and stakeholders collaboration; foster distinctive; attractive communities with a strong sense of place; making

development decisions predictable; fair and cost- effective promoting; mix land use; preserve open space, farmland, natural beauty and critical environmental areas; provide variety of transportation; strengthen and direct development towards existing communities and take advantage of compact building design - all of which when incorporated with planning and development provision will ensure sustainable development.

If the development occurs with in accessibility of transit station then it would attract more population. More population requires more facilities and due to less land availability near transit station the development will be forced to have mix of uses. The mix of uses will create more lively places. As the development will be compact more open space will be available. Compact design enables walkability and pedestrian friendly development. More people will use public transportation and thus there will be reduction in the use of private vehicles.

7.4 Proposals for Maraimalai Nagar Township

7.4.1 Introduction

Maraimalai Nagar is located in SEZ corridor of Chennai. It has huge scope of development. The evaluation of the development plan of Maraimalai Nagar shows that there is no focus on Smart growth approach to development. Assessment through observation of design aspects and their implementation it is clear that there is lot of scope for application of smart growth principle in Maraimalai Nagar. Through the study conducted on Maraimalai Nagar it is clear that though Maraimalai Nagar is located along the transportation corridor and connected by both rail and road network to the city it could not attract much population even after more than thirty years of its establishment. The infrastructure developments are not up to satisfactory level. The existing infrastructure services and facilities in Maraimalai Nagar need to be upgraded and some essential infrastructure needs to be provided. The postponement in the provision of the infrastructure and facilities will lead to serious deterioration of the urban environment of Maraimalai Nagar and will lead to poor quality of life and thus necessary measures have to be taken at the earliest.

Innovative thinking and a break from the conventional method of planning is highly essential to encourage investment in Maraimalai Nagar. For this innovative policies and

strategies have to be developed with a fresh approach to suit the local requirements. Smart Growth promotes flexibility and encourages reinvesting in cities and neighbourhoods by creating compact, walkable, transit-oriented development[44] and thus smart growth approach is the most appropriate and sustainable approach to development. A set of smart growth guidelines and policies has to be formulated specifically targeting Maraimalainagar Township.

7.4.2 Requirements for Maraimalai Nagar Township

To make transport services and infrastructure development sustainable the first and foremost requirement is to increase the population density. In Maraimalainagar there has been a gap between the area targeted for development and the area actually acquired for development. There has been a limitation on the developable land. From the study it is clear that the township requires the strengthening of the infrastructural facilities. To achieve smart growth the area requires densification and development has to be induced. The urban design of the new town needs to be improved. The development of good open space, shopping area and sports facility has to be done. Redevelopment strategies for accommodating larger population, strengthening of infrastructure facility and development of compact development needs to be formulated.

7.4.3 Strategies for Development

1. High density predominantly residential development with mix land use on the opposite side of the township abutting the railway track.
2. Redevelopment of existing urban area and make it compact and dense.
3. Development of land under private ownership, which could not be acquired by the government by private sector.

7.4.4 Proposals and Guidelines for High Density Predominantly Residential Development with Mix Land Use

The goal is to create a high density viable development near the transit station. The counter development over a period of time will induce development in the existing area due to the market forces and will lead to re-densification of low density area. The area of the proposed development will be 250 ha including the lake area. The area of lake is about 65 ha so the land available for development is 185 ha. The first phase will consist of development of 80 ha of

land. The rest 105 ha will be developed in the second phase of development. The area is to be characterized by predominant residential area with mix land use

Guidelines for Development

i. The mean net residential density of the development should be 800 persons/ha.
ii. The ground coverage for development should not be more than 20%.
iii. The development should have mix use.
iv. Most of the development should be multi-storeyed structures having 12 to 24 floors. The development along 30 m road should consist of mix use with lower two floors for commercial development and the upper floors for residential development.
v. The access for the commercial and residential area must be segregated suitably for the advantage of the pedestrian access.
vi. The commercial frontage should face the road and active frontage should be created by accommodating informal market.
vii. The streetscape must be pedestrian friendly and must have universal accessibility.
viii. The street width should be as follows

The main roads connecting the NH 40 m
The road connecting the neighbourhood to the 40 m road 30 m
Internal roads 24m to 18m

ix. The parking for vehicles should be provided at the basement and the internal roads must be free of vehicular movement.
x. The amenities like jogging track, parks must be provided with in walking distance.
xi. Schools and other amenities must be located with in walking distance.
xii. The physical infrastructure for the development should be planned well. Decentralised wastewater treatment systems must be adopted for sustainable environmental sanitation DEWAT system increases wastewater reuse opportunities.
xiii. Dual pipe system for recycled water is recommended for all the development
xiv. Proper solid waste management with segregated waste disposal needs to be done the the solid waste management can be left to private contract.
xv. Rain water harvesting must be an integral part of development and must be a mandatory requirement.
xvi. Solar street lights should be installed in the new area of development.
xvii. Area should be allocated for informal market and service market like fruits and vegetable shop, repair shops should be planned with the development.

xviii. The area should be planned as a self contained area.

xix. Full utilisation of the planned area must be done with in the planning period.

7.4.5 Proposals for the Redevelopment of Existing Urban Area

The whole of Maraimalainagar town can be divided in to the following urban zones and elements

- Residential neighbourhoods
- Town centre and sub- centres
- Industrial Areas
- Urban roads, modes and public spaces.
- Community facilities
- Open spaces and reserved areas.

Residential neighbourhood

i. From the analysis it is observed that the existing residential development is low rise development and lacks range of housing choices.

ii. The physical environment needs to be improved. Solid waste management techniques need to be implemented.

iii. With the proposed high rise residential development in due course of time the market force will be development of plots in to apartment development can be seen. seen in the existing area and the transformation of plotted development in to group housing can be seen.

iv. There is a need for improving the legibility and aesthetics the township and thus landmarks must be created and good landscaping must be done.

The town centre and sub-centres

The town centre in Maraimalainagar is not fully developed only a small portion of it is developed. Thus the new development is proposed to be a mixed use high density development should be permit for high density development. The development control must be modified to enable this. The proposals for town centre and sub-centre are

i. The commercial density has to be increased

ii. The residential density has to be increased

iii. To create green and pedestrian and bicycle friendly streetscape

iv. Increase commercial / office area.
v. Provide good access from the railway station and bus stand to the town centre
vi. Strengthening of the retail shop streetscape.

The guidelines for development in town centres and subcentres are

i. The net residential population density permitted is 500 persons/ha.
ii. An FSI of 4-5 is permitted for development.
iii. The ground coverage for residential development is 20% and for commercial development is 1/3rd of the plot area.
iv. Only commercial development is permitted along the main road (NH).
v. The residential development is not permitted on the main road (NH) abutting the town centre

Industrial Area

i. The industrial site provides a strong economic base for the Township.
ii. In case of any site abandonment the land should be put to some sound economic development. The industrial site should be reused and redevelopment.
iii. Pedestrian and bicycle friendly streetscape must be created in the industrial area also.
iv. The access to the bus stand and railway station from the industrial area needs to be improved. Frequent bus or minivan service must be provided to drop the workers and the employees in the station or bus stand.

Urban roads, nodes and public spaces and street network

Along the urban road i.e. the national highway high density mix use development should be permitted.

i. The commercial and office area must be increased.
ii. Attractive streetscape should be developed.
iii. The roads must have pedestrian pathway
iv. The circulation pattern should be well organised
v. The provision of subways or foot overbridges at appropriate places like railway station and bus stand has to be provided.
vi. The street network should be well designed with pedestrian amenities.
vii. The provision for car parking should be taken care of the regulation should strictly enforce that parking on the residential roads should not be permitted and parking should be provided with in the premises.

viii. Traffic calming techniques should be adopted.

ix. Create standards for development of street sections with pedestrian friendly environment.

x. Promote for retro fitting of sidewalks.

xi. Promoting mix use development along major corridors.

xii. Beautifying and maintaining existing sidewalks.

xiii. Concentration of facilities with in walkable distance

Public transportation nodes

i. The accessibility to the public transportation nodes should be increased.

ii. The bus stand and railway station should be located within walking distance.

iii. The people have to cross the fast moving traffic to reach the station or bus stand on the other side of the township so subways or foot bridges should be provided.

iv. The bus depot needs to be improved.

Open spaces and reserved area

i. Develop recreational open space like parks and gardens and they must be maintained well and must be with in walking distance with in the residential neighbourhood.

ii. The lakes in the site to be protected as open space and create some recreational use along the boundaries of the lake by landscaping this will prevent the conversion of the lake in to dump yard and provide the residents a quality open space.

Community facility

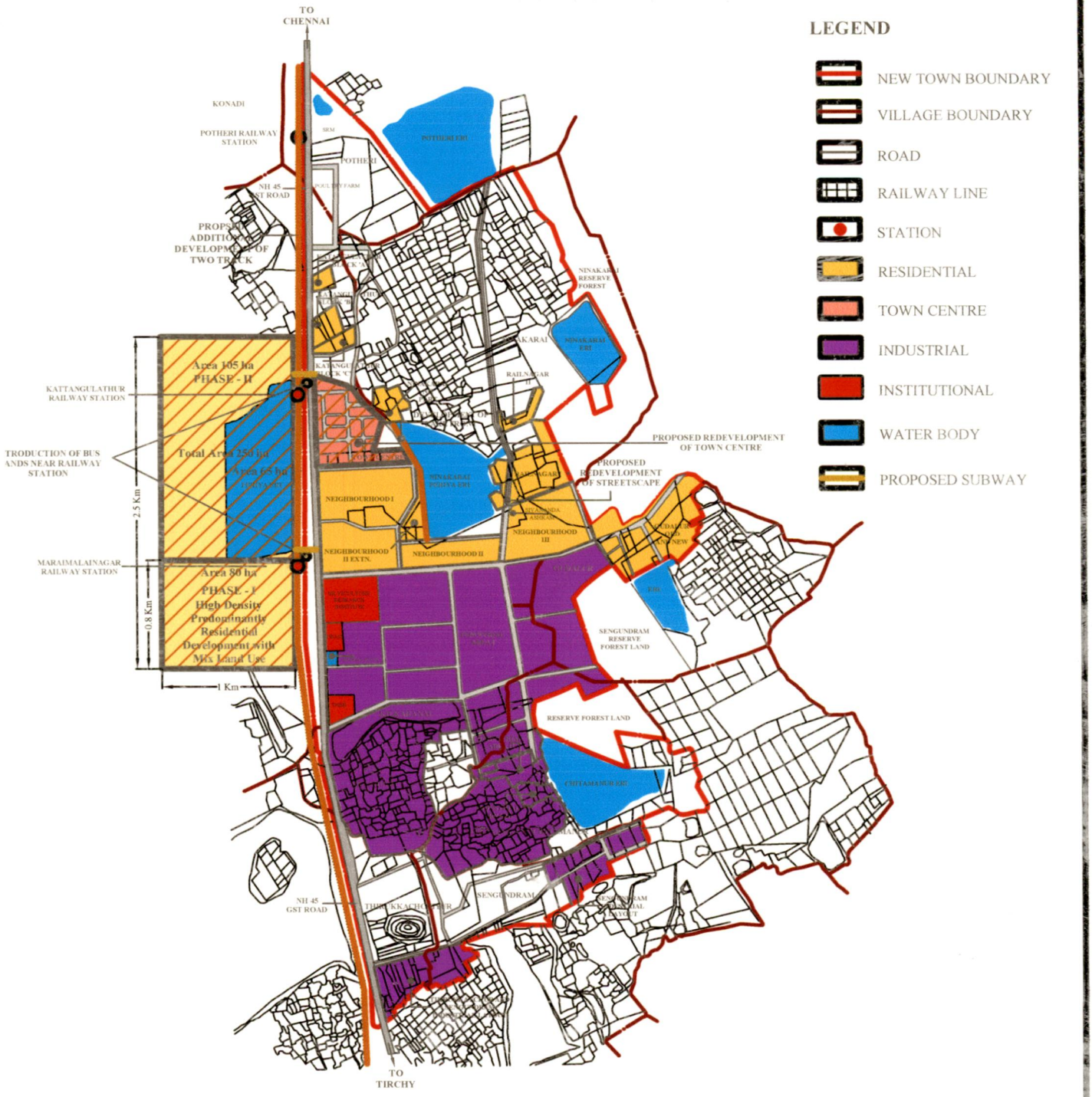
i. The community facilities for the town level needs to be provided. Libraries, community halls, multipurpose parks etc needs to be provided. These facilities must be integrated with the residential development.

The proposals for the Maraimalainagar Township is shown in the Map 7.7

7.4.6 Guidelines for Development of the Land Which Could Not Be Acquired By the Government

For the areas which are in the private ownership the following development regulations are prescribed.

i. The development proposals from private individuals, agencies and cooperative societies will have to be approved by Maraimalai Nagar municipality.

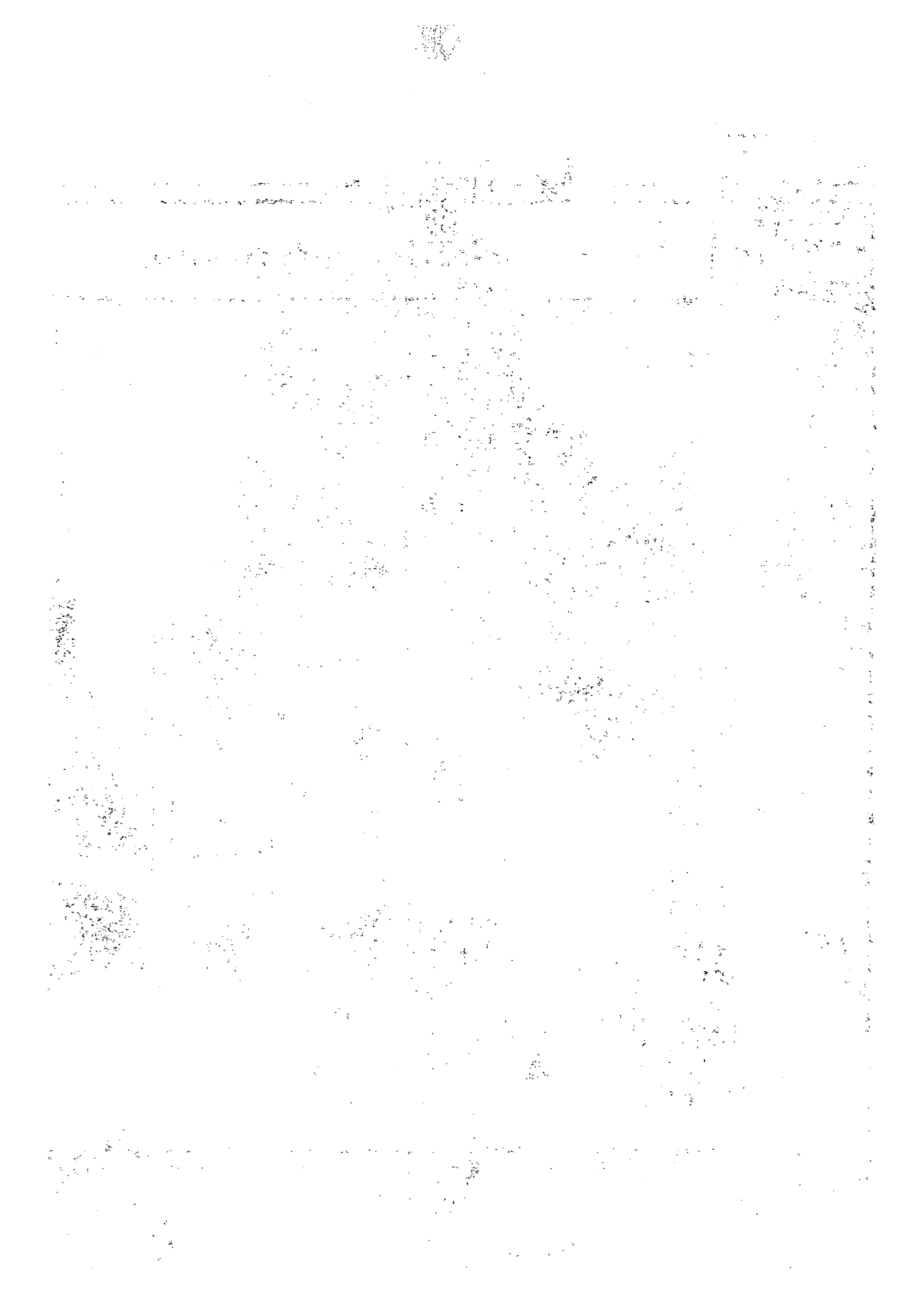


PROPOSALS FOR MARAIMALAINAGR

MAP NO: 7.7

SCALE

Source: Redrawn By Author



ii. The minimum area of proposed development which has to be submitted for approval is 1ha.

iii. Only residential, institutional, recreational and commercial developments as well as community facilities are permitted to be developed in privately owned area within the municipal limits.

iv. Every development will have to abut an approach road of width not less than 9m and 10% of land will be given to the Maraimalai Nagar local self government for development of public purposes.

v. The provision of infrastructure facility like water supply, sewerage, electricity will be done on payment basis. The cost of infrastructure development will be borne by private developers.

7.5 CONCLUSIONS

The smart-growth-oriented-development has many benefits. It encourages compact development and helps in creating pedestrian friendly environment with a sense of place. The smart growth oriented development discourages the use of personal vehicles and encourages the use of public transportation. It helps in reducing the taxes and cost of development of infrastructure. It promotes mix landuse development with commercial development on lower floors facing the street and residential development above and thus it increases the compactness of development and makes walking attractive. Smart growth helps in creating healthy communities. It helps in creating strong neighbourhoods with range of housing choices. It helps in revitalizing the neighbourhood. It helps in improving the economic development of the area. It emphasises on densities near highways and rail lines. The smart-growth-oriented-development improves the quality of life. Smart – growth- oriented - development is the most appropriate form of development to over come sprawl pattern of development.

ANNEXURE

CHAPTER 5 DEVELOPMENT SCENARIO OF CHENNAI METROPOLIS

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CHAPTER 7 DEVELOPMENT PROPOSALS FOR CHENNAI BASED ON SMART GROWTH

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ANNEXURE I

Maraimalai Nagar New Town Types of Industries Generally Permissible

1.	Fertilizers & Other Chemicals (Mixing)
2.	Machinery including electrical machinery
3.	Electronic & Radio equipment
4.	Scientific instruments
5.	Leather products
6.	Transports equipment
7.	Metal products
8.	Mechanical toys
9.	Spinning Mills
10.	Handmade paper
11.	Pre-fabricated housing elements
12.	Projectors & Cameras
13.	Storage batteries
14.	Pump sets
15.	Cashewnut processing
16.	Cashew kernel oil
17.	Ricwe bran oil
18.	Rose-perfumeries
19.	Poultry/ Cattle feed
20.	Castor oil

Source: Development Plan for Maraimalai nagar 1991

ANNEXURE II

QUESTIONNAIRE

Questionnaire For Informal Interview

Residents

1. How would you rate the quality of life in the township?
2. How long you have to travel for job, school, recreation and other amenities?
3. Is there adequate physical & social infrastructural facilities?
4. What are the problems faced in the neighbourhood?
5. How much accessible is the development with the surrounding areas?
6. How safe is your neighbourhood?
7. How attractive is the place to live in?
8. How do you rate the existing facilities and what kind of facilities do you expect in your neighbourhood?
9. What improvement do you think is essential for the township and which of the following aspect will you rate as most essential for the improvement for the township?
    - Development of affordable housing
    - Development of streetscape
    - Convenient public transportation
    - Development of open spaces and park
    - Development of shopping area
    - Development of recreational area
    - Improving job opportunities.
10. What type of growth will you prefer in and near by your township?
    - High rise residential development.
    - High rise mix use development.
    - Medium rise residential development.
    - Medium rise mix use development.
    - Low rise residential development.
    - Low rise mix use development.
    - Commercial development only.
    - Institutional development.
11. Do you think there is increase in vehicular movement with in the township?

12. What do you think about compact and high density development?
13. If good public transportation is provided would you prefer using your personal vehicle or public transportation mode?
14. Do you think a range of housing choices is essential in your township?
15. Do you think public participation in the planning process will help in better development? Would you prefer participating in the planning process of your township?

Planners and Officials

1. To what extent the development of the township was successful?
2. What are the hurdles faced during development?
3. What are the Development policies adopted for the project?
4. Were the Housing, land development policies and Pricing Policy adopted by the authority successful?
5. Details for housing schemes carried out for the project?
6. Comments on the effect of the development, on the property values, impact on employment and to what extent the development of township served its purpose?
7. What are the recent development projects to be carried out in the township?
8. What do you think about public participation in the development process?
9. What improvement do you think the township requires?
10. Do you think any changes are necessary in the development regulation to promote faster development in the township?

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